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SELF-TRANSCENDENT EXPERIENCES AND SUSTAINABLE PROSPERITY

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Abstract

The achievement of sustainable prosperity requires the enhancement of human wellbeing alongside increased care for the environment. In recent years, much has been written on the role of different mental states and their potential to influence our way of thinking and, perhaps more importantly, the way we act. In this working paper, we explore the emerging potential of a type of mental state known as Self-Transcendent Experiences (STEs) to deliver beneficial effects on human wellbeing and sustainable attitudes and behaviours. Self-transcendent experiences can be facilitated by experiences of flow, awe and meditation, as well as psychedelic experiences. Some of these experiences can occur naturally, through sometimes unexpected encounters with nature or during immersion in every-day activities that one intrinsically enjoys, as well as through more intentional practices such as meditation or the use of psychedelics. We demonstrate how each of the four alternative types of STEs share some similar neurological underpinnings and review their links to improvements in human wellbeing and sustainable attitudes and behaviours. We also highlight potential risks across the different varieties of STEs and consider factors that need to be considered if they are to be employed as a practical means of supporting sustainable prosperity.

Introduction

Over the course of the last two centuries, "the good life", or what it means to live well, has increasingly been viewed as linked to material wealth. Consumer advertising continues to tell us that we will be happier if only we could purchase the latest products. However, a cumulative body of research now shows that viewing the acquisition of material goods as a means of living well can have detrimental effects on personal wellbeing, potentially damaging interpersonal and community relationships (Kasser, Ryan, Couchman, & Sheldon, 2004). The myth that consumption and the tightly linked idea of constant economic growth can deliver both personal and societal wellbeing has been shown to be incredibly tenacious alongside mounting scientific evidence documenting rising levels of distress in advanced economies such as the US (Blanchflower & Oswald, 2020), despite rising gross domestic product (GDP). Further, capitalism's reliance on the extraction of natural resources to maintain high levels of consumption proves to be highly unsustainable (Steffen, Broadgate, Deutsch, Gaffney, & Ludwig, 2015).

We believe that this materialistic vision of the good life is therefore misguided (Dittmar, Bond, Hurst, & Kasser, 2014; Hurst, Dittmar, Bond, & Kasser, 2013), and that wellbeing must be considered as a multi-faceted construct involving not only the material conditions of a person's life but also their mental states. What happens in the mind matters. It triggers our reward-systems and allows us to experience a sense of meaningfulness whilst also predicting later physical and mental health as well as behaviour (van Agteren et al., 2021). In this paper, we will explore a growing body of research that suggests that there is a specific category of mental state that can potentially enhance our personal and collective wellbeing whilst also fostering a deep connection to and care for the environment and other people. In this way, such mental states can deliver what we call *Sustainable Wellbeing*.

The mental states that we are interested in in this paper are Self-Transcendent Experiences (STEs). STEs cover a class of mental states whereby the subjective experience of an independent self is temporarily reduced and feelings of connection to larger groups or entities is increased. STEs can occur naturally, through sometimes unexpected encounters with nature or during every-day activities that one intrinsically enjoys and lead to so-called flow states but also through more intentional practices such as mindfulness and experiences with psychedelic substances such as LSD, psilocybin or Ayahuasca. In this paper, we focus on four specific types of STE: psychedelic, mindful, flow, and awe states.

The aims of this paper are to explore whether and how STEs can foster sustainable wellbeing by examining the links between the four different types of STEs and both wellbeing and sustainability related variables. The paper is organised as follows. Section 1 is dedicated to setting out the problems presented by modern lifestyles and proposing our concept of sustainable wellbeing. Section 2 introduces STEs, exploring their characteristics and some of the different ways in which they can be experienced. Section 3 lays out our initial theoretical reasoning behind why STEs could be a potential means of achieving *Sustainable Wellbeing*. Sections 4-7 are dedicated to examining each of four different varieties of STEs in turn—psychedelic experiences, mindfulness, flow, and awe—expanding on their neuroscientific basis as well as their links to both wellbeing and sustainability. Section 8 then considers the similarities and differences across the four varieties of STEs, with a particular focus on their potential risks. We finish with a discussion of the implications of this analysis for the practical challenge of achieving sustainable wellbeing and set our future research agenda before finishing with some final remarks (Section 9).

Recently, much has been written in both the academic and popular press on the positive consequences of psychedelic-induced mental states. Whilst

research on psychedelics enjoyed wide popularity during the 1950s and 60s, following a chain of events including complacency in the control of LSD supplies, a spread of recreational use and the fact that psychedelics became synonym for a growing counter-culture on the US, it was put to a hold until recently (Novak, 1997)[1]. Following the loosening of restrictions and a reignition in interest in the potential benefits of psychedelics, a boom in both theoretical and empirical literature on psychedelic experiences began—again (Petranker, Anderson, & Farb, 2020). The Financial Times published "a psychedelic guide to wellbeing"[2]. The Guardian published articles on the "Psychedelics renaissance"[3] for improving mental health. Even Vogue writers covered psychedelic wellness[4]. Other articles asked, "Could psychedelics help us resolve the climate crisis?"[5] Such articles and research findings suggest that psychedelic-induced mental states could have the potential to support sustainable wellbeing. However, despite these potentially promising emerging insights, the use of psychedelic substances is still unlawful in most countries across the world and the use of psychedelics is known to present potential risks to long-term health. We discuss some of those risks in Section 8 of the paper. As such, our aim in this paper is not to propose the use of psychedelics as a route to sustainable wellbeing. Rather, our intention is to suggest that psychedelic experiences are one variety of a wider group of mental states that fall under the umbrella of Self-Transcendent Experiences (STEs).

1 | Towards Sustainable Wellbeing

The underlying motivation of this paper is grounded in the notion that a shift towards sustainable wellbeing is urgently required to tackle both societal and environmental issues caused by the inherent ills of modernity. Before introducing our concept of sustainable wellbeing, we will review some of the ways in which current, modern lifestyles (particularly those in "Western" countries) are potentially problematic for human wellbeing, societal progress, and the environment.

1.1 The ills of modernity and its implication for sustainable wellbeing

The French philosopher Gérard Raulet argued that "The awareness of being modern has always been the awareness of living through a crisis" (Raulet, 1993: 77). Work across the field of sociology from Weber's notion of a

1 https://maps.org/index.php?option=com_content&view=article&id=5468#_ftnref39
2 https://www.ft.com/content/612be1e7-4800-4a85-8cd0-be3af279cf77
3 https://www.theguardian.com/society/2021/sep/26/psychedelics-renaissance-new-wave-of-research-puts-hallucinogenics-forward-to-treat-mental-health
4 https://www.vogue.co.uk/arts-and-lifestyle/article/psychedelics-mental-health
5 https://theconversation.com/could-psychedelics-help-us-resolve-the-climate-crisis-129639

"disenchanted world"[6] to Durkheim's analysis of "anomie"[7] and Simmel's "blasé attitude"[8] have tried to capture the ills of modernity with dysthymia, the low-grade feeling that life is unfulfilling, now being a widely used clinical term. More recent work by Hartmut Rosa argues that fear and anxiety are natural human reactions that are brought forward through modernity, which, in turn, has created a multitude of repulsive experiences in which individuals "feel themselves placed in a latent or manifestly hostile world" (Rosa, 2019: 121).

Despite compelling claims that we have entered a new stage of enlightenment with our lives becoming longer, healthier, safer, happier and more prosperous (cf. Pinker, 2018), recent years have seen increasing numbers of people with depression[9] and growing suicide rates (Windsor-Shellard & Clay, 2020; Winerman, 2019). Together with drug overdose and alcohol related liver diseases, these pose what Case and Deaton (2015) have come to call "deaths of despair".

At the same time, the health of the natural environment has been severely compromised through unsustainable resource extraction and consumption (Steffen, Broadgate, et al., 2015), pushing natural support systems towards cataclysmic tipping points and beyond their carrying capacities (Steffen, Richardson, et al., 2015). Anthropogenic climate change causes potentially irreversible implications for the natural world and has been shown to hold significant risks for public health, both in terms of physiological and psychological wellbeing (Brereton, Clinch, & Ferreira, 2008; Burke et al., 2018). Higher ambient temperatures increase the risk of heat exhaustion, heat stroke, and mortality (Hajat, O'Connor, & Kosatsky, 2010). Depletion of green spaces threatens various indicators of health such as cortisol levels, diastolic blood pressure and the incidence of Type II diabetes (Twohig-Bennett & Jones, 2018). Low levels of natural capital (encompassing agricultural land, protected areas, and non-renewable and renewable resources, amongst others) are linked to lower levels of life satisfaction (Engelbrecht, 2009). Exposure to environmental degradation and extreme weather events has been associated with individual feeling of distress and hopelessness (Bourque & Cunsolo Willox, 2014; Coyle & Van Susteren, 2012). Whereas technocrats have maintained that an "absolute decoupling" between economic activity and environmental impact is possible, little evidence supports this perhaps appealing vision (Ward et al., 2016).

6 https://www.britannica.com/topic/disenchantment-sociology
7 https://durkheim.uchicago.edu/Summaries/dl.html
8 Simmel, G. (2013). The metropolis and mental life. In J. Lin & C. Mele (Eds.), *The Urban Sociology Reader*, 2nd Edition (pp. 23-31). Routledge.
9 The World Health Organization reports that 264 million people on the planet are depressed; depression is the third most costly disability worldwide: www.who.int/news-room/fact-sheet/detail/depression

Moreover, a reliance on 'social snacking', a strategy that is often applied in the absence of true social connections, to sustain a sense of belonging (Gardner, Pickett, & Knowles, 2005) has resulted in a steep rise of people who feel socially isolated (Cacioppo et al., 2002; Cacioppo, Hawkley, Norman, & Berntson, 2011). Social isolation has been shown to have a negative impact on our health that is comparable to the effect of high blood pressure, lack of exercise, obesity or smoking (Carnelley, Otway, & Rowe, 2015). According to Erich Fromm (1957: 8), "[t]he experience of separateness arouses anxiety; it is, indeed, the source of all anxiety". He goes on by writing that "[b]eing separate means being cut off, without any capacity to use my human powers. Hence to be separate means to be helpless, unable to grasp the world—things and people—actively; it means the world can invade me without my ability to react" (ibid).

When our need for connection and belonging is severely thwarted, we tend to care much more about status and popularity (Lavigne, Vallerand, & Crevier-Braud, 2011). A frequent response to the experience of loneliness is to try to numb the unpleasant feelings and emotions through the consumption of material goods ("retail therapy" anyone?) as well as alcohol and other (recreational) drugs (McKay, Konowalczyk, Andretta, & Cole, 2017; Pieters, 2013). While these quick fixes can provide temporary distractions, they are impossible to keep up without becoming dependent on a continuous supply as well as serious health implications through addictive behaviours. They therefore provide examples of *un*sustainable wellbeing in every possible sense—from mental and psychological wellbeing to issues around materialism and consumption. Instead, as argued by Johann Hari, the "opposite of addiction is not sobriety. It is human connection"[10]. This has been confirmed time and time again in academic research (e.g. Baumeister & Leary, 1995; Hawkley & Cacioppo, 2010; Lavigne et al., 2011; Ryan & Deci, 2017).

Another fundamental need which has been undermined through both the complexity and speed of lifestyles under modernity is the need for safety. A sense of safety is given when the environment provides a (mostly) reliable setting ensuring that security is given and trust between actors (e.g., secure attachment; Carnelley et al., 2015) can develop. Safety needs are fundamental, provide the basis for higher-level needs and are required to experience a sense of control and self-efficacy. In contrast, long and intense working hours as people aim to earn ever more money to purchase ever more stuff alongside rising job insecurity leads to high levels of stress and burnout (Clements-Croome, 2006; De Witte, Pienaar, & De Cuyper, 2016). The pace of modern life is fast and accompanied by technological change. Too much

10 https://www.ted.com/talks/johann_hari_everything_you_think_you_know_about_addiction_is_wrong#t-202527

chaos and unpredictability pitches us into a state that psychologists call "psychological entropy" (Hirsh, Mar, & Peterson, 2012). Stress activates the release of a number of hormones including cortisol that allow us to react to threats. Whereas this has for millennia ensured our very survival, if experienced for too long, it can have deteriorating effects on our wellbeing.

When safety needs are thwarted, people react in quite specific ways in their attempts to restore balance (Damasio & Carvalho, 2013). Humanities' response to modernity's increasing speed and complexity is to try to enact ever more control. Control of our waking time, what we eat and drink, how often and with who we have sex, and the list goes on. Increasingly, people are trying to record their everyday behaviour in an effort to become optimised and enhanced through apps and other technological gimmicks. In contrast, the German sociologist Hartmut Rosa (2019) argues that in a world that is inherently uncontrollable, every attempt to enforce more control will lead to what anthropologists call *liminality*,[11] the unsettled state of mind characterised by stress and disappointment. As shown by a growing body of studies, recent years have been marked by a rapid increase in climate anxiety adding to the already prevalent mental health crisis (Clayton, 2020). This is something that resembles the "disenchantment" that Max Weber famously described at the beginning of the 20th century (Weber, 1930).

1.2 The problem with materialism

Materialism describes the belief that the acquisition of material goods should be a central life goal for individuals and act as key means to achieve both personal happiness and status (Richins & Dawson, 1992). It promotes consumption behaviours that underpin consumer capitalist systems in modern societies and increasingly in emerging economies, within which it is actively encouraged through widespread consumer advertising (Fitzmaurice & Comegys, 2006; Kasser, 2017). The impacts of materialism and resource overconsumption on wellbeing and sustainability are well-documented, and insights into its potentially detrimental effects are not necessarily new. As already observed by Fromm during the first half of the last century, "Greed is a bottomless pit which exhausts the person in an endless effort to satisfy the need without ever reaching satisfaction" (Fromm, 1942). Besides the global financial crisis in 2007/2008, the growth paradigm and an understanding of "the more, the better" are seemingly dominating most of our consumption behaviours in modern, western societies. As put by (Lembke, 2021: 169), "The result is a 'work-hard/play-

11 While we acknowledge that liminality is not always a negative state, we here stick to the way Rosa uses it which seems to have a slight negative connotation.

hard' mentality in which compulsive overconsumption becomes the reward at the end of a day of drudgery."

In an attempt to counter modernity's obsession with materialism and economic growth, Jackson (2021) argues that recovering prosperity—what it means to live well—has to be seen as a positive opportunity instead of self-denial. In his own words, "[m]aterial progress has changed our lives—in many ways for the better. But the burden of having can obscure the joy of belonging. (…). The pressure of consuming can undermine the simple lightness of being." (Jackson, 2021: 4). In other words, our potentialities can be drowned out by materialistic tendencies. Materialism, just like other addictive processes and substances, lose their effect on our phenomenological experience of pleasure with repeated exposure to the same or similar pleasure stimulus, a process known as "neuroadaptation" (Lembke, 2021: 53).

1.3 A loss of connection

Despite negative effects on the global environment, human beings—especially in industrialised countries—engage in consistently high levels of consumption. This may be partly explained by a lack of understanding of their inherent connection to and placement within the world. That is, a seemingly profound disconnect between humans and other humans as well as nature.

To illustrate this point we wish to draw on an allegory used by the great naturalist E. O. Wilson (2002: 149) in his book The Future of Life: "The human species is like the mythical giant Antaeus, who drew strength from contact with his mother, Gaea, the goddess Earth, and used it to challenge and defeat all comers. Hercules, learning his secret, lifted and held Antaeus above the ground until the giant weakened—then crushed him." Wilson argues that mortal humans suffer from a self-induced handicap through our separation from Earth and other beings, his Biophilia hypothesis, which, due to our exertions, also weakens Earth.

Many scholars have similarly highlighted the problems with a lack of understanding of the inherent connectedness of human beings to the wider world. Erich Fromm, a member of the Frankfurt School, states in his book *The Sane Society*: "The problem of man's existence (…) is unique in the whole of nature; he has fallen out of nature, as it were, and is still in it; He is partly divine, partly animal, partly infinite, partly finite" (Fromm, 1956: 25). Abraham Maslow, the founding father of humanistic psychology, also speaks of a need to get in touch with our "intrinsic conscience" which is "based upon the accurate perception of our own nature, destiny, capacities, and calling in life" (as cited in Kaufman, 2020: 159). Similarly, the ancient Hindu

text "Bhagavad Gita" taught that the sorrows of human life are caused by humans' misconception of their own nature.

To achieve sustainable wellbeing, we must therefore endeavour to explore how we humans can reconnect with nature and better perceive our relation to all that is around us. The growing complexity of modern life has made it hard for human beings to reflect on their place in the world. As Walter Benjamin argues, distraction has become an alternative to contemplation and self-growth (Benjamin, 1991), as we strive to define ourselves through "having" rather than being (Fromm, 1976). It makes one wonder if the old adage "ignorance is bliss" holds more truth than one might hope. To paraphrase Alan Watts, there is a fundamental ignorance of our true ignorance, something that is seemingly manifested in the "taboo against knowing who you are" (Watts, 1966.: 77). In this paper, we will explore how STEs can act as a tool to facilitate this shift in mindset towards an understanding of our inherent connectedness and thus, sustainable wellbeing.

1.4 Introducing sustainable wellbeing

Our conceptualisation of sustainable wellbeing draws heavily on Jackson's (2016, 2021) conceptualisation of sustainable prosperity. It borrows from writings on eudemonia or eudemonic wellbeing that has been linked with self-actualisation and can be achieved through experiences of living a life of virtue in pursuit of human growth/excellence. It brings together high individual wellbeing and care for environment/sustainable behaviours, therefore accounting for current both societal and environmental contexts.

We define sustainable wellbeing at the individual level as a state that has been generated through active engagement in actions which have low environmental costs and/or promote care for the environment and other people. We consider low environmental costs to reflect the use of energy and materials at a level that does not risk depleting natural systems beyond the planet's "safe operating space" (Rockström et al., 2009). This inclusion of a sustainability aspect within our definition of wellbeing is line with the responsive quality described by Martha Nussbaum when she outlined a central human capability to "live with concern for and in relation to animals, plants and the world of nature" that allows us to live a prosperous life (Nussbaum, 2011: 34). It therefore also shows parallels with and draws on insights from E. O. Wilson's "biophilia hypothesis" (Kellert & Wilson, 1993), which states that humans evolved to have an innate tendency to seek connections with nature and other forms of life and are, consequently, hardwired to seek a connection with nature.

Our notion of wellbeing covers factors encompassing both hedonic and eudemonic definitions (Ryan & Deci, 2001). Hedonic wellbeing involves feeling good and being happy for its own sake. Besides research showing that income and happiness are not correlated beyond a certain threshold (Kahneman & Deaton, 2010), consumer societies typically emphasize the importance of this hedonic type of wellbeing. Eudemonic wellbeing, in contrast, emphasizes acting in a way that is inherently worthwhile and in line with our intrinsic values and capabilities. It is this eudemonic conceptualisation of wellbeing that is more in line with the intrinsic conscience and self-actualisation mentioned in the previous section. We consider both hedonic and eudemonic wellbeing as important components of sustainable wellbeing. As Victor Frankl (1969) suggested, contrary to some of his contemporaries, we humans don't only strive for hedonic happiness ("will to pleasure") as argued by Freud (1920) , or a dominance over others ("will to power"), as argued by Adler (1927; see also Nietzsche, 1914), but also eudemonia ("will to meaning").

2 | An Introduction to Self-transcendent Experiences

2.1 The problems with an overly individualistic sense of self

Almost all of us would agree that we have a sense of self. The feeling that there is an "I" or "me" inside our heads who observes, interprets, and instigates actions in the world. This self is enduring; I recognise that the person I am today is the same person who ran across the school playground aged seven and when shown a childhood photograph can proclaim "that's me!" Equally, when I look in the mirror at age seventy, I will feel that I am the same person as that who writes this manuscript today and will be able to state "I wrote that!" (Hood, 2012). In Western nations in particular, the self is also often experienced as independent and separate from others and the surrounding world (Cross, Hardin, & Gercek-Swing, 2010; Santos, Varnum, & Grossmann, 2017). When asked "Who are you?", people tend to answer with their unique personal characteristics, traits, abilities or likes.

This sense of self has advantages and it has been suggested that it has an evolutionarily basis (Skowronski & Sedikides, 2017). Effective social cooperation, for example, requires understanding that other group members are distinct and may think differently to you. The ability to distinguish between the self and others is also an important survival tool for detecting threats. Further, the feeling that we are a continuous entity helps us to plan for the future. There would be no point in saving money now if we did not think that we were going to be the same person in the future who could reap the rewards (Metzinger, 2009; Sedikides, Skowronski, & Dunbar, 2006).

However, an overly individualistic sense of self can lead to problems and become maladaptive (Leary, 2004). French philosopher and writer Albert Camus suggested that the basic experience of modernity is one marked by *hostility* between human beings and the world (Camus, 1991: 14). In the face of an unpredictable and increasingly harsh world that cherishes individualism, selfish behaviour tends to be rife (Jonason, Icho, & Ireland, 2016). This resembles Rosa's (2019) account of modernity in which we fail to engage in and experience what he calls "resonance" with other people, society, the environment, and the world more generally.

These insights are not endemic to the social sciences but can be found across almost all disciplines. Ecologist Tom Oliver (2020) argues that the sense of an independent "I" is driving selfish overconsumption and hindering progress to protect the natural environment. He proposes the term "individuation pathology" to describe a set of disease-like symptoms caused by a miscomprehension of our connectedness to the rest of the world. Individualistic societies whereby the independent self is dominant have been shown to have higher ecological footprints (Komatsu, Rappleye, & Silova, 2019). An independent self-construal (or representation of the self) has been linked to only showing concern for environmental degradation when the consequences will have a negative impact on the self, rather than because the environment is intrinsically valuable (Davis & Stroink, 2016). Recent research also shows that having an interdependent (rather than independent) self-construal is associated with stronger environmental values (Duff, Vignoles, Becker, & Milfont, 2022).

As a result of increasing individualisation, people within modern societies experience what Cushman (1990) described as an "empty self". That is, through the absence of community and shared meaning, people feel they must fill the self with consumer products in order to fill the void. Yet, we know that consumer products do not provide deep, sustaining happiness, despite what advertisers seemingly try to communicate (Dittmar, Bond, Hurst, & Kasser, 2014). Clinical research also documents that excessive focus on the individual self (especially its detrimental aspects) is linked to negative affect (Mor & Winquist, 2002), social anxiety (Spurr & Stopa, 2002) and depression (McLaughlin & Nolen-Hoeksema, 2011). Moreover, psychological research shows that the perception of the permanent and independent self is linked to fluctuating rather than authentic-durable happiness (Dambrun, 2017; Dambrun & Ricard, 2011).

2.2 What are self-transcendent experiences?

Despite the apparent problems with the dominant sense of self in often selfish and individualistic (Western) cultures, social-psychologist Jonathan Haidt believes that humans have the ability and capability to go beyond

these selfish, insular, often disconnected states. In his 2013 book, The Righteous Mind, Haidt suggests, "We may spend most of our waking hours advancing our own interests, but we all have the capacity to transcend self-interest and become simply a part of a whole. It's not just a capacity; it's the portal to many of life's most cherished experiences" (Haidt, 2013). This is in line with Norwegian ecologist, Arne Naess's (2010) suggestion that we need to expand from an "egoic" to an "ecological" self. The importance of connections to a larger whole is not new. For instance, the guiding principle for life in many sub-Saharan communities is that of 'ubuntu', which is often translated as "I am because you are, you are because I am". Similarly, in Mahayana Buddhism, the "bodhisattva" is someone who recognizes her inherent interdependence with all sentient beings. She is not sacrificing herself for the benefit of others—she has awakened to the realization that the very notion of a separate self is a falsehood. Indeed, some have argued that "our orientation toward the Transcendent arises from needs hard-wired into our genetic makeup" (Piedmont, 1999) and present a deeply human tendency (Kaufman, 2020: 93).

For the purpose of this paper, we adopt the position that self-transcendent experiences describe mental states in which an individual's sense of their independent self is temporarily altered. We follow Yaden et al.'s (2017) conceptualisation of STEs as encompassing two complementary components. The first involves a reduction in the salience of the boundaries between the self and "other" along with less pre-occupation with the self. In a self-transcendent state, people do not experience themselves as an isolated entity (sometimes described as "self-loss") and are less self-focused. Instead, they introspect minimally and pay little attention to other people's evaluations of them (Leary & Diebels, 2017; Leary & Terry, 2012).

The second, related component involves an increased sense of connectedness. This can be with other people, objects, nature or even the cosmos. According to Kaufman (2020: xxxiv), self-transcendence allows for the "highest levels of unity and harmony within oneself and with the world". At its most extreme, during STEs, people may experience themselves as what D'Aquili and Newberg (1999) describe as an "Absolute Unitary Being".

In addition to the before mentioned components, Stace (1960) describes a number of additional phenomenological features that are common dimensions that occasion during STEs. These include a sense of *sacredness* of the experience and a sense that the STE provides an encounter of ultimate reality and therefore deep meaning, sometimes referred to as *noetic quality* (see also Yaden et al., 2017). Moreover, besides the chance of "bad trips", STEs are usually marked by a sense of positivity, tranquillity and tenderness (Stace, 1960). STEs also often come with a sense of ineffability (Stace, 1960). That is, contrary to both genre and profession of American transcendentalist

Ralph Waldo Emerson, there is a profound sense that the experience cannot be described *adequately* in words. As noted by Stan Grof, language itself presents a special problem for expressing what we experience in transcendental realms (Grof, 2019: 270).

2.3 Varieties of self-transcendent experience

Several different mental states can be considered to represent a self-transcendent experience[12]. Yaden et al. (2017) list five "varieties of self-transcendent experience", namely mystical experiences, peak experiences, emotions such as awe, mindfulness and flow. Some of these states are typically experienced as very intense such as the mystical experiences facilitated by psychedelic substances. Others are less intense and may be experienced by some individuals on a day-to-day basis. For example, during flow states individuals can lose themselves in activities such as reading a good book, playing sports, or doing arts and crafts. In line with this, STEs have been suggested to occur along a spectrum of intensity (Yaden et al., 2017) in which there is a lesser or greater degree of overlap between the sense of self and experience of the world.

We use the term self-transcendent experiences (STEs) to account for the wide variety of mental states that are not solely triggered and facilitated through psychedelics but also through other practices including awe, mindfulness, and flow. While these states may differ in the exact way they are experienced and have different antecedents, they all share a weakening of the boundaries separating the individual self from others and the wider world and an increased sense of unity or oneness (Carhart-Harris et al., 2014; Fischman, 1983; Grof, 2019; Huxley, 1954; William James, 1882; Yaden et al., 2017).

2.4 What we don't mean by 'self-transcendent experiences'

Before we proceed, a couple of caveats need to be made. The term self-transcendence has been used by a number of different researchers across multiple fields (Kitson, Chirico, Gaggioli, & Riecke, 2020). Therefore, it is important to be explicit about which definitions of self-transcendence we are and are not employing in this argument. Frankl (1966) used the term "self-transcendence" to refer to the human capacity to be motivated by trying to help others rather than seeking pleasure for oneself. Similarly, theories of human values sometimes differentiate between self-enhancement and self-transcendent values (Schwartz, 1992). In this case, self-transcendent values refer to the extent to which people place importance on interpersonal relationships or care for the environment. In

12 For an extended list of alternate names for the transcendent experience, see Levin and Steele (2005).

these cases, self-transcendence is being used to describe the concern for others over self-interest. Whilst our definition of STEs could theoretically lead people to subsequently care more about other people, it is not, according to our definition, a characteristic of the self-transcendent mental state in itself.

In addition, both Erikson (1959) and Maslow (1962) included self-transcendence in their theories of human development. Erikson considered transcendence to be the final psycho-social stage of development whereby individuals view the world in a less materialistic, more accepting way. Maslow, best known for his work on self-actualisation, saw self-transcendence as an even higher state of being that he later added to his work (Kaufman, 2020: xiv). He thought that self-transcendence can be reached following self-actualisation and that individuals who achieve this are autonomous and able to view their place in the world on a more global scale. In these cases, self-transcendence refers to longer-lasting states of being or changes in perspectives. It may be the case that STEs can lead to changes in how people view the world but such changes in motives or behaviour do not have to display themselves within the STEs itself as we define it. Another way that self-transcendence has been conceptualised is as a personality trait (Piedmont, 1999). Cloninger et al. (1993), for example, define self-transcendence as a trait representing the extent to which people feel that they are part of the universe as a whole. These definitions also do not align with our perspective as we are interested in single, transient self-transcendent *experiences* rather than enduring personal traits.

We also need to be clear that we are not advocating for a total, permanent loss of an individual's sense of self. STEs are, again, *transient* experiences whereby people's sense of self is *temporarily* altered. If an individual experiences a chronic, total loss of their sense of self such that they can no longer recognise their thoughts or feelings as their own then this would be considered as pathological. The Diagnostic and Statistical Manual of Mental Disorders (DSM–5) recognises depersonalisation/derealisation disorder as a dissociative disorder. Depersonalisation refers to detachment from one's thoughts, feelings, sensations, body, or actions whilst derealisation refers to detachment from one's environment (Association, 2013). Depersonalisation/derealisation disorder is suggested to be triggered by traumatic experiences, intense stress or childhood anxiety (Lee et al., 2012) and has a prevalence of around 1-2 % of the population (Hunter, Hatch, & Johnson, 2004; Salami, Andreu-Perez, & Gillmeister, 2020).

3 | Self-transcendent Experiences and Sustainable Wellbeing

"Life comes from physical survival,
but the good life comes from what we care about."
—Rollo May, Love and Will (1969)

Erich Fromm believed that humans hold the capacity to have unanticipated experiences that can bring profound insights and genuine happiness. While not using the language of STE, he held that "[w]hether it be the fresh and spontaneous perception of a landscape or the dawning of some truth as a result of our thinking, or a sensuous pleasure that is not stereotyped, or the welling up of love for another person" (Fromm, 1942: 224f.). He was sure that "in these moments we all know what a human life could be if the experiences were not such rare and uncultivated occurrences" (ibid).

Echoing a similar sentiment, American environmental scientist Donella Meadows states that "There's nothing physical or expensive or even slow in the process of paradigm change…In a single individual it can happen in a millisecond. All it takes is a click in the mind, a falling of scales from the eyes, a new way of seeing." (Meadows, 1999: 18). Here again, it is suggested that single experiences can sometimes be a catalyst for new ways of being in the world.

We believe that STEs offer the potential to act as one of these experiences that facilitate a "click in the mind" or a "new way of seeing" that can support the achievement of sustainable wellbeing. On the one hand, modern research suggests that the transcendent state of consciousness is related to positive mental health and wellbeing (Kaufman, 2020: xxvi)—including positive changes in family life, reduced fear of death, better health, and a greater sense of purpose—as well as a motivation for increased altruism and prosocial behaviour (Yaden et al., 2017). On the other hand, transcendent states should encourage ecological worldviews and sustainable behaviours. Given that ecological behaviours often involve the sacrifice of individual interests in exchange for the overall interests of people and nature (Yan Yang, Hu, Jing, & Nguyen, 2018), those individuals whose sense of self has been expanded to include other people, one's environment or even the world at large (Aron, Norman, Aron, McKenna, & Heyman, 2000; Leary, Tipsord, & Tate, 2008) should be more likely to care for the environment (i.e. because it is not distinct from themselves).

At this point, it seems necessary to highlight that individuals and groups have in recent years seemingly tried to become part of "a greater whole" or, at least, something "bigger than self." However, the means through which this has been pursued can be damaging, dangerous even, at times. For instance, a general yearning to be part of something larger, a movement or

political or religious ideology can be observed via identity politics filling most of the tabloids across the world. Yet, the realization of this yearning is often built on hate and hostility for the "other" (Bloom, 2016), rather than deep commitment for a wider, common cause that aims for the betterment of humanity overall. STEs, however, promote connectedness in the absence of hostility towards an outgroup.

The remainder of this paper is dedicated towards exploring the different varieties of STEs along with how they may support sustainable wellbeing. For each variety of STE, we provide an introduction to the concept and then outline the empirical evidence base surrounding its links to both wellbeing and sustainability. In addition, we examine each approaches' neuroscientific basis to highlight how the different varieties of STEs may have (or not) similar neurological underpinnings. We start by looking at psychedelic induced STEs and then move on to consider mindfulness, flow, and awe. The additional length of the psychedelic section is not intended to suggest a preference for this route towards STEs. Rather it serves to introduce key terms and to establish an understanding of key brain regions involved in STEs which are discussed and referred to in subsequent sections.

Although peak experience was listed as one of the five varieties of STEs by Yaden et al. (2017), we have chosen not to explore peak experience as a variety of STEs that can facilitate sustainable wellbeing in the paper for a number of reasons. Firstly, peak experiences are not always well differentiated from the other varieties of STEs in the academic literature. For example, flow is sometimes considered to represent a peak experience (Bakker, 2005; Sinnamon, Moran, & O'Connell, 2012). Secondly, peak experiences are typically considered to be rather rare events (Yaden et al., 2017) and as such may hold less potential for supporting sustainable wellbeing. Thirdly, peak experiences are sometimes described as "just coming of their own accord" (McDonald, Wearing, & Ponting, 2009: 16), rather than something that an individual can make happen. In this way, they may hold less practical relevance for promoting sustainable wellbeing. Lastly, the literature surrounding the neurological correlates of peak experiences as well as their consequences for sustainability is not well developed in comparison to the other varieties of STEs included in our review.

4 | Psychedelic-induced STEs

"To fathom Hell or soar angelic/Just take a pinch of psychedelic"
Humphrey Osmond at the New York Academy of Sciences meeting in 1957.

The term "psychedelic" was coined by Humphrey Osmond in 1957 through conversations with the famous writer Aldous Huxley (Dyck, 2006). Drawing on the Greek words "psyche" (for mind or soul) and "deloun" (for show) it is now often translated as "mind-manifesting". This has proven to be a particularly fitting choice since studies have shown psychedelic substances to promote structural and neural plasticity in the prefrontal cortex (Ly et al., 2018) that are associated with brain network reorganisation (Carhart-Harris, 2018) and which we will discuss later. The provision of moderate to high doses of psychedelics have shown to consistently occasion non-ordinary states of consciousness that are less centred on one's normal sense of self, that is, they are self-transcendent (Carhart-Harris et al., 2012; Carhart-Harris et al., 2012).

Psychedelic research and its potential for psychiatric treatments received widespread interest following the serendipitous discovery of lysergic acid diethylamide (LSD) by Swiss Chemist Albert Hofmann in his lab at Sandoz in Basel in 1943 (Osmond, 1957). Following a period of active research within psychiatry and the emergent fields of neuroscience in the 1950s to 1960s with initial yet promising findings (Grinspoon & Bakalar, 1979), psychedelic research came to an abrupt stop in the early 1970s due to increased recreational use outside of controlled research settings and a growing popularity with the counter-culture movement of the time (Nutt et al., 2013). It was not until the 1990s that research on classic psychedelics experienced a resurgence (e.g. Strassman & Qualls, 1994; Vollenweider et al., 1997).

Psychedelics are usually broadly divided into *classic* psychedelics and *non-classic* psychedelics. Whereas the former provides a category for psychedelics considered to be found in nature and include psilocybin, dimethyltryptamine (DMT), and LSD, the latter includes newer analogues and derivatives of molecular structures. In this paper we will focus on classical psychedelics, which have been defined as "A drug which, without causing physical addiction, craving, major physiological disturbances, delirium, disorientation, or amnesia, more or less reliably produces thought, mood, and perceptual changes otherwise rarely experienced except in dreams, contemplative and religious exaltation, flashes of vivid involuntary memory, and acute psychosis" (Grinspoon & Bakalar, 1979: 9). For practical reasons we will particularly focus on studies involving LSD, psilocybin and Ayahuasca.

Classic psychedelics contain psychoactive compounds that exercise their effects through agonist (including partial agonist) activity at the serotonin 2A receptor (5-HT_{2A}R; Tagliazucchi, 2020). Studies on human propositi by Kometer and colleagues (Kometer et al., 2012; Kometer, Schmidt, Jäncke, & Vollenweider, 2013; Quednow, Kometer, Geyer, & Vollenweider, 2012) have shown that 5-HT_{2A}R antagonism blocks the subjective and other neurological effects of the classic psychedelic psilocybin. Despite the primary role of 5-HT_{2A}R agonism, other receptor-level mechanisms such as 5-HT_{2C} and 5-HT_{1A} receptors are associated with psychedelic effects (Halberstadt & Geyer, 2011) in the form of self-transcendent experiences.

More generally, classic psychedelics fall within one of two general structural categories. One category includes variations on the structure of tryptamine that regulates the activity of dopaminergic, serotonergic and glutamatergic systems. Examples include LSD, psilocybin, and DMT, a psychoactive compound present in the South American sacramental beverage Ayahuasca. Ayahuasca enjoys a long historical use by indigenous populations in ceremonial contexts in countries such as Peru and Brazil as well as in the Native American Church (NAC), Sainto Daime Church, and União do Vegetal (UDV) as part of their religious rituals in the United States and elsewhere. The second category includes variations on the structure of phenethylamine that acts as a stimulant in the human central nervous system. One example is mescaline, the main psychoactive agent in the peyote (Lophophora williamsii), San Pedro (Echinopsis pachanoi) and Peruvian torch (Echinopsis peruvianus) cacti (Nichols, 2016).

Classic psychedelics often occasion extreme changes in one's mental state (Passie, Seifert, Schneider, & Emrich, 2002; Griffiths, Richards, McCann, & Jesse, 2006; Griffiths et al., 2011). During a psychedelic-induced state, people can experience alterations in their visual and psychological perceptions (Huxley, 1954). They may see different colours and shapes or sense a change in their mood or perceptions. Most importantly, for our purposes, a psychedelic-induced state is often characterised by feelings of oneness, that all things are interconnected, and that the border between one's self and the outside world is breaking down (Blatchford, Bright, & Engel, 2021).

Scientists have tried to capture the phenomenological features of psychedelic experiences using a variety of terms and associated measures. For example, drug-induced ego dissolution (DIED) (Millière, Carhart-Harris, Roseman, Trautwein, & Berkovich-Ohana, 2018) is a term often used to describe people's experience of loss of sense of self and a blurring of self-world boundaries. Heightened feelings of connectedness are often described as the feeling of "oneness" or "unity" (Letheby & Gerrans, 2017). Moreover, occasionally, terms such as "mystical experiences" have been used to

describe the phenomenology of psychedelic-induced STEs such as unity, the noetic quality, and sense of sacredness (e.g. Griffiths et al., 2006; MacLean, Johnson, & Griffiths, 2011).

Notably, Millière et al., (2018b) suggest that the phenomenology of psychedelic states may be modulated and depend on a number of factors including the type of psychedelic drug, dosage, and the often-described set and setting. Contrary to *psycholytic* approaches that usually use lower doses of classical psychedelics, *psychedelic* psychotherapy uses a higher dosages to trigger strong STE, or "complete" mystical experiences (Johnson et al., 2019) often characterised by ego-dissolutions (Millière et al., 2018). Research has shown that higher doses of psychedelics occasioning strong STEs often are more likely to provide greater therapeutic benefits (Baron & Kenny, 1986; Garcia-Romeu, Griffiths, & Johnson, 2015). For instance, during psychedelic therapy using LSD, the treatment is usually conducted over the course of a few sessions during which patients receive a large dose of LSD of up to 400-600 mcg (Grof, 2019: 16). While the use of lower dosages (<250 mcg) tend to activate symptoms and are more likely to occasion people's defence mechanisms, higher dosages (>250 mcg) usually trigger cleaner resolutions. Notwithstanding, research exploring the effects of so-called "microdosing" have been conducted in recent years with less therapy-based focuses (Lant, 2017).

4.1 The neurological correlates of psychedelic self-transcendent experiences

Psychedelics are widely used in neuroscientific research (Tagliazucchi, 2020). Besides ongoing disparities in psychedelic brain imaging studies (Calvey & Howells, 2018), recent state-of-the art studies have begun to shed light on common ways in which psychedelics can affect brain activity (Vollenweider & Preller, 2020). Here, we focus on two such common themes. The first involves the relationship between the activation of the Default Mode Network (DMN) and the experience of ego-dissolution. The second involves an increase in dynamic activity across brain networks.

One brain network that has been implicated in the experience of ego-dissolution is the Default Mode Network (DMN) (Blatchford et al., 2021). The DMN comprises several brain regions that are active during rest, but less so during goal-directed engagement in tasks that require attention. Examples of some of the brain regions included within the DMN are the medial prefrontal cortex, medial and lateral parietal cortex, medial temporal lobes and posterior cingulate cortex (Andrews-Hanna, Smallwood, & Spreng, 2014). A key characteristic of the DMN is that its regions are highly interconnected and show high heteromodality (Carhart-Harris & Friston, 2010).

The DMN is involved in a number of self-related thought processes. These include self-consciousness, self-referential thought, mind-wandering and rumination, whereby people repetitively focus on, often negative, thoughts related to themselves (Blatchford et al., 2021; Carhart-Harris & Friston, 2010). It is also associated with mental time travel. Being able to access self-relevant memories from the past and project ideas about ourselves into the future is an important aspect of having a continual sense of self (Speth et al., 2016). Carhart-Harris and Friston (2010) even speculated that the network could be the primary neurological basis of the Freudian ego.

A number of studies have now documented that under psychedelics, individuals show a reduction in functional connectivity[13] within the DMN (Millière et al., 2018). These effects have been found for LSD (Carhart-Harris et al., 2016), psilocybin (Carhart-Harris et al., 2012) and Ayahuasca (Palhano-Fontes et al., 2015). Notably, psychedelic research has documented reduced activity within the brain structures that form part of the DMN such as the posterior cingulate cortex (Muthukumaraswamy et al., 2013; Palhano-Fontes et al., 2015) and medial prefrontal cortex (Carhart-Harris et al., 2012). These changes have been correlated with the subjective experience of ego-dissolution (Carhart-Harris et al., 2016; Muthukumaraswamy et al., 2013). Further studies have confirmed that people who reported mystical and out-of-body experiences show decreases in activation of other brain areas beyond the DMN such as the superior and inferior parental lobe, as well as the nearby temporo-parietal junction—a cluster of brain regions that represent self-other boundaries and egocentric spatial awareness (Farrer & Frith, 2002; Johnstone, Bodling, Cohen, Christ, & Wegrzyn, 2012).

Alongside a reduction in activity within the DMN, under psychedelics there also appears to be an *increase* in spontaneous and dynamic brain activity, especially among high-level association networks (Blatchford et al., 2021; Schartner et al., 2017; Tagliazucchi, 2020). Sometimes called the "entropic brain" (Carhart-Harris et al., 2014; Herzog et al., 2020), brain activity becomes disorganised under psychedelics allowing for an increased connectivity between usually distinct brain networks. For example, Carhart-Harris et al. (2013) showed that the DMN and Task-Positive Network (TPN, which serves focused attention), whose activities are usually negatively correlated, displayed greater functional connectivity under the effect of psychedelics. Carhart-Harris succinctly compared this effect to a mountain with usually well-trodden paths or slopes that, after the injection of psilocybin, resemble a mountain with fresh snow, thus allowing the brain to engage in new ways of operating (Illing, 2019). Neuroscientists believe that

13 Functional connectivity refers to the extent to which two spatially distinct brain regions show a statistical relationship in their activities.

this freed and unimpeded communication across brain networks holds profound therapeutic potential. Such effects have been documented under all classic psychedelics, namely LSD (Müller et al., 2017), psilocybin (Roseman, Leech, Feilding, Nutt, & Carhart-Harris, 2014) and Ayahuasca (McKenna & Riba, 2018). These increases in spontaneous neural activity and global connectivity have also been shown to correlate with subjective reports of ego-dissolution (Nour et al., 2016; Schartner et al., 2017; Tagliazucchi et al., 2016), as well as the auditory and visual effects of psychedelics (Müller et al., 2017). Carhart-Harris et al. (2017) also speculated that this increase in global functional connectivity could be the neural correlate of the unitive feelings of connectedness during the psychedelic experience itself.

Overall, neurological studies of psychedelic experiences have revealed two key themes with regards to a reorganisation of connectivity in the brain. Firstly, there is decreased connectivity *within* networks such as the DMN. Secondly, there is increased connectivity *across* brain networks (Barnett, Muthukumaraswamy, Carhart-Harris, & Seth, 2020; Tagliazucchi, 2020). These brain changes appear to relate to individuals' subjective experiences of ego-dissolution, and it has been hypothesized that they could drive the unitive experience, too. When we come to discussing the other, non-psychedelic induced varieties of STEs, we will make an effort to examine the extent to which these two common neurological features have also been documented to determine the similarity or differences in the neurological correlates across the different varieties of STE.

4.2 Psychedelic experiences and wellbeing

Growing research interest on psychedelics has led to an accumulation of evidence in recent years showing their extensive potential to actively support health outcomes (for reviews see dos Santos et al., 2016; Johnson & Griffiths, 2017; Johnson et al., 2019). These include considerable treatment potential for smoking (Garcia-Romeu et al., 2015) and alcoholism (Bogenschutz et al., 2015; Dyck, 2006; Hoffer, 1967) as well as the treatment of cluster headaches (Sewell, Halpern, & Pope, 2006), thus contributing to *physical* wellbeing. Besides earlier, mixed results (e.g. Mangini, 1998), more recent meta-analyses have provided robust evidence of the efficacy of the treatment (e.g. Krebs & Johansen, 2012).

Further evidence supporting psychedelics positive impacts on *mental* health come from studies documenting beneficial effects for patients with conditions such as depression, anxiety, addiction, obsessive-compulsive disorder and anorexia (Bogenschutz et al., 2015; dos Santos et al., 2016; Moreno et al., 2006; Patra, 2016; Roseman et al., 2018; Ross et al., 2016; Sanches et al., 2016), among others. Many of these disorders are

"internalizing disorders." Patients ruminate on negative feelings, their drug of choice, and their body image, for example. By reducing the degree of self-focus (e.g. through the reduction in the activity of the DMN), psychedelic substances can help to reorient attention away from ruminating thoughts and improve clinical outcomes (Nutt & Carhart-Harris, 2021). Such findings have led to the emergence of what has been called "psychedelic-assisted therapy" (Millière et al., 2018). In the case of depression, psilocybin has shown more positive results than traditional antidepressant treatments (Erritzoe et al., 2018).

However, the beneficial effects of psychedelics are not limited to clinical treatments. They can also have positive effects on other, non-clinical, aspects of wellbeing. For example, psilocybin has shown to reduce fear of death, while, simultaneously, increasing a person's sense of purpose (Yaden et al., 2016). This resembles the suggestion of the 17th century German Augustinian monk Abraham of Santa Clara that "The man who dies before he dies does not die when he dies" (cited in Grof, 2019: 224). According to Stanislav Grof (2019: 286) "a person whose existence is limited to the pedestrian level of everyday consciousness and who has not had experiential access to the transcendental and numinous dimensions of reality will find it very difficult to overcome their deep-seated fear of death and find deeper meaning in life. Under these circumstances, much of the daily behaviour is motivated by the needs of the false ego and significant aspects of life are reactive and inauthentic." In addition, the use of psilocybin has been linked to decreases in psychological distress (Hendricks, Thorne, Clark, Coombs, & Johnson, 2015). Under double-blind conditions which control for expectancy bias, psilocybin has also been shown to induce complete mystical experiences which were linked to enduring positive impacts on mood (Barrett & Griffiths, 2018).

The experience of ego-dissolution has also been linked to improvements in wellbeing, and this relationship appears to be stronger for psychedelic-induced ego-dissolution experiences than for those induced by cocaine or alcohol (Nour et al., 2016). When a sample of psychedelic-naïve participants took part in psilocybin sessions, 83% stated that their psilocybin experiences had increased their wellbeing and life satisfaction even at a follow-up conducted 14 months after the sessions had finished (Griffiths et al., 2011). The boost in wellbeing facilitated by psychedelics therefore appears to be persistent and long-lasting. A single dose of LSD has also been linked to increases in positive attitudes towards life and more positive moods at both 1- and 12-month follow-ups (Schmid & Liechti, 2018). Regular users of Ayahuasca have been shown to report higher levels of meaning in life alongside greater psychological wellbeing (especially aspects such as self-acceptance and prosocial ties) than non-user controls (Bouso et al., 2012).

Ayahuasca ceremony attendants in the Netherlands and Colombia displayed significantly lower levels of stress following the ritual and these changes persisted for 4 weeks (Uthaug et al., 2018).

Moreover, the use of psychedelic substances has also been shown to promote certain personality traits that are considered as beneficial for wellbeing. For example, openness is a trait that has been shown to predict higher levels of psychological wellbeing (Kokko, Tolvanen, & Pulkkinen, 2013) and has been documented to increase, following a psilocybin or LSD session (Carhart-Harris et al., 2016; Erritzoe et al., 2018; MacLean et al., 2011). Regular use of Ayahuasca (Netzband, Ruffell, Linton, Tsang, & Wolff, 2020) and lifetime recreational psychedelic use (Nour, Evans, & Carhart-Harris, 2017) have also both been positively correlated with openness scores. As we will see in the following section, increased openness may also be able to account for some of the positive effects of psychedelic substances on sustainability-related outcomes.

4.3 Psychedelics and sustainability

Given that one of the common characteristics of psychedelic STEs is that the individual experiences a heightened sense of connection with something larger than the self, it is perhaps unsurprising that use of psychedelics has been linked to increases in nature relatedness (Nour et al., 2017). These effects appear to be long lasting. For example, use of psilocybin has been linked to increases in nature relatedness at 7-12 months (Lyons & Carhart-Harris, 2018) and 8-16 months (Studerus, Kometer, Hasler, & Vollenweider, 2010) post-experience. Kettner et al. (2019) reported that frequency of lifetime psychedelic use was positively correlated with nature relatedness. Furthermore, by administering surveys to individuals one week before plus one day, 2 weeks, 4 weeks, and 2 years after a psychedelic experience, they found that nature relatedness had significantly increased at all follow-up points. Whilst Kettner et al. (2019) found that the extent of the increase in nature relatedness was heightened when individuals had stronger experiences of ego-dissolution and had access to natural surroundings during the psychedelic experience, Lyons and Carhart-Harris (2018) and Studerus et al. (2010) findings show that increases in nature relatedness can still be delivered in the absence of natural environments.

Individuals who feel more connected and related to nature also tend to display more pro-environmental behaviour (Whitburn, Linklater, & Abrahamse, 2020). In line with this, Forstmann and Sagioglou (2017) reported that past experiences with classic psychedelics was associated with both greater nature relatedness and engagement in pro-environmental behaviours such as recycling and trying to conserve water. In this study, the relationship between psychedelic experiences and engagement in

sustainable behaviours was explained by the extent to which people self-identified with nature, meaning that it is the increased feelings of connectedness to the natural world facilitated by psychedelic STEs that can encourage individuals to increase their engagement in pro-environmental actions (ibid).

Another means through which psychedelic STEs can facilitate more sustainable worldviews is by increasing the capacity for empathy (Blatchford et al., 2021). Empathy describes the ability to place oneself in another person's shoes and be able to understand how they may be feeling. Consumption of psilocybin within controlled, experimental studies has been shown to lead to increases in empathy in both healthy individuals (Pokorny, Preller, Kometer, Dziobek, & Vollenweider, 2017) and advanced-stage cancer patients (Grob et al., 2011). Mason et al. (2019) reported similar effects when studying the impact of psilocybin consumed in a retreat setting. Individuals displayed higher empathy the morning after psilocybin consumption and this effect was retained seven days later. Increases in empathy have also been reported following consumption of LSD (Dolder, Schmid, Müller, Borgwardt, & Liechti, 2016). In a survey study by Lerner and Lyvers (2006), the authors found that those individuals who had previously used psychedelics scored higher in emotional empathy than people who had not. The reduction in the salience of the boundary between self and other during psychedelic STEs may encourage the increases in empathy. By reducing the extent to which people consider themselves as separate from other people, this may increase the ability to empathise with others and thus encourage altruistic behaviours (Schmid & Liechti, 2018).

As previously mentioned, psychedelics appear to encourage the personality trait of openness (Barbosa et al., 2016; Carhart-Harris et al., 2016; Nour et al., 2017), which may be beneficial for personal wellbeing. Openness has also been linked to outcomes that are beneficial for sustainability. Individuals who are more open to new experiences and ideas are likely to be more willing to change and transform their lifestyles in favour of those that benefit the environment. Multiple studies now document a positive association between the extent to which an individual is high on openness and their environmental concern and engagement in pro-environmental behaviours (Hirsh, 2010, 2014; Markowitz, Goldberg, Ashton, & Lee, 2012; Milfont & Sibley, 2012).

Drawing on the analogy of astronauts when experiencing what has come to be known as the "overview effect" (see also Yaden et al., 2016), Grof (2019) argues that *psychonauts* (i.e. those who have experienced full STE) start appreciating *Earth* more fully and, as illustrated by Buckminster Fuller's

"Spaceship Earth"[14], as a common place shared by all of humanity, thus potentially fostering a sense of "global citizenship". This awareness can lead to a greater ecological sensitivity and, consequently, a greater commitment to protect nature. This is perhaps best captured in a quote from a research participant in a study conducted by Lyons and Carhart-Harris (2018: 817) "Before I enjoyed nature, now I feel part of it. Before I was looking at it as a thing, like TV or a painting… [But now I see] there's no separation or distinction, you are it."

5 | Mindfulness

Abraham Maslow saw individuals who aim to attain the status of an enlightened being as "transcenders" (Kaufman, 2020: 220). This general orientation and commitment, sometimes referred to as the *Bodhisattvas path* is firmly grounded in Buddhist teachings and, consequently, provides close links to the wider practice of mindfulness and meditation.

Mindfulness describes a state of being whereby attention is focused on the present moment (Kabat-Zinn, 1994). A mindful individual aims to observe their mental states and outside events as they happen, on a moment-to-moment basis but does not react to them in an automatic or emotionally charged way (Bishop et al., 2004). Rather, they observe their thoughts and experiences in a non-judgemental manner, and more consciously choose their reactions to these (Chambers, Gullone, & Allen, 2009). By focusing on the present moment, mindful individuals are not distracted by ruminations about the past or hopes and anxieties about the future (Armstrong & Jackson, 2015).

A number of researchers have explicitly stated that mindfulness involves a self-transcendent element. Vago and Silbersweig's (2012) S-ART framework proposes that mindfulness can develop a type of relationship between self and other that transcends self-focused needs and increases prosocial tendencies. Hanley et al. (2020) outline how mindfully attending to specific objects decreases self-referential thoughts. The process of becoming an objective observer of one's own stream of consciousness, sometimes referred to as "decentering", can also reduce the extent to which people identify with their existing, static sense of self (Hölzel et al., 2011). Research has shown that taking part in a mindfulness training session can lead to the dissolution of body boundaries (the extent to which the self is experienced as discrete and separate from the surrounding world) (Dambrun, 2016; Nave et al., 2021) and promote an allocentric rather than egocentric frame of

14 See e.g. https://www.bfi.org/about-fuller/big-ideas/spaceshipearth

reference (Hanley & Garland, 2019). An allocentric frame of reference denotes feelings of unity with the social and natural worlds whilst an egocentric frame of reference denotes a self-centred preoccupation with internal events (Hanley et al., 2020).

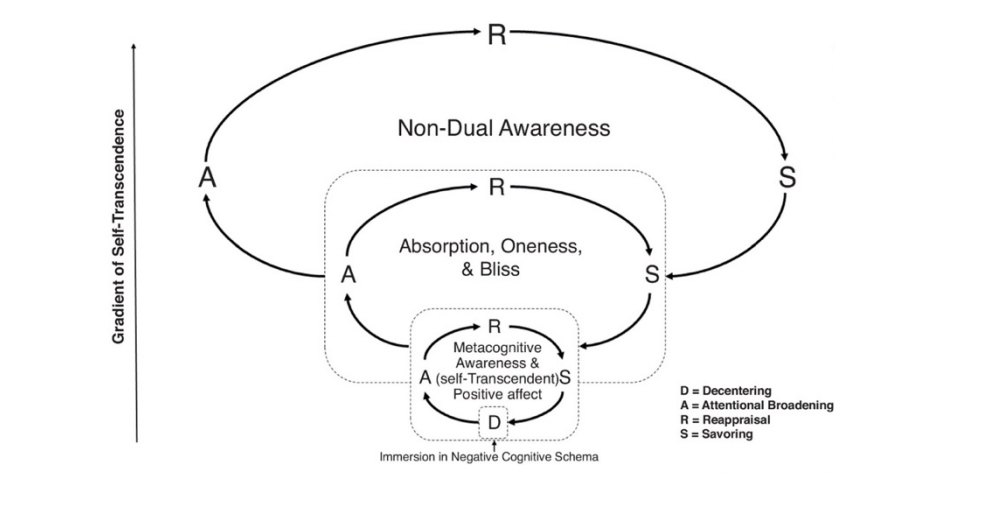

Figure 1. Representation of the Mindfulness-to-Meaning Theory (MMT) extended toward self-transcendence as presented in Garland and Fredrickson (2019).

Garland and Fredrickson (2019) argue that "mindfulness provides the system perturbation needed to disrupt habitual cognitive schemas and broaden awareness to encompass an enlarged set of contextual data from which new, adaptive appraisals of self and world can be constructed" (Garland & Fredrickson, 2019: 184). They outline a cycle (see *Figure 1*) whereby frequent mindfulness practice facilitates processes such as decentring, attentional broadening, reappraisal, and savouring, which, together, promote a self-transcendent state. Individuals move from observing their own feelings and thoughts as they are happening, to attending to connections between the self and other non-self objects (e.g. other humans or nature), to eventually achieving nondual states whereby the I-other distinction is temporarily transcended.

Mindfulness can be cultivated through the practice of meditation whereby individuals purposefully self-regulate their attention (Baer, 2003). There are several different styles of meditation that individuals can practice (Nash, Newberg, & Awasthi, 2013). These include mantra meditation, which involves the repetition of a selected word, phrase or sound (Lynch et al., 2018), loving-kindness meditation, which involves focusing attention on the heart and the love we have for certain friends or family members (Fredrickson, Cohn, Coffey, Pek, & Finkel, 2008), and focused attention

meditation, whereby individuals focus their attention on a single object or bodily sensation (Lee et al., 2012). Mindfulness is also often achieved through an active focusing on one's breath. Mindful breathing can be seen as a bodily and mental experience that fosters a relationship to the surrounding space. All of these practices help improve the individual's ability to focus attention and support general levels of mindfulness.

5.1 The neurological correlates of mindfulness and associated meditation practices

The neuroscience of mindfulness has received vivid interest in recent years (Goleman & Davidson, 2017; Lutz, Dunne, & Davidson, 2007). A consistent finding concerning the neurological correlates of a mindful/meditative state is that there is reduced functional connectivity within the DMN (Berkovich-Ohana, Wilf, Kahana, Arieli, & Malach, 2015; Tang, Hölzel, & Posner, 2015) as well as reduced activation of the brain structures within this network such as the medial prefrontal cortex and the PCC (Brewer et al., 2011; Farb et al., 2007; Garrison, Scheinost, Constable, & Brewer, 2014; Lin, Callahan, & Moser, 2018; Scheibner, Bogler, Gleich, Haynes, & Bermpohl, 2017). Effects are usually stronger for more experienced, long-term meditators (Adluru, Korponay, Norton, Goldman, & Davidson, 2020). These findings are consistent with the reduced self-referential processing and experiences of ego-dissolution that often occur during STEs and mirror those findings concerning the neurological correlates of psychedelic induced STEs.

Alongside this reduced activation of the DMN, mindful states have also been linked to increased functional connectivity across usually distinct brain networks (Kral et al., 2019). For example, the activity of the Central Executive Network (CEN, this network is involved in sustained attention, working memory and decision making related to goal-directed behaviour) is usually negatively correlated with activity in the DMN (Chen et al., 2013; Fox et al., 2005). However, studies have documented that, during mindful states, the connectivity of these two networks can be increased (Bauer, Whitfield-Gabrieli, Díaz, Pasaye, & Barrios, 2019; Brewer et al., 2011). Again, these findings are similar to those reported for psychedelic induced STEs, where we see an increase in functional connectivity across brain networks such as the DMN and TPN (Carhart-Harris et al., 2013).

When discussing the neurological correlates of psychedelic experiences, we noted that increased global functional connectivity may be linked to feelings of connectedness during the STE (Carhart-Harris et al., 2017). One may speculate that these findings of increased functional connectivity between brain regions such as the DMN and CEN during mindfulness could also facilitate the feelings of oneness outlined in Garland and Fredrickson's (2019) model (*Figure 1*). Linked to this, it has been suggested that changes

in functional connectivity between the CEN and the inferior temporal nodes of the DMN, in particular, may explain changes in perceived body boundaries and frames of reference induced via mindfulness (Hanley et al., 2020). The inferior temporal lobe is involved in the visual recognition of objects and the object-centred processing of their location in space. The increased functional connectivity between these two brain areas during mindful states (Froeliger et al., 2012) may therefore be associated with the dissolution of body boundaries and increases an allocentric frame of reference reported during mindfulness.

5.2 Mindfulness and wellbeing

Mindfulness practices are the subject of uncountable self-help books and mobile apps to help alleviate the stressors of modern lifestyles. Besides mixed findings in some areas (e.g. Korponay et al., 2019), the wellbeing benefits of practising mindfulness are well documented. On the one hand, mindfulness can improve outcomes for clinical patients experiencing problems such as anxiety (Kabat-Zinn et al., 1992) and cancer (Speca, Carlson, Goodey, & Angen, 2000). On the other hand, practising mindfulness is associated with reductions in stress (Astin, 1997) and symptoms of depressions (Shapiro, Schwartz, & Bonner, 1998), alongside greater life satisfaction (Crego, Yela, Gómez-Martínez, & Karim, 2019), positive feelings more generally (McKay & Walker, 2021) and higher self-esteem (Pepping, O'Donovan, & Davis, 2013) in non-clinical populations.

There are various proposed reasons why practising mindfulness can have beneficial effects on wellbeing. Being engaged in the present moment is enjoyable and associated with greater happiness in itself, whilst mind-wandering tends to lead to unhappiness (Ericson, Kjønstad, & Barstad, 2014; Killingsworth & Gilbert, 2010). Awareness of habits and automatic responses also increases the clarity of one's true values and identity. Choosing to pursue goals in line with these true values has consistently been linked to greater wellbeing (Kasser & Ryan, 1996). Carmody et al. (2009) demonstrated that greater clarification of values could partially mediate the relationship between mindfulness and reductions in psychological symptoms (encompassing anxiety, depression, medical symptoms, and perceived stress). Mindfulness can also increase emotional intelligence, which describes our ability to effectively understand and manage our own and other's emotions (Baer, Smith, & Allen, 2004). Schutte and Malouff (2011) found that emotional intelligence successfully mediated the relationship between trait mindfulness and higher levels of positive affect, lower levels of negative affect, and greater life satisfaction.

What is also interesting to note here is that recent research has suggested that mystical-type experiences are linked to the positive emotional

outcomes of meditation (Russ & Elliott, 2017). A handful of studies have documented that more frequent engagement in mindfulness meditation practices is associated with a greater likelihood of having mystical experiences (Berkovich-Ohana, Harel, Hahamy, Arieli, & Malach, 2016; Reavley & Pallant, 2009). This suggests that mindfulness may exert some of its positive influence of personal wellbeing through similar pathways to psychedelic experiences.

5.3 Mindfulness and sustainability

Apart from personal, individual-level benefits, scholars argue that mindfulness can provide a powerful tool to tackle societal ills. For instance, Schneider (2013) argues that a mobilisation of mindfulness practices can help to overcome the "polarised mind", that is, the fixation on a single point of view while excluding competing points of view. This polarised mind is suggested to have contributed to now common practices such as bullying and abuse, characteristic of modern societies, and even wars. Instead, scholars believe that mindfulness practices hold the potential to facilitate dialogue among groups therefore contributing to social sustainability.

With regards to environmental sustainability, Brown and Kasser (2005) highlighted that mindfulness allowed for the compatibility of both psychological and ecological wellbeing. Since then, numerous studies have been able to show that people who are more mindful tend to engage in a greater number of ecologically sustainable behaviours (e.g. Amel et al., 2009; Ericson et al., 2014; Wamsler et al., 2018). Mindfulness may encourage more pro-environmental behaviours because it increases people's awareness of their thought processes, thus allowing them to become less susceptible to persuasion from pro-consumerist messages (Rosenberg, 2004). Moreover, mindfulness has also been shown to foster empathy (Shapiro et al., 1998) and compassion (Kemeny et al., 2012). Once people are able to appreciate how their behaviour may be affecting other people, species and future generations, they seem to become motivated to behave in more pro-environmental ways (Berenguer, 2007; Lu & Schuldt, 2016). Further, mindfulness has been linked to greater self-control (Bowlin & Baer, 2012), which is suggested to be a determinant of pro-social/ecological behaviour in itself (Martinsson, Myrseth, & Wollbrant, 2010), and arguably needed to resist often pervasive advertisement strategies.

6. Flow Experiences

Flow describes a state of optimal experience whereby an individual is totally immersed in what she or he is doing. It is about the intense absorption and immersion in an activity that results in a feeling within the moment that everything just seems to "come together" for the individual (Jackson & Eklund, 2004). The flow concept was first identified by the Hungarian positive psychologist Mihalyi Csikszentmihalyi (1975) while conducting interviews with musicians, artists, rock-climbers, and surgeons, amongst others. Csikszentmihalyi found that in all these different activities, people were reporting similar experiences of total absorption.

Flow experiences are typically considered to involve nine components or characteristics. These outline the different conditions that are usually present and feelings that people have when they are in flow. In terms of the conditions that support flow, the first is that there is a perceived balance between the skills that a challenge requires and those that an individual possesses (Mihalyi Csikszentmihalyi, 1975; Moneta & Csikszentmihalyi, 1996). This balance should also occur above individual's average skill level. In other words, we must stand a chance of completing the task we are confronted with, but still feel challenged and stretched to perform at our best level (Engeser & Rheinberg, 2008; Massimini & Carli, 1988), sometimes referred to as "optimal challenges" (Ryan & Deci, 2017). *Figure 2* displays the relationship between challenge and skill levels in the experience of flow. The other condition elements of flow are that the activity has clear goals. This helps to order an individual's attention and keep them connected to the activity. In addition to perceiving clear goals, a person must also be provided with immediate, unambiguous feedback regarding their progress towards meeting these. This feedback, whether in the form of cues from the environment or bodily awareness, helps individuals to suitably adjust their behaviour to meet the challenges present (Csikszentmihalyi, 1990; Jackson & Eklund, 2004).

During flow, individuals devote all their attention to the activity they are engaged in, creating an experience of total concentration. Further, as no attention is granted to anything other the activity, this prevents an individual from perceiving themselves as a separate entity from the actions they are performing (Csikszentmihalyi, 1992). There is no attention left to attend to the self and as such individuals' actions feel spontaneous or effortless because they are not aware of any conscious effort to initiate them. For similar reasons, during flow all self-consciousness disappears and therefore, rather than being pre-occupied with living up to a certain standard, individuals show reduced concerns with what other people may be thinking about them (Csikszentmihalyi, 1990). This blurring of the boundary

between self and action and loss of self-consciousness is what makes flow a self-transcendent experience.

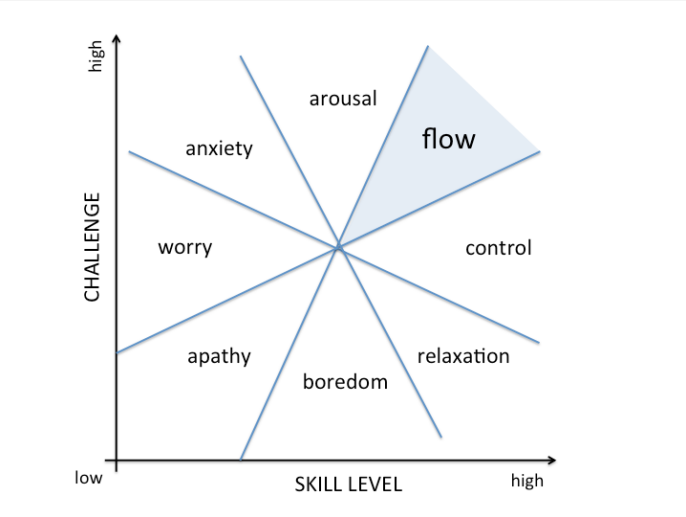

Figure 2. Graphical model of flow (Suksma, 2014. Retrieved from: *http://www.sukshma.net/2014/06/13/beyond-giving-up/*).

Due to the extreme immersion experienced during flow, individuals' perception of time is altered, most commonly such that hours seem to go by in minutes. They also experience a sense of control; that they are acting freely and can directly influence the outcome of the activity. These feelings of control may arise when individuals overcome each challenge within an activity. Finally, the flow experience is intrinsically motivating. That is, it is enjoyable and rewarding so that individuals will choose to engage in the respective activity simply for the sake of experiencing flow, rather than for any external rewards (e.g. money or praise) it may bring. Each experience of flow increases the actor's motivation to experience it again (Csikszentmihalyi, 1992; Jackson & Eklund, 2004).

6.1 The neurological correlates of flow experiences

Flow experiences do appear to share some common neurological correlates with psychedelic induced STE. A prominent early proposal surrounding the neurological correlates of flow is Dietrich's (2003, 2004) transient hypofrontality hypothesis, which emphasizes that during flow there is reduced activity of the prefrontal cortex. Although a few studies have provided support for this hypothesis (Leroy & Cheron, 2020), research has tended to suggest that a reduction in activity across the prefrontal cortex during flow is not a reliable finding. Instead, there are certain areas within

the prefrontal cortex that become less active during flow while others become more active. Most relevant for our purposes is the finding that those brain areas considered to be part of the DMN as the medial prefrontal cortex and PCC (Keller, 2016; Ulrich, Keller, & Grön, 2016; Ulrich, Keller, Hoenig, Waller, & Grön, 2014; Ulrich et al., 2018) tend to show decreased activation. This reduction in activity within the DMN is consistent with the other self-transcendent experiences we have explored and helps to explain why during flow individuals often lose self-consciousness and stop perceiving themselves as separate from the actions they are performing. Regions of the prefrontal cortex that tend to show increased activation during flow include the Central Executive Network (CEN), which is involved in sustained attention, working memory and decision making related to goal-directed behaviour (Huskey, Craighead, Miller, & Weber, 2018; Ulrich et al., 2016; Yoshida et al., 2014). The increased activation of the CEN is in accordance with the high levels of concentration and goal-directed nature of flow.

Less work has examined whether there is an increase in dynamic brain activity, including increased functional connectivity across brain networks, during flow. There are, however, some preliminary findings that suggest this neurological feature may be present. For example, the synchronization theory of flow (Weber, Tamborini, Westcott-Baker, & Kantor, 2009) suggests that during a flow experience, there is increased synchronization of activity across brain networks involved in cognitive control and those involved in reward processing (Huskey et al., 2018). Future work is needed to further support the notion that during flow there is an increase in dynamic brain activity.

6.2 Flow and wellbeing

We have noted that one of the characteristics of flow is that the experience is intrinsically motivating and thus highly enjoyable. The total concentration on the activity during flow means that any awareness of the worries and concerns of everyday life is suppressed. This escape from the troubles of reality may help to make flow an enjoyable experience. On top of being inherently enjoyable, frequent flow experiences have been linked to enhanced individual wellbeing. For example, research shows that people who experience flow more often also tend to have greater self-confidence (Hektner & Csikszentmihalyi, 1996), higher life satisfaction (Bryce & Haworth, 2002; Tse, Nakamura, & Csikszentmihalyi, 2020) and a stronger sense of fulfilment (Asakawa, 2004). A single, high quality experience of flow can also give people a boost in positive feelings immediately after the activity (Fullagar & Kelloway, 2009; Mundell, 2000; Rogatko, 2009). Indeed, flow was outlined to be one of the five core elements that can deliver psychological wellbeing by one of the founders of positive psychology,

Martin Seligman. In his PERMA theory of wellbeing, Seligman (2012) lists Positive emotions, Engagement, Relationships, Meaning and Achievement as the five pillars of psychological wellbeing. The engagement element corresponds to the experience of flow. It is worth noting, however, that some academic have warned that flow does have the potential to lead to negative wellbeing consequences when an individual becomes addicted to achieving the flow state. For example, Lembke, (2021: 169) highlights that "The "flow" of deep concentration is a drug in itself, releasing dopamine and creating its own high. This kind of single-minded focus, although heavily rewarded in modern rich nations, can be a trap when it keeps us from the intimate connections with friends and family in the rest of our lives."

6.3 Flow and sustainability

For the previous types of self-transcendent experience that we have explored, there is evidence to suggest that the STE can lead to increases in pro-ecological values and/or behaviours. However, with flow, there is not yet any evidence surrounding how the experience of flow may lead to changes in individual values. Insights from neuroscientific studies suggest that flow could lead to more pro-ecological values since it involves the same reduction in activity of the DMN as in the previous types of STEs (Keller, 2016; Ulrich et al., 2016, 2014, 2018). However, it is worth noting that the definition of flow does not include any aspect of connectedness apart from the individual feeling as one with the activity they are performing. The extent to which flow can facilitate more pro-ecological values and a sense of connection with the world at large still needs to be established.

Although we do not yet have evidence to support flow's role in facilitating pro-ecological worldviews, flow can still support attempts to drive sustainable development. Recent research has shown that the experience of flow is more likely to occur in activities with lower environmental costs. Isham et al. (2019) examined the experiences of the members of 500 US families as they were engaged in their different daily activities. They found that the activities that people were reporting experiencing the characteristics of flow in, tended to have lower greenhouse gas intensities (in other words, be less environmentally costly). In particular, flow seemed to be occurring in activities such as talking with family and friends, prayer, yoga, arts and crafts, singing and dancing, cycling and aerobics. None of these necessarily require great amounts of physical energy and materials.

Indeed, earlier research by Csikszentmihalyi (2004) provided a theory for why flow experiences tend to occur in more environmentally friendly activities. He argued that there was an inverse relationship between the extent to which an activity required inputs of external energy (e.g. electricity, materials) and the extent to which it required inputs of psychic

energy (i.e. attention). Take the following as an example. If I decide I want to do some yoga then I can do this on the floor without any equipment, but I must really focus on the practice and moving my body in a certain way. In contrast, if I decide that I want to watch YouTube videos, then I must have an electronic device to play the videos on, but it does not require much mental effort or concentration on my part. Here we can see then that the level of investment of effort/attention is greater in the less environmentally intensive activity. As one of the defining features of flow is the investment of all attention in an activity, we thus see flow occurring more often in less environmentally costly activities.

Flow's contribution to sustainable wellbeing then is that it can provide enjoyment and satisfaction through engagement in less environmentally costly activities. To the extent that flow is an intrinsically motivating experience, this should mean that people are, consequently, encouraged to continue seeking flow in these more sustainable activities rather than seeking satisfaction in more materialistic and environmentally costly behaviours.

7. Awe: A Self-Transcendent Emotion

Awe is a complex emotion that is suggested to be triggered when an individual is faced with a stimulus that they perceive to be perceptually and/or conceptually vast and requires them to adjust their current mental schemas in order to accommodate this new information (Keltner & Haidt, 2003). More recent research by Shiota et al. (2017) further supported this, arguing that awe is a discrete emotion that addresses the need to take in novel, complex information. It often includes heightened feelings of wonder, appreciation, joy, and inspiration as well as fear and a sense of being overwhelmed (Yaden et al., 2019). The two latter emotions seem to be of key importance. Ekman and Cordaro (2011) suggest that the main difference between wonder and awe is the sensation of fear but especially of overwhelming vastness.

Common elicitors of awe include nature scenes, art, music, extraordinary talent, religious experiences and the birth of a child (Chirico & Yaden, 2018; Shiota, Keltner, & Mossman, 2007; van Elk, Karinen, Specker, Stamkou, & Baas, 2016). Astronauts have been suggested to experience awe when viewing the earth from space, a phenomenon now known as "the overview effect" (David B Yaden et al., 2016) and briefly introduced earlier. Awe can also be experienced through more mundane, shared, and unifying experiences such as during demonstrations or a concert, which led David Yaden to refer to awe as "the everyperson's spiritual experience" (as cited in

Kaufman, 2020: 206). Recent experimental research has also explored the possibility of promoting awe through exposure to natural scenes via virtual reality (Chirico, Ferrise, Cordella, & Gaggioli, 2018). It is important to note that awe can be prompted by both positive (e.g. natural wonders) and negative (e.g. natural disasters) stimuli (Gordon et al., 2017) and the nature of the associated awe experience can differ based on this. For example, awe prompted by beautiful scenery may be characterised by feelings of surprise, wonder and humility whilst awe prompted by a natural disaster (or a worldwide pandemic) may be characterised by feelings of fear, disorientation and uncertainty (van Elk et al., 2016).

When experiencing awe an individual is suggested to feel small and insignificant in relation to the vast and overwhelming stimuli they are confronted with (Bai et al., 2017; Campos, Shiota, Keltner, Gonzaga, & Goetz, 2013; Piff, Dietze, Feinberg, Stancato, & Keltner, 2015). This leads them to direct their attention away from themselves (Shiota et al., 2007) and widens their attentional focus towards entities that are larger than the self (Sung & Yih, 2015). Moreover, research has shown that awe leads individuals to perceive the size of their physical body to be smaller (van Elk et al., 2016). In this way, awe encapsulates the ego-dissolution aspect of STEs in that self-referential processing is reduced.

At the same time, this reduction in the salience of the self during awe is accompanied by feelings that one belongs to a larger or universal group such as their neighbourhood, nation or species (Chen & Mongrain, 2020; Shiota et al., 2007; Van Cappellen & Saroglou, 2012). This encompasses the increased feeling of connection aspect of STEs. Increased feelings of oneness with others means that awe often promotes better moods as well as pro-social behaviours (Joye & Bolderdijk, 2015). Indeed, much research has shown that awe can be a prosocial emotion which leads to an increase in generosity, altruism and helping behaviours (Prade & Saroglou, 2016; Zhou, Wu, Han, & Lin, 2014) alongside a reduction in aggressive tendencies (Ying Yang, Yang, Bao, Liu, & Passmore, 2016) and greater humility (Stellar et al., 2015).

7.1 The neurological correlates of awe

Examination of the neural basis of awe has only begun over the last couple of years. But despite the fact that insights are only emerging, it appears that awe does share some of the same neural correlates with psychedelic-induced STEs. In particular, studies on awe have observed changes in activity in structures within the DMN. In a study by van Elk et al. (2019), the researchers found reduced activity in the DMN of participants when watching videos designed to induce awe, including weaker activation in the frontal pole, the Posterior Cingulate Cortex (PCC) and the angular gyrus. In

line with this, Guan et al. (2018) found that dispositional awe was negatively correlated with regional grey matter volume in the Anterior Cingulate Cortex (ACC) and PCC. Again, both structures form part of the DMN and are involved in self-referential thinking. These findings are consistent with the reduction in self-directed attention during awe.

An increase in functional connectivity across different brain areas has also sometimes been documented during awe experiences. For example, Takano and Nomura (2020) found that during awe experiences, the right anterior supra-marginal gyrus (aSMG) showed increased functional connectivity with brain structures such as the amygdala and Middle Temporal Gyrus (MTG). The right aSMG forms part of the temporoparietal junction that integrates information regarding the location of the self in relation to others (Ionta et al., 2011) and has been linked to empathetic responses (Miller, Xia, & Hastings, 2020). Alterations in the functional connectivity of the brain area may therefore be related to some of the self-transcendent aspects of awe (blurring self-other boundaries and increasing feelings of connection to others). Accordingly, we can see that awe experiences do have somewhat similar neurological correlates in comparison to psychedelic induced STEs, having documented reductions in activity within the DMN alongside increased functional connectivity across different brain areas outside of the DMN.

7.2 Awe and wellbeing

Following the publication of Keltner and Haidt's (2003) seminal paper, numerous studies have linked awe with higher wellbeing. For example, awe has been associated with greater levels of life satisfaction (Krause & Hayward, 2015; Rudd, Vohs, & Aaker, 2012) and a perceived expansion of available time. This greater perception of available time was also linked to higher levels of life satisfaction; perhaps because this allows us to savour the present moment rather than feeling rushed to get things done (Rudd et al., 2012). On top of this, the experience of awe can help to alleviate stress and anxiety and promote positive feelings when individuals are experiencing uncertainty (Anderson, Monroy, & Keltner, 2018; Rankin, Andrews, & Sweeny, 2019). Positively valanced awe experiences have also been shown to increase meaning in life (Rivera, Vess, Hicks, & Routledge, 2019).

Research has also documented that awe can promote other positive emotions such as gratitude and optimism that have already been shown to have beneficial effects on wellbeing (Nelson-Coffey et al., 2019). Gratitude, for example, whereby people notice and are thankful for positive things in their life, has been linked to increases in happiness, life satisfaction and self-esteem (Alkozei, Smith, & Killgore, 2017; Robustelli & Whisman, 2016;

Witvliet, Richie, Root Luna, & Van Tongeren, 2018). In this way, awe may be able to have additional indirect beneficial effects on personal wellbeing.

There is also some evidence to show that the experience of awe is associated with activation of the parasympathetic branch of the autonomic nervous system (ANS) (Chirico et al., 2017)—sometimes called the "rest and digest" system as it conserves energy by decreasing heart rate. In addition, awe has been linked to reduced activation of the sympathetic branch of the ANS (Shiota, Neufeld, Yeung, Moser, & Perea, 2011). The sympathetic nervous system is responsible for the body's "fight or flight" response during stressful situations. Together, these effects mean that awe could help to moderate the effects of stress on the body (Chen & Mongrain, 2020). In line with this, research has shown that awe is associated with lower levels of proinflammatory cytokines (Stellar et al., 2015).

7.3 Awe and sustainability

The experience of awe has been positively linked to several factors related to sustainable behaviours (Zelenski & Desrochers, 2021). Induced awe experiences can lead to greater intentions to engage in resource saving behaviours such as recycling or taking shorter showers (Bethelmy & Corraliza, 2019; Yan Yang et al., 2018) as well as a greater likelihood of purchasing of "green" products (Wang, Zhang, Shi, Lu, & Song, 2019). After experiencing awe, individuals are more willing to sacrifice their own standard of living in order to protect the environment (Zhao, Zhang, Xu, Lu, & He, 2018) and donate greater amounts of money to environmental charities (Ibanez, Moureau, & Roussel, 2017).

Awe has also been shown to influence consumption behaviours. Research by Rudd et al. (2012) demonstrated that following an experience of awe, people tend to show a reduced preference for material goods. Similarly, Griskevicius, Shiota and Neufeld (2010), in their research on the influence of different positive emotions on persuasion processing, found that the effect of awe led not only to greater scepticism toward weak messages, but also decreased feelings of materialism. More generally, those individuals with a higher dispositional tendency to experience awe have also been shown to be less inclined to partake in conspicuous consumption (Hu, Yang, Jing, & Nguyen, 2018).

Given that awe is said to increase feelings of connection to groups larger than the self, it is unsurprising that experiencing awe is linked to greater feelings of connectedness to nature (Nelson-Coffey et al., 2019). Certain studies have documented that higher levels of connectedness to nature could mediate the relationship between awe and engagement in pro-environmental behaviour (Yan Yang et al., 2018). Along similar lines, Sun et

al. (2021) showed that higher levels of concern for the environment mediated the relationship between awe induced by the COVID-19 pandemic and green consumption behaviours.

8. Comparing the Different Varieties of STEs

Sections 4-7 introduced four different varieties of STE and highlighted their links to outcomes supporting sustainable wellbeing. We noted across these sections that the different varieties of STE show similarities in their neurological underpinnings. In this section, we will further explore the similarities and differences across the four varieties of STE explored in this paper. Particular attention with be paid to the relative risks presented by each variety of STE.

8.1 Similar (non-transcendent) characteristics

As different varieties of STEs, mindfulness, flow, awe, and psychedelic experiences, all have in common a self-transcendent aspect. However, there are other ways in which certain varieties are similar, beyond their self-transcendent features. For example, flow and mindfulness share some similar qualities despite the fact that they may be considered as experientially incompatible (Sheldon, Prentice, & Halusic, 2014). Reid (2011) highlights how both varieties of STEs involve a heightened sense of presence or attunement. Similarly, when Wright et al. (2006) asked an artist, a musician, and a horticulturist to keep a diary of the nature of their flow experiences over two weeks, they found that participants often noted a mindfulness-like quality of their flow experience in that there was a "tuning in" to the present moment.

Another example of where the different STEs share similarities can be found by looking at the relationship between awe and psychedelic induced STE. In his work exploring the psychological mechanisms that could potentially explain the positive outcomes of psychedelic-assisted psychotherapy, Hendricks (2018) highlighted that awe and psychedelic-occasioned STEs have many similar characteristics. For example, the Mystical Experience Questionnaire (Barrett, Johnson, & Griffiths, 2015), a widely used measure of psychedelic induced STEs, has two items that explicitly relate to awe: "Sense of awe or awesomeness" and "Experience of amazement". Similarly, Tupper (2014) also suggests that awe is a common phenomenological marker of psychedelic experiences. Hendricks presents a psychological model whereby awe (and the corresponding sense of a small self) experienced during psychedelic experiences acts as the mechanism, which supports the long-term benefits of psychedelic-assisted therapy.

8.2 Different levels of social acceptability

One important way in which the varieties of STEs differ is that psychedelic induced STEs are currently much less socially accepted when compared to the other three varieties. The recreational use of psychedelics is still mostly prohibited with often negative reputation firmly attached to its use. Indeed, some critics have even labelled psychedelic substances as "brain poison" (Vaillant, 2008: 180). Conservative critics warn that the legalisation of psychedelics could fuel a second wave of the counter-culture activity as observed in the San Francisco Bay Area and feared by some policy makers as in the mid-1960s and mid-1970s, along with irresponsible use of powerful drugs under non-controlled conditions that led to the first halt on psychedelic research in the 1970s.

While criticism can range across different areas, the potential *risks* of psychedelics are often the main concern for critics. According to Johnson et al. (2019), a number of these risks can be broadly summarised in three different categories. First, taking a sufficiently high dose of a classic psychedelic is likely to occasion states that can involve anxious, dysphoric, confusing, and, less commonly, delusional acute reactions, commonly referred to as "bad trip". The often stark experiences need careful integration into existing realities in order to reap the full benefits. Whilst more recent research conducted in controlled settings has shown to significantly reduce the risk of accidents or dangerous behaviours that are more frequently observed in uncontrolled settings (Carbonaro, Johnson, Hurwitz, & Griffiths, 2018), it may be hard to ensure that all psychedelic use remains within controlled settings should they become mainstream. Second, whereas the cause of the psychotic reaction remains unclear, a risk of aggravation of symptoms of patients with psychotic disorders has occasionally been found following treatment with psychedelics. Third, classic psychedelics have shown to trigger temporary physiological effects in the form of modest increases in blood pressure and accelerated heartrate during the more intense stages of the effects (Griffiths et al., 2006). Consequently, the use of psychedelics could potentially be dangerous for individuals with severe cardiac disease[15] (Johnson, Richards, & Griffiths, 2008).

The other three varieties of STE that we have discussed are both legal and more socially acceptable, largely because they do not carry the same risks as psychedelic substances. This is not to say that the other three varieties are without any risks at all. For example, flow, due to its intrinsically motivating nature, can become addictive. Csikszentmihalyi (1985) describes some

15 For an extensive review of classic psychedelic and comprehensive guidelines on how to minimise these see e.g. Johnson et al. (2008).

surgeons who experience flow when operating who, even on holiday, could not refrain from seeking out opportunities to partake in this flow-inducing activity. In line with this, flow has been suggested to play a role in online game (Chou & Ting, 2004; Wu et al., 2013; although note that Wan & Chiou, 2006 failed to replicate this effect using a Taiwanese sample), elite surfing (Partington, Partington, & Olivier, 2009), mobile phone, and video game (Hull, Williams, & Griffiths, 2013; Khang, Kim, & Kim, 2013) addiction. However, because mindfulness, flow and awe do not require taking a physical substance, they tend to be seen as less threatening and thus more socially acceptable than the use of psychedelics.

8.3 Common risk of commercialisation

A risk that is common across the different varieties of STE that we have discussed is that they could be adopted to support commercial (rather than sustainable wellbeing) aims. For instance, the use of classic psychedelics is deeply rooted in ancient practices of indigenous populations in ceremonial contexts in countries such as Peru and Brazil. However, recently, an interest in psychedelic micro dosing has quickly found its way into the creative industries and management, amongst others, promising to trigger creativity, deep-insights and productivity (Lant, 2017) to foster one's career. Similarly, mindfulness, which has its roots in Buddhist practices, is now being marketed as a way of increasing worker productivity or reducing absenteeism (sometimes called "McMindfulness"). These uses of mindfulness to increase profits is oxymoronic when compared to its ethical, Buddhist origins, which emphasize the use of mindfulness to foster compassion and understand the causes of collective suffering (Purser & Loy, 2013).

Similar problems arise for flow which, within the field of consumer psychology, is viewed as a means of encouraging positive brand attitudes and purchase behaviours when experienced in the retail environment (Ettis, 2017; Gao & Bai, 2014; Hsu et al., 2013). As a consequence, research has begun examining how best to design shopping environments so as to promote flow experiences (Martins, Costa, Oliveira, Gonçalves, & Branco, 2019; Sarkar & Khare, 2018). Given that virtual reality is sometimes used as a research tool to occasion awe experiences (Chirico, Yaden, Riva, & Gaggioli, 2016; Quesnel & Riecke, 2018), technological advances may also allow an easy marketization of awe-inducing technology.

The point we wish to make here is that it will be important to consider how a capitalist market economy might try to commercialise STEs along with the positive and negative consequences of this. As we can see, there is already evidence of the different varieties of STE are being used in the pursuit of

commercial aims, rather than the enhanced wellbeing and sustainable behaviours that we propose here.

8.4 Different implications for social justice

A further difference between the varieties of STEs is the implications that they would have for social justice issues, should they be taken up or implemented on a large scale. We would expect that one person's experience of mindfulness or flow would not necessarily come at the cost of another person's livelihood or own experiences. With regards to psychedelics, this might be different. If their popularity were to continue to grow further, their large-scale use could have potentially negative effects on those indigenous populations for whom psychedelics play a religious and/or spiritual role. Firstly, mainstream use of psychedelics—especially Ayahuasca—in Western societies may be unsustainable and risk depleting resources of sacred plant medicines for those indigenous groups for whom the plant is considered sacred (Pollan, 2021). Secondly, indigenous tribes are subject to capitalist dynamics and fear an appropriation of their both knowledge and territory. Further, given that Ayahuasca natively grows in jungle regions of the South American Amazon, distribution of the psychedelic also implies significant environmental impacts through required transport from often remote places.

Indeed, capitalist market dynamics show the first warning signs. As psychedelics have found open ears and eager interest from entrepreneurs and venture capitalists[16], this has led to practices such as Ayahuasca tourism. Here, single retreats can easily exceed the cost of £2000. Commodification of the Ayahuasca experience led prices for the vine to more than triple over the last years[17] and turned former villages such as Iquitos in Peru into busy tourist hubs. Whilst some may argue that such practices are making Ayahuasca more accessible to people across the world, there is also a case to be made that the high costs involved limit the accessibility of psychedelics to people from all socioeconomic backgrounds.

With awe, too, we may hypothesize that there are potential problems surrounding fairness. Given that awe is often experienced in the face of natural beauty (Chirico & Yaden, 2018; Shiota, Keltner, & Mossman, 2007; van Elk, Karinen, Specker, Stamkou, & Baas, 2016), it may be that those individuals who can afford to travel to global sites such as Machu Picchu, Niagara Falls or the Colosseum are better able to have these experiences. Increased tourism to beautiful locations also risks depleting the very resources that make them beautiful in the first place and reducing the

16 https://pharmaphorum.com/news/vc-fund-dedicated-to-psychedelic-meds-launches-in-uk/
17 https://www.theguardian.com/sustainable-business/2017/jan/24/tourist-boom-peru-ayahuasca-drink-amazon-spirituality-healing

quality of life for locals. For example, the marine environment surrounding the Phi Phi islands in Thailand has been harmed by pollution from motorboats and litter[18]. Increased tourism to Mount Everest has also led to huge amounts of waste being left on the mountain which risks contaminating water supplies in local villages [19].

What these issues highlight is that the pursuit of STEs cannot be a selfish one. Instead, a *healthy* transcendence that is grounded in the "harmonious integration of one's whole self on the service of cultivating the good society", as argued by Scott Barry Kaufman (2020: 218), demands a considerate, sustainable approach that will enable sustainable wellbeing for the many. It will be important to determine how best to encourage the different varieties of STE such that one person's sustainable wellbeing is not put above that of another.

9. Discussion and Conclusions

In this paper, we aimed to explore the promise of Self-Transcendent Experiences (STEs) for the achievement of sustainable wellbeing. In this final section, we will reflect on some of the lessons learnt thus far, consider points relevant for how we can practically begin to use STEs to promote sustainable wellbeing and begin to set out our future research agenda surrounding the ideas presented.

9.1 STEs as a tool for reaching sustainable wellbeing

We started our exploration by arguing that modernity's materialism is not only pushing our natural life-support system beyond its limits (Steffen, Richardson, et al., 2015) but also that the processes driving unsustainable consumption such as greed and longing for reputation and status are detrimental to our psychological and social wellbeing. Given these problems, we then highlighted the need to find ways of achieving sustainable wellbeing, whereby people experience high levels of human wellbeing alongside care for the environment and engagement in sustainable behaviours. Our aim in this paper has been to explore how STEs might be able to act as a means of achieving sustainable wellbeing.

Four different varieties of STEs have been examined. Namely, psychedelic experiences, mindfulness, flow, and awe. Psychedelic experiences are facilitated by ingestion of substances such as LSD, psilocybin and Ayahuasca and can involve intense feelings of connectedness and ego-dissolution.

18 https://www.bbc.co.uk/news/science-environment-36313139
19 https://www.nationalgeographic.com/science/article/partner-content-bally-cleaning-up-everest

When practicing mindfulness individuals purposefully try to regulate their attention such that they objectively observe their mental states and outside events. Mindfulness is often supported by meditation techniques and can theoretically be practiced anywhere. When in a state of flow individuals are completely absorbed in an activity—often to the extent that they lose track of time and their everyday affordances. Flow is most often experienced in activities such as sports, arts and crafts, and when socialising with friends. During moments of awe individuals experience of sense of a "small self" as they are faced with a larger, vast, or overwhelming stimulus. Awe can be facilitated through exposure to nature, art, or music, amongst others. In each case, we outlined the evidence base for how the specific variety of STE have been linked to increases in wellbeing and positive effects on sustainability related variables. Further, we have highlighted how the four different types of STEs have some common neurological features: (a) decreased activation and functional connectivity within the default mode network and, (b) increased dynamic activity and functional connectivity across brain networks.

All four varieties of STE show strong empirical links to higher levels of personal wellbeing. In addition, all four varieties of STE display positive links to sustainability, although, at present, the more specific pathways appear to differ slightly across the approaches. For example, the experience of awe has been shown to facilitate stronger feelings of connectedness to nature, which can promote engagement in pro-environmental behaviours in a similar way to psychedelic experiences. However, mindfulness appears to support sustainability through the promotion of greater empathy, compassion and self-control leading to a heightened engagement in more altruistic and pro-environmental behaviours. With flow, the links to sustainability, at present, come from the findings that the flow experience itself is more likely to occur in less environmentally costly activities. Given that research in these areas is still emerging, it is too soon for us to conclude that the different STEs support sustainability in completely distinct ways. Further research is needed to test, for example, how flow and mindfulness might support nature connectedness, and how awe experiences may be more or less likely to occur in contexts with significant material impacts.

Following the introduction and discussion of the four types of different STEs, Section 8 was devoted to considering the similarities and differences across them. Here, we saw that the different STEs do have some similar characteristics beyond their self-transcendent aspect and are susceptible to being adopted to promote commercial aims. They, however, present different levels of risk and social acceptability. Psychedelic STEs, in particular, are not currently socially acceptable and are considered to present many risks such as those of bad trips, aggravation of psychotic

symptoms, and a depletion of sacred plant medicines for indigenous groups. Accordingly, although there are some suggestions that psychedelic therapy may become mainstream and psychedelics should be legalised[20], given these potential risks and problems, we would suggest that the three alternative varieties of STE (mindfulness, flow, and awe) currently represent less controversial routes towards sustainable wellbeing.

Overall, our exploration suggests that STEs have the potential to prompt changes in our relationship with ourselves and the natural world. STEs help us to find meaning in our lives and become more satisfied with what we have. We can also move from viewing ourselves as distinct individuals who, seemingly, need to dominate nature to communities of people who are connected to nature and act in ways that help to conserve it. Whilst some varieties of STEs (i.e. psychedelics) will require access to certain substances, others can theoretically be achieved in the conventional everyday if we can take the time and make the effort to engage with our activities and environments in meaningful ways.

9.2 Longevity of effects

In this paper, we have been interested in how STEs can prompt beneficial changes in wellbeing and sustainable attitudes/behaviours. The longevity of these changes is an important factors to consider as it has practical implications for how often STEs need to occur to achieve sustained increases in sustainable wellbeing. Whilst these states may only last several minutes or hours, evidence hints at potentially long-lasting effects. For example, we saw that many studies reported improvements in wellbeing and nature connectedness that lasted months to even years after the psychedelic experience itself (Kettner et al., 2019; Schmid & Liechti, 2018). Moreover, psychedelic experiences were also suggested to prompt changes in personality *traits* such as openness (Barbosa et al., 2016; Carhart-Harris et al., 2016; Nour et al., 2017), which are considered to be relatively stable over time.

Similarly research on meditation has generated some promising findings showing that the state-level neurological effects of mindful STEs can result in longer-term, trait changes in neurological functioning (Cahn & Polich, 2006; Millière et al., 2018). For example, experienced meditators have been shown to display reduced resting state DMN activity (Bauer et al., 2019; Brewer et al., 2011; Hasenkamp & Barsalou, 2012) along with increased resting state functional connectivity between the DMN and other brain areas such as the auditory/salience network (Kilpatrick et al., 2011). These findings suggest that the practice of mindfulness and associated meditation

20 For a recent debate please see https://www.intelligencesquaredus.org/debates/legalize-psychedelics

practices can prompt trait-level changes in brain functioning which we could speculate to represent a new way of viewing/interacting with the world over the long term. The evidence surrounding the longevity of the effects of awe and flow on wellbeing and sustainable variables is less developed and we would suggest that this is a fruitful area for future work.

When discussing the longevity of the changes induced by STEs it may be useful to mention the overlap with what has been dubbed "quantum change." William Miller (2004) describes quantum change as sudden yet profoundly meaningful experiences that can trigger personal transformations with far-reaching implications for personal emotions, cognitions, and behaviours. The phenomenon of quantum change is, as indicated by its very name, characterised by abrupt, often intense changes and differs when compared to conventional behavioural change, which usually occurs through incremental processes (Elf, Isham, & Gatersleben, 2020). Quantum change rarely occurs in natural settings, making it difficult to study and apply in intervention studies. Future research could explore the phenomenological similarities and if psychedelic STEs can facilitate sustainable wellbeing via quantum change. Further work into the longevity of the changes induced by the other varieties of STEs and how suddenly these occur could provide insights into how these other types of STEs could also operate as facilitators of quantum change.

9.3 Could the different STEs support each other?

In this paper, we have largely considered the effects of each of the four varieties of STE separately. However, in recent years, a (still limited) number of studies have started to explore how the positive effects of each STE may be amplified by combining approaches. Here, we will provide three examples for how the different STEs may be able to work together to produce greater beneficial effects on sustainable wellbeing.

The first way in which the different STEs could work together is by using mindfulness to increase individuals' likelihood of experiencing flow. It has also been documented that individuals who are more mindful tend to experience flow more frequently (Thienot et al., 2014). In sports settings, in particular, the training of mindfulness has been shown to increase athletes propensity to experience flow (Aherne et al., 2011; Kaufman et al., 2009). It has been suggested that the extent to which people are mindful is positively related to their tendency to experience flow because both experiences are supported by the ability to self-regulate attention and be cognitively flexible (Moore, 2013).

Similarly, psychedelics seem to increase people's propensity to experience awe via a promotion of the personality trait of openness (Barbosa et al.,

2016; Carhart-Harris et al., 2016; Nour et al., 2017). That is, individuals with high levels of openness have shown to be more likely to experience awe (Nusbaum & Silvia, 2010; Stellar et al., 2015) whilst those high in need for cognitive closure (a desire to avoid ambiguity) are less awe-prone (Pilgrim et al., 2017; Shiota et al., 2007). In addition, a recent study looking at the effects of psilocybin micro dosing found that volunteers who had self-administered a psilocybin micro dose for three weeks showed significantly greater awe reactions to positive and neutral valence videos than a placebo group (van Elk et al., 2021).

As a final example, it has been suggested that combining psychedelic and mindfulness interventions could lead to greater beneficial effects on mental health and wellbeing (Payne, Chambers, & Liknaitzky, 2021). Smigielski et al. (2019) found that administering psilocybin to practitioners during a mindfulness meditation retreat led to increased meditation depth and more profound, positive experiences of ego-dissolution. At 4-month follow-up, meditators who had also taken psilocybin at the retreat reported significantly greater appreciation of life, self-acceptance, quest for meaning and sense of purpose than the placebo group. Similarly, Griffiths et al. (2018) reported that administering psilocybin to healthy participants alongside supported spiritual practice (which included aspects of mindfulness meditation) led to greater improvements in their mood, positive attitudes towards self and life, as well as prosocial attitudes and behaviours in comparison to a group who received psilocybin without the additional supported spiritual practice at 6-months follow-up.

The point we wish to make here is that the different varieties of STEs do not have to be pursued in an either/or fashion. Rather, they appear to be able to operate in a largely complementary manner. Future work should continue to pursue how to best combine different varieties of STEs in order to reap the largest beneficial effects for sustainable wellbeing.

9.4 Are certain people more prone to STE? Consideration of antecedents

If we are to accept the proposal that STEs offer a valuable route towards achieving sustainable wellbeing, a subsequent question might be how can we promote engagement in STEs to individuals? It is rather unlikely that everyone can suddenly start to experience STEs without any change in our current mindsets or lifestyles. We will have to engage in a process of cultivation. This is in line with the eudemonic perspective, which considers wellbeing not as a state, but a *process* one engages in. This cultivation should not be a deterrent to us, as highlighted by Maslow: “An unearned paradise becomes worthless” (Maslow 1966 quoted in Grogan 2013, p. 179). Instead, it should become an inspiring prospect towards sustainable wellbeing.

One approach we can take here is to consider the psychological antecedents to STEs. That is, the individual characteristics that can support engagement in STEs. Within CUSP, we have conducted extensive work into the antecedents of the flow variety of STEs. Through this work we have documented that people with strong materialistic values are less likely to experience flow (Isham, Gatersleben, & Jackson, 2021a) and that having higher levels of self-regulatory strength can make people more likely to experience flow (Isham, Gatersleben, & Jackson, 2021b). Self-regulatory strength refers to a person's ability to alter their own thoughts, feelings, and behaviours to be in line with certain goals or expectations. By reducing the strength of materialistic values, or increasing self-regulatory strength, we may therefore be able to encourage STEs through flow.

Some other individual characteristics that could support engagement in other varieties of STE include trait absorption. Trait absorption describes the individual disposition to pay total attention to and be completely immersed in their mental activities (Tellegen & Atkinson, 1974). Millière et al. (2018) highlighted that trait absorption could predict the occurrence of STE in both meditation and under psychedelics (Russ & Elliott, 2017; Studerus, Gamma, Kometer, & Vollenweider, 2012). Other research has documented that trait absorption could predict awe experiences (van Elk et al., 2016). We may hypothesise that trait absorption would also be a positive predictor of individual's tendency to experience flow. If we know that trait absorption encourages STEs, then we can plan to locate those individuals currently low on the respective trait and devise targeted interventions to alter their disposition to become absorbed. Other personal factors that could act as antecedents to STEs include curiosity (Baumann, 2012), openness (Nusbaum & Silvia, 2010), and, arguably, *courage* to actively engage in change.

9.5 Setting our future research agenda

Rami Gabriel recently argued in an Aeon article[21] that "Mythology was traditionally the expression of an enchanted world, and now psychology is an attempt to fill the disenchanted space with a rich characterisation of interiority." The same is possible to say about research on experiences under the umbrella of STEs. However, our work in this paper does not directly attempt to contribute to this development but, instead, focuses on the outcomes and its potential. Indeed, the work reviewed in this paper highlights the great potential for STEs to help the transition towards sustainable wellbeing. Yet, we also notice that there are a number of areas where future work needs to be conducted to strengthen and help clarify the existing evidence base. Below we set out 5 key themes that we consider important to explore in future research.

21 https://aeon.co/essays/how-psychology-fills-the-gap-from-the-disenchantment-of-the-world

a) Exploring how STEs support pro-environmental values and behaviours.

For the psychedelic, awe, and mindfulness varieties of STEs there is already some evidence showing that the STEs are associated with subsequently stronger pro-environmental values and behaviours. With flow, however, the evidence links with sustainability are currently provided only through the finding that flow is more likely to occur during activities with low environmental costs. Further empirical research is needed to examine how engagement in flow STEs can lead to (or not) increases in the experiencers pro-environmental attitudes and behaviours. At CUSP, we are currently conducting research into how the experience of flow may be able to promote pro-environmental values over time.

b) Examining the longevity of increases in wellbeing and sustainable attitudes from awe and flow varieties of STE.

For the psychedelic and mindfulness varieties of STEs, we previously noted how the evidence base suggests that engagement in these types of STEs can lead to longer-lasting changes in how individuals interact with the world. However, to date, less work has been conducted to examine how a single experience of awe or flow can alter wellbeing and sustainability-related variables over time. This is important to determine and has implications for the design of interventions to encourage sustainable wellbeing through STE. Is just one STE sufficient for lasting changes in sustainable wellbeing? Or, do we need to ensure that individuals can have these STEs on a somewhat regular basis in order to maintain positive changes in sustainable wellbeing? Can STEs strengthen commitment to pro-social and pro-environmental actions and help support attitude and/or value-action gaps?

c) Further exploring the neurological correlates of STEs.

We have highlighted how STEs tend to have certain neurological correlates some of which, for example the reduction in activation and functional connectivity within the default mode network, are common across the different varieties of STEs discussed in this paper. Yet, there is still much to learn about the neuroscience of STEs. There might be other brain areas involved in facilitating different varieties of STEs that have not yet been fully explored. For example, the experience of awe has been negatively correlated with regional grey matter volume in the insula (Guan et al., 2019); a brain area implicated in interoception and the experience of bodily self-awareness (Zaki, Davis, & Ochsner, 2012). One might wonder if this neurological feature is also present during psychedelic experiences, mindfulness and flow.

Another specific area for further testing is whether flow states include an increase in dynamic brain activity and functional connectivity across different brain areas. Existing findings from research on psychedelics, awe and

mindfulness already indicate that there is an increase in functional connectivity across brain areas, but for flow this has yet to be explored. This will be important to assess, especially given that it has been speculated that increases in global functional connectivity could be the neural correlate of feelings of connectedness (Carhart-Harris et al., 2018).

The work of Colombia psychologist Lisa Miller on religion and spirituality (Miller et al., 2012) may also offer some clues to understand other brain areas' role in facilitating STEs. According to Miller (2021: 161), during a spiritual experience, hard, fixed boundaries soften, a feeling of separateness is weakened, and we tend to "embrace sensations of transcendence and union", thus sharing significant similarities with STEs' effects explored in this paper. Recent research from her lab has found that during a spiritual experience greater activation in the ventral attention network and the frontotemporal network can be observed as well as reduced activation in the inferior parietal lobe, where we navigate perceived distinctions between self and others (McClintock et al., 2019). Such brain areas may also have relevance for the different varieties of STE that we have explored in this paper and could be explored in future work.

d) STEs and value change.

We have seen that the different varieties can lead to changes in wellbeing, attitudes and sometimes even personality traits. One area that is currently underexplored, yet highly relevant for the achievement of sustainable wellbeing in our point of view is how STEs may be able to influence the strength of individual values. The strength of different values can influence individuals' willingness to engage in different pro-environmental actions as well as individual wellbeing. For example, strong materialistic values are linked to lower levels of individual wellbeing and a lesser tendency to engage in sustainable behaviours (Dittmar et al., 2014; Hurst et al., 2013). Future research exploring how the different varieties of STEs can, or cannot, lead to changes in the strength of different individual values would therefore be useful and further advance the field.

9.6 Final remarks

Oscar Wilde famously remarked that "In this world there are only two tragedies. One is not getting what one wants, and the other is getting it". Evidence now clearly documents that our current lifestyles in developed, Western nations are deeply unsustainable and unrewarding. At the same time, the notion that changing our underlying motives and behaviours is difficult is nothing new. William James argued that many (perhaps most!) of our behaviours are influenced by automatic or habitual processes, providing the "enormous flywheel of society, its most precious conservative agent" (James, 1890: 243).

But with ever growing pressure on the environment and accelerating societal problems (Eyring et al., 2021), we urgently need to find ways of transforming our mindsets and changing our behaviours that are aligned with environmental and social limits if we are to achieve sustainable wellbeing and allow humans to flourish within ecological limits.

We aimed to explore the potential of self-transcendent experiences (STEs) to support that transformation. During STEs, an individual experiences a reduced salience of the individual self, alongside enhanced feelings of connection to other non-self groups or objects. Our review of the academic literature suggests that experiencing self-transcendent states through the careful administration of psychedelics, practicing mindfulness and meditation, and experiencing moments of flow and awe might hold the potential to unlock a deeper understanding of human beings that goes beyond our material existence and connects us with others and nature. Moreover, STEs show potential to induce changes in brain activity and to alter previously deep-rooted habits and beliefs (Miller, 2004). Whereas future research will need to further empirically examine STEs' potential to drive sustainable wellbeing, the current evidence base provides promising findings.

Practically implementing STEs as a means of achieving sustainable wellbeing will present further challenges to overcome. Reconnecting with our underlying values and emotions, rather than seeking superficial comfort through material goods, means opening oneself up to potential uncomfortable states (Kellert & Wilson, 1993). As Maslow (1971: 275) pointed out, "transcenders" experience both greater ecstasy and happiness but also greater sadness. That is not to say that we should shy away from experiencing more fully. In fact, we must become more open to live more fully instead. In the words of Jackson (2021), "[b]y shunning pain, avoiding distress, denying suffering, it seems, we are destroying our own capacity to achieve one of the most fulfilling states of human existence. By being prepared to face the darkness, on the other hand, we free our minds to experience our highest potential."

In other words, if we can embark on safe ways of achieving STEs and implement the necessary structures within our lives and societies to support them, then, one might speculate, we can achieve a new way of life that protects both people and planet, something we have referred to as sustainable wellbeing in this paper. Our exploration of the risks and rewards of the different varieties of STE suggests that mindfulness, flow, and awe are relatively safe means of supporting the STEs that can potentially foster sustainable wellbeing, whilst psychedelic-induced states are arguably more potent but riskier means of achieving similar results.

The psychiatrist Stanislav Grof (2019: 174) argues that the crisis we are currently facing reflects the level of conscious evolution of the human species.

To resolve such crisis, or at least alleviate it, will require a radical inner transformation of humanity. As postulated by Austrian-born American systems theorist and deep-ecologist Fritjof Capra "the emergence of novelty often only occurs in critical moments of instability that can potentially result in a new state of order" (Capra, 2020)[22]. Based on the research reviewed in this paper, STEs could contribute to this radical inner transformation and result in a new state of order that supports the sustainable wellbeing that is desperately needed.

22 min 24.30: https://vimeo.com/464353112

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