Introducing a New Model of Wellbeing: Applications to the General Public and Student Population.

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Submitted to Swansea University in fulfilment of the requirements for the Degree of Doctor of Philosophy

Swansea University

2022

Abstract

The science of wellbeing has become more nuanced in its approach, with scholars progressing through the various waves of positive psychology. The aim of this thesis was to further broaden the scope of wellbeing through an integration of different research areas, covering not just the individual, but the community and the environment. Accordingly, this thesis has implications for large-scale challenges such as climate change, emphasising a key role for individual wellbeing that lays strong foundations for collective and planetary wellbeing. This thesis includes three chapters based on collected data as well as three chapters comprising reviews of the literature and two summary chapters. The first chapter presents an overview of the field of health and wellbeing, with a focus on increasing individual wellbeing through individual, community, and environmental pathways, and presenting a new model of wellbeing (the GENIAL model), which spans individual, community and environment domains. Chapter 2 discusses the upcoming chapters for the rest of the thesis and the overall arguments that are presented. Chapter three investigated the impact of these three domains (focusing on exemplars of each) on wellbeing during a time of collective trauma (the COVID-19 pandemic). Using a multiple regression model, findings highlight key protective roles for gratitude and tragic optimism. Chapter 5 investigated whether this impact was mediated by post-traumatic growth (PTG), with results indicating distinct pathways to PTG and wellbeing, although no evidence was obtained for a mediating role. Building on the knowledge generated in these initial chapters and drawing on developments in modern wellbeing science, chapter 7 presents an updated GENIAL model, highlighting not only the importance of the individual, community, and environment domain, as well as wider sociostructural and environmental issues that impact on the individual beyond their control. This updated model lays the foundation for the subsequent chapter, which determined the impact that a 5-week wellbeing science module had on student wellbeing. Findings from a mixed-effects ANOVA demonstrated significant benefits for wellbeing. Focusing on where my research is now developing, Chapter 11 provides an overview of how broad the scope of wellbeing could reach, discussing the need for top-down (e.g. policy-making) and bottom-up (e.g. individual behaviours) approaches. The chapter provides a hopeful future, not just for the wellbeing of individuals, but the wider environment and planet, and subsequently, future generations. To conclude, I provide an overview of the impact that the work of this thesis is now having in chapter 12.

DECLARATION

This work has not previously been accepted in substance for any degree and is not being concurrently submitted in candidature for any degree.

Signed ....J.P.Mead....... (candidate)

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STATEMENT 1

This thesis is the result of my own investigations, except where otherwise stated. Where correction services have been used, the extent and nature of the correction is clearly marked in a footnote(s).

Other sources are acknowledged by footnotes giving explicit references. A bibliography is appended.

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I hereby give consent for my thesis, if accepted, to be available for photocopying and for inter-library loan, and for the title and summary to be made available to outside organisations.

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Acknowledgments

I would firstly like to acknowledge my team of supervisors who encouraged and supported me to reach my greatest potential. In doing so, they have changed my life for the better by broadening my mindset of what I am capable of and have removed the psychological limitations that I once set for myself. I would not have known of the various opportunities that I have been blessed to experience if it had not been for my primary supervisor, Professor Andrew Kemp, nor would I have thought I was capable of pursuing them. I will forever be grateful for your support, encouragement, and belief in me that allowed me to push myself to new heights. You encouraged me to think critically, reason with logic and debate complex ideas - helping me to own and defend my research and provide sound justification for any and all decisions made along the way. For my second and third supervisors, Professor Jeremy Tree and Dr. Zoe Fisher, I will forever be grateful for the additional support that you both provided, whether this was being the best audience members for presentations or providing fresh eyes on a paper. Thank you all for supporting me in my various publications, too.

I would like to express my gratitude for Susie Jenkins, my EMDR therapist, without whom I would not have made it through my PhD. You are the magician that turned my life around when I needed it most and I am forever grateful that I found you. You are incredible in what you do, and I can't praise you enough for being my PhD and life-saviour. I'd also like to give a huge thank you to Dr. Claire Williams and Maria Davis, both of whom helped me during a time of crisis and gave me the time and strength I needed to be able to submit a thesis that I am incredibly proud of.

As with any PhD experience, the journey was an emotional rollercoaster, but I found solace whenever I needed by reminding myself that however this journey ends, I have found one of the most wonderful people I have ever had the pleasure of meeting. So, this is to you Dave, a thank you bigger than can ever be expressed for being my rock throughout this journey and all future journeys we may share together. I would also like to thank my mum for being wonderfully you. You never doubt my abilities and you bolster me with confidence whenever I need it. You are the biggest cheerleader, the best friend, and the most incredible mum.

My dachshund, Deano, who has been my emotional support buddy for the last 11 years and always grounded me in times of stress throughout my PhD. Finally, my nan, Glenda, who was always a source of comfort throughout my life and continued to be a that source of comfort throughout my PhD up until her passing last month. You were filled with pride

whenever I shared any achievement, no matter how small, even if you expressed disappointment each time I published a paper when I informed you that it would not be in the local newspaper. I know that you and Dean will be filled with pride when I submit my thesis and I'll make sure to raise a glass to you both.

Tables and Figures

Chapter 1

1. Rethinking wellbeing: Toward a more ethical science of wellbeing that considers current and future generations.

A version of this chapter is published as a pre-print:

Mead, J., Fisher, Z., Wilkie, L., Gibbs, K., Pridmore, J., Tree, J., & Kemp, A. (2019). Rethinking wellbeing: Toward a more ethical science of wellbeing that considers current and future generations. Retrieved from https://www.authorea.com/users/9886/articles/388348-rethinking-wellbeing-toward-a-more-ethical-science-of-wellbeing-that-considers-current-and-future-generations

Abstract

Wellbeing models have been criticised for being individualistic and neglecting the importance of wider influences. While these criticisms overlook recent developments, there remains a need for models that extend theoretical grounding beyond individual wellbeing, incorporating overlapping contextual issues relating to community and environment. The first GENIAL model (Kemp et al., 2017) provided a more expansive view of pathways to longevity in the context of individual health and wellbeing, emphasising bidirectional links to positive social ties and the impact of sociocultural factors. In this chapter, I build on these ideas, working towards a developing GENIAL 2.0, focusing on intersecting individual-community-environmental contributions to health and wellbeing, and laying an evidence-based, theoretical framework on which future research and innovative therapeutic innovations could be based.

Positive Psychology: Brief History

As a discipline, psychology has the aim of understanding human behaviour, but with the route of "fixing what is wrong". However, a sole focus on "fixing what is wrong" does not inherently create a space for people to experience happiness, fulfilment, meaning, or other factors that can enhance quality of life. Therefore, there is an additional need to focus on "building what is strong"; building the aspects that make life worth living – this is where a newer branch of psychology plays its part, known as positive psychology (Seligman & Csikszentmihalyi, 2000). The first wave of positive psychology was kick started in 1998 when Martin Seligman addressed the American Psychological Association (Seligman, 1999). Since then, there has been a rapid growth in publications (Donaldson et al., 2015) and interventions (Parks & Schueller, 2014), and positive psychology has since been through the second wave and entered the third wave.

The first wave of positive psychology aimed to flip the script on what was a focus on 'dysfunctions', to a focus on positive phenomena, such as positive emotions, behaviours, and cognitions. This wave created some incredibly influential work, with key models of wellbeing being created by Ed Diener (1999), Carol Ryff (reference 2014), and Martin Seligman (2017). However, it created a rhetoric that positive states are always beneficial for good life outcomes, whereas negative states would hinder life outcomes; a rhetoric that underpinned the key models above. The first wave became heavily criticised for polarising positive and negative aspects of life, with a pursuit for the positive inevitably neglecting the beneficial role of negative emotions and experiences (Yakushko & Blodgett, 2018). Such an intense focus on positivity and disregard for negative states created the phrase the 'tyranny of positivity' (Held, 2004). Not only can a pursuit for happiness worsen your wellbeing (Humphrey et al., 2021), but negative emotions and experiences have a functional role and can spur positive change (Wong, 2011). For example, whilst optimism can be beneficial for health and wellbeing (Carver et al., 2010), there are times when this seemingly 'positive' valence is harmful (Gibson & Sanbonmatsu, 2004), resulting in the phrase 'toxic positivity' (Villines, 2021). Similarly, avoiding negative emotions (also known as experiential avoidance) can do more harm than good, with therapies that counter this approach (such as Acceptance and Commitment Therapy) being successful for various conditions (Ciarrochi et al. 2016).

Second wave positive psychology became a more nuanced version of positive psychology by acknowledging that positive and negative states aren't inherently good or bad, but rather, the context within which they occur is what shapes them. Wong (2012) introduced the dual-system model, highlighting the importance of contextual factors in both positive and negative experiences and differentiating between positive/negative *conditions* and positive/negative *outcomes*. Wong notes that it is rare to have conditions that are solely positive or negative and speaking about experiences in such dichotomous terms is not realistic. He uses the example that you might be happy about a promotion, but worried about the extra stresses involved. In contrast, you might be sad about losing a job, but feel happy that you can go back to school for retraining. In acknowledging the importance of both the positive and negative, second wave positive psychology overcomes the pitfalls faced within the first wave. However, another key criticism emerged that claimed the research area continued to be individualistic, ignoring that the individual exists within and is impacted on by wider societal and environmental factors (Yakushko & Blodgett, 2018); this is where positive psychology broadens into its third wave.

Third wave positive psychology began to address the socio-cultural factors that impact individual wellbeing, known as a 'systems-informed approach' (Lomas et al., 2020a). It is important to note that scholars have noted the potential influence of ecological factors in previous waves (Seligman & Csikszentmihalyi, 2000), however, the focus of research remained predominantly on an individual level (Donaldson et al., 2015). It is argued that a move towards systems informed positive psychology (SIPP) is necessary to sustainably build individual and collective wellbeing for current and future generations (Kern et al., 2020). From an application viewpoint, Ciarrochi et al. (2016) combine the key messages in both second and third wave positive psychology and argue that we need to move away from content-focused positive interventions, which have a sole focus on altering the content of people's thinking, usually with a focus on increasing positive affect, neglecting to consider the environment that they are part of. Alternatively, we need to move towards context-focused positive interventions, whereby situational and historical events are acknowledged as key factors that influence behaviour. This move can bring together the work of psychology, which has long placed responsibility on the individual, and the work of sociology, which places responsibility on society and the social structure that reside within. Additionally, the third wave of positive psychology has encouraged a move towards more complex methodologies (Lomas et al., 2020a), also discussed as part of SIPP (Kern et al., 2020).

However, despite the movements through the various waves of positive psychology, current models of wellbeing remain predominantly in the first wave and are yet to be updated.

Issues in Wellbeing Science

Despite considerable research interest in the topic of 'wellbeing' and its relationship to 'health', there remains much debate and criticism. The Oxford English Dictionary (OED) defines 'wellbeing' as 'the state of being comfortable, healthy, and happy', suggesting that the term relates to aspects of emotions and feelings, as well as 'health'. By contrast, the OED defines 'health' as 'the state of being free from illness or injury'. However, this definition indicates that to experience wellbeing, one must be free from illness and injury, therefore excluding anyone living with a mental or physical illness. It is also important to highlight that absence of illness is not necessarily 'healthy'. It is possible, for instance, to be *on course for an illness* through physical inactivity, poor diet and lack of sleep. Similarly, 'not being depressed' is not the same thing as 'being happy'. The World Health Organisation defines 'health' as complete mental, physical and social wellbeing, from which it could be assumed that people living with long-term disabling conditions such as common mental disorders, diabetes, obesity and cardiovascular disease do not have opportunities for experiencing wellbeing if wellbeing incorporates 'health'. I argue otherwise and propose that it is not necessary for all aspects of health to be at its best to experience wellbeing; it would be unfeasible to do so. Similarly, I reject the notion that 'negative' experiences are wholeheartedly negative. In line with second wave and existential positive psychology, wellbeing is not solely built on positive states, but rather, it is built from a dialectic of both positive and negative experiences, leaving room for the opportunity of building wellbeing from adversity (including chronic illness).

Overall, there is a gap in wellbeing science for a new model and/or framework that integrates the remarkable work of positive psychology to date and brings together the work of various disciplines, avoiding the criticisms. Such a model needs to avoid the flaw of 'scientific polyannaism' (Yakushko, 2019), whereby a model simply focuses on what constitutes happiness, by acknowledging the role of adversity in personal growth (Wong, 2010). Such a model also needs to extend the individual, incorporating their community and environment, whilst also being aware of the complex interplay between these and wider sociostructural issues. Next, I present an updated GENIAL model that strives to overcome these previous criticisms.

Next, I provide a brief overview of each domain (individual/community/environmental) and their importance for providing pathways to wellbeing.

The GENIAL Model

The word 'GENIAL' is an acronym encompassing Genomics, Environment, vagus Nerve, social Interaction, Allostatic regulation, and Longevity. The original GENIAL model (Kemp, Arias, & Fisher, 2017) was introduced as a way of highlighting wellbeing pathways that extend beyond the individual, emphasising pathways to health and wellbeing versus ill-health and premature mortality. The authors proposed key roles for vagal function (as a neurophysiological link between the mind and the body) and social interaction along these pathways. The GENIAL model also acknowledged the role of health behaviours in individual wellbeing, something previous models of wellbeing were lacking. However, there is a need for an updated version of this model, incorporating ideas from second and third wave positive psychology.

Expanding the Focus of Wellbeing

In this section, I emphasise a role for individual, community and environmental contributors to personal wellbeing, their overlap, and impacts. Table 1 provides a summary of major theories and models in individual, social and environmental domains, which has helped to further develop my theoretical understanding. These models and supporting evidence are briefly described in the following sections.

Table 1

Summary of Major Theories and Models Relevant for Building the GENIAL model.

Domain	Theory	Description
Individual	Tripartite model of subjective wellbeing (Diener)	Life satisfaction, increasing positive affect and reducing negative affect. Typically characterised as tapping into hedonic wellbeing.

	Diener has argued that subjective wellbeing does not involve making value judgments by 'experts' on what a good life entails (Kesebir & Diener, 2008), such as proponents of 'eudaimonic wellbeing'.
Six-factor model of psychological wellbeing (Ryff)	Argues that wellbeing cannot be reduced to hedonic wellbeing. Spans positive relationships with others, personal mastery, autonomy, a feeling of purpose and meaning in life, and personal growth and development. This model is characterised as tapping into 'eudaimonic wellbeing'.
PERMA model (Seligman)	Positive emotion, engagement, social relationships, meaning and achievement all contribute to wellbeing. Spans both hedonic (affect) and eudaimonic (psychological wellbeing) aspects of wellbeing.
Salutogenesis theory (Antonovsky)	'Salutogenesis' is based on the Latin term 'salus' (health, well-being) and the Greek word 'genesis' meaning emergence or creation. The salutogenic concept emphasises a role for a 'sense of coherence' in managing and overcoming stress, with life experiences being key to shape this sense of coherence, all of which contribute towards health and wellbeing. The arguments lays within the innate capacity that humans have to aim for health and wellbeing.
Neurovisceral Integration Across the Continuum of Time	A life-course theoretical framework for wellbeing, characterising pathways to ill-being versus wellbeing, highlighting a key role for the

	(NIACT) model (Kemp)	vagus nerve. NIACT is complimentary to the GENIAL model of wellbeing (see below).
Community	Social identity theory (Haslam)	Groups provide individuals with a sense of meaning, purpose and meaning with positive psychological consequences. This theory has led to the publication of a book titled 'The New Psychology of Health', which emphasises the importance of positive social ties.
	Conceptual models on the social determinants of health (SDOH)	Multiple models have been proposed, however a recent review by Lucyk and McLaren (2017) emphasised the role of health equity and social gradients as major concepts.
	GENIAL 1.0 [genomics-environment-vagus nerve-social interaction-allostatic regulation-longevity] model (Kemp)	Builds on the NIACT model, again emphasising a role for the vagus nerve in a host of psychological and physiological processes. Novel aspects include the role of social ties and sociostructural factors.
Environmental	Biophilia hypothesis (Wilson)	Core assumption is that human beings have a strong, innate affiliation with the biological world.
	Psycho-evolutionary theory (Ulrich)	Restorative influences of nature involve a shift toward more positive emotions, parasympathetic dominated responses (heart rate deceleration) and sustained – yet non-taxing – attention.
	Topophilia hypothesis (Sampson)	A broadening of the 'biophilia' hypothesis to encompass non-living, physical elements, emphasising human affiliation with the local environment ('place') and a role for cultural experience.

Positive psychology of sustainability (Corral-Verdugo)	Sustainable behaviour is characterised as a positive behaviour aimed at protecting the socio-physical environment involving pro-ecological, altruistic, frugal and equitable behaviors, which have positive psychological consequences.
Model of sustainable happiness (O'Brien)	'Sustainable happiness' is defined as individual, community, and/or global well-being that does not involve exploitation of other people, the environment, or future generations. Critically, it is distinguished from 'sustaining happiness' or 'sustainable increases in happiness'.
Model of sustainable wellbeing (Kjell)	Places the construct of wellbeing within the framework of sustainability, highlighting interdependencies between the individual, others, and nature.
Social-ecological theory (Cohen)	Emphasises dynamic relationships among individuals, groups and their environments. Complementary to this is Glenn Albrecht's concept of the 'symbioment', which has particular relevance to the present review paper given the direct link between the environment and human emotions. The symbioment refers symbiotic coexistence in which 'all life exists within living systems at various scales.'

Table 2: *Contributions of Previous Models/Theories to the GENIAL Model*

Model/theory	Strengths/Weaknesses	Relevance for the GENIAL Model
Tripartite model of subjective wellbeing (Eudaimonic wellbeing)	Acknowledges the role of positive emotions, but only acknowledges negative emotions in so far as	The GENIAL model adopts the importance of positive emotions, but adapts the focus of negative emotions

	reducing these, neglecting the potential role of negative emotions in wellbeing. There is also a heavy focus on the individual, neglecting wider societal and environmental influencers.	by incorporating aspects of third wave and existential positive psychology, with a key example being PTG. The GENIAL model also incorporates the knowledge of previous social and environmental theories (including those within this table).
Six-factor model of psychological wellbeing	Acknowledges the importance of longer-term aims as contributors to wellbeing, however, does not incorporate the experience of positive emotions. Additionally, whilst this model begins to incorporate the importance of social contributors to wellbeing, there is also a heavy focus on the individual, neglecting wider societal and environmental influencers.	The GENIAL model incorporates the aspects of both eudaimonic and psychological wellbeing. The GENIAL model also incorporates the knowledge of previous social and environmental theories (including those within this table).
PERMA model	The PERMA model combines the theories of both eudaimonic and psychological wellbeing, although Seligman himself noted that this is not an exhaustive model of wellbeing. We note that the	The GENIAL model incorporates the aspects of both eudaimonic and psychological wellbeing that the PERMA model highlights. The GENIAL model also incorporates the knowledge of previous

	model neglects key factors related to social and environmental influencers of wellbeing in a similar manner to previous wellbeing models.	social and environmental theories (including those within this table).
Salutogenesis theory	Acknowledges the importance of context and available resources in dictating whether 'positive' or 'negative' experiences are processed as such and how these contribute to wellbeing – a similar argument to that of Paul Wong and existential positive psychology more widely. Antonovsky also discusses the role of social structures in shaping individuals' sense of coherence (within a systems theory framework) – an aspect that models of wellbeing do not tap into. However, a major focus on outcomes in salutogensis is the absence of negative health issues (such as depression).	The GENIAL model acknowledges the importance of the social structures within which the individual lives, drawing from the work of salutogenesis theory and the work of Bronfenbrenner. The GENIAL model also notes the role of both internal and external factors in influencing the processing of 'positive' and 'negative' experiences. Unlike salutogenesis theory, the GENIAL model has a heavy focus on positive psychological-based outcomes, drawing from the work of eudaimonic and hedonic wellbeing models.
Neurovisceral Integration Across the Continuum of Time (NIACT) model	This model provides a structural link between mental and physical health (the vagus nerve), a focus	The GENIAL model has been built heavily utilising this framework. Using the vagus nerve as a structural

	that is often neglecting among health/wellbeing models. The NIACT model also integrates the dimension of time and the long-term impacts on health and longevity or ill-health and mortality – an element that is vital among epidemiological research, but often neglecting among models of health and wellbeing.	link between mental and physical health, the GENIAL model argues for the importance of both mental and physical interventions in targeting wellbeing, with the vagus nerve being one key physiological pathway through which interventions can be successful.
Social Identity Theory	This theory broadly encapsulates the role of group identities in health and wellbeing, whilst not specifically being a health and/or wellbeing model. It does not have a focus on the individual or the environment, but does provide a useful theoretical basis for the impact of social identities, relevant for the community domain of the GENIAL model.	Incorporated into the community domain of the GENIAL model as a key influencer of wellbeing. The GENIAL model expands on previous models of wellbeing by acknowledging the influential role of group identities, both positive and negative, in building wellbeing.
Conceptual models on the social determinants of health	Multiple models and theories have been provided, with an overarching focus of acknowledging the influence of social determinants of health, specifically health	Social determinants of health and inequalities are acknowledged in the GENIAL model across all domains, an element that has long been neglected in

	inequalities. Many models of health and wellbeing often neglect the influential role of the social determinants of health, despite these being an important focus for top-down initiatives.	psychology and is focused more within sociological research areas. However, if we are to focus on both bottom-up and top-down targets of wellbeing, social determinants of health are a key focus from a governmental standpoint (top-down).
GENIAL 1.0	The GENIAL model was the first to integrate individual aspects of wellbeing (building on previous wellbeing and health models), community elements (drawing from sociological theories) and physiological elements (drawing on research based on the vagus nerve). However, the model did not acknowledge the role of the natural environment and the importance of sustainable practices for planetary wellbeing.	The updated GENIAL model has the added "community" domain, incorporating the benefits of the natural environment and highlighting pathways to wellbeing through sustainable practices that support the individual, the collective, and the planet – an element that is often neglected in psychological models.
Biophilia hypothesis	This hypothesis is helpful in underpinning the benefits of the natural environment. Whilst not a model of health or wellbeing, it provides an	The biophilia hypothesis has supported the theoretical understanding of the "environment" domain for the GENIAL model.

	evolutionary perspective of the importance of nature.	
Psycho-evolutionary theory	In a similar manner to the biophilia hypothesis, this theory helps provide a theoretical underpinning to the benefits of the natural environment for our wellbeing by focusing on the restorative effect of nature via parasympathetic dominated responses.	This theory lends support for the role of the vagus nerve in supporting wellbeing (the dominance and control for the para-sympathetic nervous system), a key element introduced in the first GENIAL model.
Topophilia hypothesis	Building on the biophilia hypothesis, the topophilia hypothesis has a greater focus on the cultural elements of the local environment and the influence of environmental changes on health and wellbeing. Whilst not a model of health or wellbeing, it helps underpin our understanding of a connection to a place, beyond simply being a natural environment.	This theory becomes particularly pertinent for chapter 11 where planetary issues are discussed and the subsequent impact on individual wellbeing. This extends beyond any previous model of health and/or wellbeing by incorporating both environmental and cultural elements of places within which people reside. The focus becomes vital when considering the long-term impacts of human behaviours and thus, the importance of sustainable approaches to wellbeing.
Positive psychology of sustainability	A relatively new area of positive psychology, this	The updated GENIAL model incorporates this

	begins to deal with the importance of sustainable practices when considering wellbeing. This approach focuses on the individual benefits of engaging in sustainable practices, along with the community and environmental benefits of such behaviours – a focus that is often neglecting in psychology.	thinking but acknowledging sustainable pathways to wellbeing within the three domains, such as altruism and environmentally-friendly behaviours.
Model of sustainable happiness	Previous approaches to health and wellbeing have often neglected to consider the impact of the individual on wider factors, such as communities and the environment. Positive psychology of sustainability introduces the importance of sustainable practices for ourselves, others, and the planet.	This approach is at the heart of the updated GENIAL model, with a focus on pathways to wellbeing, but not at the expense of other and the planet. This element is relatively new within the sphere of health and wellbeing and can provide a novel framework within which people can focus on building wellbeing from bottom-up and top-down processes.
Model of sustainable wellbeing	In a similar approach to the model of sustainable happiness, the model of sustainable wellbeing highlights the importance of the individual, community, and nature (in a similar	The original GENIAL model provides the theoretical underpinning of the vagus nerve as one key bridge between health and wellbeing, and between the three key domains – noting

framework to that of the GENIAL model), highlighting the relationships between these 'domains'. Previous models of wellbeing often focus on isolated elements of health and/or wellbeing, or if other elements are acknowledged, they are spoken as separate entities.

that an important factor of the GENIAL model is the interrelationships between the domains and factors within. In addition, the GENIAL model adopts the sustainable focus. By incorporating all these elements, the GENIAL model provides one of the most nuanced perspectives of pathways to wellbeing, whilst also understanding that it is adaptable to different contexts.

| Social-ecological theory | Cohen's social-ecological theory highlights the importance of relationships between individuals, others, and the environment with a focus on health, in a similar manner to the model of sustainable happiness and model of sustainable wellbeing, but with a broader focus. It expands on the more simplistic models of health and/or wellbeing by taking a broad perspective on multiple-level factors that can influence health. | As with the previous models that focus on multi-levelled influencers, the GENAL model integrates this multi-levelled approach by acknowledging the role of the individual, the community, and the environment on individual wellbeing, compared to previous models of wellbeing that had an isolated focus on the individual. |

Individual Domain

There is a wealth of evidence demonstrating a reciprocal relationship between health behaviours and mental health/wellbeing, reviews on one typically do not discuss the other. There are two potential reasons for this: 1) the distinction between mind and body remains an issue of great philosophical debate, with consequences for mental and physical health, and 2) researchers tend to work in disciplinary silos, a phenomenon reinforced by higher education, focused research areas and targeted funding initiatives. In my thesis, I use the term "balanced minds" to cover psychological experience, allowing room for 'negative' experiences and emotions. Here, evidence is provided for the importance of balanced minds and positive health behaviours for our wellbeing.

Individual Domain: Balanced Minds

Historically, psychological interventions have typically focused on reducing impairment and researchers (Ryff & Singer, 1996) have argued that routes to recovery from illness do not only come from ameliorating negative symptoms associated with ill-health, but it is also necessary to advocate for interventions that create a platform for the experience of wellbeing. Creating environments that promote positive emotions may help people to learn how to short circuit the downward spirals to illness. It is in this regard that interventions from the field of first wave positive psychology have much to offer.

Major theories relating to the wellbeing of individuals (see table 1) can be categorised according to two contrasting philosophical positions: hedonic and eudaimonic wellbeing. According to the hedonic standpoint, wellbeing is achieved by focusing on pleasurable experiences to enhance positive affect. One major theory is the 'tripartite model of subjective wellbeing', (Diener, 1984), which highlights a role for life satisfaction, decreases in negative affect and increases in positive affect. Another major theory is the 'broaden and build' theory by Barbara Fredrickson (2001), which focuses on the role for positive emotions such as joy, interest, contentment, pride and love in broadening individual thought-action tendencies that subsequently build personal resources for individual growth, social connection and psychological resilience. The routes through which positive emotions can impact wellbeing include increased perception of social connectedness, enhanced vagal function, and the

adoption of positive health behaviours, among other factors (Kok & Fredrickson, 2010; Kok et al, 2013; Sin et al., 2015). Interested readers are referred to major reviews on this topic (Boehm et al, 2012; Chida & Steptoe, 2008; Dubois et al., 2012).

In contrast to a focus on hedonia, eudaimonic theories of wellbeing look beyond momentary happiness, focusing on purpose, meaning in life, and flourishing. According to this perspective, Ryff's Psychological Wellbeing theory (Ryff, 1989; 2013; Ryff & Keyes, 1995) emphasised six factors that contribute to psychological wellbeing. These include self-acceptance, personal growth, purpose in life, positive relations with others, environmental mastery, and autonomy. Similarly, work by Wong (1998; 2014) on personal meaning emphasised a role for religion/spirituality, self-transcendence, self-acceptance, and fairness/social justice, as well as positive emotion, achievement, relationship, and intimacy.

However, these theoretical models – especially those focusing on hedonia – have faced criticism. The focus on 'happiology' has been criticised as lacking in nuance (Biswas-Diener & Wiese, 2018). Positive affect alone is not sufficient for improving wellbeing and over-valuing the need to be happy can actually lead one to feel less happy (Mauss et al, 2011; 2012), and may even be associated with the symptoms and diagnosis of unipolar depression (Ford et al., 2014) and bipolar depression (Ford et al., 2015). Other writers have criticised the individualistic focus, which ignores the impact of community and wider environmental factors (Carlisle et al., 2009; Davies, 2015; Frawley, 2015). Eudaimonic theories have also attracted criticism for not recognising the importance of positive emotions, leading to proposals such as Seligman's (2012; 2017) PERMA model, which incorporates aspects of both hedonic and eudaimonic theory. The PERMA model argues for a five-pronged model of wellbeing including positive emotions, engagement, positive relationships, meaning, and accomplishment. According to this model, all five pillars of wellbeing contribute to flourishing in life.

Interventions based on these advances in positive psychology have been effectively implemented. For example, meta-analyses demonstrate that positive psychological interventions (PPIs) are effective for people with or without diagnosed disorders,[107,148–151] with effect sizes ranging from small to large, being effective for improving wellbeing, strengths, quality of life, depression, anxiety, and stress (Carr et al., 2020). Meta-analyses have further demonstrated the effectiveness of specific positive psychological interventions

(PPIs) on increasing SWB, PWB, optimism, positive affect and life satisfaction, including the practicing of gratitude (Davis et al., 2015), the 'best possible self' intervention (Malouff & Schutte, 2016), savouring positive emotions (Smith et al, 2014), mindfulness-based interventions(Simpson et al., 2019), and performing acts of kindness(Curry et al., 2018), highlighting the link between positive minds and positive bodies, higher resting state vagal function is associated with positive mood states (Kok & Fredrickson, 2010; Kok et al., 2012).

However, despite the advances, positive psychology has received criticism as many key wellbeing models do not acknowledge the important role of negative states for our wellbeing. The narrative that we must reduce and/or avoid negative states feeds into experiential avoidance which has been linked with the development of psychopathology (although the research in this area is lacking scientific rigor; Brereton & McGlinchey, 2019; Chawla & Ostafin, 2007). However, positive and negative states coexist and are rarely experienced in isolation, a topic that is discussed in the dual-systems model (Wong, 2012). This thinking is a more sustainable approach to wellbeing given that negative states are inevitable and are arguably essential for self-transformation and meaning-making (Davies, 2012; Gibson, 2015). Second wave positive psychology is the driver to such approach, accepting that life has its difficulties, but overcoming these difficulties and finding meaning from negative experiences is an opportunity to build wellbeing (Lomas & Ivtzan, 2016; Wong, 2019).

Researchers have proposed a new approach to wellbeing, whereby suffering, authenticity, and meaning in life are all integrated into wellbeing (Kaftanski & Hanson, 2022). Within this approach, the researchers argue that suffering should not be inherently viewed as negative, and the alleviation of suffering should not be a blanket approach to targeting wellbeing, as this would bypass opportunities for building meaning in life and authenticity. Meaning in life is an important contributor to health and wellbeing (Steger, 2009) and has been highlighted as a mediator in the relationship between suffering and wellbeing (Edwards & van Tongeren, 2020). Paul Wong introduced the 'Suffering Hypothesis', arguing that it is not possible to live a meaningful life without finding meaning in suffering, noting that suffering is the missing factor in wellbeing research (Wong, 2023). Tragic optimism is one example of a positive psychological factor that integrates suffering, defined as 'optimism in the face of tragedy' (Frankl, 1984), an approach that is effective in counselling and trauma therapy (Leung, 2019). Another example is post-traumatic growth, defined as a 'positive change that occurs as a result of the struggle with highly challenging life crises' (Tedeschi & Calhoun, 1996), allowing people to grow through their trauma and develop new perspectives on life and living

(Turner & Cox, 2004). These examples indicate that negative emotions are not always incompatible with wellbeing (Fianco et al., 2015), but can potentially lead us to self-growth and derive a deeper sense of meaning in life (in accordance with existential psychology; Wong, 2011).

Overall, the above section highlights the importance of building a balanced mind for wellbeing. It draws upon influential research from first wave positive psychology, incorporating key aspects of previous wellbeing models (see figure 1 for details). In addition to the wellbeing impacts of the eudaimonic and psychological perspectives, additional support comes from health-related outcomes. For example, longitudinal research (Petrie et al., 2018) has observed that participants in a low positive-affect grouping have a two-fold increased risk for mortality, compared to those in the more favourable grouping over a 16.5 year follow-up period. The focus on eudaimonia has also been associated with improved health, including subjective health, chronic conditions, symptoms and functional impairment (Ryff, 2013) For example, purpose in life reduces risk of developing Alzheimer's disease and mild cognitive impairment (Boyle et al., 2010) along with reducing risk of death (Boyle et al., 2009). Research has even revealed that those with greater purpose in life present with better cognitive functioning, highlighting a moderating role of purpose in life on the relationship between brain-based pathology and cognitive functioning (Boyle et al., 2012). Other research also shows a stronger sense of purpose to be associated with decreased mortality (Alimujiang et al., 2019), an effect associated with a hazard ratio of 2.43 (95% CI, 1.57-3.75) when comparing those in the lowest life purpose category with those in the highest life purpose category.

Individual Domain: Health behaviours

Whilst health behaviours are typically thought of with respect to their impact on physical health, there is now compelling evidence that health behaviours impact on both physical and mental health. In this section, I present some key studies highlighting the importance of health behaviours in wellbeing-related outcomes, along with physical and mental health outcomes as additional support, although an exhaustive review is beyond the scope of this chapter. Interested readers are referred to Kemp, Arias, and Fisher (2017). Given the number of health behaviours, for brevity, I focus specifically on physical activity, diet and sleep. A summary of public health guidelines and associated evidence-base relating to physical

activity, diet and sleep is provided in Table 2 below, providing a summary of public health guidelines and associated evidence-base relating to physical activity, diet and sleep (key references include Kromhout, and C J K Spaaij, de Goede, & Weggemans, 2016; Aune et al., 2017; Mujcic & J.Oswald, 2016; Firth et al., 2019; O'Keefe, Bhatti, Bajwa, DiNicolantonio, & Lavie, 2014; Plunk, Syed-Mohammed, Cavazos-Rehg, Bierut, & Grucza, 2013; Cao, Willett, Rimm, Stampfer, & Giovannucci, 2015; Wen et al., 2011; Chekroud et al., 2018; Watson et al., 2015; MILNER & COTE, 2009; Duggan, McDevitt, Whitehurst, & Mednick, 2016).

Table 3

Summary of Public Health Guidelines and Associated Evidence-base Relating to Physical Activity, Diet and Sleep.

Health Behaviours	UK Government Guidelines (Adults 18+)	Peer-reviewed literature	Comparison: Guidelines vs Research
Diet: Fruit and Vegetable Intake	Consume at least five portions a day (or 400g) (Public Health England, 2016)	Dutch guidelines based on 29 systematic reviews of meta-analyses comprising RCTs and the risk of chronic disease based on diet choices - 200g of fruit and 200g of vegetables daily (Kromhout et al., 2016). Although research highlights benefits in increasing fruit and vegetable intake up to 800g per day in regards	UK guidelines may be an underestimate of the ideal amount of fruit and vegetable consumption given the health benefits of eating more than 5 a day for both physical and mental health.

to reducing risk for heart disease, cardiovascular disease and all-cause mortality (Aune et al., 2017). In addition to these physical health benefits, increasing fruit and vegetable portions has been shown to be beneficial in improving wellbeing (Mujcic & Oswald, 2016): 8 portions a day increases life satisfaction by 0.24 points, equivalent to the psychological gain of moving from unemployed to employed.

| Diet: Other food items | Consume at least two portions of fish (2x 140g) weekly (one of which is oily fish), consume some beans, pulses, eggs, meat and other proteins, and limit unsaturated oils and spreads (Public Health England, 2016) | Dutch guidelines - Limit consumption of red meat, a few dairy portions daily, eat legumes weekly, consume at least 15g of unsalted nuts daily, consume oily fish weekly, zero alcohol (or less than one glass daily), less than 6g salt daily (Kromhout et al., 2016). Dietary | Guidelines do not specify recommended amounts of more general food items, such as legumes and red meat. It would be beneficial to provide evidence-based recommendations on these foods. |

		interventions have also been shown to improve mental health (symptoms of depression and anxiety) (Firth et al., 2019) - examples include adherence to a Mediterranean diet, coaching in healthy eating, and calorie-restricted diets.	
Diet: Alcohol Consumption	Less than 14 units per week (Public Health England, 2016)	There is a J-shaped curve with alcohol consumption and cardiovascular health (O'Keefe et al., 2014), the benefits of drinking peak around 2 nonheavy occasions per week (Plunk et al., 2014), with mortality risk increasing thereon after. Drinking more than 60g on one occasion increases risk of CHD (Kromhout et al., 2016). The J-shaped curve between alcohol and health is not present for risk of cancer; even light drinkers display increased risk compared	Limiting alcohol consumption to less tan 14 units per week is reasonable given the evidence; given that research highlights a J-shaped curve for alcohol consumption and many health outcomes it would be unreasonable to recommend a zero-alcohol diet. However, a recommended restriction is beneficial given the severe health outcomes of drinking heavily.

		to non-drinkers (Cao et al., 2015).	
Physical Activity	At least 150 minutes of moderate aerobic exercise a week, in addition to a minimum of two strength exercise sessions weekly (Public Health England, 2019)	15 minutes of exercise a day reduces all-cause mortality risk by 14% (Wen et al., 2011); exercise also improves mental health, with specific exercises (such as team sports and cycling) being more effective (Chekroud et al., 2018)	Guidelines could be more focused in the types of exercise that is recommended, given that the evidence base highlights certain sports to be more efficacious in health outcomes.
Sleep	Between 6-9 hours each night (NHS, 2019)	No less than 7 hours per night to promote optimal health, with less than 7 hours per night on a regular basis being associated with adverse health outcomes, including obesity, diabetes, heart disease, stroke, and depression (Watson et al., 2015). Daytime napping shown to be beneficial for healthy adult populations - improving cognition and wellbeing (Milner & Cote, 2009). However, emotional reasons for napping are associated with reduced	A discrepancy arises among sleep guidelines, with the UK recommending between 6-9 hours a night, despite the evidence base recommending no less than 7 hours to avoid adverse health outcomes.

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wellbeing, while
restorative reasons for
napping improves the
health outcomes
(Duggan et al., 2018).

Physical activity is a mood booster, increasing positive affect and life satisfaction (Wiese et al., 2018), along with a better overall quality of life, functional capacity, and mood states (Penedo & Dahn, 2005), which have subsequent benefits as noted in the 'balanced minds' subsection. As little as 10 minutes of physical activity per week and/or 1 day of being physically active each week has the potential to increase levels of happiness (Zhang & Chen, 2019). Additionally, lower levels of physical activity and increased sedentary behaviour have been associated with poorer wellbeing among adolescents (Ussher et al., 2007). However, there is comparatively limited research investigating the relationship between physical activity and wellbeing, with the research available being of lower quality than found in research with other, related, outcomes (for example, randomised control trials). Due to this, we draw from research related to other outcomes, such as mental health. For example, research on a sample of 49 prospective studies (N=266,939) showed that physical activity protected against depression, irrespective of age and geographic region (Schuch et al., 2018). Another study of more than 1 million individuals in the U.S.(Chekroud et al, 2018) reported that exercisers display 43% fewer days of poor mental health than non-exercisers. The authors further reported that all exercise types were associated with a lower mental health burden (from 11.8% to 22.3% reduction), while the activities with the strongest associations included popular team sports (22.3% lower), cycling (21.6% lower), and aerobic and gym activities (20.1% lower). Exercise duration of 45 minutes and frequencies of three to five times per week were associated with the lowest mental health burden.

With respects to diet and wellbeing, adherence to the Mediterranean diet has been associated with increased subjective wellbeing (Moreno-Agostino et al., 2019). Additionally, increased intake of fruits and vegetables has been linked with higher levels of happiness and wellbeing (Conner et al., 2015). However, in a similar manner to the relationship between physical activity and wellbeing, there is limited research investigating the relationship between diet and wellbeing specifically, thus, we draw upon related outcome variables, such as mental

health. Combined data from four longitudinal studies found a risk estimate of highest vs. lowest adherence to the Mediterranean diet of 0.67 (95% CI 0.55-.82) for incident depression (Lassale et al, 2018). The Mediterranean diet has also been implicated in slowing age-related deterioration, including improvements in cognitive function – an important predictor of wellbeing – and reduced risk of cognitive impairment and dementia, with B-vitamins and antioxidants playing a key role. Several randomised controlled studies showed that a modified version of the Mediterranean diet reduced depression symptomology (Jacka et al., 2017: Parletta et al., 2017). As a result of the research, the adoption of "traditional" diets, such as the Mediterranean diet, has been recommended (Opie et al, 2016) although it is worth noting here that socio-structural factors (e.g. inequality and poverty) have important impacts on capacity to follow such advice (Liu et al., 2019).

Moving the attention to sleep, sleep can impact wellbeing on a day-to-day basis, as one study found that minor reductions in sleep during the previous night resulted in reduced positive affect during positive experiences (Sin et al., 2020), although there is minimal research investigating this research further. The following data discuss the relationship between sleep and related outcome variables as a starting point to highlight the importance of sleep for wellbeing. A systematic review and meta-analysis of 14 studies found that sleep disturbances predicted risk of suicidal ideation, an effect not moderated by depression (Liu et al., 2019). Poor sleep is also associated with common mental disorders, while improving sleep in these patients can lead to mental health improvements (Freeman et al, 2017). Analyses on nearly 100,000 adolescents in Japan (Kaneita et al., 2007) found a U-shaped association between mental health status and sleep duration such that those individuals sleeping less than 7 hours or more than 9 hours displayed poorer mental health status. The authors also reported a linear association between mental health status and subjective sleep assessment such that worse subjective sleep assessment was associated with worse mental health. Similarly, among an elderly population, sleep problems were associated with poorer mental (and physical) health-related quality of life (Reid et al., 2006).

In summary, I highlight a role for balanced minds (incorporating 'negative' emotions and experiences) and positive health behaviours in facilitating individual pathways to wellbeing. Accordingly, I suggest that future interventions must focus on enhancing balanced minds in addition to positive health behaviours for maximum benefit, drawing on modern theories of behavior change such as Barbara Fredrickson's upward spiral theory of lifestyle change. However, there is comparatively limited research investigating the relationship between

health behaviours and wellbeing (compared with mental health outcomes), with the research available being of lower quality than found in research with other, related, outcomes (for example, randomised control trials). Nonetheless, individual factors are not the only determinants of wellbeing, and so, the next section explores the role of community on individual wellbeing.

Community Domain

Here I draw upon an inclusive definition of community wellbeing when highlighting the relationship between community wellbeing and individual wellbeing. Wiseman and Brasher (2008) defined community wellbeing as the combination of social, economic, environmental, cultural, and political conditions identified by individuals as essential for them to flourish. This definition is flexible in that it allows the individual to decide what community is for them, whether this be, for example, their local neighbourhood or a group of people with shared interests and values. Unfortunately, there is much evidence to suggest that community is deteriorating (Kemp et al., 2017a; Kushlev et al, 2017; Twenge, 2013). The reasons for this are complicated and involve a host of interconnected societal issues including generational shifts in narcissism (Twenge, 2013), declines in perspective taking and empathic concern (Scheffer et al., 2017), increasing individualism (versus collectivism) in western society and societal inequalities (Nolan & Valenzuela, 2019; Scheffer et al., 2017).

There is now an unprecedented proportion of single-person households in Western societies, undoubtedly causing a rise in loneliness (Snell, 2017). This is a concern given the impact of positive social ties on individual wellbeing (Haslam et al., 2018; Kemp et al., 2017a). A meta-analysis of studies on more than 300,000 participants reported that there was a 50% increased likelihood of survival for those with stronger social relationships over a 7.5 year follow-up period, an effect that was stronger than physical activity, smoking cessation (15 cigarettes daily) and body mass index (Holt-Lunstad et al, 2010). In a more recent study on nearly 49,000 participants, the same researchers (Holt-Lunstad et al., 2015) observed that social isolation (29%), loneliness (26%), and living alone (32%) increased the risk of premature mortality, reporting no differences for objective and subjective measures. Furthermore, greater impacts on mortality were observed among those under the age of 65 years.

Social isolation and loneliness impact on a host of behavioural, psychological, and physiological factors (Kemp et al., 2017a). Behavioural factors (Shankar et al., 2011; Stickley

et al, 2014) include physical inactivity, smoking, substance use and hazardous drinking, while psychological factors include decreases in self-esteem, increased risk of depression, and feelings of hopelessness both of which subsequently contribute to dysregulation of cardiovascular, metabolic, and neuroendocrine processes (Schoffield et al., 2001), higher systolic blood pressure, independent of several factors such as age, gender, cardiovascular risk factors, medications, social support and perceived stress (Hawkley et al., 2010). The NIACT (Kemp et al., 2017b) and original GENIAL (Kemp et al., 2017a) models integrate these behavioural, psychological, and physiological factors into innovative frameworks within which pathways to health and ill-health may be understood, bridging the gap between psychological moments and mortality.

Social identity theory provides a useful context within which to understand the influence of community on the health and wellbeing of the individual. For example, social identity provides meaning, purpose and worth (De Vroome & Hooghe, 2014; Nakamura, 2013; Peterson et al., 2005), the importance of which was highlighted above in the discussion of balanced minds. Social identities also facilitate the extent to which others are likely to provide social support (Cohen, 2004; Levine et al,. 2002; 2005; Platow et al., 2006), and provide a sense of efficacy, agency and power to an individual, contributing to the sense that 'the whole is greater than the sum of its parts' (Haslam et al, 2017). Strikingly, research has demonstrated that cardiac and respiratory patterns synchronise when members of a choir sing in unison, compared to when singing independently (Muller & Lindenberger, 2011). This phenomenon of 'physiological linkage' may help to explain perceptions of relationship connectedness (Timmons et al., 2015) and associated health benefits (Kemp et al., 2017a; 2017b; Porges, 2011).

Interventions targeting social isolation and disconnection (e.g. "Groups 4 Health" or G4H) improve mental health, wellbeing, and social connectedness up to 6-months post intervention. This study (Haslam et al., 2016) provided preliminary evidence demonstrating that social-identity and sense of belonging to a group are associated improvements in depression, anxiety, stress, loneliness, and life satisfaction. It is therefore vital that wellbeing models consider the influence of community-related pathways to experiencing wellbeing. Altruism is one example of how individuals can engage with their community, build social connections and increase positive emotions, improving the wellbeing of the helper and the recipient (Kahana et al., 2013; Weinstein & Ryan, 2010). Such behaviour has been proven beneficial to

wellbeing across multiple cultures, suggesting that helping others is ingrained in human nature (Aknin, 2010).

To conclude, a supportive community will contribute to the wellbeing of individuals, and this relationship will be a bidirectional one, such that improved wellbeing of the individual will help to foster community wellbeing. In the next section, I turn my attention to the wider environment within which individuals live and work, focusing on another major societal challenge to individual wellbeing: the 'climate crisis'.

Environment Domain

It is now accepted in scientific circles (as demonstrated by the 2007 and 2014 reports from the Intergovernmental Panel on Climate Change) that humanity will face catastrophic climate change should we fail to commit to climate action. An increase in the frequency, duration and intensity of extreme weather events increases the risk of population distress and psychiatric disorders through disruption to food supply and damage to community wellbeing (Berry et al., 2010; Hayes et al, 2018). Extreme weather events have even been shown to influence future health and wellbeing of unborn children through impacts on brain development and metabolic outcomes (Dancause et al, 2015; Dufoix et al, 2015). Other research has also shown that climate change has increased global economic inequality by ~25% over the last 50 years, with wealthy countries benefiting disproportionally (Diffenbaugh & Burke, 2019). However, not only are our actions having catastrophic consequences on the planet, they are impacting our wellbeing on a day-to-day basis with less and less green space available to us as a species. This should be of great concern to us as human beings have a strong, innate affiliation with the biological world, a phenomenon captured by the 'biophilia hypothesis' (Wilson, 1984). In addition to the biophilia hypothesis, human beings also have a strong affiliation with the local environment ('place'), driven by cultural experience (Beery et al, 2015; Sampson, 2012), known as the 'topophilia hypothesis'. Biophilia and topophilia hypotheses provide a foundation on which to understand the distress, pain or sickness associated with environmental degradation of home or territory. The term 'solastalgia' has been coined to describe this negative feeling associated with place-based distress (Albrecht, 2005; 2019).

Epidemiological research has highlighted the relationship between nature and health, reporting a strong association between the quantity of green space that surrounds a residence and the perceived mental health, general health, and all-cause mortality of those residents

(van den Berg et al., 2015). Research now indicates that people who spend at least two hours a week in nature are more likely to report good health and high levels of wellbeing than those who spend no time in nature (White et al., 2019). These findings were consistent across a variety of demographic variables including sex, age-group, occupational social grade, presence of chronic illness and whether or not individuals met physical activity guidelines. Prior research has indicated that spending time in nature over a two-week period boosts hedonic as well as eudaimonic wellbeing (Passmore & Howell, 2014), and that effect sizes are larger (*d*s from .37 to .63) than those reported for other positive psychology interventions (*d*s from .20 to .34, see Boiler et al., 2013). Such research has led to proposals for changes to the well-known Satisfaction with Life Scale (Diener et al., 2010), with the researchers acknowledging the impact of the natural environment on wellbeing and proposing additional questions that target nature connection (Lambert et al., 2020).

There are many pathways through which nature improves wellbeing. One pathway is how exposure to nature can lead to transcendent emotions (Bethelmy & Corraliza, 2019), peak experience (Maslow, 1964) and psychological flow (Csikszentmihalyi, 2002). Interestingly, transcendent emotions – including compassion, gratitude and awe – foster healthy social relationships (Goldy & Piff, 2020; Stellar et al, 2017) and such relationships are facilitated by spending time in nature (Mayer et al., 2009; Richardson et al., 2016) again highlighting the inter-connectedness between individual, community and environmental domains. Research also reports that exposure to nature is associated with stress reduction (,[114,115] feelings of restoration (Hansmann et al, 2007; Ulrich et al, 1991), subjective wellbeing (Johansson et al., 2011; Luck et al., 2011; White et al., 2017), and improved cognitive functioning (Berman et al., 2008; Berto, 2005).

In a review of the literature, (Kuo, 2015) identified 21 pathways through which nature impacts health, examples of which include the environmental conditions (such as the benefits of the chemical and biological agents in nature), improvements in physiological and psychological states, and the positive behaviours and conditions that are associated with nature (such as increased physical activity and social ties). Based on the evidence, (Kuo, 2015) proposed one central pathway through which these other factors feed in to; that being improved immune function.

The importance of the natural environment for individual wellbeing is starting to be recognised. For example, the positive psychology of sustainability (Corral-Verdugo, 2012;

Corral-Verdugo et al, 2015; O'Brien, 2012; 2016) is a strategy that may help to foster what has been described as sustainable wellbeing (Kjell, 2011). Feelings of guilt, shame, fear, emotional discomfort and solastalgia have been associated with motivation to engage in environmental sustainability behaviours (Albrecht, 2009; Dickerson et al, 1992; Kaiser et al,. 2008; Malott, 2010), and such behaviours have been associated with increased wellbeing (Brown & Kasser, 2005; Corral-Verdugo et al., 2011; Netuveli & Watts, 2020; Prati et al., 2017; Xiao & Li, 2011). However, it is important to be mindful that simply engaging in these behaviours may not always improve wellbeing. Using frugality as one example, whilst (Corral-Verdugo et al., 2011) found that an aggregate of sustainable actions significantly predicted happiness, frugality on its own had an almost zero correlation. I argue that the association between pro-environmental behaviours and wellbeing is based on the meaning behind it. For example, whilst frugality has been associated with increased wellbeing (Muinos et al., 2015), when split in to 'restrictive behaviour' and 'being resourceful' the researchers found that restrictive behaviour was associated with significantly worse wellbeing among individuals on low income (compared to medium and high incomes). This suggests that when restrictive behaviour may no longer be a pro-environmental choice, but rather a must to manage finances, the benefit to wellbeing is not the same. Other research has also identified income to play a similar role in the relationship between pro-environmental behaviour and wellbeing (Binder et al., 2020). Researchers have also highlighted that the link between pro-environmental behaviours and wellbeing is in part explained by factors such as intrinsic value orientation, mindfulness (Brown & Kasser, 2005), and one's notion of the good life (Binder et al., 2020), further suggesting that the drive to engage in pro-environmental behaviours is important. As such, Young (2000) argues that a promotion of pro-environmental behaviour needs to focus on building intrinsic satisfaction for such behaviours.

Interestingly, a central concept within the field of positive psychology is that of 'character strengths' (Seligman & Peterson, 2004). Twenty-four character strengths are described, all of which are possessed by any particular individual to more or less of a degree. A structural model of the relationships between character strengths, virtues and sustainable behaviours (i.e. altruistic, frugal, equitable and pro-ecological behaviours) has been presented such that all 24 character strengths are associated with the four sustainable behaviours (Corral-Verdugo et al., 2015). The knowledge that pro-environmental behaviours provide opportunities to promote happiness and build resources for resilience, provides a useful foundation on which

psychological scientists could address environmental challenges through targeted interventions focusing on the individual (Clayton et al., 2015; Corral-Verdugo, 2012; Corral-Verdugo et al., 2011). Unfortunately, the vast majority of people do not engage in pro-environmental behaviours, a result that has been attributable to helplessness and low self-efficacy (Salomon et al., 2017).

Therefore, I argue that the aim for individual wellbeing regarding the environment should be twofold. Firstly, we need to encourage the connection, both physical and psychological, between the environment and the individual, as this benefits wellbeing in and of itself (as highlighted by Kuo, among other researchers). Secondly, as individuals become more connected to nature, we need to encourage engagement in pro-environmentally friendly behaviours and build their intrinsic motivations to do so. This will benefit their wellbeing through the engagement itself and, in turn, will improve the environment and begin to tackle the climate crisis which in turn will impact their wellbeing. For example, research not only highlights the importance of eating less meat for individual health and wellbeing (Demeyer et al, 2016; Micha et al., 2010; Pan et al., 2011), it also has beneficial impacts on the environment (Poore & Nemecek, 2018), reinforcing the symbiotic coexistence of all life at various scales. Mayer and Frantz (2004) authors of the connectedness to nature questionnaire, argued that feeling connected to nature is fundamental for adopting pro-environmental behaviours. In order to agree with and help promote changes being made, one must value and believe in the cause of such changes. Thus, it is important to build this connection before encouraging pro-environmental behaviours if we want a sustainable wellbeing model. Despite this hurdle, it is a cause to strive towards as it is argued that our wellbeing will catch up with the degrading environment and will too start to deteriorate (Raudsepp-Hearne et al., 2010). A selfish approach to individual wellbeing will not serve the wellbeing of future generations, highlighting the importance of current wellbeing models to acknowledge the climate crisis.

In summary, we have observed emerging research interest in the concepts of sustainable happiness and wellbeing, directly linking positive psychology to concepts relating to sustainability and pro-environmental behaviours. Although much work remains to be done, these efforts serve to combat criticisms of psychological science relating to a blinkered focus on personal happiness that ignores important societal challenges. Spending time in and caring for the natural environment may also provide an under-appreciated means to promote wellbeing that is over and above the beneficial impacts of outdoor physical activity (Bowler

et al., 2010: Capaldi et al., 2015; Franco et al., 2017) and may even promote commitment to pro-environmental behaviours, supporting efforts to combat the climate crisis. However, engagement in pro-environmental behaviours is not always associated with improved wellbeing and has been associated with reduced wellbeing among those with less income (Binder et al., 2020; Muinos et al., 2015), highlighting the influence of sociostructural factors on influencers of individual wellbeing. It is necessary for wellbeing models to acknowledge the role that such factors can have on wellbeing. For example, Prilleltensky (2013) argues that fairness and social justice are important aspects that should be considered for wellbeing. Following from this, the next section will discuss such issues more generally across the three domains (individual, community, and environment) and the ways in which factors outside of the control of the individual can hinder their ability to build their wellbeing.

Sociostructural Factors

As previously noted, positive psychology has been criticised for being individualistic and neglecting the important roles that wider societal structures play on individual wellbeing. In doing so, Yakushko (2018) argues that the research area has ignored the systemic and institutionalised oppression that occurs in society, along with judging the feelings, experiences, and actions of people who fight against these forms of oppression. Here I will draw upon SES as an exemplar of a key inequality that lays within societies and that act as barriers for individuals in improving wellbeing

Socioeconomic Status (SES) Inequity

A large proportion of research has highlighted how lower SES is associated with worse health outcomes. For example, a recent meta-analysis on over 1.5 million people found that low SES (based on job title) was associated with a 2.1 year reduction in life expectancy between the ages 40 and 85 years (Stringhini et al., 2017). Not only does individual SES impact wellbeing greatly, but the greater the disparity in the distribution of income within a society also impacts wellbeing, independent of individual SES. For example, income inequality was calculated for the 50 US states in 1980 and 1990 (Kaplan et al., 1996). Significant correlations were reported between income inequality and all-cause mortality, age specific mortalities and rates of low birth weight, homicide, violent crime, work disability, expenditures on medical care and police protection, smoking, and sedentary activity.

To focus the pathways through which SES impacts health, Adler and Newman (2002) highlighted how SES underlies three major determinants of health. The first is health care, with low-SES individuals facing greater access barriers to health care (McMaughan et al., 2020). This includes a lack of knowledge and skills around accessing health information and resources (Ross & Chia-Ling Wu, 1995). The second determinant of health is health behaviour, with low-SES individuals being more likely to engage in unhealthy behaviours, such as smoking, alcohol consumption, physical inactivity, and poor diet (French et al., 2019; Nandi et al., 2014; Pampel et al., 2010; Stringhini et al., 2011; Wardle & Steptoe, 2003), behaviours which disproportionately harm those from lower SES backgrounds (Foster et al., 2018). The third determinant of health is environmental exposure, with low-SES individuals more likely to be exposed to damaging experiences and/or agents in their work, school and/or home environment (Evans & Kantrowitz, 2002; World Health Organisation, 2010). In addition to the poor environmental conditions, lower-SES individuals have less access to green spaces or the green spaces that they do have access to are of poor quality (Hoffimann et al., 2017). Interestingly, research has highlighted the benefits of nature may be 'equigenic', with the health benefits being strongest among disadvantaged groups, including lower individual and neighbourhood SES (Dadvand et al., 2012, 2014).

In addition to these environmental factors, climate change is affecting people disproportionally. In fact, climate change is impacting people in such an unequal manner that climate change, racial justice, and feminism are heavily linked, with Black people, poor people and women being mostly affected (Islam & Winkel, 2017). The UN Department of Economic and Social Affairs identified three channels through which climate change disproportionally impacts disadvantaged groups (Islam & Winkel, 2017). Firstly, they are exposed to climate change hazards at a greater frequency due to affordability of housing and the areas in which they work. Secondly, they are more susceptible to the damages caused by climate change when the hazards do occur, for example, through poorer housing or due to the greater likelihood of catching diseases. Thirdly, there are inequalities in the ability to cope and recover due to the inequitable spread of resources, whether this be from the communities, non-government organisations, or from the government.

The 2010 Marmot Review argued that we need to tackle both social inequalities and climate change as one in order to address the health inequalities (Marmot et al., 2010). Action is required across all the social determinants of health that is in line with proportionate universalism – meaning that the actions must be universal but with a scale and intensity that

is proportionate to the level of disadvantage. Such actions will need to be policy driven and will rely on local delivery and participation at an individual and community level. The Marmot Review echoes the proposals of the GENIAL framework. Unfortunately, the second Marmot Review conducted 10 years later reported that inequalities in life expectancy had increased (Marmot et al., 2020). They highlighted that those who lived in more deprived areas spent more of their shorter lives in ill-health than those in less deprived areas. The authors argue that health inequalities are a matter of fairness and social justice, with health inequalities being a result of social inequalities (Marmot et al., 2010, 2020).

Discussion and GENIAL 2.0

This theoretical review could help to move the science of wellbeing forward to a more ethical and moral science that considers the wellbeing of current *as well as future generations*, through the understanding of the relationships between the individual, community, and environment. Based on the theory provided, I, in collaboration with the authors of the original GENIAL model (Kemp, Arias, & Fisher, 2017) aimed to develop the model to incorporate advances in wellbeing science. We argue that the model will be a fundamental part of third wave positive psychology (Lomas et al., 2020b), a scientific movement that moves beyond the individuals as the primary focus and raises the importance of the groups and systems of which they are part of, incorporating other disciplines.

Figure 1 below encapsulates a brief insight into our views of extending the GENIAL model (identifying three core domains, with the addition of the environment). The subsequent studies aim to investigate the importance of each domain within the GENIAL model for wellbeing, with a succinct and updated version of the GENIAL model provided in chapter 7.

Figure 1

A Venn Diagram to Encapsulate the Relationships Between Three Core Domains of the
GENIAL Model.
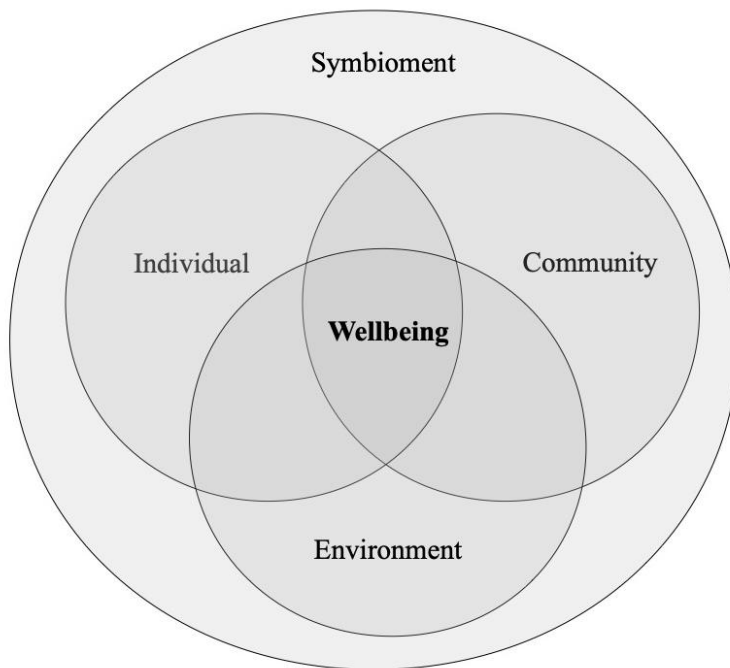
Chapter 2

2. Thesis Aims and Overview

Abstract

This chapter covers a broad overview of the proceeding chapters in this thesis. I place this thesis in the context of a growing area of wellbeing science, moving beyond the individual and incorporating communities and the planet. I cover each chapter, providing a brief overview of the study or literature review, findings, and conclusions, highlighting how each chapter links together to form one overarching message; the need to place individual wellbeing within the broader issues of society, such as sociostructural issues and climate change. I argue that this thesis will be an influential piece of work in third wave positive psychology, already having received attention from leading researchers in the field.

The aim of the current thesis was to emphasise a need for a more sophisticated approach to individual wellbeing, one that is not restricted to the individual or the pursuit of individual wellbeing. Alternatively, I highlight an approach that focuses on the individuals as well as their communities and environments within which people live. In doing so, a pursuit of individual wellbeing underpins the promotion of collective and planetary wellbeing, which is arguably a more sustainable approach to achieving wellbeing. Critically, this approach accepts the inevitability of human suffering, reinforcing sustainable wellbeing and promoted in light of the collective trauma that the pandemic presented. The following chapters set out to evidence the need and impact of such an approach, which we have described as the GENIAL model.

The next chapter (chapter 3) is a research article, published in Frontiers in Psychology, which delves into areas of second wave positive psychology and existential positive psychology during the COVID-19 pandemic, in an investigation of the potentially protective factors to wellbeing within a general UK population (N=138), within the framework of the GENIAL model. Exemplars were chosen to represent core domains of the individual, community, and environment for feasibility. These included physical activity (a health behaviour that helps build individual wellbeing), tragic optimism (optimism in the face of tragedy), gratitude (a prosocial emotion), social support (the perception and experience of being loved, cared for and valued by others), and physical and psychological connections with nature. This chapter examines the associations with wellbeing, as measured by the Warwick-Edinburgh Mental Wellbeing Scale and reports a significant impact of the GENIAL model on individual wellbeing (accounting for 50% of the variance in wellbeing scores). Both gratitude and tragic optimism were found to be of particular importance, highlighting key roles for appreciation and acceptance when living through collective trauma. At the time of writing this thesis, the published version of this chapter has been viewed 7,985 times and has attracted 38 citations, demonstrating the impact that this paper has now received in the UK and beyond. This paper also attracted media attention from BBC Worklife (with a focus on the dangers of toxic positivity and the role that tragic optimism can play for helping us accept adversity – see appendix A) and the ABC Radio National podcast, "All in Your Mind" (also with a focus on toxic positivity – see appendix B). In summary, this chapter highlighted key psychological characteristics that may help one to acknowledge and accept adversity. However, given the importance of factors associated with appreciation and accepting adversity (i.e. gratitude and tragic optimism), questions remain around whether these factors can protect wellbeing

directly, or whether this is mediated by a related construct associated with growing from adversity – post-traumatic growth (PTG).

Chapter 5 is a research article, published in the Journal of Existential Positive Psychology, and follows a similar design to the previous chapter, but with the addition of PTG, further delving into literature within existential positive psychology, with a greater focus on incorporating adversity into individual wellbeing. The aim of chapter 5 was to investigate the potential mediatory role that PTG may play in the relationship between the GENIAL model and wellbeing (as measured by the Warwick Edinburgh Mental Wellbeing Scale). We previously found evidence to suggest that pathways in the GENIAL model can help protect and/or build wellbeing during times of adversity (the pandemic). However, it would be of interest to understand if this impact is mediated through the facilitation of PTG. PTG is a key factor in predicting healthy functioning after a trauma, thus, an important process to facilitate when devising a model to build individual wellbeing. The study was conducted on the general population (N = 136), exemplars of the GENIAL domains were consistent with the previous study (physical activity, gratitude, tragic optimism, social support, and nature connection), with the additional measure of PTG, as measured by the Post-Traumatic Growth Inventory. Whilst findings highlighted that PTG did not mediate the relationship between the domains of the GENIAL model and wellbeing, the exemplars of the GENIAL domains did account for up to 18% of the variance in PTG scores. The findings highlighted key roles of gratitude and nature connection in their influence of PTG. Chapter 5 is novel in the field for being the first study to quantitatively research the relationship between nature connection and PTG, and is one of few studies to address the route through which PTG can influence wellbeing, with important implications and suggestions for future research discussed. I was successful in winning a scholarship based on this paper, which included both a financial reward and the opportunity to present the study at the International Meaning Conference 2021.

My experience conducting the first two studies presented in this thesis led me to gain a greater understanding of a quickly developing scientific field, leading me to write an updated version of the GENIAL (2.0) model, which was submitted to and now published in Frontiers in Psychology in May 2021. This paper is presented as chapter 7 and presents the core domains of the GENIAL model, which include the individual, community, and environment (as described in chapter 1), which support an individual's capacity to experience wellbeing, underpinned by the functioning of the vagus nerve, a putative psychophysiological index of

wellbeing (Kemp, Arias, & Fisher, 2017a), around which additional socio- structural and -contextual factors laying beyond the control of the individual either promote or impede that capacity. The model extends existing models in the field for various reasons, including, but not limited to, the inclusion of *both* mental and physical aspects of health *and* a physiological link between the two, along with discussions around nature connection, incorporating adversity into wellbeing, and acknowledging the importance of factors beyond the control of the individual. At the time of writing (December 2022), this work has been read more than 8,400 times, has been cited 27 times (including from influential researchers in the field, such as Louise Lambert, Victor Corral-Verdugo, and Miles Richardson), and has achieved an altmetric score of 121, highlighting the impact that this work has had on the field. The paper has formed the basis for various other work that has been conducted, including interventions to support individuals with brain injury (Gibbs et al., 2022; Wilkie et al., 2022).

This updated framework of wellbeing laid the foundations for developing and delivering a wellbeing science module for university students, the impacts of which were recently published in the Teaching of Psychology, a SAGE publication in association with Division 2 of the American Psychological Association. This paper is presented as chapter 9 and describes a 5-week module that was guided by the GENIAL model and delivered to students at Swansea University in the United Kingdom as an optional module during their undergraduate degree programme. As part of this module, students attended five-weekly seminars and were encouraged to participate in the suggested interventions around which they wrote up an N-of-1 study documenting the impact that this module had on their own wellbeing (Kemp & Fisher, 2021). Chapter 9 reports significant benefits for student wellbeing for those who enrolled on the module. This study was supported by the Greatest Need Fund in Swansea University after my application was successful in passing the panel. The grant ensured we met the required sample size, subsequently resulting in the publication of the study in Teaching of Psychology. Further research is underway to investigate the pathways through which this module can protect and/or build wellbeing, including analyses on the exemplars of the GENIAL domains that are utilised in this thesis (physical activity, gratitude, tragic optimism, social support, and nature connection). Additional analyses will soon be carried out to investigate the role that novel factors (such as eco-anxiety) can play in wellbeing.

Finally, chapter 11 was written to describe the direction of travel that my research is now taking, including a move into the exciting new field of climate psychology, and suggestions

for how we might move wellbeing science forward not only to protect our own wellbeing, but with a focus on others and the planet. As opposed to presenting a wellbeing model, chapter 11 places the concept of individual wellbeing amongst community and planetary wellbeing, considering optimal pathways through which scientists can further protect the wellbeing of ourselves, others, and the planet, including top-down (e.g. policies) and bottom-up approaches (e.g. inner development). At the heart of doing so is an interconnectedness of all living beings, also known as eco-homeostasis (Albrecht & van Horn, 2016). This paper is currently under review for publication in a research topic run by Professor Paul Wong and others in the Frontiers in Psychology journal.

Finally, chapter 12 highlights the impact that this thesis has had thus far, and other related research that has grown from the GENIAL model. From chapter 1, this thesis began having an impact within the wider literature, with the pre-print being cited among movements in wellbeing science towards the inclusion of the natural environment (Lambert, 2020). The proceeding chapters received attention from both scholars in the field and non-academic communities. I was successful in gaining grants throughout my PhD, starting with a scholarship for chapter 5, moving on to a £10,000 grant to run an interdisciplinary wellbeing conference, then securing a £1600 grant for chapter 9, finally securing a £3000 grant to continue my research post-PhD. The work within this thesis now underpins developments in the healthcare and education sectors (Kemp & Fisher, 2022) to promote the wellbeing of people living with chronic conditions (Kemp, Tree, Gracey, & Fisher, 2022) and university student populations (Kemp & Fisher, 2021; Kemp, Mead & Fisher, 2022).

Chapter 3

3. Protectors of Wellbeing During the COVID-19 Pandemic: Key Roles for Gratitude and Tragic Optimism in a UK-Based Cohort

A version of this paper is published in:

Mead, J. P., Fisher, Z., Tree, J., Wong, P., & Kemp, A. H. (2021). Protectors of wellbeing during the COVID-19 pandemic: key roles for gratitude and tragic optimism in a UK-based cohort. *Frontiers in Psychology, 12:647951.* Doi: 10.3389/fpsyg.2021.647951

The results of this paper received attention in the form of two interviews: one with BBC Worklife (appendix A) and another with the podcast "All in the Mind" (appendix B).

The data for this chapter is available on the OSF (appendix F).

Abstract

The COVID-19 pandemic has presented a global threat to physical and mental health worldwide. Research has highlighted adverse impacts of COVID-19 on wellbeing but has yet to offer insights as to how wellbeing may be protected. Inspired by developments in wellbeing science and guided by our own theoretical framework (the GENIAL model), we examined the role of various potentially protective factors in a sample of 138 participants from the United Kingdom. Protective factors included physical activity (i.e., a health behaviour that helps to build psychological wellbeing), tragic optimism (optimism in the face of tragedy), gratitude (a prosocial emotion), social support (the perception or experience of being loved, cared for, and valued by others), and nature connectedness (physical and psychological connection to nature). Initial analysis involved the application of one-sample t-tests, which confirmed that wellbeing (measured by the Warwick-Edinburgh Mental Well-being scale) in the current sample ($N = 138$; $M = 46.08$, $SD = 9.22$) was significantly lower compared to previous samples ($d = -0.36$ and $d = -0.41$). Protective factors were observed to account for up to 50% of variance in wellbeing in a hierarchical linear regression that controlled for a range of sociostructural factors including age, gender, and subjective social status, which impact on wellbeing but lie beyond individual control. Gratitude and tragic optimism emerged as significant contributors to the model. Our results identify key psychological factors that may be harnessed through various positive psychology strategies to mitigate the adverse impacts of hardship and suffering, consistent with an existential positive psychology of suffering.

COVID-19 is a respiratory virus leading to general symptoms such as fever and cough, with more severe cases requiring intubation (Chan et al., 2020; Wang et al., 2020). On March 11th 2020, the World Health Organisation (WHO) declared the COVID-19 outbreak a global pandemic and on March 23rd, the UK government declared a nation-wide lockdown requiring citizens to stay at home. Residents were only permitted to leave their household to shop for basic necessities, to exercise once a day, to tend to medical needs, or to travel for work when working from home was not possible. Since the easing of the first nation-wide lockdown further restrictions had been imposed in the United Kingdom although these differed by locality. As of February 22nd 2021, over 109 million cases had been diagnosed globally with more than 2.3 million fatalities (GOV.UK, 2020). Beyond threat to life, COVID-19 has caused widespread bereavement, self-isolation, loss of income, unemployment as well as delays in treatment for ongoing health conditions as resources are diverted towards managing COVID-19 patients (Spinelli & Pellino, 2020).

Recent publications on the COVID-19 pandemic have raised concerns about the deterioration of mental health (Cullen et al., 2020; Galea et al., 2020; Gunnell et al., 2020; Pfefferbaum & North, 2020; Xiong et al., 2020). The Office for National Statistics (2020) reported a large increase in anxiety and decrease in life satisfaction due to boredom, loneliness, anxiety, and stress during March and April, 2020 (ONS, 2020), representing the first two months of lockdown associated with the COVID-19 pandemic. A significant reduction in wellbeing – measured by the Warwick-Edinburgh Well-being Scale – was observed in a large sample of 12,989 participants from Wales (Gray et al., 2020). Interestingly, researchers have highlighted potentially protective factors against loneliness, including higher levels of social support (*OR*: 0.92), being married or co-habiting (*OR*: 0.35) and living with more adults (*OR*: 0.87; Groarke et al., (2020). Higher levels of community connectedness have also been linked to lower levels of psychological distress (Sibley et al., 2020), highlighting the important influence of the community on an individual level. While this research has improved our understanding of the factors that can protect against ill-being during the pandemic, reducing ill-being is not the same as promoting wellbeing, as wellbeing does not necessarily emerge when illbeing is reduced (Ryff et al., 2006; Westerhof & Keyes, 2010). Furthermore, our own work has shown that wellbeing is possible despite much suffering (Fisher et al., 2020; Tulip et al., 2020; Wilkie et al., 2021). Theoretical developments now emphasise that navigating the challenges of life and experiencing suffering may actually contribute to sustainable wellbeing (Wong, 2020) and post-traumatic

growth (Chan et al., 2016). In addition, researchers have argued for the use of self-guided therapeutic and positive psychological approaches to manage wellbeing during self-isolation and social distancing, including physical activity, savouring positive emotions, and optimising positive social resources (Fischer et al., 2020; Holmes et al., 2020; Yamaguchi et al., 2020). It is therefore important to understand the extent to which positive psychological factors contribute towards wellbeing during a time of great individual and societal suffering. Accordingly, the aim of our study is to better understand the factors that may help to protect and build wellbeing during the COVID-19 pandemic.

The focus on wellbeing during the pandemic is considered within the context of a newer, developing GENIAL model – (Fisher et al., 2020; Kemp et al., 2017; Mead et al., 2019, 2021), a theoretical framework of wellbeing which was originally underpinned by connection to ourselves and to others, with a newer focus being added - connection to the environment within which we live (Mead et al., 2019, 2021). The GENIAL model is a life-course biopsychosocial framework that places individual wellbeing within the context of their social and natural ecologies. The framework encourages reflection on how wellbeing might be improved by targeting features across individual (e.g. positive emotions, and physical health behaviours), community (e.g. social support and connection), and now, the environmental domain (nature connectedness). For the present study, we chose variables – shown in previous work to contribute to wellbeing – from each of these domains. We now briefly review the evidence linking each of these chosen exemplars to wellbeing, providing the rationale for our focus on these factors.

The individual domain of our theoretical framework emphasises a role for positive factors such as optimism and engagement in physical activity, drawing on published evidence demonstrating the impacts of mind *and* body interventions on wellbeing. In regards to 'mind', we focus here on the role of tragic optimism (Wong, 2019) in particular, which is a construct defined as 'optimism in the face of tragedy' and in spite of pain, guilt, and death (the 'tragic triad'). Tragic optimism differs from more traditional optimism as it places an emphasis on hope despite distress and suffering, and therefore has relevance to the experience of living through the ongoing pandemic of COVID-19. Research has shown that daily optimism during the pandemic is positively associated with support from others (Kleiman et al., 2020), demonstrating a link between the positive psychological attribute of optimism and one's capacity for connecting to others. Studies have also reported associations between optimism and multiple health factors, ranging from small to large effects, including quality of

life (r =.37), mental health (r = .21; Auer et al., 2016), and subjective wellbeing (r = .54; Duy & Yıldız, 2019). A meta-analysis further demonstrated a relationship between optimism and coping (Nes & Segerstrom, 2006), such that optimism is associated with coping strategies to manage stress or emotion (r = .17).

In addition to tragic optimism, we also investigate whether the life orientation of gratitude, in which one displays an appreciation generally (McCullough et al., 2002), is benefical for wellbeing. To highlight this point, a recently published meta-analysis of 158 independent samples on more than 100,000 participants concluded that dispositional gratitude is moderately to strongly correlated with well-being (Portocarrero et al., 2020). Importantly, recent work highlighted that higher levels of gratitude early in the pandemic (January – March) predicted lower psychological harm (B = -.239) and higher subjective wellbeing (B = .584) among a small sample (N = 86) a few months later (April – May) (Bono et al., 2020). Individuals with a grateful disposition are more likely to appreciate other people (Gulliford et al., 2013; Ma et al., 2017; McCullough et al., 2001), highlighting a role for gratitude in prosocial behaviour (Ma et al., 2017). In addition, a grateful disposition leads people to appreciate life in general (Wood et al., 2010). Despite different theoretical approaches to gratitude (and their respective measures), all support a higher order gratitude factor relating to a life orientation of gratitude (Wood et al., 2010). As with an optimistic life orientation, one with a grateful life orientation would experience a greater frequency and intensity of gratitude regardless of measure used, as argued by Wood et al. (2008). Wood et al. (2010) highlights that gratitude has been associated with a variety of adaptive personality traits, multiple conceptions of wellbeing, post-traumatic growth and is inversely associated with poor health behaviours and poor mental health.

Further to positive psychological attributes, recent meta-analyses have highlighted a role for positive health behaviours, such as physical activity, for improving wellbeing. For instance, a recent meta-analysis on 157 studies reported a beneficial small effect of physical activity on subjective wellbeing [d = 0.36, 95% CI [0.301, 0.420] (Buecker et al., 2020). Given the extensive barriers to exercise during the pandemic (due to closure of indoor public spaces and restrictions on the number of times allowed to leave the house), researchers have argued that increasing physical activity levels should be prioritised as a treatment target in psychological therapy (Diamond & Waite, 2020). Further research has supported the benefits of physical activity during the pandemic for wellbeing in the UK, with fewer hours of moderate-to-vigorous physical activity per day associated with poorer mental wellbeing (as

measured by the short Warwick-Edinburgh Mental Wellbeing Scale), $OR = 0.82$, 95% CI [0.67-0.98] (Jacob et al., 2020). Physical activity has also been associated with increased levels of psychological wellbeing during the pandemic in Italy (Maugeri et al., 2020), and is the most commonly reported coping behaviour during the pandemic among healthcare workers in New York City (Shechter et al., 2020).

The newer GENIAL model (figure 1) further emphasises a role for community and social ties for wellbeing, a topic that has been labelled 'the new psychology of health' (Haslam et al., 2017). A major protective factor within the community domain is social support, defined as the perception or experience of being loved, cared for, and valued by others. Social support has been shown to be positively related to wellbeing measures, such as life satisfaction ($r = .23$) and personal wellbeing ($r = .34$; Brajša-Žganec et al., 2018). A highly cited meta-analysis of 148 studies reported a 50% increased likelihood of survival for participants with stronger social relationships (indicated by social support; $OR = 1.50$, 95% CI [$1.42 – 1.59$]) (Holt-Lunstad et al., 2010). There is an extensive list of mechanisms through which social support may positively impact on health and wellbeing, including behavioural (e.g. health behaviours), psychological (e.g. quality of life) pathways, and biological pathways (e.g. immune function) (Thoits, 2011; Uchino et al., 2018). As noted earlier, social support has played a vital role in reducing illbeing during the COVID-19 pandemic (Groarke et al., 2020; Sibley et al., 2020). Coping strategies involving social support have proven beneficial for wellbeing during the pandemic for those living in Germany, with emotional support being associated with increased positive affect ($B = .11$) and instrumental support (in the form of advice) being associated with increased life satisfaction ($B = .06$) (Zacher & Rudolph, 2020).

The GENIAL model (figure 1) further highlights a contributing role for the natural environment to wellbeing, an especially important consideration in light of the observed and predicted impacts of anthropogenic climate change (Cook et al., 2016) and potential ecosystem collapse (Future Earth, 2020). Recent work on a population from England demonstrated that a physical and psychological connection to nature, known as 'nature connectedness', contributes to wellbeing and may even play a role in promoting pro-environmental behaviour (Martin et al., 2020). The relationship between nature connection and eudaimonic wellbeing ($r = .24$) as well as hedonic wellbeing ($r = .20$) (Pritchard et al., 2020) is associated with small to medium effect sizes. It has even been argued that connecting people to nature could provide a population-wide strategy for health promotion

(Maller et al., 2006) that may help to tackle health inequities (Allen & Balfour, 2014) while contributing to pro-environmental behaviours (Richardson et al., 2020). Interestingly, research during the pandemic in Canada highlighted that among both active and inactive individuals, those classified as flourishing indicated greater nature relatedness compared to those who scored low on the scale (Lesser & Nienhuis, 2020), therefore indicating that nature connection plays an important role for wellbeing regardless of physical activity levels. Research across 9 countries ($N = 5,218$) highlighted that people believed a view of nature and contact with nature helped buffer the negative effects of lockdown and increased positive emotion (Pouso et al., 2020). The researchers argued that ecosystems provided additional opportunities to mitigate the negative impacts of pandemic-related lockdowns. However, despite research highlighting the benefit of green spaces on wellbeing, research has highlighted a reduction in the use of urban green spaces by respondents in many European countries during the pandemic, compared to pre-pandemic use, possibly due to the lockdown restrictions (Ugolini et al., 2020).

While the above factors are discussed as independent contributors to wellbeing, they are all interrelated and inter-connected components of a wider framework (GENIAL) that may promote each other to some degree (Chen & Kee, 2008; Dadvand et al., 2016; Elavsky et al., 2005; Holt-Lunstad et al., 2010; Kok et al., 2013; Petersen et al., 2019). The nation-wide lockdown associated with the COVID-19 pandemic in the UK provided a unique opportunity to explore the impact on and contributors to wellbeing during a time of great suffering, the focus of Second Wave Positive Psychology (PP 2.0), also described as existential positive psychology (Wong, in press.;Wong et al., 2020). Our study sought to test several predictions. First, it was predicted that wellbeing would be significantly lower than that reported in surveys on UK samples prior to COVID-19 – consistent with recent research (Gray et al., 2020) – providing a platform on which results from additional analysis would be interpreted. Second, we predicted that physical activity, gratitude, tragic optimism, social support, and nature connection would act to protect wellbeing during the pandemic, over and above the impacts of sociostructural factors including age, gender, and subjective social status, providing support the newer inter-disciplinary GENIAL framework (figure 1).

Method

Participants

A total of 138 UK residents participated voluntarily in this study, including 109 females and 29 males, with a mean age of 33.32 (SD = 13.32), ranging from 18- to 68-years. Participants were recruited via advertisements on social media platforms and an internal departmental advertisement site. The research protocol was considered and approved by the Department of Psychology ethics committee at Swansea University (approval number: 2020-3862-2832).

Measures

At the time this study was carried out, it was not clear how long the lockdown would remain in place. Limitations were therefore imposed on the length of chosen measures to ensure that the time taken to complete the survey maximised potential recruitment and minimised potential attrition. The measures that were discussed in chapter 2 were utilised, these being the measure of physical activity, tragic optimism, gratitude, social support, and nature connection. Along with the control measures – SSS, age, and gender.

Physical Activity

A single item was used to measure physical activity in which participants were asked how physically active they had been on a 5-point Likert-type scale from a value of 1 (not at all active) to 5 (extremely active) during the previous 2 weeks. A single item to measure physical activity has several advantages including brevity and parsimony, and has been shown to be both reliable and valid (Schechtman et al., 1991; Milton et al., 2011; Gill et al., 2012; Portegijs et al., 2017; O'Halloran et al., 2020).

Gratitude

The Gratitude Questionnaire-Six-Item Form (GQ-6) (McCullough et al., 2002) is a six-item questionnaire based on a Likert scale from 1 (strongly disagree) to 7 (strongly agree). Items 3 and 6 are reversed scored, after which all scores are then added to obtain a total score out of 42. The GQ-6 has relatively high internal consistency (Cronbach's alpha ranging from 0.76 to 0.87), convergent validity $(r = 0.33, p < 0.01$; McCullough et al., 2002) and temporal validity $(r = 0.59$ and 0.73 for two samples; Wood et al., 2008b). Discriminant validity was indicated by factorial independence of the GQ-6 from measures of related constructs, these being life satisfaction $(r = 0.53)$, vitality $(r = 0.46)$, happiness $(r = 0.50)$, tragic optimism $(r = 0.51)$, and hope $(r = 0.67$; McCullough et al., 2002).

Tragic Optimism

The Life Acceptance Measure (LAM; Wong, 2019a) is a new 9-item measure with statements on a 5-point Likert scale (1 being strongly disagree and 5 being strongly agree), with a Cronbach's alpha score of $a = 0.82$. The scores are added, and a total is obtained. The maximum score is a total of 45.

Social Support

The Multidimensional Scale of Perceived Social Support (MSPSS) is a 12-item scale designed to measure perceived social support from family, friends, and a "special person" (Zimet et al., 1988). The measure uses a 7-point Likert scale, ranging from 1 (very strongly disagree) to 7 (very strongly agree). Scores are added and a total is obtained with a maximum score of 84. The scale has good internal reliability, with Cronbach's alpha ranging from 0.84 to 0.92, and has moderate to strong factorial validity and construct validity (Zimet et al., 1988, 1990).

Nature Connection

Previous questionnaires have focused on either contact with (Largo-Wight et al., 2011) or connection to nature (Mayer and Frantz, 2004; Nisbet and Zelenski, 2013). We argue that both are important for wellbeing, but inclusion of multiple existing measures would lengthen our survey unnecessarily. Accordingly, and for brevity, a new measure named "Nature Connection" was created, to measure physical as well as psychological connection to nature. The statements are (1) "I feel I spend enough time in nature," (2) "I wish I could spend more time in nature," (3) "I feel disconnected from nature," and (4) "I am often immersed in nature." Responses ranged from 1 (strongly disagree) to 5 (strongly agree). Respondents were informed that the term nature referred to green spaces (such as parks, forests, gardens, fields) and blue spaces (such as lakes, rivers, the sea) and were asked to respond based on their experiences during the past 2 weeks. Cronbach's alpha indicated that statement 2 needed removing (as this statement was reducing the reliability), leading to a three-item measure relating to nature connectedness. Following removal of this item, Cronbach's alpha increased from 0.719 to 0.777. A summary measure is calculated by reverse scoring item 3, after which all items are added together, providing a total score out of 15.

Wellbeing

The Warwick-Edinburgh Mental Well-being Scale (WEMWBS) is a positively worded 14-item measure on a 5-point Likert scale (1-5) that measures subjective and

psychological wellbeing (Tennant et al., 2007). Prior research has indicated a Cronbach's alpha score of 0.89 (student sample) and 0.91 (population sample) and correlations with other measures of mental health and wellbeing indicate convergent validity (Tennant et al., 2007). Authors also noted that test-retest reliability was 0.83, 1 week between assessments. Item scores were added to produce a total score. The maximum score is a total of 70. Data collected for this study was compared with data reported in the 2018 Scottish Health Survey ($N = 4,810$ adults) (Cheong et al., 2018), and the Health Survey for England 2016 ($N = 8,011$; Morris and Earl, 2017).

Covariates

Covariates included subjective social status (SSS), age, and gender, all of which influence wellbeing (World Health Organisation Calouste Gulbenkian Foundation, 2014). The MacArthur Scale of Subjective Social Status (SSS) is a measure of subjective social status relating to socioeconomic position (Adler et al., 2000) with greater sensitivity for assessing SES, compared to questions on income and/or education level. The MacArthur Scale of SSS has previously predicted health and wellbeing better than objective measures of SES (Singh-Manoux et al., 2005).

Design & Procedure

Using a cross-sectional design, data collection commenced on 8th April 2020, 16 days after lockdown was introduced in the UK, and ceased on 23rd May 2020, lasting 45 days. Participants accessed an anonymous online link to the questionnaire, hosted on the Qualtrics platform. Participants were informed of questionnaire content and consent was provided via a tick box, prior to questionnaire completion. The first part of the questionnaire focused on demographic items and subjective physical activity, after which respondents were presented with remaining measures in random order, asking them to reflect on their experiences during the preceding two-week period.

Statistical Analysis Method

Of the exported data from Qualtrics ($N = 220$), those who did not proceed beyond the information sheet ($N = 13$), who did not provide age ($N = 25$), who provided age but were under 18 years old ($N = 3$), who were not from the UK ($N = 28$), who did not provide SSS ($N = 3$), and who had at least one value missing from the wellbeing measure ($N = 9$) were removed. In addition, one participant was flagged for completing the questionnaire in a short

period of time (304 seconds). Upon inspection, they were suspected of satisficing (more specifically, straight-lining), and were therefore removed. This resulted in 138 participants for the demographic information and one sample t-test. Further participants were removed for the regression if they had at least one missing value in any of the measures included in the analysis ($N = 15$), resulting in 123 participants.

Statistical tests were conducted using SPSS and JASP. One-sample t-tests were carried out to compare the wellbeing data with previous UK-based samples. For the regression, SSS and physical activity were converted into dummy variables. For SSS, "low" was determined as a score of 0-4, "middle" was determined as a score of 5 or 6, and "high" was determined as a score of 7-10. For physical activity, a score of 1 or 2 was classed as "low", 3 was classed as "moderate", and 4 or 5 was classed as "high". The reference variable for SSS and physical activity was "low SSS" and "low physical activity", respectively. A two-step, hierarchal, linear regression was conducted using the enter method to determine whether predictor variables significantly protected wellbeing during the lockdown, while controlling for age, gender, and subjective SSS. The first step of the model included age, gender, and subjective SSS, as those variables are key influencers of wellbeing lying beyond the individual control. The protective factors were collectively added in the second step, consistent with the GENIAL model, which characterises three overlapping and interacting domains to protect wellbeing (including individual, community, and environment domains). Effect sizes (d and r) and Bayes factors are reported to illustrate the size of the effect and degree of support for the null and alternative hypothesis. Effect sizes are described as either small ($d = 0.2$, $r = 0.1$), medium ($d = 0.5$, $r = 0.3$), or large ($d = 0.8$, $r = 0.5$) based on benchmarks suggested by Cohen (1988). Bayes factors were determined using the Summary Statistics module in JASP version 0.13.1 (Ly et al., 2018). A classification scheme for interpreting Bayes Factors (Jeffreys, 1961; M. Lee & Wagenmakers, 2013; Wagenmakers et al., 2018) is used such that values of 1 to 3 correspond with anecdotal evidence, values of 3 to 10 as moderate evidence, values of 10 to 30 as very strong evidence, while values exceeding 100 reflect extreme evidence in support of the null (BF_{01}) or alternative (BF_{10}) hypothesis.

Results

Descriptive statistics

The characteristics of the sample ($N = 138$) are presented in table 3.

Table 4

Characteristics of Sample

Characteristics	Category	N
Gender	Female	109
	Male	29
Age	18-27	64
	28-37	30
	38-47	14
	48-57	21
	58-68	9
Subjective Social Status	0-4	25
	5-6	53
	7-10	60
The presence of a physical health condition	Yes	26
	No	110
	Did not answer	2
The presence of a mental health condition	Yes	22
	No	114
	Did not answer	2
The presence of COVID-19 symptoms	Yes	8
	No	130
Physical Health	Poor	6
	Fair	30
	Good	46
	Very Good	41

	Excellent	15
Mental Health	Poor	13
	Fair	42
	Good	49
	Very Good	25
	Excellent	9

Comparison of current sample to a sample from the UK

A one-sample t-test was performed, comparing data from 138 participants with that from a Scottish general population sample from 2018 ($N = 4,810$ adults) (Cheong et al., 2018). Results highlighted a significant difference in wellbeing between the current ($M = 46.08$, SD = 9.08) and previously published sample [($M = 49.4$, SD = 8.96), $t(137) = -4.23$, $p = .000$, $BF_{10} = 362.64$] representing a small to medium effect size ($d = 0.36$) (Cohen, 1988), The average wellbeing score of the current sample was 3.32 points less than the general population sample from 2018. Comparing our sample with another from the 2016 study from England ($M = 49.9$) (Morris & Earl, 2017), results again indicated a significant reduction in our current sample [$t(137) = -4.87$, $p = .000$; $d = 0.41$, $BF_{10} = 4295.42$].

Predicting wellbeing

A hierarchical, linear regression was performed using data from 123 participants. There assumptions linearity was met, and multicollinearity was not a concern. The outcome variable was normally distributed, and inspection of the residuals highlighted that the data was homoscedastic. In addition, the data contained no outliers and the assumption of independent errors and non-zero variances was met. See supplementary material for more information.

With all assumptions met, a two-step, multiple, hierarchical, linear regression was conducted to see if physical activity, gratitude, tragic optimism, social support, and nature connection predicted wellbeing, after controlling for age, gender, and SSS. The descriptive statistics and correlations are provided in table 4 and table 5 below.

Table 5

Mean and Standard Deviation of Variables

Measure	Mean	Standard Deviation
Wellbeing	45.83	8.84
Physical Activity	3.10	1.04
Gratitude	33.38	6.43
Tragic Optimism	34.00	5.26
Social Support	64.82	14.40
Nature Connection	9.86	3.08

Table 6

Zero-order Correlations Amongst Wellbeing Variables

	Wellbeing	Physical Activity	Gratitude	Tragic Optimism	Social Support	Nature Connection
Wellbeing	1.00	.31**	.63**	.54**	.46**	.35**
Physical Activity	.31**	1.00	.30**	.13	.23**	.39**
Gratitude	.63**	.30**	1.00	.52**	.45**	.26**
Tragic Optimism	.54**	.13	.52**	1.00	.39**	.33**
Social Support	.46**	.23**	.45**	.39**	1.00	.18*
Nature Connection	.35**	.39**	.26**	.33**	.18*	1.00

* $p < .05$

** $p < .01$

Results from the first block, which contained the control variables only (age, sex, SSS) were significant, $F_{(4,118)} = 2.62$, $p = .038$, $R^2 = .08$, R^2 Adjusted = .05. However, SSS was the only variable to significantly contribute toward this model. The addition of the predictor variables (block 2) significantly improved the model, F change $(6,112) = 18.35$, $p < .000$, R^2 Change = .46, $R^2 = .54$, R^2 Adjusted = .5, $BF_{10} = 3.041e+12$. Inspection of the Bayes

Factor revealed extreme evidence for the full model relative to that with only control variables. Gratitude and tragic optimism were the only variables to contribute significantly to the model. No other predictor and control variables contributed significantly to the model. The results from the t-tests are presented below. Inspection of the standardised beta values highlighted that gratitude was the most influential variable in the model.

Table 7

Results From the Regression

	t	p value	Standardised Beta value
Gratitude	4.55	.000	.38
Tragic Optimism	2.73	.007	.22
Social Support	1.88	.063	.14
Nature Connection	1.43	.155	.11
Physical Activity (moderate)	.86	.393	.07
Physical Activity (high)	1.15	.252	.10

Discussion

The aim of the present study was to examine the contributions of exemplars from the three GENIAL domains – individual, community, and environment - to a reliable and valid measure of wellbeing during the COVID-19 pandemic. We also sought to determine whether wellbeing of participants during the COVID-19 lockdown was less than that reported by other studies from the United Kingdom prior to the emergence of COVID-19 to help contextualise reported findings. As expected, we reported a significant reduction in wellbeing in our UK-based sample compared with prior samples, findings associated with a small to medium effect size. This is consistent with other research showing reductions in wellbeing in larger samples during the pandemic (Gray et al., 2020). We further observed that the predictors accounted for up to 50% of the variance in wellbeing, in a full regression model, an especially strong finding in psychological science. Key roles of tragic optimism and gratitude emerged as significant predictors of wellbeing during a time of great suffering, core characteristics of existential positive psychology (PP2.0) (Wong et al., 2020; Wong, 2011; Wong, 2019).

We show here that both gratitude and optimism significantly contribute to wellbeing over and above sociostructural factors of age, sex and subjective social status and other protective factors that were included in the model. Gratitude and optimism were identified as key positive psychological attributes contributing to wellbeing. These factors reflect a 'life orientation' in which one displays general appreciation and is hopeful for their future. Data from meta-analyses and epidemiology provide insights as to the extent of the positive impacts of gratitude and optimism. As highlighted previously, gratitude correlates with various types of wellbeing (Portocarrero et al., 2020), including emotional (such as quality of life, life satisfaction, and flourishing) and social (such as positive relationships and prosocial behaviour) wellbeing (Jans-Beken et al., 2020). The positive impact of gratitude also likely contributes to longevity, not only through different types of wellbeing, but also by reducing psychopathology (Jans-Beken et al., 2020) and improving cardiovascular health (Cousin et al., 2020), among other potential pathways. Regarding optimism, a study on two epidemiologic cohorts of people reported a dose-dependent association of higher optimism levels at baseline with increased longevity (Lee et al., 2019). Specifically, those with the highest versus lowest optimism levels had 1.5 (women) and 1.7 (men) greater odds of surviving to the age of 85 years, after adjusting for demographic and health conditions findings associated with what was described as 'exceptional longevity'. Research has also highlighted that these factors can protect wellbeing during extremely distressing experiences. For example, optimism can mitigate the influence of negative and traumatic life events on suicide ideation (Hirsch et al., 2009). In the field of second wave positive psychology, tragic optimism and existential gratitude are critical components of a positive psychology of suffering (Wong, 2019) and are essential for aiding survival and growth during adversity and trauma (Wong, 2020). Tragic optimism may provide a conceptual roadmap for clinicians to help trauma survivors accept their experiences, and affirm meaningful and virtuous aspects of their lives (Leung (2019). As such, it has been argued that tragic optimism and existential gratitude are needed during COVID-19 and post-pandemic world (Uppal, 2020; Wong, 2020).

We therefore advocate for the adoption of strategies to promote the experience of gratitude and tragic optimism, through, for example, the "three good things" activity (Lai, 2017) and finding meaning from adverse experiences in order to cultivate a tragically optimistic outlook (Leung, 2019). Gratitude and optimism can enhance connectedness to oneself, others and the natural environment (Bono & Sender, 2018; Brissette et al., 2002). For

example, research has highlighted that gratitude directly fosters perceived social support (Wood et al., 2008) and may even enhance the positive impact of social support on psychological wellbeing (Deichert et al., 2019). Social support may also be a key route through which the health benefits of optimism may arise (Brissette et al., 2002; Scheier & Carver, 1987). The emotion of gratitude has even been considered to play a role in connecting individuals to the natural environment (Petersen et al., 2019). It is possible therefore that the lack of significant contribution to the regression model by protective factors other than gratitude and optimism is attributable to the inter-relationships between measured variables in the context of lockdown.

Interestingly, physical activity, social support and nature connection contributed to the regression model in terms of variation in wellbeing (evident by zero-order correlations and beta values), however, they did not independently contribute to the model over above the contributions of gratitude and tragic optimism. Further work is needed to explore potential inter-relationships among potentially protective factors, guided by new theoretical frameworks such as the GENIAL model that seek to broaden understanding of the complex construct of wellbeing by expanding focus beyond the individual to issues relating to community, the natural environment and other sociostructural factors, consistent with a systems informed positive psychology (Kern et al., 2019). Some initial work in this area has demonstrated that social support and physical activity partly mediate the relationship between nature exposure and health (Dadvand et al., 2016). Another study conducted during the pandemic – in Bulgaria – reported that the positive mental health effects of outdoor green space were partially mediated by social support (Dzhambov et al., 2020). It is therefore possible that nature may have provided a context within which social support and physical activity was experienced during lockdown.

Several limitations of the present study are worth noting. The first limitation concerns the context within which the research was conducted, by which we refer to the regulations and restrictions associated with UK lockdown. It remains to be determined as to whether results are replicable in countries where lockdown was either more restrictive or relaxed. Another limitation was restricting the number of measures within each of the broad domains. Ideally, we would have measured additional factors known to influence of wellbeing guided by theory (e.g. diet, sleep, meaning and purpose, social capital, cohesion, active hope and sustainable behaviour) across each of the three domains to highlight the importance of a greater variety of factors that are vital for protecting wellbeing. However, at present, there is

no measure that encompasses all these variables, and it was not feasible, nor practical, to administer multiple additional measures. Instead, we chose exemplars from across the core domains guided by findings from influential meta-analyses (Davis et al., 2015; Holt-Lunstad et al., 2010; Nes & Segerstrom, 2006; Pritchard et al., 2020; Wiese et al., 2018). Regarding the cross-sectional nature of the study, we are not able to draw conclusions relating to causal direction. Based on the literature discussed in chapter 1, we argue that it is likely that gratitude and tragic optimism contributes to wellbeing, however, as with several positive psychological factors and wellbeing, this relationship is likely to be bi-directional. In line with the ethos of Bronfenbrenner's Ecological model (1977) of reciprocal interactions between various systems, the GENIAL model argues for multi-directional interactions between different domains of the model and wellbeing. However, the aim of this thesis is to provide a basis for the GENIAL model to contribute towards wellbeing, thus, the theoretical underpinnings and analyses are focused on this pathway for purposes of applying the theory in practice to increase wellbeing.

Additionally, the data does not control for the presence of mental illness. Whilst it is acknowledged that wellbeing and distress are not extreme ends of a single spectrum, they do correlate highly, influencing one another (Iasiello & Agteren, 2020). Replications of this study would benefit from controlling for common mental health symptoms (such as depression and anxiety). A final limitation concerns the gender disparity in the sample, with a relatively larger number of women (n = 109) than men (n = 29). While gender was a control variable in our study, researchers have raised the concern of a gender wellbeing gap, one that is consistent across countries, time, and various measures, whilst also accounting for influential variables such as age (Blanchflower & Bryson, 2023). Further research on a larger sample with more equal proportion of males and females would be able to determine the extent to which the findings reported here are replicable and generalisable. Additionally, whilst it was not possible with the current sample, future research would benefit from using gender as a variable of interest, as opposed to simply controlling for this variable. Gender is an important social determinant of health and is highlighted as a focus within the sustainable development goals (SDGs; a topic discussed in chapter 11; Manandhar et al., 2018). Thus, it would be beneficial for future research to investigate gender differences in the pathways to wellbeing.

To our knowledge this is the first study to investigate the collective contribution of factors across three broad domains relevant to the complex construct of wellbeing. The present study is also the first empirical research to support the importance of existential positive psychology (PP2.0) involving the acceptance of suffering through tragic optimism and gratitude. Our findings therefore provide support to proposals (Fischer, Karl, et al., 2020; Holmes et al., 2020; Yamaguchi et al., 2020) that recommend the application of positive psychological approaches targeting gratitude and tragic optimism – in particular – in order to manage wellbeing during self-isolation and periods of adversity. A move towards more holistic models of health that involves building wellbeing – rather than the reduction of illbeing – is necessary for promoting population wellbeing during the pandemic and beyond. Such an approach is necessary to prepare for a post-pandemic world, considering that life is often characterised by tragedy, adversity and suffering (Ivtzan et al., 2016).

Chapter 4

4: From Wellbeing During Suffering, to Post-Traumatic Growth

The previous chapter attempted to provide evidence to indicate the importance of the three domains of the GENIAL model – individual, community, and environment. A multiple linear regression was utilised on a UK-based sample soon into the COVID-19 pandemic. Interestingly, only gratitude and tragic optimism, both part of 'balanced minds', emerged as significant contributors to wellbeing. One argument for these findings could be due to the remaining three factors merging in the pathways through which they are experienced, a consequence directly related to the context of the pandemic. For example, during lockdown restrictions it was possible that a common route through which one may be physically active and/or receive social support was in a nature-based setting (i.e. outdoors). Given these merging pathways, it could be likely that each factor accounts for the same variance in wellbeing and, thus, not emerge as significant in the model. However, despite the finding not fully supporting the hypothesis, this study contributes to an already existing research base supporting the benefits of gratitude for wellbeing (Portacarrero et al., 2020). In addition, the study is the first to document the relationship between tragic optimism and wellbeing during the COVID-19 pandemic, contributing to a relatively small research base. The fundamental basis of tragic optimism is the ability to remain optimistic in the face of tragedy, not through avoidance or denial, but rather acceptance of the tragic triad (Wong, 2019). This raises important questions about the role of wellbeing in the face of tragedy, leading onto the topic of post-traumatic growth – a key concept in existential positive psychology and adapting to trauma.

A key theoretical development for wellbeing is that suffering can be cultivated into growth, and thus, emotions and experiences that are traditionally thought of as 'negative' are not wholeheartedly so - a common theme in second wave positive psychology and existential positive psychology, as previously discussed. To address this question, the next chapter replicates the previous study, with a new sample and the added measure of post-traumatic growth (PTG; the ability to grow from adversity and trauma). If the key exemplars of the newer GENIAL model could predict PTG, this would provide initial evidence that the model is sustainable throughout life's inevitable adversity and suffering. Additionally, I propose that increases in the five predictors would lead to increased PTG, which would subsequently

increase wellbeing. The next chapter addresses these questions on a UK-based sample, over 6 months into the pandemic and associated lockdown restrictions, utilising a mediation analysis.

Chapter 5

5. Pathways to Post-Traumatic Growth and Wellbeing During the COVID-19 Pandemic

A version of this chapter is published in:

Mead, J. P., Playfoot, D., Fisher, Z., Tree, J., & Kemp, A. H. (2022). Pathways to post-traumatic growth and wellbeing during the COVID-19 pandemic: findings from a UK-based sample. *International Journal of Existential Positive Psychology. Special Issue: Proceedings of the 2021 Meaning Conference 2022, 11.*

This paper also won a scholarship and was presented at the International Meaning Conference.

The data for this chapter are available on the OSF (appendix G).

Abstract

COVID-19 presented a major societal challenge including threat to life, bereavement, self-isolation, loss of income and significant psychological distress. Yet, it is possible that such suffering may also lead to post-traumatic growth (PTG) and subsequent wellbeing. The current study aimed to investigate the contributors to PTG and whether PTG mediated their relationship with wellbeing, measured using the Warwick-Edinburgh Mental Well-being Scale. In a cross-sectional sample of 136 participants (mean age = 30.52; SD = 13.80), a hierarchical regression and mediation analysis was conducted, focusing on physical activity, gratitude, tragic optimism, social support, and nature connection, guided by our recently published 'GENIAL' framework (Mead, Fisher, & Kemp, 2021). The regression analysis highlighted that our variables predicted up to 18% of the variance in PTG, whilst controlling for age, gender and subjective social status, with gratitude and nature connection being key predictors – indicating the importance of these factors over and above previously reported contributors to PTG, such as social support. Our findings provide new evidence on the drivers of PTG and raise important questions concerning the relationship between the related constructs of PTG and wellbeing. Limitations and suggestions for future research are discussed.

The COVID-19 pandemic has had considerable adverse impacts on mental health (Phiri et al., 2021), even for those not directly impacted by the virus (e.g. lockdown) (Bridgland et al., 2021). It is interesting therefore to consider these experiences in regard to second wave positive psychology, which emphasises the importance of adversity in life (Ivtzan et al., 2016) and capacity to accept and transcend suffering for sustained wellbeing (Wong, 2019a; Wong, Mayer, Arslan, 2021).

A limitation of wellbeing science that has been previously discussed is the lack of acknowledgement of suffering and adversity for wellbeing, or it is talked about in means of impeding wellbeing. This issue is highlighted well among the most utilised wellbeing models, such as the PERMA model (which advocates for an increase in positive emotion and does not acknowledge negative emotions) and eudaimonic wellbeing models (which argues for the reduction in negative affect). Whilst it is understood that pathologies are not the desired outcome, not all suffering is a sign of pathology, thus, it is important to understand when negative emotions and experiences could serve as a foundation for growth and contribute towards wellbeing. Arguments have been made for a more nuanced perspective on wellbeing, one that integrates suffering. For example, Kaftanski and Hanson (2022) highlights how suffering can be the basis for meaning in life and authenticity, key aspects of wellbeing. Meaning in life is a valuable contributor to health and wellbeing (Steger, 2009) and can act as a mediator between the relationship between suffering and wellbeing (Edwards & van Tongeren, 2020). A similar ethos can be found from the work of Viktor Frankl, the creator of the term 'tragic optimism' and author of "Man's Search for Meaning" (Frankl, 1984). Similarly, living an authentic life is a contributor towards wellbeing, however, authenticity requires the individual to face and accept limitations, a process that would not traditionally be considered 'positive' (Kaftanski & Hanson, 2022).

Wong (2012) noted that "every positive or negative [emotion] contains a seed of its opposite," an idea exemplified perhaps in the construct of post-traumatic growth (PTG), defined as positive psychological change resulting from challenging life circumstances that leads to higher levels of functioning (Tedeschi & Calhoun, 2004). The authors argue that post-traumatic growth occurs in five domains of life, including 1) an appreciation for life and an altered sense of priorities, 2) intimate and meaningful social relationships, 3) personal strengths (a belief in one's own capabilities), 4) spirituality, and 5) a recognition of new possibilities in life. The purpose of the current study was to investigate the potential contributors and facilitators of PTG associated with COVID-19.

Using the Post-Traumatic Growth Inventory (Tedeschi & Calhoun, 1996), several studies have reported the experience of PTG among a range of populations, including brain injury survivors (Baseotto et al., 2020), women with breast cancer (Soo & Sherman, 2015), and campus shooting survivors (Vieselmeyer et al., 2017). PTG can be a mark of healthy coping and recovery from trauma and has been associated with improved wellbeing (Grace et al., 2015; Mostarac & Brajković, 2021). Veronese et al. (2017) reported that whilst trauma negatively impacts on wellbeing, the experience of PTG over time reduces this negative impact by approximately 10%. In a meta-analytic review, Helgeson et al. (2006) reported a medium effect size of .22 [95% CI .18-.25] from a total of 17 studies (N = 2,268) when analysing the relationship between wellbeing (as measured by positive affect, self-esteem, and life satisfaction) and PTG. Interestingly, this relationship strengthened over time, with an effect size of .13 for studies focused on trauma in the preceding 24 months, and an effect size of .28 for studies focused on trauma over 24 months ago. Overall, the experience of PTG after trauma appears to play a role in protecting and/or building post-trauma wellbeing, with this strengthening over time. Although it is worth noting that PTG is not a certain outcome after trauma, with many people experiencing low or minimal PTG (Wu et al., 2019).

Reports are already emerging regarding the experience of PTG as a result of the COVID-19 pandemic (Cui et al., 2021; Koliouli & Canellopoulos, 2021; Vazquez et al., 2021). However, knowledge about how PTG is facilitated requires attention. There is an abundance of research focusing on pathways to wellbeing (see chapter 1), though more research remains to be conducted on how PTG might be facilitated. Furthermore, there is very little work on whether such facilitators of PTG might subsequently contribute to the experience of wellbeing via PTG.

The design of the current study is a replication of the previous study (chapter 3), building on the newer developments of the GENIAL model - with key developments emphasising individual, community and environmental pathways to wellbeing (Fisher et al., 2020; Kemp et al., 2017; Kemp & Fisher, in press.; Mead et al., 2019; Mead, Fisher, & Kemp, 2021; Tulip et al., 2020). We have drawn upon the same key exemplars within the three core domains of the model – physical activity, tragic optimism, gratitude, social support, and nature connection (Mead et al., 2021), with a focus on facilitating PTG. The previous study highlighted predictors of wellbeing – including gratitude and tragic optimism – which accounted for up to 50% of the variance in wellbeing (Mead et al., 2021). Our framework may also be relevant for the construct of PTG, which may partially mediate the relationship between contributors to wellbeing and the experience of it. We now discuss the

potential role of each chosen contributor to wellbeing in facilitating PTG, including physical activity, gratitude, tragic optimism, social support, and nature connection.

Physical Activity as an Exemplar of Positive Health Behaviours

A recent meta-analysis of 32 studies reported a small, positive association between physical activity and PTG (average correlation = 0.12; 95% [.071 to .168]; (Chen et al., 2020). While this correlation is not strong, small-scale effects have the potential to elicit large health effects at a population level (Matthay et al., 2021). Four routes were discussed through which physical activity might facilitate PTG (Chen et al., 2020). The first process concerned changes in perceptions of the self through opportunities to develop mastery experiences, a sense of control, and self-empowerment. The second process was that of social experiences, as physical activity provided an opportunity to increase social networks and gain meaningful relationships which brings with it a sense of belonging and social support. The third process was philosophical re-evaluation, as physical activity facilitated the meaning-making process after trauma, allowing for re-evaluation of stressful events and life in general promoting spirituality. The fourth process related to physical and mental health benefits, subsequently helping to facilitate PTG. However, it is important to note that the experience of PTG itself can lead to increases in physical activity (Chen et al., 2020), highlighting a bi-directional relationship between PTG and physical activity. Overall, physical activity is associated with many of the processes of PTG, including improved cognition, emotional resilience, and social connectedness (Tedeschi & Calhoun, 2004).

Gratitude and Tragic Optimism as Exemplars of a Balanced Mind

As part of the GENIAL 'individual domain', we draw upon two key exemplars for a balanced mind – gratitude, reflecting a life orientation of general appreciation (Wood et al., 2010), and optimism, reflecting a life orientation of positive future expectancies (Carver & Scheier, 2014). In this paper, we will focus on the existential version of optimism, referred to as tragic optimism (Frankl, 1984; Mead et al., 2021; Wong et al., 2002). Gratitude has been shown to provide a protective mechanism after trauma (Vieselmeyer et al., 2017), likely due to 'deliberate rumination', referring to the cognitive effort that grateful people exert when assessing their life circumstances (Chun & Lee, 2013; Kim & Bae, 2019) and subsequent positive reappraisal (Cárdenas Castro et al., 2019). Interestingly, a cross-lagged model

highlighted that gratitude may facilitate PTG, although the experience of PTG does not subsequently increase levels of gratitude (Zhou & Wu, 2015). Gratitude can also positively impact on other factors that facilitate PTG, including the development and maintenance of social relationships (Algoe et al., 2020; Tedeschi & Calhoun, 2004). During the pandemic, gratitude appeared to have protected against negative mental health, bolstered positive emotions and widened the perceptual field of opportunities and appreciation (Waters et al., 2021).

In a similar manner to gratitude, optimism can facilitate PTG through its influence on cognitive processing. Optimism increases the likelihood of problem-focused coping which subsequently facilitates PTG through deliberate rumination (Yang & Ha, 2019). Overall, there is a strong indication that optimism has the potential to increase the likelihood of PTG after trauma, as highlighted by a meta-analytic review ($k = 27$, N = 4,794), which reported an effect size of $g = .23$ [95% CI .18 - .29] for the association between optimism and PTG (Prati & Pietrantoni, 2009). For the current study, tragic optimism is particularly important for facilitating PTG as it helps to overcome the criticism that PTG has a self-deceptive side, as is suggested by the Janus face model (Maercker & Zoellner, 2004). This criticism relates to the illusion that one convinces themselves of positive outcomes that are not necessarily there (a positive illusion; Taylor., 1983), suggesting that PTG may be unrealistically optimistic. By contrast, tragic optimism overcomes 'toxic positivity', by retaining the beauty of optimism while accepting hardship and suffering (Volpe, 2021). Tragic optimism is underpinned by the acceptance of life's adversities and finding meaning in them (Frankl, 1984). Interestingly, evidence has highlighted the importance of both acceptance coping and meaning-making processes in facilitating PTG (Jordan et al., 2020; Prati & Pietrantoni, 2009; Wang et al., 2016; Zeligman et al., 2018).

Social Support as an Exemplar of the Community Domain

One of the five domains comprising PTG is social support, as meaningful and intimate social relationships play a key role in facilitating PTG (Tedeschi & Calhoun, 2004). The importance of social support is highlighted by a meta-analysis which reported a small effect size of $g = .26$ for the relationship between social support and PTG ($k = 46$, N = 5,876; (Prati & Pietrantoni, 2009). While according to Cohen's conventions this effect size is small, such effects may still trigger large effects over time (i.e. "small sparks start big fires"), as previously noted (Matthay et al., 2021). Given the extent and scale of the impacts that

COVID-19 has had, a small effect of social support could feasibly lead to PTG that has an important population-wide impact. Interestingly, a study in China highlighted that levels of social support following an earthquake significantly predicted subsequent PTG, but not vice versa (Jia et al., 2017), suggesting a unidirectional pathway. One route through which social support facilitates PTG is through adaptive coping (Cao et al., 2018), a broad term that covers various coping strategies that are beneficial after trauma, including acceptance coping (linked to tragic optimism), active coping, positive reframing (linked to positive reappraisals and gratitude) and planning. Structural equation modelling (Cao et al., 2018) has also highlighted a mediating role that adaptive coping plays in the relationship between social support and PTG (N = 201). The authors concluded that both internal factors, such as cognitive reappraisals, and external factors, such as social support, are necessary facilitators for PTG. For this study, we drew focus on social support as an exemplar of the community domain in the GENIAL model, but acknowledge that other factors (trust, reciprocity, and identification) relevant to the community domain may also facilitate PTG (Nie et al., 2021).

Nature Connection as Part of the Environment Domain

The therapeutic aspects of nature are increasingly acknowledged. For example, Kuo (2015) highlighted 21 pathways through which nature can impact on health and wellbeing, including environmental factors, physiological and psychological states, and behaviour. While the relationship between the natural environment and PTG lacks definitive research, available evidence suggests that nature may contribute to PTG. For example, recent qualitative research (Wilkie et al., 2021) highlighted that re-connecting to nature may have contributed to the emergence of PTG in people living with acquired brain injury. Nature-based therapies have also proven useful in treating patients with PTSD, with one literature review noting a range of benefits such as a reduction in PTSD symptoms, an increase in sense of control over their symptoms, and increased quality of life and hope (Varning Poulsen, 2017). Although the review does not explicitly refer to the impact of nature-based therapies on PTG, the use of nature-based therapies has been proposed to facilitate PTG in veterans (Wise, 2015). We hope to build on the limited research in this area, providing evidence for the capacity of nature to facilitate PTG during the COVID pandemic.

Study Aims

The aim of this study was to highlight the collective influence of multiple potential contributors to PTG, focusing on physical activity, gratitude, tragic optimism, social support, and nature connection, guided by our key theoretical framework which links these factors to wellbeing (Fisher et al., 2020; Kemp & Fisher, in press.; Mead et al., 2019; Mead, Fisher, Tree, et al., 2021; Tulip et al., 2020). Our previous study highlighted the collective contribution of these factors on wellbeing (Mead, Fisher, & Kemp, 2021). Here, we also sought to determine whether PTG mediated the association between those contributing factors and wellbeing.

Methods

Participants

Our UK-based sample is comprised of 136 participants (a new data set, further into the pandemic compared to the previous study), aged 18 to 69-years (M = 30.52; SD = 13.80) and included 109 females and 27 males. Data was collected between November 16th 2020 and February 3rd 2021 during a government-imposed national lockdown associated with the COVID-19 pandemic.

Measures

Physical Activity

A single item was used to measure physical activity in which participants were asked how physically active they had been on a 5-point Likert-type scale from a value of 1 (not at all active) to 5 (extremely active) during the previous 2 weeks. A single item to measure physical activity has several advantages including brevity and parsimony, and has been shown to be both reliable and valid (Schechtman et al., 1991; Milton et al., 2011; Gill et al., 2012; Portegijs et al., 2017; O'Halloran et al., 2020).

Gratitude

The Gratitude Questionnaire-Six-Item Form (GQ-6) (McCullough et al., 2002) is a six-item questionnaire based on a Likert scale from 1 (strongly disagree) to 7 (strongly

agree). Items 3 and 6 are reversed scored, after which all scores are then added to obtain a total score out of 42. The GQ-6 has relatively high internal consistency (Cronbach's alpha ranging from 0.76 to 0.87), convergent validity $(r = 0.33, p < 0.01$; McCullough et al., 2002) and temporal validity $(r = 0.59$ and 0.73 for two samples; Wood et al., 2008b). Discriminant validity was indicated by factorial independence of the GQ-6 from measures of related constructs, these being life satisfaction $(r = 0.53)$, vitality $(r = 0.46)$, happiness $(r = 0.50)$, tragic optimism $(r = 0.51)$, and hope $(r = 0.67$; McCullough et al., 2002).

Tragic Optimism

The Life Acceptance Measure (LAM; Wong, 2019a) is a new 9-item measure with statements on a 5-point Likert scale (1 being strongly disagree and 5 being strongly agree), with a Cronbach's alpha score of $a = 0.82$. The scores are added, and a total is obtained. The maximum score is a total of 45.

Social Support

The Multidimensional Scale of Perceived Social Support (MSPSS) is a 12-item scale designed to measure perceived social support from family, friends, and a "special person" (Zimet et al., 1988). The measure uses a 7-point Likert scale, ranging from 1 (very strongly disagree) to 7 (very strongly agree). Scores are added and a total is obtained with a maximum score of 84. The scale has good internal reliability, with Cronbach's alpha ranging from 0.84 to 0.92, and has moderate to strong factorial validity and construct validity (Zimet et al., 1988, 1990).

Nature Connection

The "Nature Connection" measure from the previous study was utilised. The statements are (1) "I feel I spend enough time in nature," (2) "I feel disconnected from nature," and (3) "I am often immersed in nature." Responses ranged from 1 (strongly disagree) to 5 (strongly agree). Respondents were informed that the term nature referred to green spaces (such as parks, forests, gardens, fields) and blue spaces (such as lakes, rivers, the sea) and were asked to respond based on their experiences during the past 2 weeks. A summary measure is calculated by reverse scoring item 3, after which all items are added together, providing a total score out of 15.

Wellbeing

The Warwick-Edinburgh Mental Well-being Scale (WEMWBS) is a positively worded 14-item measure on a 5-point Likert scale (1-5) that measures subjective and psychological wellbeing (Tennant et al., 2007). Prior research has indicated a Cronbach's alpha score of 0.89 (student sample) and 0.91 (population sample) and correlations with other measures of mental health and wellbeing indicate convergent validity (Tennant et al., 2007). Authors also noted that test-retest reliability was 0.83, 1 week between assessments. Item scores were added to produce a total score. The maximum score is a total of 70.

Post-Traumatic Growth Inventory

The Post-Traumatic Growth Inventory (PTGI), adapted for the pandemic, is a 21-item measure on a 6-point scale, ranging from 0 (I did not experience this change as a result of the pandemic) to 5 (I experienced this change to a very great degree as a result of the pandemic). The measure targets growth from trauma in 5 distinct areas: appreciation of life, relationships with others, new possibilities, personal strength, and spiritual change. Example statements include "I have a greater appreciation for the value of my own life", "I have a greater sense of closeness with others", and "I am better able to accept the way things work out". The measure has high internal consistency ($a = .90$), including internal consistency on the individual factors: new possibilities ($a = .84$), relating to others ($a = .85$), personal strength ($a = .72$), spiritual change ($a = .85$), and appreciation of life ($a = .67$). Test-retest reliability for the measure is $r = .71$. The measure also has concurrent and discriminative validity, having been compared with related personality measures, resilience, and religious beliefs, along with construct validity (Tedeschi & Calhoun, 1996).

Covariates

Covariates included subjective social status (SSS), age, and gender, all of which influence wellbeing (World Health Organisation Calouste Gulbenkian Foundation, 2014). The MacArthur Scale of Subjective Social Status (SSS) is a measure of subjective social status relating to socioeconomic position (Adler et al., 2000) with greater sensitivity for assessing SES, compared to questions on income and/or education level. The MacArthur Scale of SSS has previously predicted health and wellbeing better than objective measures of SES (Singh-Manoux et al., 2005).

Design & Procedure

The research protocol was considered and approved by the psychology department ethics committee at Swansea University before data collection began (approval reference ID: 3862). Using a cross-sectional design, data was collected via the online Qualtrics platform. Participants were asked for demographic information and the presentation of subsequent measures was randomised.

Statistical Analysis

A total of 166 respondents provided information, which was reduced to 136 participants once those participants with missing data were removed. Scores on subjective social status (SSS) were dummy coded as the following: "low" representing a score of 0-4, "middle" representing a score of 5 or 6, and "high" representing a score of 7-10. Scores on physical activity were dummy coded as the following: "low" representing a score of 1 or 2, "moderate" representing a score of 3, and "high" representing a score of 4 or 5. A two-step, hierarchical, linear regression was conducted using the enter method to determine if the predictor variables significantly predicted PTG, after controlling for age, gender and SSS. For the mediation, modelling involved applying the SEM module in JASP based on Rosseel's R laavan package (Rosseel, 2012), using the maximum-likelihood estimator. Following the recommendations of Biesanz et al. (2010) the 95% confidence intervals around the parameter estimates were calculated through bias-corrected bootstrapping (5000 samples).

<div align="center">

Results

</div>

Table 1 below presents the demographic information of 136 participants, characterised as predominantly young and female from a range of socioeconomic backgrounds, and Table 2 presents the descriptive statistics relating to key variables included in our study.

Table 8

Demographic Information

Characteristics	Category	*N*
Gender	Female	109
	Male	27
Age	18-27	79
	28-37	24
	38-47	9
	48-57	15
	58-69	9
SSS	1-4	29
	5-6	57
	7-10	50

Table 9

Descriptive Information of Key Variables

Variable	Mean (SD)	Median	Range
PTG	46.38 (23.06)	50.00	0/102
Wellbeing	44.82 (8.91)	45.00	19/68
Physical Activity	2.88 (1.08)	3.00	1/5
Gratitude	33.33 (5.64)	34.00	15/42
Tragic Optimism	32.65 (5.26)	33.00	15/45

Social Support	64.57 (13.78)	65.50	14/84
Nature Connection	9.22 (2.88)	9.00	4/15

SD = Standard Deviation

Inspection of standardised residuals indicated there were no outliers and skewness values were all within range, indicating normally distributed scores across all measures. The assumption of collinearity was met with all variables below a VIF value of 10 and above a tolerance value of 0.1. The assumption of independent errors was also met (Durbin-Watson value = 1.84). Inspection of the histogram and P-P plot of standardised residuals highlighted that the errors were normally distributed. The assumption of homoscedasticity was also met upon inspection of the scatterplot of standardised residuals versus standardised predicted scores. The data also met the assumption of non-zero variances and the assumption of linearity.

The control variables (age, gender, and SSS) were included in the first block but did not significantly predict PTG; F change $(4, 131) = 1.12$, $p = .352$, R^2 adjusted $= .00$. The hypothesised contributors to PTG significantly improved the model, F change $(6, 125) = 5.61$, $p < .001$, R^2 change $= .21$, $R^2 = .24$, R^2 adjusted $= .18$, accounting for 18% of the variance in PTG. Gratitude, nature connection, and age were observed to significantly contribute to this model. Table 3 includes the results from the regression of our predictor variables. As indicated by the standardised beta values above, gratitude had the greatest influence on the model, followed by nature connection. The remaining variables contributed to the model (according to the standardised beta values), although not significantly so.

Table 10

Regression results with PTG as the Outcome Variable

	t	p value	Standardised beta value
Gratitude	2.00	.047	.21

Tragic Optimism	1.44	.153	.13
Social Support	1.16	.248	.11
Nature Connection	2.14	.034	.21
Moderate Physical Activity	0.18	.860	.02
High Physical Activity	0.07	.943	.01

Next, we approached the hypothesis that the relationship between the predictor variables and wellbeing would be partially mediated by PTG, while controlling for age, gender and SSS. Table 4 highlights the significant direct effects of the predictor variables on wellbeing, with physical activity, gratitude, tragic optimism, and social support significantly contributing towards the model. However, the mediation analysis was not significant, highlighting that PTG did not mediate the effects of any of the contributing variables on wellbeing. Overall, the data highlights the ability for exemplars of the GENIAL model to contribute towards both PTG and wellbeing, although PTG did not mediate the effects of selected contributors to wellbeing.

Table 11

Direct Effects of the Predictor Variables on Wellbeing in the Mediation Analysis

Predictor	z-value	P value	95% CI
Physical Activity (high relative to low)	2.66	.008	0.04 - 0.34
Physical Activity (moderate relative to low)	2.94	.003	0.05 – 0.34
Gratitude	2.66	.008	0.05 – 0.36
Tragic Optimism	4.22	<.001	0.14 – 0.48
Social Support	3.46	<.001	0.08 - 0.40

| Nature Connection | 1.18 | .238 | -0.05 – 0.23 |

Discussion

The purpose of the current study was to investigate the collective contribution of five potential facilitators of PTG including physical activity, gratitude, tragic optimism, social support, and nature connection. While our sample exhibited a lower level of PTG (M = 46.38, SD = 23.06) compared to another sample of participants surveyed during the pandemic (M = 70.53; t (135) = -12.1, p <.001, d = 1.18; (Cui et al., 2021), reflecting greater stress and adversity in frontline nurses than in the general UK population, the extent of PTG in our sample was comparable to others, including husbands of women with cancer (M = 46; (Weiss, 2002). The analysis highlighted that the five variables accounted for up to 18% of the variance in PTG scores, with gratitude and nature connection emerging as significant. Our study represents the first to explicitly link key variables – previously examined in isolation – to PTG during COVID-19 pandemic. Our findings are especially interesting given the emergence of nature connection and gratitude as significant predictors, alongside well-known influencers of PTG that were not associated with PTG (such as social support).

The emergence of gratitude as a potential facilitator of PTG supports previous research (Vieselmeyer et al., 2017). Gratitude is associated with deliberate rumination (Chun & Lee, 2013; Kim & Bae, 2019) which subsequently encourages positive reappraisals of traumatic situations (Cárdenas Castro et al., 2019). Interestingly, Watkins et al. (2021) highlighted gratitude to be the positive emotion that was most experienced during the pandemic, compared with happiness, hope, relief, and joy, highlighting a critical role for gratitude– and opportunities for promoting it – during a time of great suffering. Importantly, gratitude interventions, such as the three good things exercise (Lai, 2017), have been shown to increase levels of gratitude, providing opportunities to promote sustainable wellbeing (Bohlmeijer et al., 2021), and facilitate PTG during times of trauma.

Having a physical and psychological connection to nature also emerged as a significant predictor of PTG. Previous research has suggested that this may be the case (Wilkie et al., 2021), although the present study represents the first to explicitly consider the potential role of the natural environment in facilitating PTG. Future research is needed to untangle the potential routes through which nature connectedness may facilitate PTG. One potential route relates to the ecological-self theory and spirituality (Trigwell et al., 2014),

reinforcing the interconnectedness of individual wellbeing and that of nature, suggesting that a spiritual connectedness with all things may support the development of PTG. Research has highlighted a mediating role of spirituality for the positive relationship between nature connection and wellbeing (Kamitsis & Francis, 2013; Trigwell et al., 2014). This argument is consistent with that of the newer development of the GENIAL model which focuses on a sense of connectedness to the self, others, and nature (Chapter 1). Spirituality is a key aspect of PTG (Tedeschi & Calhoun, 2004), therefore, one clear route through which nature connection can facilitate PTG is by promoting spirituality, and the experience of self-transcendent emotions, such as gratitude, awe, and compassion, encouraging individuals to connect with others and the world (Diamond et al., 2020). Interestingly, connection to nature has been shown to facilitate the experience of self-transcendent emotions (Castelo et al., 2021). There is a large body of work noting the importance of spirituality and self-transcendence, with recent research highlighting the protective role self-transcendence has on the psychological adjustment of people during the COVID-19 pandemic (Wong et al., 2021). As Wong et al. (2021) describes it, self-transcendence can encourage a shift in mindset from "what I can get from life" to "what I can give to life". Such a shift in mindset reflects the change individuals experience as they live through PTG. Interestingly, the current and previous study observed gratitude to be a predictor of both PTG and wellbeing, respectively (Mead et al., 2021). Although the mediation model indicated that PTG did not mediate the relationship between gratitude and wellbeing, it is possible that the relationship between PTG and wellbeing strengthens over time (Helgeson et al., 2006), and that the experience of PTG in our current sample may relate to future improvements in wellbeing. Previous research has also shown that the initial benefits of PTG relate to reductions in negative symptoms, while positive impacts on wellbeing taking a longer period of time (Sawyer et al., 2010).

Limitations

One debate in the field of PTG is whether PTG is a process that leads to post-trauma outcomes or whether it is a post-trauma outcome in and of itself (Ho, 2015). Tedeschi and Calhoun (2004) argue that PTG is both a process and an outcome, with different aspects of the PTG domains interacting, influencing, and are influenced by PTG. In a similar manner, we propose that variables from the GENIAL domains (individual – community – environment) may facilitate PTG, but also interact with PTG in a bi-directional manner (at least to some degree). Similarly, that the relationship between PTG and wellbeing could act

in somewhat of a self-sustaining cycle, one supporting the development of the other. As previously noted, the relationship between PTG and wellbeing strengthens over time, with one study reporting an effect size of .13 for studies focused on trauma in the preceding 24 months, and an effect size of .28 for studies focused on trauma over 24 months ago (Helgeson et al., 2006). Thus, providing a foundation for the argument that they may grow to facilitate each other. The argument that wellbeing-related factors influence each other is core to the GENIAL model, underpinned by similar ethos from Bronfenbrenner's Ecological model (1977). However, due to the cross-sectional nature of the current study, we are unable to address this question, providing exciting opportunities for future research on this topic.

Another limitation concerns the gender disparity of the sample. In a similar manner to the previous data-driven chapter, this sample is predominantly female ($n = 109$) vs male ($n = 27$). Regarding wellbeing, research has identified a 'gender wellbeing gap', despite controlling for key influential variables (Blanchflower & Bryson, 2023). Regarding PTG, research highlights a higher level of PTG among women, including as a result of the COVID-19 pandemic (Cohen-Louck, 2022). Interestingly, there was also an interaction reported between gender and pandemic duration (indicated by the number of lockdowns the participants experienced – short/medium/long). Research highlighted that whilst women experienced greater levels of PTG the more lockdowns they experienced, this same relationship was only present up until a medium level of lockdowns for men. Men who experienced a long lockdown experienced significantly lower levels of PTG than men in the short/medium conditions. This poses interesting questions about the gender differences in not just the experience of PTG, but the contexts (such as the length of time) in which the experience occurs. Future research would benefit from collecting an equal gender sample and further analysing the differences, incorporating the context (such as time).

A third limitation concerns the lack of control variables related to mental illness/distress. Whilst mental distress and wellbeing are not opposite ends of the same spectrum, they do influence each other to some degree (Iasiello & Agteren, 2020). Additionally, there are gender differences in negative psychological symptoms related to traumatic experiences, subsequently influencing the level of PTG that is experienced (Cohen-Louck, 2022). Thus, not only would mental health symptomology be important to control for, it would be of particular importance to investigate the relationship between these levels, gender, and subsequent experience of PTG.

Future Research

Whilst further research is needed to clarify the potential pathways linking our predictor variables, wellbeing and PTG, it is exciting to learn that positive psychological change can arise from the pandemic, which may be facilitated through gratitude interventions and building connection to nature. While we focused on PTG within the context of a UK population, the COVID pandemic is a global traumatic event, which researchers (Beyer et al., 2021) have suggested to be linked to the unfolding effects of the climate catastrophe (Ripple et al., 2017, 2020, 2021). Increases in extreme weather events (World Meteorological Organisation., 2022) and pandemics (Madhav et al., 2017) will inevitably contribute to increasing numbers of people who will face significant trauma. Further study of climate-change related trauma, the opportunity for PTG, and how such growth may support our capacity to mitigate and adapt to future change will be an incredibly important area of future research. Additionally, research on the impact of such trauma is important not only on an individual level, but on a community and planetary level (Logan et al., 2021), investigating the potential role of PTG on larger scales. For example, Logan et al. (2021) discuss ways in which vicarious PTG can occur (using an example of healthcare workers when working with trauma survivors). As such, they highlight the role that organisations have taken to facilitate PTG on a larger scale for their workers. Additionally, they discuss how organisations in themselves experience PTG, by which they have achieved a higher level of functioning than they had before a traumatic event (such as a natural disaster), or governments have created positive change through policy changes after disasters. In essence, the science of PTG would benefit from addressing what facilitates PTG on a community level (such as businesses) and a planetary level (such as governmental change).

Conclusion

In summary, this paper provides support for the role of gratitude in facilitating PTG and contributes to the emerging research that explicitly links PTG to nature connection, over and above other previously investigated factors associated with the construct of PTG such as social support. While human suffering is inevitable, it is clear one can learn to cultivate and grow from that experience. Gratitude and nature connection may provide pathways for growth in such challenging contexts, which over the longer term may promote sustainable wellbeing (Wong, 2019a) and mature happiness (Wong, 2021). These findings lay important

foundations for further investigating the potential for PTG from future global traumatic events that are expected to arise from the unfolding climate catastrophe.

Chapter 6

6. Applying What We Know About Wellbeing and Growth

The previous chapter highlighted the potential benefits of the GENIAL model when applied to both the wellbeing of the individual, but also the ability to facilitate PTG during times of suffering (the context of the COVID-19 pandemic). A limitation raised within second wave positive psychology is the need for wellbeing science to better integrate the 'dark side of life' (Ivtzan et al., 2016), in line with the dual-system model (Wong, 2012). The GENIAL model has been proposed as a more nuanced wellbeing framework, incorporating these newer movements in second wave psychology. The previous chapter provides the first steps at evidencing the efficacy of the GENIAL model in supporting wellbeing and PTG throughout a time of great difficultly. However, with the ever-growing literature, it has been increasingly clear that an expansion of the GENIAL must not stop at the inclusion of environmental pathways to wellbeing, but must extend to wider societal structures, and begin to tackle issues that we face as a population. The next chapter provides an insight into an updated GENIAL model and the various influences we must consider when we think about individual wellbeing, incorporating the literature covered at the start of this manuscript, but also extending beyond these domains to consider sociocontextual factors that lay beyond the control of the individual, as well as larger societal and planetary issues.

Chapter 7

7. Moving Beyond Disciplinary Silos Towards a Transdisciplinary Model of Wellbeing

A version of this is published in:

Mead, J. P., Fisher, Z., & Kemp, A. H. (2021). Moving Beyond Disciplinary Silos Towards a Transdisciplinary Model of Wellbeing: An Invited Review. Front. Psychol. 12:642093. doi: 10.3389/fpsyg.2021.642093

This paper received attention from Swansea University in the form of a press release (appendix C): https://www.swansea.ac.uk/press-office/news-events/news/2021/05/research-reveals-new-approach-to-understanding-our-wellbeing.php

Abstract

The construct of wellbeing has been criticised as a neoliberal construction of western individualism that ignores wider systemic issues such as inequality and anthropogenic climate change. Accordingly, there have been increasing calls for a broader conceptualisation of wellbeing. Here we impose an interpretative framework on previously published literature and theory and present a theoretical framework that brings into focus the multifaceted determinants of wellbeing and their interactions across multiple domains and levels of scale. We define wellbeing as positive psychological experience, promoted by connections to self, community, and environment, supported by healthy vagal function, all of which are impacted by socio-contextual factors that lie beyond the control of the individual. By emphasising the factors within and beyond the control of the individual and highlighting how vagal function both affects and are impacted by key domains, the biopsychosocial underpinnings of wellbeing are explicitly linked to a broader context that is consistent with, yet complementary to, multi-levelled ecological systems theory. Reflecting on the reciprocal relationships between multiple domains, levels of scale and related social contextual factors known to impact on wellbeing, our GENIAL framework may provide a foundation for a transdisciplinary science of wellbeing that has the potential to promote the wellbeing of individuals while also playing a key role in tackling major societal challenges.

Here we impose an interpretative framework on previously published literature and theory, laying a foundation for a transdisciplinary framework focused on better understanding and improving wellbeing. First, we briefly summarise some of the complexities and criticisms relating to wellbeing and its construct.

Complexities and Criticisms of Wellbeing

The word "wellbeing" is not a simile for reduced illbeing, quality of life or happiness (Headey et al., 1985; Ryff et al., 2006; Westerhof & Keyes, 2010; Skevington & Böhnke, 2018). Our own work for example (Fisher et al., 2020; Tulip et al., 2020; Wilkie et al., 2021), has shown that wellbeing may be improved in neurological disorders, and in despite of significant levels of ill-health and distress. Previous research has also reported the experience of wellbeing despite the presence of mental health symptoms (Kinderman et al., 2018), with different pathways being highlighted for wellbeing vs. illbeing. For example, Hofgaard et al., (2021) reported pathways, such as physical activity, to be important for reducing illbeing, whereas pathways such as relationship security where important for wellbeing, along with joint pathways, such as meaning and reduced loneliness. Additionally, with the use of confirmatory factory analysis, Keyes (2005) highlights how measures of wellbeing and measures of mental illness form separate, but correlated, unipolar factors. Work from Andrew Kemp and Zoe Fisher is particularly relevant, where they apply the GENIAL model to patients living with chronic conditions (Kemp, Tree, Gracey, & Fisher, 2022). A key argument within this paper is the need for healthcare to focus on determinants of wellbeing, as opposed to solely focusing on an 'absence of distress'. The research is presented to highlight separate strands of focus for people living with chronic conditions, strands which may overlap, but remain independent from one another. This paper builds upon the work of Hunter (2020), whereby the present a Pleasure-Purpose-Practice framework, arguing that patients with MS can engage in wellbeing-focused activities, despite the presence of pain or disability. These findings reinforce Wong's dual system model of what makes life worth living (Wong, 2012). Negative emotions provide the seeds for personal growth (Wong, 2010; Kashdan & Biswas-Diener, 2015), while major adversity and suffering can lead to "post-traumatic growth" (Joseph and Linley, 2006). Wellbeing interventions have been developed within disciplinary silos leading to a focus on isolated components [e.g., psychological interventions (Carr et al., 2020) are often distinct from the promotion of positive health behaviours (Buecker et al., 2020)]. The scientific focus on what constitutes a happy or good life has been described as "scientific polyannaism" (Yakushko, 2019), while the individual pursuit of wellbeing has been described as a socio-

cultural construction of western individualism that places importance on wealth, fame and materialistic pursuits (Carlisle et al., 2009; Davies, 2015; Hull & Pasquale, 2018).

These complexities and criticisms highlight the need to transcend disciplinary boundaries and work towards a transdisciplinary model of wellbeing. Such an approach requires disciplinary integration and recontextualisation of competing theories in such a way that leads to new ideas and knowledge (Choi & Pak, 2006). Wellbeing must be conceptualised as a system, within which the interconnectedness of the individual in relation to their communities and environments must be explored while appreciating the impacts of socio-contextual factors (e.g., inequality, culture) that influence wellbeing and behaviour change theory to identify sustainable solutions for improving wellbeing. We further highlight a role for vagal nerve functioning, a psychophysiological index of wellbeing that affects and is affected by various determinants of wellbeing across multiple domains at multiple levels of scale, providing the theoretical glue around which our GENIAL framework has been developed (Kemp et al., 2017a; Mead et al., 2019; Fisher et al., 2020; Wilkie et al., 2021).

Rethinking Wellbeing

Here we define wellbeing as positive psychological experience, promoted by connections to self, community and environment, supported by healthy vagal function, all of which are impacted by socio-contextual factors that lie beyond the control of the individual. Our writing has been structured around this definition, focusing on each of the domains within which wellbeing may arise, highlighting major socio-contextual factors that lie beyond the control of the individual, and discussing the capacity to sustain positive change, drawing on behaviour change theory at multiple levels of scale. Table 12 highlights the key research areas influencing the development of our work.

Table 12

An outline of key research areas underpinning the GENIAL model

Discipline	Influence
Positive Psychology	The core of positive psychology is subjective and psychological wellbeing, with the PERMA model being a highly utilised model of wellbeing (Seligman, 2017). The work from positive psychology has supported the

	development of the individual and community domains of the GENIAL model.
Positive Psychology of Sustainability	The work of the likes of Victor Corral Verdugo (Corral-Verdugo & Frias-Armenta, 2016; Corral-Verdugo et al., 2011; Corral-Verdugo et al., 2015) highlights the positive role of sustainable behaviours for individual wellbeing, supporting both people and the planet alike. The work of positive psychology of sustainability has supported the development of the environment domain of the GENIAL model.
Health	The individual domain incorporates the work of health behaviours, although as highlighted in chapter 1, much of this work focuses on physical and mental health, with more work needed linking health behaviours with wellbeing.
Existential Positive Psychology	Existential psychology has supported the development of GENIAL, incorporating factors such as tragic optimism and self-transcendence. The work of Victor Frankl (1984) and Paul Wong (2010) is particularly notable.
Ecophilosophy	The philosophy of ecological harmony, relevant to psychology in terms of what bonds and damages us from our natural environment and the consequences our actions have on the unfolding crises. The likes of Glenn Albrecht (2005) is particularly relevant and has been drawn upon to form the basis of the GENIAL model, particularly the environment domain.
Sociology/Social Psychology	Key aspects that underpin the GENIAL model include the work of the Haslam's (Haslam et al., 2018) and social identity theory, research that is most relevant for the community domain of the GENIAL model.
Behavioural Psychology	Here, we draw upon work related to behaviour change theory (Francis, O'Connor, & Curran, 2012; Kwasnicka et al., 2016), specifically when considering the

	implementation or interventions based on the GENIAL model and a focus on sustainable changes.
Biopsychology	The bridge between mental and physical health has been discussed throughout this thesis and is a key driver underpinning the GENIAL model, with recommendations for both physical and mental interventions for wellbeing. The vagus nerve has been discussed as one biological link that can physiologically mediate the impact of interventions on outcomes (Kemp, Koenig, & Thayer, 2017b; Thayer et al., 2009).
Developmental Psychology	The approach that there are reciprocal relationships between different levels of influence within an individual's life is adopted into the GENIAL model; this can be seen across the domains and impacted by external factors outside of the control of the individual. The work of Bronfenbrenner is particularly relevant (1977).

Self-connection is a relatively new concept, rooted in self-awareness that involves accepting and aligning behaviour based on that awareness (Klussman et al., 2020a,b,c). We suggest that "self-connection" may be supported by the vagus nerve, a structural link between body and mind. Self-connection is also associated with self-actualisation (Klussman et al., 2020a) and connectedness with others (Kok & Fredrickson, 2010; Kok et al., 2013), which has been described as a psychological need (Baumeister & Leary, 1995; Deci & Ryan, 2000). Social connectedness is associated with the social relational emotions including gratitude, compassion and awe, all of which are powerful determinants of prosocial behaviour (Stellar et al., 2017; Petersen et al., 2019). These emotions have been associated with higher levels of vagal function (Childre, 2004; Shiota et al., 2011; Bello et al., 2020), and recent thinking suggests that they may be involved in feelings of connection to the natural environment (Petersen et al., 2019) which are again associated with vagal nerve functioning (Richardson et al., 2016).

The Vagus Nerve and Wellbeing

The vagus nerve connects the central nervous system to many different organs including heart, gut, liver and lungs. While the vagus nerve is one of several responses systems contributing to the experience of wellbeing, it has a regulatory role over many including the sympathetic nervous system (Porges, 2011; Deuchars et al., 2018), hypothalamic-pituitary adrenal axis (Porges, 2011), immune functioning (Tracey, 2002; Pavlov and Tracey, 2012), brain-gut interactions (Bonaz et al., 2018; Fülling et al., 2019) neurogenesis and epigenetic mechanisms (Follesa et al., 2007; Biggio et al., 2009; O'Leary et al., 2018). Research now links vagal function to positive emotions (Geisler et al., 2010; Kok & Fredrickson, 2010; Kok et al., 2013), meaning and purpose in life (Zilioli et al., 2015; Dang et al., 2021), emotion regulation (Geisler et al., 2010; Williams et al., 2015), executive function (Williams et al., 2019; Eggenberger et al., 2020), psychological flexibility (Kashdan & Rottenberg, 2010; Colzato et al., 2018), prosocial behaviours (Kemp et al., 2012; Geisler et al., 2013; Kok et al., 2013), positive health behaviours (Werner et al., 2015; Young & Benton, 2018), biopsychosocial resilience (Dedoncker et al., 2021), time spent in nature (Richardson et al., 2016; De Brito et al., 2020) and future morbidity and mortality (Hillebrand et al., 2013; Jandackova et al., 2016; Fang et al., 2020). Various theoretical models have been proposed within which these findings have been interpreted. The neurovisceral integration model (Thayer et al., 2009) presents the vagus nerve as a structural link between mind and body, arguably representing a psychophysiological correlate of self-connection. An iteration of this model (Kemp et al., 2017) described HRV as a missing structural link between psychological moments and mortality, mediating the association between wellbeing and longevity vs. illbeing and premature mortality. Polyvagal theory (Porges, 2011) illustrates a role for the vagus nerve in the social engagement system, supporting the capacity for social connection (Holt-Lunstad et al., 2010; Kemp et al., 2017a). The evolutionary model for the wellbeing benefits of nature (Richardson et al., 2016) features the vagus nerve within a physiologically based model of affect. Interestingly, a meta-analysis (Bello et al., 2020) has demonstrated a role for the vagus nerve in feelings of compassion, an experience supporting connection to self, others and nature (Neff, 2003; Petersen et al., 2019). Compassion is often facilitated through loving kindness meditation, which builds positive emotions, promotes feelings of social connectedness and raises levels of vagal function in an upward spiral relationship (Kok et al., 2013).

Overall, research has linked vagal function with factors across all the GENIAL domains (previously noted in this chapter), facilitating the experience of connection (through

physiological control) to themselves, others, and the environment. Thus, vagal function serves as an important strand throughout all domains. For example, Wilkie, Fisher & Kemp (2022) provides the discourse on the domains of the GENIAL model (connection to oneself, others, and the environment) through the lens of vagal function and has applied this theory in various settings (Wilkie, fisher & Kemp, 2022; Wilkie et al., 2023). The paper highlights how the vagus nerve has a specific role in wellbeing and may drive wellbeing-focused interventions. They describe the mechanisms by which vagal function can promote connection to self, others and planet, highlighting the role of afferent vagal nerve fibres which feed information from the physical body to the brain (mind), clarifying for instance, how physical health behaviours can impact wellbeing (a key aspect that is lost in previous wellbeing models). This key role in facilitation connection to oneself, others, and the environment, is the key reason why this neural function is a focus within the GENIAL model. Other aspects that are discussed include the role of the vagus in emotional regulation facilitating emotional balance as well as a sense of meaning in life. In relation to connection to others, the paper clarifies how vagal function supports social relational emotions, social connectedness and engagement. In relation to the environment, the paper also describes how high levels of HRV may underpin social relational emotions with implications for nature connection and how nature itself can positively impact on HRV.

In summary, we view healthy vagal functioning as fundamental in supporting an individual's capacity for connection to self, others and nature, while also acknowledging external impacts on vagal functioning that impact wellbeing.

The Individual Domain and Wellbeing

Mental and physical wellbeing are core components of overall health that are bidirectionally associated (Kemp & Quintana, 2013; Steptoe et al., 2015). Mental wellbeing encompasses hedonic (positive emotions) and eudaimonic (flourishing) wellbeing (Diener et al., 1999; Ryan and Deci, 2001; Fredrickson, 2004; Wong, 2012; Ryff, 2014), and while competing theories have focused on one or the other, Seligman's PERMA model—encompassing positive emotions, engagement, relationships, meaning and achievement—has characterised wellbeing as their combination (Seligman, 2012, 2017). Recent meta-analysis (Carr et al., 2020) reported that a variety of positive psychological interventions consistent with PERMA theory have small to medium effects on wellbeing ($g = 0.39$) as well as related outcome measures including character strengths ($g = 0.46$), quality of life ($g = 0.48$), depression ($g = -$

0.39), anxiety (g = –0.62), and stress (g = –0.58). Findings from the English Longitudinal Study of Ageing reported that individuals with higher levels of eudaimonic wellbeing display a three-fold higher rate of survival over an 8.5-year follow-up period (Steptoe et al., 2015). Optimism is associated with a 11–15% longer lifespan and greater odds for achieving "exceptional longevity" (Lee et al., 2019). Vagal function may play a mediating role in these longevity outcomes (Zulfiqar et al., 2010; Kemp et al., 2017; Hernández-Vicente et al., 2020).

However, whilst the PERMA model made great strides in positive psychology, there is a need for an updated wellbeing model, one that incorporates the inevitability of human suffering. The acceptance of life's adversities is arguably essential for self-transformation and meaning-making (Davies, 2012; Gibson, 2015), providing an opportunity to build wellbeing (Lomas & Ivtzan, 2016; Wong, 2019). The dual-system model explains how wellbeing science must take the view that there are no wholly positive or negative conditions, but rather, each contains a seed of the other, both having important roles for our wellbeing (Wong, 2012). Therefore, approaches to wellbeing need to incorporate such adversities as part of wellbeing and growth, and not as a detriment to our wellbeing. Tragic optimism (optimism in the face of tragedy) is a key example of an area of positive psychology that incorporates the potential benefits of adversity (Frankl, 1984). So too is PTG (positive growth from adversity; Tedeschi & Calhoun, 1996). Thus, wellbeing models must acknowledge the importance of both "positive" and "negative" emotions, experiences, and outcomes.

The association between mental and physical wellbeing (r = 0.347) does not depend on whether objective or subjective measures of health status are used, or differ across those with or without chronic conditions (Ngamaba et al., 2017). More than 80% of the vagal nerve fibres are afferents, conveying sensory information from the viscera to the central nervous system (Yamakawa et al., 2015), providing an important communication pathway for the beneficial effects of positive health behaviours to influence brain and behaviour. As the vagus nerve provides a structural link between mind and body (Kemp et al., 2017), we suggest that interventions focused on building mental and physical wellbeing may facilitate the experience of wellbeing to a greater extent than focusing on one or the other separately. As well as mental and physical wellbeing, the functioning of the vagus nerve is also associated with social connectedness (Kok & Fredrickson, 2010; Porges, 2011; Kok et al., 2013), the topic that we turn to next.

The Community Domain and Wellbeing

As mentioned near the beginning of this manuscript, there is much evidence to suggest that community is deteriorating (Kemp et al., 2017a), including generational shifts in narcissism (Twenge, 2013), declines in perspective taking and empathic concern (Konrath et al., 2011), increasing individualism (Santos et al., 2017) and inequality (Nolan & Valenzuela, 2019). Community is more than an aggregation of individuals, it is communicative and interactive, a dynamic process involving social interactions that support individual wellbeing (Brymer et al., 2020). Despite evidence of deterioration, humans are driven to connect with others, to feel a sense of attachment and belonging to the social group. This sense of relatedness with others is described as a basic psychological need (Baumeister and Leary, 1995; Deci and Ryan, 2000), and improvements in connectedness have been shown to improve public mental health (McNamara et al., 2013) year-on-year (Saeri et al., 2018). Individuals with stronger relationships have even been shown to have a 50% increased likelihood of survival over an average of 7.5 years follow-up (Holt-Lunstad et al., 2010). The theory of social wellbeing (Keyes, 1998, 2002; Westerhof & Keyes, 2010) is linked to the sense that society6 is meaningful and understandable (social coherence), provides an opportunity for growth (social actualisation), is something that one belongs to and is accepted by (social acceptance and integration) and that one can meaningfully contribute to (social contribution). Accordingly, our focus extends beyond personal relationships, including concepts such as social capital, social cohesion and social identity. Social capital refers to connections between similar individuals (e.g., family and close friends; i.e., bonding social capital), people from diverse backgrounds (e.g., neighbours, members of sporting clubs, work colleagues; i.e., bridging social capital) and relationships characterised by power differences (e.g., the employee—employer relationship or that between citizen and government; i.e., linking social capital) (Putnam, 2000; Uphoff et al., 2013). Social capital protects against stress (Umberson & Montez, 2010) and is associated with positive emotions (Diener & Oishi, 2005) and wellbeing (Williams, 2006), especially in those with lower socioeconomic status (Uphoff et al., 2013). The related concept of social cohesion refers to the extent to which a geographical space achieves "community" through the sharing of values, cooperation and interaction (Beckley, 1995) Voluntary social participation promotes social cohesion in the community, creating a context for positive social relationships and eliciting feelings of belongingness and acceptance (De Vries et al., 2013; Elliott et al., 2014; Fonseca et al., 2018). Volunteering has been described as the "single most reliable way to momentarily increase one's well-being"

(Seligman, 2012). Social identity theory provides a useful context for appreciating these effects on the wellbeing of individuals. Those who strongly identify with their community have display higher levels of wellbeing (McNamara et al., 2013). Social identity provides meaning and purpose to one's life, facilitating feelings that one can collectively cope with the challenges. This sense of community is fostered through the promotion of social relational emotions, such as gratitude, compassion and awe, which may be linked to capacity for psychological connections to nature (Petersen et al., 2019), the topic that we turn to next.

The Environment Domain and Wellbeing

Globalisation, urbanisation, and technological advancements has meant that humans have become increasingly disconnected from nature (Hartig et al., 2014; Chawla, 2015). This continues despite research showing that contact with nature improves wellbeing (Greenleaf et al., 2014; Capaldi et al., 2015; McMahan & Estes, 2015). Connection with nature contributes a small to medium effect to hedonic ($r = 0.20$) and eudaimonic ($r = 0.24$) wellbeing (Pritchard et al., 2019), and may reflect another fundamental psychological need (Richardson et al., 2020a). Researchers have even argued that one should consider spending up to 2 h per week in nature to experience wellbeing (White et al., 2019). Here in lies a conundrum: on the one hand, connection to the natural environment appears to be critically important for wellbeing, yet on the other, the impacts of climate change raises important ethical issues relating to focusing on the former, while ignoring the latter. It is interesting therefore to see emerging literature highlighting associations between nature connectedness and pro-environmental behaviours, in addition to wellbeing (Martin et al., 2020; Richardson et al., 2020b). Pro-environmental behaviours have been linked to psychological wellbeing (Verdugo, 2012) (Ganglmair-Wooliscroft & Wooliscroft, 2016; Venhoeven et al., 2016), positive emotion (O'Brien, 2008; Cloutier et al., 2014; Helliwell, 2017), and eudaimonic well-being (Venhoeven et al., 2013, 2016), social wellbeing (Prati et al., 2016) and community connectedness (Kweon et al., 1998). Furthermore, sustainability has been specifically linked to wellbeing, an idea that characterises the "positive psychology of sustainability" (Verdugo, 2012; Corral-Verdugo et al., 2015; Corral-Verdugo & Frías-Armenta, 2016), with researchers highlighting the positive psychological consequences of pro-ecological, altruistic, frugal and equitable behaviour (Corral-Verdugo et al., 2011, 2015). While our framework places the individual within the context of their social and natural ecologies, consistent with recent developments in wellbeing science (Lomas, 2015; Nielsen & Ma, 2018), there is also a need

to consider factors that impact on wellbeing that lie well beyond the control of individuals. We turn our attention to such factors next.

Socio-Contextual Factors and Wellbeing

A wide range of socio-contextual factors either facilitate or restrict the experience of wellbeing. Epidemiological studies demonstrate an association between proximity to green spaces and reductions in all-cause mortality including circulatory disease, ischemic stroke and depression (Mitchell & Popham, 2008; Wilker et al., 2014; Helbich et al., 2018). Yet, the advantages to health and wellbeing derived from proximity to green spaces are undermined by inequality with greater efforts needed to increase green space proximity for people of colour and lower income groups (Saporito & Casey, 2015). Inequality is perhaps one of the most discussed issues impacting on the wellbeing of populations. The most economically disadvantaged in society are disproportionally impacted by major societal challenges including increasing burden of chronic disease, societal loneliness and anthropogenic climate change (Cesare et al., 2013; Niedzwiedz et al., 2016; Otto et al., 2017). However, economic inequality also has adverse impacts on the entire population, contributing to multiple health and social problems, causally impacting on a variety of outcomes including educational attainment, obesity and homicide (Pickett & Wilkinson, 2015). Accordingly, improving economic inequality is fundamental to improving population wellbeing (Wilkinson & Pickett, 2010, 2019), and is a strategy featuring prominently in initiatives such as the Green New Deal (GND) (Galvin & Healy, 2020). Unlike narrow economic solutions, such as carbon taxes and emissions trading schemes, a GND would involve major societal and economic transformation driven by respect for human rights, social equity and societal wellbeing.

Culture is another important socio-contextual factor which has been shown to influence the way in which emotion and wellbeing is experienced and appraised (Diener & Suh, 2000; Ahuvia, 2002; Steptoe et al., 2007). While "individualistic" cultures prioritise positive emotions and personal wellbeing (Diener & Suh, 2000; Ahuvia, 2002; Steptoe et al., 2007), "collectivist" cultures place greater emphasis on emotional stability than on positive affect (Lu, 2001; Ng et al., 2003). Accordingly, wellbeing in individualistic cultures is more strongly associated with self-esteem and a sense of personal achievement, while wellbeing in collectivistic cultures is more strongly associated with avoiding social conflict and achieving interpersonal goals (Uchida and Oishi, 2016). Recent work has examined the impact of socio-contextual factors on vagal function (Kemp et al., 2016; Yang & Immordino-Yang, 2017)

reporting that the vagus may support the capacity for emotional regulation associated with racial discrimination. For example, Kemp et al., (2016) highlighted how discrimination can indirectly contribute to the effects of race on HRV. The research highlights that black people have greater HRV than white people, a finding that has been interpreted as evidence for heightened emotion regulation in black people who are required to process the emotional impacts of racial discrimination. Interestingly, black people have increased risk of premature morbidity and mortality, which high levels of HRV levels typically protect against. These intriguing epidemiological findings provide some context for interpreting this 'psychophysiological conundrum'. While other research has reported that healthy vagal functioning may predispose bicultural individuals to adopt a cultural identity that emphasises calmness (Yang & Immordino-Yang, 2017).

The discipline of psychology has focused mostly on western, educated, industrialised, rich and democratic (WEIRD) samples (Henrich et al., 2010), with as many as 78.2% of publications in positive psychology (up to 2018) associated with Western countries (Hendriks et al., 2018). While all people have fundamental needs including the need for happiness, meaning and self-determination, the expression and attainment of those universal values may be culture-bound (Wong, 2013). There is a growing appreciation for cultural differences in wellbeing, leading to new pluralistic measures (Lambert et al., 2020) that include a combination of hedonia, eudaimonia, social wellbeing, and the roles of culture, community, nature, and governance. We now turn our attention to the topic of how positive change might be sustained.

Sustaining Positive Change

There is an inherent disconnect between what people know and what they actually do; known as the intention-behaviour gap (Sheeran, 2002). This represents a major barrier to translating evidence surrounding well-being activities into sustained practice (Francis et al., 2012). Emotions act as an important mediator in the intention–behaviour gap and emotionally based interventions may increase the efficacy of behaviour change interventions (Mohiyeddini et al., 2009). According to the upward spiral model of lifestyle change (Cappellen et al., 2017), positive affect experienced during health behaviours increases non-conscious motives for those behaviours, while vagal nerve functioning provides a biological resource for positive change. A review of 100 behaviour change theories identified five overarching, interconnected themes relating to effective behavioural change strategies (Kwasnicka et al.,

2016). Themes reflected the differential nature and role of motives, self-regulation, habits, psychological and physical resources, and environmental and social influences from initiation to maintenance. Subtle behavioural "nudging" has also been shown to successfully change behaviours at the societal level (Gill & Boylan, 2012; Marteau et al., 2012). An alternative approach involves "psychological boosting," guided by a much more positive view of humanity described as "ecological rationality" in which non-rationality is viewed as an adaptive capacity to be valued (Gigerenzer, 2018; Hertwig et al., 2019; Fabian & Pykett, 2021). This approach develops capacity, empowerment and participation of individuals and may help in promoting societal and economic transformation through wellbeing public policy (Fabian & Pykett, 2021). Metrics such as the Happy Planet Index now rank countries on the basis of a combination of wellbeing (life satisfaction), life expectancy, inequality of outcomes and ecological footprint, facilitating conversations, and driving actions to achieving sustainable development goals while promoting wellbeing of individuals as well as the communities and environments within which people live (Patrick et al., 2019). These metrics may help to facilitate a shift in focus from GDP to wellbeing as has been done in New Zealand, Iceland, Scotland, and Wales, the "so-called" economies of wellbeing (Fabian & Pykett, 2021).

Discussion and Conclusion

The framework we present emphasises core inter-related domains that span the individual, community and environment, encompassing major determinants of wellbeing. Our framework has also been inspired by and builds on recent developments (Kemp et al., 2017a; Kemp, 2019; Kern et al., 2019; Mead et al., 2019; Wong, 2019; Lomas et al., 2020), characterised as second and third wave positive psychology (Wong, 2019; Lomas et al., 2020), which place importance on emotional balance, meaning and purpose, interconnectedness and interdisciplinarity. The previous chapters support the framework presented here, with evidence to highlight the role of the core domains in building wellbeing in the general (chapter 3) and PTG (chapter 5). This framework has also been utilised to support people living with neurological disorders (Fisher et al., 2020), with a focus on acquired brain injury (Tulip et al., 2020; Wilkie et al., 2021).

By emphasising the inter-connectedness across domains and levels of scale, our framework encourages thinking about how to promote wellbeing while simultaneously ameliorating major societal challenges. Take for example, the challenge of climate change in which

behavioural and lifestyle choices together with larger collaborative efforts will be essential for successful adaptation (IPCC, 2014). At an individual level, nature connection can be enhanced through nature-enhanced meditation (Ray et al., 2020), gardening (Blair et al., 1991; Okvat & Zautra, 2011), and physical exercise (Coon et al., 2011). At a community level, peaceful environmental activism (Klar & Kasser, 2009) and volunteering (Binder and Freytag, 2013; Binder and Blankenberg, 2016) offer ways to increase subjective wellbeing, community connectedness while promoting pro-environmental behaviours (Jackson, 2005; Okvat & Zautra, 2011; Ibáñez-Rueda et al., 2020). In the clinical setting "green care" interventions, such as care farming, horticultural therapy, wilderness therapy, ecotherapy, sustainable building etc., have been shown to improve wellbeing (Haubenhofer et al., 2010; Whear et al., 2014; Wright and Wadsworth, 2014; Wendelboe-Nelson et al., 2019; Fisher et al., 2020; Tulip et al., 2020; Wilkie et al., 2021). Environmental modifications such as the commissioning of outdoor gym equipment (Cranney et al., 2016), provision of community gardens (Veitch et al., 2012), walking or bike trials and improved accessibility of parks or gardens (Fraser & Lock, 2011) have the potential to increase nature connectedness, pro-sustainable behaviours and positive health behaviours (diet and physical activity), contributing to improved population health and wellbeing (see (Shanahan et al., 2019) for a review). Corporate sustainability strategies have considerable scope to improve environmental outcomes, especially when employees are involved in the development of these strategies, while global initiatives such as the GND are needed to facilitate societal transformation (Boiral, 2005; Michailides and Lipsett, 2013). Finally, any initiatives must specifically consider socio-cultural values, which determine the way in which people use natural resources, the extent of their pro-environmental behaviours (Ringov & Zollo, 2007) as well as specific determinants of wellbeing (Diener & Suh, 2000; Ahuvia, 2002; Steptoe et al., 2007).

In conclusion, focusing on wellbeing across multiple domains at increasingly higher levels of scale offers underrealised potential to ameliorate social challenges, while also promoting wellbeing of individuals. The framework presented here may provide a foundation for thinking about how this might be achieved, while working towards a transdisciplinary science of wellbeing.

Chapter 8

8. What Do We Do with What We Know?

The previous chapter provides a succinct overview of the breadth of the GENIAL model. In a similar manner to Seligman when the PERMA model was created, we make no claims that the GENIAL model covers all possible pathways to wellbeing. However, I started the thesis by expanding the focus and extending GENIAL 1.0, with the previous chapter highlighting the widespread focus that wellbeing should take. I have provided two studies that begin to evidence the relationship of GENIAL domains with wellbeing and PTG, however, what becomes an important focus is the potential application of the GENIAL model. The following chapter discusses the use of a wellbeing module (based on the updated GENIAL model incorporating individual, community and environmental pathways to wellbeing) among undergraduate psychology students, and its efficacy for improving wellbeing, utilising a mixed effects design. In comparison to the previous data-driven chapters, this sample does not focus on the general population, nor were there lockdown restrictions in place at the time of the research.

Chapter 9

9. Improving Student Wellbeing: Evidence From a Mixed Effects Design and Comparison to Normative Data

A version of this paper was published as a pre-print

Kemp, A. H., Mead, J., Sandhu, S., & Fisher, Z. (2022, July 13). Teaching wellbeing science. https://doi.org/10.17605/OSF.IO/E7ZJF

A version of this paper is published in:

Kemp, A. H., Mead, J. P., & Fisher, Z. (2022). Improving student wellbeing: evidence from a mixed effects design and comparison to normative data. *Teaching of Psychology, 0,* 1-7. Doi: 10.1177/00986283221112428

This paper received attention in the form of a press release from Swansea University (appendix D): https://www.swansea.ac.uk/press-office/news-events/news/2022/08/how-learning-about-wellbeing-can-benefit-university-students-own-wellbeing.php

The data from this chapter are available on the OSF (appendix H).

Abstract

The wellbeing of university students is deteriorating, highlighting a critical role for institutions to better support student wellbeing. The goal of this work is to determine whether a final-year undergraduate wellbeing science module, inspired by recent theoretical developments, improved wellbeing during the COVID-19 pandemic. Students learned the latest wellbeing theory, spanning the individual to the planet, and engaged with opportunities to improve wellbeing, broadly defined. Participants (N = 128) completed a brief online questionnaire including the Warwick-Edinburgh Mental Well-being Scale across baseline and follow-up assessments. Analysis involved 2 group (intervention, control) × 2 time (baseline T1, follow up T2) mixed-effects analysis of variance (ANOVA) and one-sample t-tests to compare the intervention group with population-based norms for adults aged 16–75+. A significant interaction effect was observed, reflecting an increase in wellbeing in the intervention group in T2 relative to T1. Comparisons with published norms, further highlighted the beneficial impact of the module. Thus, encouraging connection to self, others and nature has beneficial impacts on wellbeing, consistent with a modern science of wellbeing.

University students are considered a high-risk population for mental ill-health (Eisenberg et al., 2013; Francis & Horn, 2017). The transition to university coincides with a critical developmental period for the brain, major exposure to stressors (leaving home, loneliness, academic pressures, gaining independence, developing new relationships, managing finances, social media) and lifestyle changes including exposure to alcohol and illicit recreational substances. Over and above traditional risk factors, the COVID pandemic brought a unique set of stressors including serious disruptions to education as courses were transitioned to online platforms, social isolation, and uncertainty about academic attainment and prospects (Liu et al., 2021). It is not surprising therefore that university students experienced significantly higher rates of anxiety (21.5% vs. 8.8%) and depression (38.6% vs. 15.8%) relative to the general population during the pandemic (Naser et al., 2020). These findings are contrasted by emerging research, highlighting a variety of factors to have protected wellbeing during the pandemic, including tragic optimism, gratitude, physical activity, social relationships, and connecting to nature (Kemp et al., 2022; Pouso et al., 2021; Wright et al., 2021; Wu et al., 2021; Mead et al., 2021b). Specifically related to students, physical health status, resilience and emotional support are positively associated with psychological wellbeing (Liu et al., 2021). Overall, these findings emphasize the adverse impacts associated with COVID-19, but also highlight capacity for building wellbeing despite hardship and suffering, consistent with recent developments in the field focused on accepting and transcending suffering for sustained wellbeing (Wong, 2019). In the present paper, we present evidence for the impact of a wellbeing science module on student wellbeing during the COVID pandemic using a group-based research design.

Several authors have demonstrated the beneficial impacts of positive psychology modules on university student wellbeing (Hood et al., 2021; Lambert et al., 2018; Young et al., 2020). These studies demonstrate how teaching of wellbeing-related concepts build declarative knowledge, while positive psychology interventions (PPIs) facilitate the development of procedural knowledge (see Kemp et al., 2022 for examples of PPI interventions). We have developed a module for final-year undergraduate students which included teaching recent theoretical advances in wellbeing science as well as the application of evidenced-based interventions guided by this work. The module was structured around our own theoretical model of wellbeing (Fisher et al., 2022; Kemp et al., 2017; Kemp & Fisher, 2022; Mead et al., 2019; Mead et al., 2021a), a transdisciplinary framework that 'brings together' other influential models across different disciplines and levels of scale, integrating heterogeneous

ideas into a coherent whole. Our framework could be conceptualized as adding the theoretical glue that connects disparate transdisciplinary ideas, illustrating how these ideas reciprocally interact to realize wellbeing at multiple levels of scale, spanning the individual, community, and environment. Recent iterations of our model (Fisher et al., 2022; Kemp & Fisher, 2022; Mead et al., 2019; Mead et al., 2021a) present the key determinants of wellbeing within five categories; these include three categories denoting levels of scale relating to the individual, collective and planetary wellbeing in addition to socio-structural and cultural factors that influence wellbeing at each level of scale. While the capacity of individuals to promote their own wellbeing is greater than their capacity to promote collective and planetary wellbeing, there remains tremendous scope for individuals themselves to promote collective and planetary wellbeing alongside larger collaborative efforts through for example, volunteering and effective activism.

What sets our module apart from other previously described modules (Hood et al., 2021; Lambert et al., 2018; Young et al., 2020) is a focus on broad theoretical underpinnings of wellbeing and theoretically-informed interventions that have been shown to support individual wellbeing whilst simultaneously promoting collective and planetary wellbeing. In the present paper, we address the following research question: Does our wellbeing science module improve student wellbeing during the COVID-19 pandemic? We predicted that participants who completed the module would display improved wellbeing on module completion.

Method

Participants

A total of 181 student volunteers were recruited for this study across two academic years (2020–2021 and 2021–2022) with a total of 128 students completing baseline and follow-up assessments. Groups did not statistically differ across these measured demographic variables providing evidence of equivalence prior to intervention (see Table 1). Ethical approval was provided by the School of Psychology ethics committee.

Table 13

Participant Characteristics

Demographic Information	Total Sample	Intervention Group ($n = 66$)	Control Group ($n = 62$)	Statistics
Age (*M, SD, range*)	21.47, 3.87, 18-49	22.08, 5.07, 20-49	20.82, 1.79, 18-28	$t(80.37) = 1.88$, $p = .064$, $d = 0.33$
Gender (male, female, non-binary, missing)	23, 103, 1, 1	11, 53, 1, 1	12, 50, 0, 0	$X^2(1) = 0.099$, $p = .753$, *log OR* = -0.145
Subjective Social Status				$X^2(1) = 0.007$, $p = .934$, *log OR* = 0.038
Low (0-4)	53	27	26	
Med (5-6)	45	24	21	
High (7-10)	30	15	15	
Presence of a physical condition				$X^2(1) = 0.037$, $p = .848$, *log OR* = -0.094
Yes	20	10	10	
No	107	56	51	
Missing	1	0	1	
Presence of a mental health condition				$X^2(1) = 0.666$, $p = .414$, *log OR* = 0.348
Yes	29	17	12	
No	98	49	49	
Missing	1	0	1	

Research Design

A non-randomized, mixed-effects design was adopted including a between-subjects factor of group (intervention, control), and a within-subject factor of time (baseline and follow-up assessments). For the intervention group, assessments occurred before and after the module, and for the control group, the assessments were separated by an equivalent amount of time

elapsing for those in the intervention group. Those in the control group completed another optional third-year psychology module (equivalent in length to the positive psychology module). The content of these other modules ranged broadly and participants in the experimental condition were also offered these optional modules. We also compared participant scores at baseline and follow-up with population-based norms from the Scottish Health Survey (Cheong et al., 2018).

Procedure

Swansea University student volunteers were recruited through social media, email, and the departmental participant pool. Those who elected to complete the optional, credit-bearing wellbeing science module were assigned to the intervention group (recruited $n = 98$, completed $n = 66$), while those that did not select to complete the module were assigned to the control group (recruited $n = 83$, completed $n = 62$). Assessments were conducted on the Qualtrics platform, facilitating the collection of basic demographic information and responses to the Warwick-Edinburgh Mental Well-being Scale (WEMWBS).

Materials

Demographic information included age, gender, number of self-reported physical and mental health conditions, and subjective social status (SSS) to assess a persons perceived standing in society. SSS was determined using the MacArthur Scale of Subjective Social Status (Adler et al., 2000). The WEMWBS provided a measure of wellbeing, characterized by sound psychometric properties (internal consistency, $r = 0.89$ for student sample and 0.91 for population sample; test-retest reliability, $r = 0.83$; minimal susceptibility to social desirability; Tennant et al., 2007). The WEMWBS taps into aspects of eudaimonia (flourishing; e.g., "I've been feeling useful"), hedonia (positive emotions; e.g., "I've been feeling cheerful") and psychological functioning (e.g., "I've been thinking clearly"). All 14 items are positively phrased, and participants respond using a 5-point Likert scale ranging from 1 (none of the time) to 5 (all of the time). A total score is determined by summing the score for each of the 14 items.

Teaching Intervention

The intervention was a credit-bearing, stand-alone and optional module, offered to students in the third year of their candidature on a three-year BSc degree in psychology. The module took place over 5 weeks, including a focus on theory and background (week 1), connecting to self (week 2), others (week 3) and nature (week 4), as well as positive behavior change (week 5), while reflecting on sociostructural promoters and barriers to wellbeing alongside each week's content. The module adopted a blended learning approach, encompassing 5 hours of online seminars over Zoom, 10 hours of asynchronous online learning modules, 40 hours of private study and activities, and 45 hours preparing for assessment. Control participants were enrolled on an alternative optional module with similar time commitments. On completion of the wellbeing science module, students were required to write up a research report on the impact the module had on their own wellbeing, encouraging active learning and a focus on how their own wellbeing might be improved. Repeatedly sampled data were analyzed and interpreted using statistical process control analysis, a rigorous approach to drawing objective conclusions in studies characterized by an N-of-1 research design. We have previously described student assessment for this module elsewhere (Kemp & Fisher, 2021), and have made supporting materials freely available to instructors on the Open Science Framework (Kemp et al., 2022). Content includes reading materials, student guidance, datasets on which analysis – reported in this paper – is based and additional resources.

Data Preparation and Analysis

Statistical analysis was conducted using JASP (version 0.16.1). The impact of the module on wellbeing was examined using a 2 group (intervention, control) $\times$ 2 timepoint (baseline, follow-up) mixed-effects ANOVA. One-sample t-tests were also conducted to compare wellbeing scores with those from a nationally representative dataset (Cheong et al., 2018; $N = 4299$, M (all adults) = 49.4, $SD = 8.96$, age range: 16–75+). Effect sizes (d) and Bayes factors are reported to illustrate the size of the effect and degree of support for findings. Effect sizes are described as either small ($d = 0.2$, $r = 0.1$), medium ($d = 0.5$, $r = 0.3$), or large ($d = 0.8$, $r = 0.5$) based on benchmarks suggested by Cohen (1988). A classification scheme for interpreting Bayes Factors (Jeffreys, 1961; Lee & Wagenmakers, 2013; Wagenmakers et al., 2018) was used such that values of 1–3 correspond with 'anecdotal' evidence, values of 3–10 as 'moderate' evidence, values of 10–30 as 'strong' evidence, values of 30–100 as 'very

strong' evidence, while values exceeding 100 reflect 'extreme' evidence in support of the hypothesis (BF_{10}).

Results

Analysis of Student Data

Parametric assumptions were checked, and investigation did not reveal any violations. A significant interaction between group and time was observed, $F(1, 126) = 7.76$, $p = .006$, $n^2_p = 0.058$, $BF_{10} = 6.30$. Notably, post-hoc tests on wellbeing scores for the intervention group increased significantly from baseline to follow-up, $t(65) = 4.16$, $p < .001$, $d = 0.512$, $BF_{10} = 219$, while scores for the control group did not, $t(61) = 385$, $p = .702$, $d = 0.049$, $BF_{10} = 0.149$. Students who enrolled on the module displayed a significant mean increase in wellbeing scores by 4.34 points. WEMWBS wellbeing scores and all pairwise comparisons are provided in Table 2.

Table 14

Descriptive Statistics and Pairwise Comparisons

Wellbeing Score	Total Sample ($N = 128$)	Intervention Group ($n = 66$)	Control Group ($n = 62$)	Statistics by Group
WEMWBS at T1 (*M, SD*, range)	45.04, 9.27, 20-70	44.49, 9.63, 25-70	45.63, 8.90, 20-68	$t(125.97) = 0.70$, $p = .486$
WEMWBS at T2 (*M, SD*, range)	47.46, 8.25, 26-70	48.83, 8.53, 32-70	46.00, 7.75, 26-67	$t(125.87) = 1.97$, $p = .051$
Statistics by time	$t(127) = 3.31$, $p = .001$	$t(65) = 4.16$, $p = .001$	$t(61) = 0.385$, $p = .702$	N/A

Note. WEMWBS = Warwick-Edinburgh Mental Well-being Scale.

Comparison with Population-Based Norms

Additional one-sample *t*-tests indicated that wellbeing for the intervention group at baseline ($M = 44.49$, $SD = 9.63$) was significantly less than published normative data ($M = 49.4$, $SD = 8.96$; $t(65) = -4.15$, $p < .001$, $d = -0.51$, $BF_{10} = 211$), and this difference was ameliorated on module completion, $t(65) = -0.54$, $p = .591$, $d = -0.066$, $BF_{10} = 0.155$. Associated JASP datafiles are provided on the Open Science Framework (Kemp et al., 2022).

Discussion

Here we present the first evidence for the impact of our wellbeing science module on student wellbeing during the COVID-19 pandemic. Findings indicate that the module improved wellbeing relative to those participants who did not complete the module. Findings also demonstrated beneficial impacts of the module relative to population-based norms. The unique contribution of this work is that it provides evidence on the impact of a wellbeing science module, built from a transdisciplinary perspective, encompassing individual, collective and environmental pathways to wellbeing.

Reported findings are notable for several reasons. First, students are at a high risk of developing mental health difficulties (Edwards et al., 2019; Sheldon et al., 2021) and as student demand for mental health typically exceeds support available in the general and student populations (Brown, 2018; Limone & Toto, 2022), there is an opportunity for instructors in psychology to contribute to institution-wide efforts to improve student wellbeing. Second, research has demonstrated (Santini et al., 2021) that for each point increase in mental wellbeing, healthcare costs and sickness benefit transfers decrease per person, a year later ($\$-42.5$ and $\$-23.1$, respectively), highlighting potential future downstream impacts of promoting wellbeing in student populations. Third, our study was conducted during the COVID-19 pandemic, a period associated with social isolation and generalized societal distress, highlighting the benefits of focusing on wellbeing despite suffering, providing support for an emerging existential positive psychology and science of wellbeing (Wong et al., 2021).

Our module was embedded into a third-year undergraduate degree program in psychology in the United Kingdom. A variety of teaching materials are provided (Kemp et al., 2022) for instructors who would like to develop a similar module at other institutions or adapt the module for different learning environments including class size, modality, student level and

discipline. Historically, the module has been a popular one, attracting up to 150 students each year, and has been designed in such a way to allow students to progress independently, supported by weekly seminars, online learning modules and an online discussion board. For the upcoming academic year, it is expected that module contact time with students will increase from 1-hour-long weekly Zoom-based seminars, which included a presentation by the instructor and group-discussion, to 2-hour-long face-to-face workshops that will involve additional student group-work, focused on discussion of key reading materials (Kemp et al., 2022). Module delivery is flexible however and while it has been developed for the (online) classroom, it could be adapted for student life outside of the class environment without much difficulty. While our module was offered to students as an optional credit-bearing module in the final year of their degree, available materials could also be adapted for less advanced students as the module does not require prerequisite skills. Given considerations around flexible delivery, capacity for students to progress relatively independently, and no requirements relating to prerequisite learning, there is also capacity to embed available materials into programs run in other disciplines.

Our module was developed on strong theoretical foundations and developments in the field (Kemp & Fisher, 2022; Mead et al., 2021a), emphasizing that while human suffering is inevitable, there remains tremendous capacity to accept and transcend that suffering to realize sustained wellbeing (e.g., Wong 2019; Wong et al., 2021). The present study demonstrates that student wellbeing can be improved against the backdrop of COVID-19. Related interventions for people living with acquired brain injury further demonstrate that wellbeing can be promoted despite considerable suffering (e.g., Gibbs et al., 2022; Wilkie et al., 2021). Recent work has reported high levels of climate-related distress in children and young people (Hickman et al., 2021), and such distress will inevitably lead institutions to question what they can do to support students in managing difficult emotions relating to the unfolding climate catastrophe. As our module places emphasis on individual, collective and planetary wellbeing (Kemp & Fisher, 2022; Mead et al., 2021a), we suggest that there is tremendous scope for supporting institution-wide responses to the climate emergency, and work has begun to measure the impact of our module in this regard.

While our study has several notable strengths including control group, sample size and research design, some limitations are worth noting. First, we restricted our dependent variable to the WEMWBS, a widely used measure of wellbeing. While this enabled us to determine the impact of our module on a reliable and valid measure, future research is needed to explore

mediators and moderators of these findings. Second, it was not possible to randomly assign participants to group as the study was conducted within the context of an undergraduate degree curriculum. It is possible therefore that participants in the intervention group were more motivated to improve wellbeing – as they chose to study an optional module focused on wellbeing – than those in the control group. PPIs to improve wellbeing were also self-selected by students in the intervention group, consistent with calls for a more personalized approach to wellbeing promotion (Ciarrochi et al., 2022). While this may be considered a limitation, it is important to acknowledge that motivation is a key ingredient for the success of any psychological intervention (Ryan et al., 2011). However, in order to fully understand the impact of such a module whilst controlling for individual motivation, future research could consider offering this and an equivalent module at the first and/or second year level, randomly allocating students to one or the other.

A third limitation is that demand characteristics may have contributed to responses returned on the WEMWBS, although recent research suggests that informing participants about the purpose of an experiment has no detectable effect on observed treatment effects (Mummolo & Peterson, 2018), minimizing concerns relating to such characteristics. Fourth, our sample was comprised of individuals with pre-existing physical and mental health conditions. While no significant difference was observed in numbers of students with and without such conditions across intervention and control groups, future research is needed on larger samples to further explore impacts. Whilst it is acknowledged that wellbeing and distress are not extreme ends of a single spectrum, they do correlate highly, influencing one another (Iasiello & Agteren, 2020). Finally, we acknowledge that the intervention group included more older students (range: 20–49) than the control group (range: 18–28), which may have impacted on findings obtained, although no statistically significant differences on age was observed between groups.

In summary, we have described an innovative wellbeing science module that broadens the scope of taught content in positive psychology to encompass self, others, and nature. Findings presented here demonstrate that student wellbeing was significantly improved on completion of this module relative to a control group and population-based norms. It is our hope that by making our module resources freely available that other instructors will join our effort to promote a transdisciplinary approach to improving wellbeing at multiple levels of scale focused on individual, collective and planetary wellbeing.

Chapter 10

10. What's Next for Wellbeing Research?

This thesis has provided a broad and nuanced overview of a new model of wellbeing, initially evidenced with two data-driven chapters. Throughout my PhD, it became clear that the ever-growing literature meant the GENIAL model had to continually expand in scope. Thus, a succinct and updated GENIAL model was presented in chapter 7. We argue that there is a need to focus on wellbeing across multiple domains (individual, community and environment) at increasingly higher levels of scale, an approach that offers underrealised potential to ameliorate social challenges whilst also promoting wellbeing on an individual level. The applied efficacy of this framework for wellbeing was tested in chapter 9 on a student sample within an educational-based setting, with findings supporting the use of the GENIAL framework. The next, and final chapter, focuses on where wellbeing (with the GENIAL model as an underpinning) has a place amongst current crises moving forward.

Chapter 11

**11. What's Next for Wellbeing Science? Moving From the Anthropocene to the
Symbiocene**

A version of this chapter has been submitted to Frontiers in Psychology, in the special issue
"A New Science of Suffering, the Wisdom of the Soul, and the New Behavioural Economics
of Happiness: Towards a General Theory of Well-being"

Abstract

Positive psychology has been criticised for a heavy focus on the individual, neglecting wider communities and environment. The GENIAL model presents an updated approach to wellbeing, one that considers the bidirectional relationship between individuals and their communities and environment, including long-term impacts on the planet. This chapter places the GENIAL model in the context of global issues, discussing the role that wellbeing science can play in supporting top-down initiatives set out to resolve major planetary issues we face. There is a heavy emphasis on motivating individuals to engage in collective action, thus, a bottom-up approach, supporting by wellbeing science, can support top-down initiatives (such as policies). Large-scale initiatives are discussed (United Nations Sustainable Development Goals and Inner Development Goals), followed by the role that the GENIAL model can play in supporting such initiatives. The current trajectory for our planet is not hopeful, however, we propose a move into a new era, moving from a restricted focus on the self (a characteristic of the Anthropocene) towards a focus on the inter-relationships of the self, others, and nature (moving into the Symbiocene). Within this new era, a focus on wellbeing will be characterised by inner development, subsequently motivating collective action to support communities and the environment, an effort that will further improve wellbeing (in a bidirectional manner, as discussed in the GENIAL model).

The modern world is complex and evolving at an accelerated pace. With that, we are now living in the Anthropocene; a word derived from the Greek terms for human (*anthropo*) and new (*cene*) (Slaughter, 2012). This 'new human' era denotes the significant impact that human activities have had on the ecosystems within which we live and is characterised by distinct ecological change. Our continued lack of collective action is giving rise to a new era of avoidable suffering for people and the planet. Anthropogenic climate change is increasing risk and frequency of natural disasters, with rising global temperatures leading to more devastating droughts, wildfires, and floods, as well as loss of life and agricultural capacity. The impact of the climate crisis is a systemic problem which also incurs significant socioeconomic, demographic, and political consequences (Kalwak & Weihgold, 2022) and is on the brink of what has been described as 'Hothouse Earth' (McGuire, 2022), which cannot be reversed through human intervention once the tipping point has passed (Steffen et al., 2018). The Power Threat Meaning Framework (Johnstone & Boyle, 2018) provides a lens for understanding different responses to climate breakdown which include eco-distress, climate trauma and feelings of institutional betrayal relating to wider contextual factors including vested interests of the fossil fuel industry, carbon intense lifestyles, geopolitics and war (Morgan et al., 2022). Developments in psychological science and ecophilosophy highlight an urgent need to foster a sense personal agency for the promotion of planetary wellbeing, rediscovering a sense of purpose and hope, and reconnecting with and cultivating compassion for the natural world, which will require reaching out to those with different values relating to the unfolding catastrophe (Morgan et al., 2022; Pihkala, 2022). Despite the positive contributions of psychology including the promotion of climate action (Gulliver et al., 2021), the field has been criticised for focussing on the individual rather than the system. Our own work (see Kemp et al., 2017; Kemp & Fisher, 2022; Mead et al., 2019; Mead, Fisher, & Kemp, 2021; Wilkie et al., 2022 for context), and the work of others, has highlighted how the combination of top-driven (i.e. public policy) and bottom-up (i.e. individual focussed) approaches may be combined to support responses to complex problems. Our focus in this paper is on the need for inner development and self-transformation in order to improve progress on the United Nations Sustainable Development Goals (UNSDGs), drawing on scientific developments embedded in existential and positive psychology.

On the Need for Inner Development for People and Planet

Influenced by developments in social and psychological sciences, the UNSDGs represent a universal call to action to achieve peace and prosperity for people and the planet by the year 2030 (https://sdgs.un.org/). These goals provide a blueprint for sustainability and focus on the promotion of good health and wellbeing, minimising poverty, reducing inequalities, building sustainable cities and communities, and taking action against climate change. Progress towards the UNSDGs has been disappointing, a result of cascading crises including international conflicts, worsening climate change and the Coronavirus (COVID-19) pandemic (see https://unstats.un.org/sdgs/report/2022/ for further information). This lack of progress indicates that policy mandates alone are not sufficient to spur collective action - we *must also* focus on individuals and communities and nurture their capacities to promote planetary wellbeing. The suggestion that capacity for effective action will depend on the inner development and transformation of individuals (Wamsler & Brink, 2018; Woiwode et al., 2021), is an idea that has led to the so-called 'inner development goals' or IDGs (https://www.innerdevelopmentgoals.org/).

This initiative highlights various skills and qualities for inner growth that must be supported in individuals, groups, and organisations if humanity is to achieve a sustainable global society in the face of complex societal and global issues. This includes cognitive and social skills, with a focus on being, thinking, relating, collaborating, and activism. These concepts are conterminous with recent developments in wellbeing science including our own work (Kern et al., 2020; Lambert et al., 2022; Lomas et al., 2020; Mead, Fisher, & Kemp, 2021), highlighting that actions to support planetary health and wellbeing are often synonymous to those required to achieve individual and collective wellbeing, demonstrating a connectedness between the complex constructs and systems of the modern world. Our own theoretical framework (the GENIAL model) focuses on similar concepts, including balanced minds, engaged communities, and connection to nature, around which we have promoted positive change at multiple levels of scale. We have defined the complex construct of wellbeing itself as the sense of connectedness to ourselves (the individual domain), others (the community domain), and nature (the environment domain) (Kemp et al., 2017; Kemp & Fisher, 2022; Mead et al., 2019, 2021; Wilkie et al., 2022). Various societal crises have been considered to reflect the result of a disconnection from ourselves, others, and nature (Bhaskar, 2012; Weintrobe et al., 2021); such that rebuilding our sense of connection (or relatedness, as per the IDG's) is crucial for supporting both ourselves, our communities and planet.

Examples for Inner Development

There is good evidence to suggest that a sense of connectedness to the self (i.e. the individual) may be supported by activities which engage the body and mind, such as mindfulness. Defined as intentional, non-judgemental attention to the present moment (Kabat-Zinn, 1990), mindfulness has been linked to theories of attention and awareness (Brown, Ryan, & Creswell, 2007; Sumantry & Stewart, 2021), with research demonstrating that regular mindfulness meditation influences structural changes in brain regions involved in learning, emotion regulation, self-referential processing and perspective taking (Hölzel et al., 2011). Mindfulness-based behavioural therapies, such as Acceptance and Commitment Therapy, focus on defusing thoughts, feelings, and experiences and explicitly seek to promote mental health and well-being by increasing meaningfulness and valued living (Hayes, Strosahl & Wilson, 1999). Mindfulness may support clarification of one's values, with value-based living driving thoughtful future actions. Together these strategies offer an evidence-based and sustainable means for supporting inner development (Ericson, Kjønstad, & Barstad, 2014) by broadening mindsets and increasing the capacity of individuals to deal with complex issues (such as climate change), reducing avoidance-based coping tendencies that may otherwise arise when overwhelmed (Centre for Research on Environmental Decisions, 2009). A focus on inner development may therefore encourage and facilitate 'sustainability from within' (Wamsler et al., 2018). A seemingly 'individual' focused intervention can subsequently have widespread impacts across the three domains of the GENIAL model (individual, community, and environment), thus being a potential target for changing large-scale issues in society. For example, mindfulness can be used to increase altruistic behaviour (Iwamoto et al., 2020), with a meta-analysis of 31 studies reporting medium effect sizes for the efficacy of mindfulness interventions on prosocial behaviours (Donald et al., 2019). Although research is not always consistent, with the people and context being important (Guo et al., 2023), thus further research is needed to understand how to utilise mindfulness to facilitate individual action towards a greater cause. Additionally, mindfulness can be used to facilitate pro-environmental behaviours, through means of self-regulation, relational capacities, internalising environmental motivation, increasing wellbeing, and deepening mindfulness (Thiermann & Sheate, 2022), highlighting the link between an individual-based intervention and tackling wider environmental issues.

Another example that can be drawn upon for supporting inner development whilst also having an impact at scale is nature connection. Discussed as part of the environment domain

within the GENIAL model, nature connection has benefits for the individual, the community/others, and the environment, highlighting another intervention strategy where focusing on inner development can have widespread benefits. Kuo (2015) provides an overview of benefits that exposure to nature has on an individual level, such as improving physical health (across various markers), improving parasympathetic control (highlighting links with the GENIAL model and vagal function), and supporting various physiological and psychological states (such as stress reduction, increases in transcendent emotions, and attention restoration), all of which support inner development on an individual level. Research suggests that this inner development subsequently filters through to community and environmental benefits. For example, research highlights that nature connection can increase prosocial behaviour (e.g. altruism), reduce antisocial behaviour (e.g. crime and aggression), and increase social connection (e.g. social ties, social cohesion, and civic engagement), with mechanisms for how this occurs including self-transcendent emotions, motivation, social ties, place attachment, trust, and self-regulation (Arbuthnott, 2023). In addition to social and community benefits, nature connection can increase pro-environmental behaviours (DeVille et al., 2021) and has been associated with both individual and collective climate action (Thomson & Roach, 2023). Thus, interventions that target increased nature connection and nature exposure among individuals (or on a larger scale with policy-focused initiatives, e.g. green space) may be an effective way to improve wellbeing sustainably, whilst also supporting others and the environment.

We now provide examples of how we have sought to promote inner development within the context of education and the healthcare sector - two complex systems with great capacity to influence the development and wellbeing of current and future generations.

Promoting Inner Development through Complex Systems

A system can be conceptualised as an integrated or interdependent set of elements forming a complex whole (WHO Regional Office for Europe, 2022). Systems approaches hereby emphasizes the need to understand the dynamic interconnections between elements within a system (which may include individuals, populations and organisations) to recognise how agents evolve in response to each other and their varying contexts (WHO Regional Office for Europe, 2022). Systems-informed thinking lends itself to addressing 'wicked' societal health challenges (including the complex construct of wellbeing and the pernicious effects of inaction against climate change) by taking a broader viewpoint which accounts for the

complexity and interdependence of related and overlapping systems (Kreuter et al., 2004). Healthcare is one such system that is inherently complex (Tien, 2009), as is the education sector. Recent efforts have combined developments in positive psychology with systems thinking to elucidate leverage points where meaningful change may occur (Kern et al., 2020). This approach has been successfully applied to education (Kern et al., 2020), with such developments inspiring our own work within the complex system of education. Our recent efforts have demonstrated how inner development may be facilitated in generations whose collective action will play a key role in navigating the climate crisis in the near future through the strategic design and delivery of an evidence-based module informed by our GENIAL framework (Kemp et al., 2017; Mead, Fisher, & Kemp, 2021). This module – which is now embedded into the curriculum for undergraduate students studying psychology within our academic institution - educates students about the latest developments in wellbeing science and theory and empowers them to apply these ideas to promote individual, collective and planetary wellbeing (Kemp et al., 2022; Kemp & Fisher, 2021). Delivery of this module was found to significantly improve levels of student wellbeing at a time of suffering and crisis - specifically during the height of the Coronavirus pandemic, where levels of anxiety and depression increased (Castaldelli-Maia et al., 2021) particularly in those at a social or economic disadvantage (Gloster et al., 2020). It is this focus on building inner development alongside suffering that is a key part of second wave positive psychology (Wong, 2019).

Suffering is an inevitable feature of the human experience (Malpas & Lickiss, 2012; Wong, 2022). This is not to say that we must surrender to suffering, but rather that we must learn to transcend it (Nhat Hạnh, 2014) and harness its potential to foster growth in contrast to experiential avoidance (Chawla & Ostafin, 2007). Existential positive psychology outlines the foundations for growing through adversity (Wong, 2019), with much of the philosophical underpinnings stemming from the work of Viktor Frankl (1984), and more recently by Paul Wong (Wong, 2011, 2019, 2020). Research highlights how suffering can drive the meaning-making process, which can subsequently facilitate wellbeing (Edwards & van Tongeren, 2020; Kaftanski & Hanson, 2022; Steger, 2009). As evidenced by the Coronavirus (COVID-19) pandemic, suffering can be a driver for positive change, ranging from small-scale changes at the individual level (such as health behaviours; Jaeger et al., 2021) to large-scale changes that impact upon the environment, such as reductions in pollution and greenhouse gas emission (Khan et al., 2021). However, change is not always permanent, evidenced by increasing emissions (Davis et al., 2022; Ripple et al., 2021) despite slight improvement

during multi-national COVID-related lockdown. Our own work has identified the role of tragic optimism (optimism despite suffering) in supporting wellbeing (Mead et al. 2021) during the pandemic, along with identifying routes through which post-traumatic growth can be achieved, including gratitude (a self-transcendent emotion) and connection to nature (Mead et al., 2022). Embedding these insights into the psychology curriculum and encouraging students to apply these principles to their own lives has the potential to scale up opportunities for positive change. We are also applying these ideas to our work within the healthcare sector through interventions for individuals with pervasive impairment that cannot be 'fixed' (Gibbs et al., 2022; Tulip et al., 2020; Wilkie et al., 2021). This work is focused on achieving positive change at multiple levels of scale including the individual (e.g. post-traumatic growth), the organisation (e.g. co-production and partnership working to realise previously unimagined opportunities) and society (e.g. progress on government legislation such as the Wellbeing of Future Generations Act in Wales), positioning the individual within increasing phenomenological scales that extend to the ecosystem and life course, with important implications for the sustainability of the healthcare sector (Gibbs et al., 2022b).

Laying the Foundations for the Symbiocene

The SDG and IDG initiatives highlight the role that wellbeing and psychological science can play in securing a better future for ourselves and the planet. As positive psychology has moved from the individual to groups and societies (Lomas et al., 2020), we ironically highlight the need for a return to the individual with a focus on methods for fostering inner development in order to drive societal change alongside top-down initiatives at a higher level, through for example wellbeing public policy (e.g. Fabian & Pykett, 2022). Strategies which nourish inner dimensions and foster connectedness, community, and a belief in something greater than oneself are proposed as an emerging '*recovery movement'* in response to the various crises we face (Koger, 2015). Because many of the crises we face may stem from an extreme disconnection from the self, others and nature (Bhaskar, 2012; Way et al., 2018; Weintrobe, 2021), we argue that methods to facilitate these connections may help to build our inner resources (see Mead et al., 2021 and Wilkie et al., 2022 for suggested pathways), supporting individual change needed to achieve positive change at a higher level. By moving away from a restricted focus on the self (a characteristic of the Anthropocene) and towards a focus on the inter-relationships of the self, others and nature, we will be laying foundations for a new era that has been described as the Symbiocene (from the Greek 'sumbiosis', or companionship; Albrecht & van Horn, 2016), focused on the potential for all living beings to

live together harmoniously for mutual benefit, providing a potential antidote to the *'long emergency'* (Kunstler, 2007).

Conclusions

In conclusion, we suggest that the health and wellbeing of individuals, communities and nature is dependent upon humanity moving towards a new epoch - the Symbiocene – an era beyond the Anthropocene, characterised by an interconnectedness and 'eco-homeostasis' between all living beings (Albrecht & van Horn, 2016). Progress on inner development must be supported by the state through commitments to ecological economics and systemic change for a post-growth society. Inner development will play a key role in driving positive planetary change, presenting unique opportunities for psychological scientists to facilitate self-development and transformation in order to manage, cope and inevitably flourish despite suffering. This potential has motivated the development and continued refinement of our own GENIAL model, research and applications, guided by a need to better align sustainability and wellbeing agendas (Kemp et al., 2017a, 2017b; Kemp & Fisher, 2022; Mead et al., 2021). The emerging fusion of ideas between sustainability literature, wellbeing science, and behaviour change, offers huge potential for developing novel, evidenced-based approaches to societal transformation.

Chapter 12

12. Discussion and Impact

Abstract

The following chapter provides an overview of the thesis, highlighting the growth of the GENIAL model from the beginning to the end of my PhD. Key findings from data-driven chapters are discussed, along with suggestions for future research. The work in this thesis begun to have an impact on the wider scientific field from chapter 1, a topic that is discussed in the current chapter. Additionally, my success in being awarded a scholarship, multiple grants, and running a wellbeing conference are highlighted. I conclude with the argument that self-transcendence may be a key theme throughout each chapter, a question that I will continue to research after my PhD, having been successful in gaining a grant to run this study.

Overview and Impact

This thesis began with the focus of expanding the original GENIAL model (Kemp, Arias, & Fisher, 2017). The original model (GENIAL) provided a framework within which pathways to wellbeing can be achieved through individual and social efforts and highlighted a key role for the vagus nerve. These pathways were subsequently incorporated into the "individual" and "community" domains of the updated GENIAL model (chapter 1; Mead et al., 2019). However, the science of wellbeing has become more nuanced is its approach, with scholars progressing through the various waves of positive psychology. Thus, the aim of this thesis was to further broaden the scope of wellbeing through an integration of different research areas, covering not just the individual, but the community and the environment.

Chapter 1: Expanding the GENIAL Model

Motivated by the unfolding climate emergency (Ripple et al., 2021) and inspired by efforts to rethink wellbeing from the perspective of the natural environment (Capaldi et al., 2015; Richardson et al., 2016). I sought to integrate an "environment" domain into the new model, highlighting the importance of the natural environment for our health and wellbeing. Additionally, major criticisms of wellbeing science included the flaw of 'scientific polyannaism' (Yakushko, 2019), thus ignoring the role of adversity in wellbeing (Wong, 2010), along with neglecting the role of sociostructural issues. In this new GENIAL model (chapter 1; Mead et al. 2019), I argued a need to re-focus wellbeing science into three domains including the individual, community, and environment, creating a model of wellbeing that now underpins developments in the healthcare and education sectors (Kemp & Fisher, 2022) to promote the wellbeing of people living with chronic conditions (Kemp, Tree, Gracey, & Fisher, 2022) and university student populations (Kemp & Fisher, 2021; Kemp, Mead & Fisher, 2022).

While researchers in recent years had begun to explore the link between wellbeing and nature, the addition of the environment domain in a wellbeing model was novel at the time. Since the publication of chapter 1 as a pre-print, leading researchers have incorporated nature connection into the measurement of wellbeing (Lambert, 2020), and the authors drew on insights from my preprint when developing the rationale for this work. However, another novel component of this developing GENIAL model was that the incorporation of human suffering as an element of wellbeing, stemming from research in the realms of second wave and existential positive psychology. I began to build a novel model of wellbeing that aimed to

overcome valid criticisms of positive psychology as a research field. For example, the updated GENIAL model overcame criticisms that positive psychology polarises positive and negative emotions/experiences by incorporating aspects of second wave and existential positive psychology. Another criticism of the research area is that it is individualistic, however, the GENIAL model has a heavy focus on expanding beyond the individual. Chapter 1 (pre-print) began being cited by influential scholars in the field within one month of publishing and continues to be cited, highlighting the relevance of this work and the impact it is having. For example, Professor Paul Wong drew upon our pre-print when introducing his second wave positive psychology and its contribution to counselling psychology (Wong, 2019). Dr Louise Lambert, Dr Tim Lomas, and the late Professor Ed Diener drew upon our work when writing about the need for a more inclusive measure of wellbeing, highlighting a move towards a greater global understanding of wellbeing (Lambert et al., 2020). Lambert subsequently drew upon our work when discussing 'collective wellbeing' (Lambert et al., 2022), drawing upon the novel elements of the GENIAL model when discussing how positive psychology has begun to move beyond the individual. While Chapter 1 provided an overview of the substantial evidence base of various pathways to wellbeing – which are typically studied in isolation –, original research investigating the collective impact of these domains on wellbeing was still required.

Chapter 3: Protectors of Wellbeing During the COVID-19 Pandemic

The purpose of chapter 3 was to investigate the importance of the three domains of the GENIAL model, representing the first study to explicitly research the collective contribution of individual, community, and environment factors to individual wellbeing. It was hypothesised that the sample would exhibit significantly lower wellbeing than previous general population samples due to the context of the COVID-19 pandemic. Additionally, it was hypothesised that each variable would significantly contribute to wellbeing in a multiple regression model. Significant reductions in wellbeing were observed among our sample, findings associated with a small to medium effect size, findings also indicated that the three domains (physical activity, gratitude, tragic optimism, social support, and nature connection) accounted for 50% of the variance in wellbeing – an especially strong finding for psychological science. Furthermore, gratitude and tragic optimism emerged as significant contributors to the model, both of which are core characteristics of existential positive psychology (Wong et al., 2020, Wong, 2011, Wong, 2019), highlighting the importance of

these constructs in further research on better managing population-wide trauma and forming the basis for the next data-driven chapter.

Whilst we highlighted the importance of gratitude and tragic optimism, the other variables of our model did not support our hypothesis, with physical activity, social support and nature connection not significantly contributing towards the model. An argument provided for this centres on the experience of these factors during the pandemic, with experiences of one often overlapping with the other. For example, Dzhambov et al. (2020) highlighted that the positive mental health effects of outdoor green space during the pandemic were partially mediated by social support. It is therefore possible that nature may have provided a context within which social support and physical activity was experienced during lockdown. Replications of this study would be beneficial in a post-pandemic world to investigate the role of each variable in wellbeing, including potential mediatory roles.

The published version of this chapter in Frontiers in Psychology attracted attention from media outlets both in the UK and Australia (see appendix A and B), both of which were particularly interested in the concept of tragic optimism as a potential antidote to toxic positivity, a discussion that was also had by leading scientist, Scott Kaufman, a few months later (Kaufman, 2021). The paper developed traction in the scientific field, too. At the time of writing this thesis, the published version of this chapter has been viewed 7,985 times and has attracted 38 citations, including interest from Dr Lilian Jans-Beken in her paper on 'mature gratitude' as a method for coping with COVID-19 (Jans-Beken, 2021). The findings from my study, as well as subsequent interest, highlighted a need to delve further into existential positive psychology and pathways to thriving as a result of it. The collective trauma of the pandemic is a salient example that human suffering is part of life. However, the GENIAL model argues that we need to incorporate adversity into our wellbeing to sustainably build our wellbeing when thinking about 'balanced minds'. Thus, a question arises as to whether the domains of the GENIAL model are not just only beneficial for immediate wellbeing, but whether they can facilitate growth through adversity, subsequently impacting wellbeing. This was the purpose of the next data-driven chapter, which further explored existential positive psychology utilising post-traumatic growth.

Chapter 5: Predictors of PTG During the COVID-19 Pandemic

Results from chapter 3 highlighted the importance of gratitude and tragic optimism during the COVID-19 pandemic – a time of collective trauma. This opened up further discourse into one

of the key additions to the updated GENIAL model (overcoming criticisms of previous models of wellbeing) – the acknowledgement of 'negative' experiences or adversity. Leading from this, one of the most influential factors in healthy adjustment after trauma and adversity is PTG. Building on findings from chapter 3, the aim of chapter 5 was two-fold; to investigate the collective influence of the GENIAL domains (as measured by physical activity, gratitude, tragic optimism, social support, and nature connection) as facilitators for PTG, and secondly, to investigate whether this impact subsequently improves wellbeing. It was hypothesised that the variables would significantly predict wellbeing (replicating the previous findings) and that this relationship would be partly mediated by increases in PTG. With a new UK-based sample collected 6-months after the original study (chapter 3), a mediation analysis was conducted to investigate the relationship between our variables of interest. Findings highlighted the GENIAL domains to account for 18% of the variance in PTG scores, with gratitude and nature connection being significant contributors to the model. Chapter 5 is the first study to research the collective influence of factors across individual, community, and environment domains, on PTG, and the first study to quantitatively link nature connection with PTG. Interestingly, the mediation analysis highlighting the impact of the GENIAL domains on PTG did not subsequently impact wellbeing, however, research suggests that the wellbeing benefits of PTG may occur over time (Sawyer et al., 2010), thus, would not be detectable in a cross-sectional design. Limitations of the study are discussed under the 'limitations' subsection.

I submitted this paper as part of a scholarship application for the International Meaning Conference and was successful in winning a scholarship, including the opportunity to present this work at the conference. The growth of my knowledge to this period of time in my PhD encouraged me to apply for a grant to run a conference, alongside two other PhD students (Katie Gibbs and Lowri Wilkie). We were successful in gaining a £10,000 grant from the Morgan Advanced Studies Institute, an institute aimed at facilitating interdisciplinary research (appendix E). We organised and hosted the conference (titled 'Summer of Hope'), with the aim of bringing together the next generation of researchers, all of whom shared novel methods for improving health and wellbeing in a post-pandemic world. In this two-day conference, we hosted Professor Jose Luis Marti, from Pompeu Fabra University of Barcelona, as one of our key speakers, who discussed ideas of planetary wellbeing. We also hosted Vanessa King, from the Action for Happiness group, as another key speaker, who discussed the role that positive psychology can play in a post-pandemic world. Among our

key speakers, we hosted PhD students (or recent graduates) from across the world, all of whom shared their recent research in line with health and wellbeing.

Chapter 7: The GENIAL Model: A Transdisciplinary Model of Wellbeing

The previous chapters made key contributions to wellbeing science and support my growth in knowledge, gaining a greater insight into the field. With a greater understanding of wellbeing science, a further iteration of the GENIAL model was created and has since been published in the Frontiers in Psychology (chapter 7; Mead, Fisher & Kemp, 2021). This model discusses the importance of the three core domains (individual, community, and environment), the role of the vagus nerve in being the physiopsychological index of wellbeing (as discussed in the first iteration of the GENIAL model previous to this thesis; ref Kemp, Arias & Fisher, 2017), the impact of sociocontextual factors that lay beyond the control of the individual, and a brief background to behaviour change theories that may impact an individual's ability to sustain positive change. The publication of this paper in Frontiers in Psychology gathered attention from leading researchers in the field, with a general theme of broadening the scope and vision of wellbeing. For example, Nerys Edmonds, drew on our published work when informing her public health perspective on wellbeing (Edmonds, 2022), Victor Corral-Verdugo drew on our work when discussing wellbeing from the perspective of positive environments (Corral-Verdugo, 2022), Louise Lambert drew on our updated GENIAL model when discussing collective wellbeing (Lambert et al., 2022), and Alison Pritchard and Miles Richardson drew upon our work when discussing human and planetary wellbeing (Pritchard & Richardson, 2022). At the time of writing this thesis (December 2022), the published version of chapter 7 has been read more than 8,400 times, been cited 27 times, and has achieved an altemetric score of 121, highlighting interest from the scientific community. Additionally, the pre-print version of chapter 1 and peer-reviewed version of chapter 7 have been the foundation for various other work that has been conducted, including applications to the healthcare sectors (Gibbs, Fisher, & Kemp, 2022). For example, a paper published in PLoS ONE discusses a surfing intervention for people living with brain injury, an intervention that targets all three key domains of the GENIAL model (individual, community, and environment), with results highlighting benefits across the three domains (Gibbs et al., 2022). For example, themes identified from the reflexive thematic analysis included connection to nature (environment domain), meaning and purpose (individual domain), and social connection (community domain). Another key theme that arose was managing and accepting difficult emotions, a factor within the individual domain, drawing from second wave and existential positive

psychology. A further study focused on the benefits surf-therapy reported similar findings, aligned with the GENIAL model (Wilkie, Fisher, & Kemp, 2022). Additionally, a university-taught module was created and delivered to students, an evaluation of which formed chapter 9 of this thesis.

Chapter 9: Utilising the GENIAL Model to Target Student Wellbeing

Chapter 9 aimed to tackle the prevalence of mental health issues among university students and provide a novel 'intervention' through which wellbeing can be improved. A final-year, undergraduate wellbeing science module was created and taught by Professor Andrew Kemp, designed off chapter 1 and 7 of this thesis. Students were taught the theoretical background of wellbeing, in accordance with the GENIAL model, and encouraged to engage in opportunities to improve wellbeing during the 5-week course. It was hypothesised that students on the wellbeing module would have a significant wellbeing benefit compared to those who did not take the module (control participants). Results from the mixed ANOVA highlighted a significant benefit for wellbeing for students enrolled on the course, supporting the hypothesis.

This study was supported by the Greatest Need Fund in Swansea University after my application was successful in passing the panel. The grant ensured we met the required sample size, subsequently resulting in the publication of the study in Teaching of Psychology. Further research is needed to investigate the pathways through which this occurred, including, but not limited to, measuring changes in wellbeing-related behaviours (i.e. was there a greater impact on wellbeing among those who participated in positive behaviours more frequently?). However, the findings provide a positive outlook for what can feasibly be achieved when targeting student wellbeing across universities. I am continuing with this research post-PhD to further investigate the mechanisms through which wellbeing is increased among students on the module. Measures that will be investigated include the exemplars from this thesis (physical activity, gratitude, tragic optimism, social support, and nature connection), along with novel measures, such as eco-anxiety and self-transcendence. Given the importance of gratitude for wellbeing and PTG in chapter 3 and 5, respectively, I am interested to find out the role that gratitude may play in building wellbeing among the student cohort. From the collection of further data, we hope to answer questions surrounding key pathways to wellbeing that would be beneficial to target among university students and beyond. However, whilst the GENIAL model has proven beneficial to a sample of university

students, there is a need to understand how the model can be applied when considering wider societies and the world, with an understanding of what is currently being targeted among top-down and bottom-up strategies for wellbeing.

Chapter 11: What's Next for Wellbeing Science?

The aim of chapter 11 was to take a wide view on where wellbeing science can fit in amongst major planetary issues that continue to unfold. It discusses the current state of being, within the Anthropocene, whereby individuals set out with selfish endeavours and unsustainable goals, resulting in detrimental ecological change. The United Nations Sustainable Development goals represent a call to action to achieve peace and prosperity for people and the planet by 2030. However, there has been a lack of progress in this regard, highlighting that policies alone are not sufficient to create large-scale change. The responsibility for change must also be on individuals and communities, requiring collective action to do so, resulting in the 'inner development goals'. The initiative aims to build inner growth among individuals (concepts that are echoed by recent developments in wellbeing science, including the GENIAL model), motivating them to take collective action for something greater than themselves. Mindfulness-based therapies are discussed as one example to facilitate inner development through broadening mindsets. Overall, the chapter highlights a need for wellbeing science in facilitating inner development, to subsequently spur collective action that can better our communities and planet.

Overview & Impact: Thesis

Overall, this thesis has provided a novel model of wellbeing, but one that is not isolated to positive psychology alone. The GENIAL model incorporates the works of various disciplines, highlighting the key domains of individual, community, and environment, with suggested pathways to wellbeing within. However, this is just a framework to work with and the focus within can be adaptable to the needs of people (e.g. patients within a healthcare sector). In a similar manner to chapter 9, where students were encouraged to adopt their own preferred wellbeing intervention within the GENIAL framework. The first two data-driven chapters in the thesis focus on highlighting pathways to wellbeing and PTG within the GENIAL framework, successfully highlighting key roles for some, but not all factors. The final data-driven chapter provides initial evidence for the efficacy of an education-based module in supporting student wellbeing. Finally, the thesis provides a view forward for

wellbeing science, where once a research field focused solely on the individual, now has scope to focus on wider worldwide issues with a key role of wellbeing within this.

Limitations and Future Research

Several limitations of the thesis are worth noting. The first limitation concerns the context within which data was collected. The first two data-driven studies were conducted during the height of the COVID-19 pandemic; thus, findings may not generalise under 'normal' living standards. However, this very limitation can also provide beneficial insights. Given that a novel focus of the GENIAL model is the inclusion of adversity in pathways to wellbeing, it was a prime opportunity to investigate the benefits of GENIAL pathways to wellbeing and PTG during a time of great adversity. Future research should aim to replicate these findings in a post-pandemic world in order to highlight beneficial pathways both in and outside of adverse periods of time. I argue that findings will be comparable in the variance accounted for with both wellbeing and PTG, although the pathways that emerge as significant may differ depending on the context. Additionally, it would be beneficial to measure the extent to which participants are impacted by a trauma, subsequently comparing those who are impacted highly vs. minimally by trauma. If exemplars of GENIAL domains can consistently predict both wellbeing and PTG across a variety of experiences (i.e. those going through adversity vs. those living a 'normal' period of their life), this would provide evidence for the GENIAL model as a sustainable approach to wellbeing in the view of existential positive psychology.

An additional limitation concerns the lack of control over the presence of mental illness in our samples across the three data-driven chapters. The first two chapters present demographic data on the presence of mental and physical illness in the samples, but this data is not controlled for in the regression or mediation analyses. Additionally, the third data-driven chapter highlights no statistical difference between the groups in terms of presence of mental illness, but this is not controlled for in the main analysis. Whilst it is acknowledged that wellbeing and distress are not extreme ends of a single spectrum, they can correlate highly, influencing one another (Iasiello & Agteren, 2020). Therefore, it is debatable that some of the variance accounted for in wellbeing and PTG could in fact be an indirect pathway from the GENIAL factors via reductions in mental health symptomology. This becomes a particularly interesting discussion when considering that those who experience greater levels of distress following a trauma subsequently experience greater levels of PTG (Cohen-Louck, 2022).

Thus, it is arguably not enough to simply control for mental distress, but in fact utilise this as a variable of interest in future research relating to wellbeing and PTG. In addition, the GENIAL model itself does not explicitly discuss whether the pathways are unique to wellbeing or if they are joint with pathways to mental health. However, the GENIAL model is a broad overview of domains (individual, community, and environment), offering a framework within which future researchers and health professionals can work within. However, in acknowledgement of this limitation and in line with other researchers (Agteren & Iasiello, 2021), I note that future research focusing on wellbeing (including my own future directions) would benefit from measuring both wellbeing and mental health-related constructs to comprehensively investigate shared and distinct pathways to these constructs.

A third limitation that crosses all the data-driven chapters in this thesis is the unequal gender balance in the samples, which each sample being predominantly female. While gender was a control variable in the studies, researchers have raised the concern of a gender wellbeing gap, one that is consistent across countries, time, and various measures, whilst also accounting for influential variables such as age (Blanchflower & Bryson, 2023), highlighting the impact that gender can have on individual wellbeing. Further research on a larger sample with more equal proportion of males and females would be able to determine the extent to which the findings reported here are generalisable. Additionally, whilst it was not possible with the current sample, future research would benefit from using gender as a variable of interest, as opposed to simply controlling for this variable.

Gender has also not been a focus within the GENIAL model more broadly. Gender is an important social determinant of health and is highlighted as a focus within the sustainable development goals (SDGs; a topic discussed in chapter 11; Manandhar et al., 2018). Thus, it would be beneficial for future research to investigate gender differences in the pathways to wellbeing within the scope of the GENIAL model and provide this discourse. I argue that the application of the GENIAL model will apply across all genders, however, the strength of the pathways to wellbeing is likely to differ (as has been reported among health research, Chen et al., 2022). For example, perceived social support (an exemplar of the community domain focused on in this thesis) has been highlighted as a partial mediator between having a romantic partner and increased wellbeing, however this pathway was stronger for men than it was for women (Stronge, Overall, & Sibley, 2019). Thus, supporting the notion that pathways may be stronger/more relevant for one gender over another.

A similar argument can be raised for the age-related differences in pathways to wellbeing. For example, research highlights the influence of both objective and subjective social class on wellbeing (Shi & Jiang, 2023). However, the impact of subjective social class (as opposed to objective social class) becomes greater among middle-aged and older adults, highlighting a perceptual change across the lifetime. The authors attribute these findings to the socioemotional selectivity theory (SST; Carstensen, 2006). The SST provides an understanding behind age-related changes in perceptions, in that constraints on time left (whether that be determined by age, health-related factors or other situations that alter one's perception of time left) shifts an individual's priorities, subsequently altering the regulation of emotional states (Carstensen, 2006). The SST is also an argument for the age-related positivity effect that has been reported (Reed & Carstensen, 2012), whereby older adults (compared to younger adults) exhibit a preference for positive over negative material in cognitive processing. However, whilst wellbeing-related factors may differ across the lifespan, their relationship with wellbeing may remain consistent, as has been reported with gratitude (an exemplar focused on in this thesis; Chopik et al., 2019). With a large sample ($N = 31,206$), Chopik et al. (2019) reported that whilst levels of gratitude differed depending on age (with older adults experiencing greater levels compared to middle-aged and younger adults), the relationship between gratitude and wellbeing remained consistent across the lifespan. Similarly, the relationship between perceived social support (another exemplar utilised in this thesis) and wellbeing does not appear to differ across the lifespan (Siedlecki et al., 2014). Therefore, whilst wellbeing itself and positive psychology factors may differ depending on life stage, the pathway through which wellbeing can be increased is arguably still present, regardless of age, although the strength of the pathway may differ.

Overall, whilst the original GENIAL model was built with the view of wellbeing across the lifespan, this topic has not been discussed in detail within this thesis. Whilst the research in this thesis controlled for age, gender and subjective social class, future research would benefit from utilising these factors as variables of interest. This becomes particularly important when considering the application of the GENIAL model and the need to adapt targeted interventions to different populations.

A final limitation of this thesis concerns the use of UK-based samples throughout. Whilst we argue the use for the GENIAL model across cultures given the flexibility within each domain, the initial studies that underpin the GENIAL model (such as those in this thesis) are based on those living within the UK. Whilst this information is useful in applying the knowledge to

further UK samples, we have not yet applied this model across different cultures. Positive psychology is already criticised for being a Western-, Educated-, Industrialised-, Rich-, and Democratic- (WEIRD) focused research area (van Zyl & Rothmann, 2022), with suggestions being provided on how to adapt PPIs for different cultures (Shick et al., 2021). Researchers have argued that applying strategies that are not conducive with the cultural values of the individuals could do more harm than good (Joshanloo, de Vliert, & Jose, 2021).

However, in a similar manner to gender, we acknowledge that different factors may be more or less beneficial within different cultures, although the overarching framework (individual, community, environment) will remain important. Additionally, the GENIAL model far exceeds any previous model of wellbeing in terms of the breadth of pathways to wellbeing, arguably making in inherently more applicable for cross-cultural applications. For example, Joshanloo et al. (2021) note four distinct comparisons between cultures when discussing common wellbeing narratives. The first contrast is the emphasis on hedonic vs. eudaimonic experiences, with different cultures placing more importance on one over the other. However, unlike the early models of wellbeing, the GENIAL model acknowledges the importance of both strands, incorporating the works of wellbeing science from both camps, thus making it applicable across cultures in this regard. The second comparison that is noted is the preference for either self-enhancement or that of modesty among different cultures and their relationship with wellbeing. However, the GENIAL model acknowledges the importance of both positive feelings towards the self (e.g positive emotions, emotional balance, connection to oneself), as well as the importance of others and the collective. The third comparison that is noted by Joshanloo et al. (2021) is the comparison between autonomy and harmony, with some cultures valuing personal change and mastery vs other cultures valuing harmony with others and the environment. The GENIAL model balances both of these perspectives by noting individual endeavours to wellbeing (e.g. the inclusion of traditional wellbeing models in the individual domain), whilst also acknowledging that the pursuit of such should not be at the expense of others and the planet (highlighting the sustainability aspect if the model). The final comparison is made when considering the context to which individual wellbeing is attributed to. There is a distinct difference across cultures, with some emphasising an internal loci of control when considering wellbeing, whereas others are more likely to address the importance of external factors. This makes for a particularly interesting argument as the impact of sociostructural factors on wellbeing is not commonly addressed within wellbeing research. However, the GENIAL model overcomes this criticism by acknowledging the role of sociostructural factors that lay beyond

the control of the individual, hence the argument for both bottom-up (from an individual level) and top-down (e.g. from a policy level) targets for individual wellbeing. Overall, the definition of wellbeing in accordance with the GENIAL model (connection to oneself, others, and the environment) arguably makes the model inherently sensitive across cultures.

Recommendations for Theory and Practice

This thesis provides a step forward for wellbeing science, expanding far beyond the individual and making a space for wellbeing science at any level (when considering Bronfenbrenner's view of influence). Whilst other theories and/or models of wellbeing have begun to expand their focus (Lambert et al., 2020), many they remain restricted in their view and application, thus limiting the impact. We argue for those with a focus on wellbeing to increasingly expand their scope, building interdisciplinary teams to consider influencers of/impacts on wellbeing beyond an individual view, including both bottom-up and top-down pathways. Bottom-up pathways form the fundamentals of wellbeing science (i.e. interventions targeted on an individual level), although the scope of these need to expand (to incorporate community and environmental foci), however, top-down pathways need to become a greater focus within wellbeing science. It is argued that there is a need for critical realism for wellbeing science (Price, 2017), by which policies need to have a focus that is not placing the responsibility of wellbeing solely on the individual, neglecting the wider sociostructural issues that impact people and communities. Chapter 11 of this thesis highlights how wellbeing science can serve to support top-down changes as an effort to improve the wellbeing of nations.

The GENIAL model can act as an informative approach in various settings, as has already been demonstrated. For example, the model has since been applied in both the healthcare settings, with work previously discussed by Kemp & Fisher (2022). Additionally, it is viable for other educational settings to adopt the GENIAL framework in an education-based module in a similar manner to chapter 9. Interestingly, Dr Laurie Santos of Yale University created a "Science of Well-being" course, becoming the most popular course offered by Yale University, with evidence highlighting a significant, positive on student wellbeing compared to a control group (Yaden et al., 2021), highlighting the possibility of universities to offer such a module. However, the course was restricted to traditional positive psychology content, thus, we argue for more universities to adopt methods of embedding wellbeing modules, but to do so with a broader view on wellbeing. Additionally, the content of the course could be

adapted to suit an intervention-based course, whereby universities (or other institutions) could offer the course as a form of support and prevention of worsening wellbeing.

This thesis provides the foundation for various research projects and interventions to build off. Recommendations for interventions range from targeting the self, others, and the planet (with interventions that target factors across all three being optimal). For example, 'Surf-Ability', an adapted surf therapy, was reported to significantly improve wellbeing levels (as measured by the WEMWBS) among patients with traumatic brain injury (Wilkie, Fisher, & Kemp, 2022). Qualitative analysis highlighted that the benefits were attributed to factors on an individual level (increased mindfulness and physical activity), a community level (improved relationships, community participation, and contribution to organisations), and environment level (connection to nature). By focusing interventions within the GENIAL framework, healthcare professionals, and those alike, could target wellbeing with a broader view, increasing the likelihood of sustainable changes, something that positive psychology interventions have fallen criticism of (Wong & Roy, 2017). An example of thinking broadly and creating sustainable approaches is highlighted by the paper by Wilkie, Fisher, and Kemp (2022) in which the individual is targeted through surf-therapy, but in a way that integrates them with their community, allowing for community-based support once the support from the healthcare system ceases. Additionally, this is done within a nature-based setting (the benefits of which have been noted throughout this thesis), creating new opportunities and new environments that the individual can build confidence in and continue to engage with once the professional support ceases.

Conclusions and A Future Direction

Whilst there are limitations of the research conducted, what is of particular interest is an overview of statistical findings from this thesis highlights gratitude, tragic optimism, and nature connection as playing a role in wellbeing and/or PTG during times of adversity. Interestingly, these three factors provide pathways to wellbeing that stem beyond adversity in life and a focus on oneself, a theoretical basis for self-transcendence, a concept that was only briefly touched upon during this thesis. Self-transcendence encourages a shift in mindset from 'what I can get from life' to 'what I can give to life' (Wong et al., 2021), a philosophy that is emulated in the GENIAL model, where we become focused on what role we can play in supporting communities and the planet, as this has a bidirectional impact on an individual's wellbeing. When considering the broader picture of how we, as wellbeing

scientists, can progress into a new epoch (the symbiocene, as discussed in chapter 11), self-transcendence can play a vital role, as already evidenced (Pizarro et al., 2021). Researchers from Spain and Ecuador investigated the impact of three self-transcendent emotions (awe, elevation, and kama muta) on strengthening a global identification, willingness to help, and wellbeing (N = 1,064). Results highlighted a beneficial role for self-transcendent emotions in motivating a shared identity across all humanity, collective intentions to help others, and a benefit for wellbeing (through a higher shared identity). This echoes the discussion in chapter 11, whereby I note a need for inner development (drawing on mindfulness as an example, which interestingly, can increase self-transcendence; Hanley, Dambrun, & Garland, 2020), that will provide the inner resources needed to encourage collective action towards a common goal (e.g., climate issues). I have recently been awarded a £3000 grant from the Greatest Need Fund at Swansea University to research the role that positive psychological factors, one key factor being self-transcendence, can play in wellbeing and subsequent academic performance. I hope to answer some questions raised in this thesis when I complete this longitudinal research.

Overall, when bringing together the findings in this thesis, literature from the GENIAL model, and discussions of movements from the Anthropocene to the Symbiocene, a new research direction may unfold – a focus on self-transcendence. An argument could be made that the key domains of the GENIAL model provide opportunities for inner development, personal growth, and a focus beyond oneself, building towards self-transcendence. Additionally, the benefits of gratitude, tragic optimism, and nature connection for our wellbeing may be mediated by an increase in self-transcendence. Finally, the approach to build inner development to encourage collective action may be best taken if focused on building self-transcendence, as this can help us connect to others and the planet (Stellar et al., 2017), as Pizarro et al. (2021) evidenced as possible. Other researchers have highlighted a need for further research into the pathway through which self-transcendence and self-transcendent emotions can encourage collective action (e.g. pro-environmental behaviour; Zelenski & Desrochers, 2021). The growth of knowledge and opportunities I have had the pleasure to experience during my PhD have equipped me to continue my research moving forward, starting with a study incorporating self-transcendence and wellbeing as a result of recent funding.

Appendix A

I was invited for an interview with BBC Worklife based on the results of chapter 3, alongside Professor Paul Wong. The article discusses the importance of accepting the adversities in life and the dangers of toxic positivity.

https://www.bbc.com/worklife/article/20210302-tragic-optimism-the-antidote-to-toxic-positivity

Appendix B

An interview with "All in Your Mind" podcast based on the results of chapter 3:

https://www.abc.net.au/radionational/programs/allinthemind/toxic-positivity-when-happiness-becomes-harmful/13749368

Appendix C

A Swansea press release highlighted the novel contributions of our work based on chapter 7: https://www.swansea.ac.uk/press-office/news-events/news/2021/05/research-reveals-new-approach-to-understanding-our-wellbeing.php

Appendix D

A Swansea press release highlighted the benefits of a positive psychology module (chapter 9) based on a novel model of wellbeing:

https://www.swansea.ac.uk/press-office/news-events/news/2022/08/how-learning-about-wellbeing-can-benefit-university-students-own-wellbeing.php

Appendix E

I, alongside two other PhD students, were successful in gaining a £10,000 grant to run a wellbeing conference, titled "Summer of Hope": https://www.swansea.ac.uk/masi/summer-of-hope/

Appendix F

Data for chapter 3: https://osf.io/ap2rj/

Appendix G

Data for chapter 5: https://osf.io/aufwq/

Appendix H

Data for chapter 9: https://osf.io/e7zjf/

Appendix I

Data was collected between 6th-10th October 2023, with a total sample of 230 participants. The aim of this data collection was to validate the Nature Connection measure created in this thesis against a well-know measure of nature connection (Connectedness to Nature Scale; Mayer & Frantz, 2004). The sample had a mean age of 20.41 (SD = 1.91), with a gender split of male (42), female (175), non-binary/third gender (7), prefer not to say (4), and other (2). Below is a description of the nature connection measure created for this thesis.

Nature Connection

Previous questionnaires have focused on either contact with (Largo-Wight et al., 2011) or connection to nature (Mayer and Frantz, 2004; Nisbet and Zelenski, 2013). We argue that both are important for wellbeing, but inclusion of multiple existing measures would lengthen our survey unnecessarily. Accordingly, and for brevity, a new measure named "Nature Connection" was created, to measure physical as well as psychological connection to nature. The statements are (1) "I feel I spend enough time in nature," (2) "I wish I could spend more time in nature," (3) "I feel disconnected from nature," and (4) "I am often immersed in nature." Responses ranged from 1 (strongly disagree) to 5 (strongly agree). Respondents were informed that the term nature referred to green spaces (such as parks, forests, gardens, fields) and blue spaces (such as lakes, rivers, the sea) and were asked to

respond based on their experiences during the past 2 weeks. Utilising data from chapter 3, Cronbach's alpha indicated that statement 2 needed removing (as this statement was reducing the reliability), leading to a three-item measure relating to nature connectedness. Following removal of this item, Cronbach's alpha increased from 0.719 to 0.777. A summary measure is calculated by reverse scoring item 3, after which all items are added together, providing a total score out of 15.

Results

The table below highlights correlations investigating the relationship between the three variables. The table highlights a moderate correlation between the Connectedness to Nature Scale and the Nature Connection measure ($r = .51$). Additionally, the table highlights a stronger correlation between the Nature Connection measure and wellbeing, compared to the Connectedness to Nature Scale and wellbeing, suggesting the Nature Connection measure may be a better measure for wellbeing-related nature connection.

Correlations between Connectedness to Nature Scale (CNS), Nature Connection measure (NC), and the Warwick-Edinburgh Mental Wellbeing Scale (wellbeing)

Variable (Mean & SD)	CNS	NC	Wellbeing
CNS (3.22, .63)	-		
NC (8.87, 2.56)	.51 (<.001)	-	
Wellbeing (44.59, 9.34)	.29 (<.001)	.37 (<.001)	-

Additionally, a multiple linear regressions was carried out to investigate the ability for each nature connection measure to predict wellbeing. The addition of both measures significantly predicted wellbeing, $F(2,208) = 33.85$, $P < .001$, *Adjusted R^2* = .15. Interestingly, scores from the Connectedness to Nature Scale did not significantly contribute towards the model ($p = .08$, $\beta = .13$), whereas scores from the Nature Connection measure significantly contributed towards the model ($p < .001$, $\beta = .31$). Whilst this is only initial data, it provides some evidence towards the validity of the Nature Connection measure in relation to its importance for wellbeing.

Appendix J

Data was collected between March to May of 2021, with a total sample of 101 participants. The aim of this data collection was to validate the physical activity measure created in this thesis against well-known measures of physical activity (Godin Leisure-Time Exercise Questionnaire and International Physical Activity Questionnaire – Short Form). The sample had a mean age of 20.89 (SD = 4.15), with a gender split of male (18), female (82), and non-binary/third gender (1). Below is a brief description of the physical activity measure created for this thesis.

Physical Activity

A single item was used to measure physical activity in which participants were asked how physically active they had been on a 5-point Likert-type scale from a value of 1 (not at all active) to 5 (extremely active) during the previous 2 weeks. A single item to measure physical activity has several advantages including brevity and parsimony, and has been shown to be both reliable and valid (Schechtman et al., 1991; Milton et al., 2011; Gill et al., 2012; Portegijs et al., 2017; O'Halloran et al., 2020). This measure was created for the purpose of this thesis.

Results

The table below highlights correlations investigating the relationship between the four variables. The table highlights significant correlations between my physical activity measure and two commonly used measures. The table also highlights my physical activity measure to be a better correlator with wellbeing compared with the two other physical activity measures.

Correlations between PA (physical activity measure used in this thesis), IPAQ (International Physical Activity Questionnaire Short Form), Godin (Godin Leisure-Time Exercise Questionnaire), and Wellbeing (Warwick-Edinburgh Mental Wellbeing Scale).

Variable (Mean & SD)	PA	IPAQ	Godin	Wellbeing
PA (3.16, 1.09)	-			
IPAQ (3185.98, 3425.77)	.40 (<.001)	-		
Godin (42.85, 25.06)	.58 (<.001)	.54 (<.001)	-	
Wellbeing (45.21, 9.90)	.31 (.002)	.06 (.570)	.26 (.008)	-

Additionally, a multiple linear regression was carried out to investigate the ability for each physical activity measure to predict wellbeing. The addition of three measures significantly

predicted wellbeing, F (3, 97) = 4.48, P = .005, *Adjusted R^2* = .095. Interestingly, scores from the IPAQ did not significantly contribute towards the model (p = .183, β = .153), scores from the Godin measure did not significantly contribute towards the model (p = .129, β = .197) whereas scores from the physical activity measure used in this thesis significantly contributed towards the model (p = .033, β = .255). Whilst this is only initial data, it provides some evidence towards the validity of the 1-item physical activity measure in relation to its importance for wellbeing.

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