An Exploration into ‘noctcaelador’ in Young People of Generation Z

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Abstract

This research will qualitatively explore the nuanced ways in which Generation Z (those born between 1995 and 2012) maintains its connection to the night sky amid the challenges and opportunities posed by modern technological and environmental contexts. The findings will contribute to the broader academic discourse of cultural astronomy, building on the work of psychologist William E. Kelly who coined the term 'noctcaelador' (psychological attachment to the night sky), offering insights into how contemporary factors shape the night sky's significance for young people today. Through the surveys of 29 Gen Z respondents and four interviews, this research found that stargazing experiences during childhood helped inspire astronomical interest, and that familiarity with common celestial features helped form attachment over time. By stargazing, Gen Z participants noted feeling connected to ancestors, nature, God and the universe. Some participants shared particularly transcendent and spiritual night sky experiences which inspired feelings of uniqueness and smallness, as well as perceived changes in perspective such as feeling part of something bigger. These types of encounters with the sky were noted as profound benefits of stargazing. Additional benefits captured included using the sky as a therapeutic tool, such as means of coping with stress. Moreover, curiosity was found to be a significant driver, with media products (such as science-fiction movies), social media and apps playing significant roles in Gen Z's astronomical interests. Participants also expressed significant concerns about light pollution, voicing fears that excessive artificial lighting could lead to a diminished appreciation of the sky. Nonetheless, there was a sense of optimism that advances in astronomical research and space technology will empower future generations to reconnect with the night sky.

Introduction

The aim of this research was to consider the relationship between Generation Z and the night sky in a contemporary context, building on the foundational work of William E. Kelly who conceptualised the psychological and emotional attachment to the night sky as 'noctcaelador'.[1] Kelly's quantitative research on this phenomenon has explored how individuals form and maintain this cosmic connection, examining various factors that may influence people's astronomical interests, such as the role of curiosity in driving night sky watching behaviours.[2] My research similarly investigated the ways in which individuals of Gen Z, defined by Jean Twenge as those born between 1995 and 2012, actively seek and cultivate a connection to the night sky, as well as the underlying motivations for this pursuit.[3] As the first generation to grow up with digital technology from a young age, Gen Z has been uniquely exposed to an array of unprecedented cultural and environmental changes over the past few decades. These changes include escalating concerns about climate change, an increasing reliance on social media and online living, and significant advancements in scientific knowledge and technology that have revealed the universe in greater detail than ever before. These factors collectively shape how Gen Z engages with and perceives the night sky in the modern age, providing a unique opportunity to observe the interplay between technological advancement, environmental change, and human experience in young people today.

The allure of the night sky has captivated humanity throughout history.[4] As cultural astronomer Nicholas Campion has noted its essential role in shaping the understanding and appreciation of cultures past and present.[5] This fascination often weaves into religious and

[1] William E. Kelly, 'Night-Sky Watching Attitudes Among College Students: A Preliminary Investigation', *College Student Journal*, 37 (2003), 194–196 (p. 196).
[2] William E. Kelly and Don Daughtry, 'The Case of Curiosity and the Night Sky: Relationship Between Noctcaelador and Three Forms of Curiosity', *Education (Chula Vista)*, 137.2 (2016), 204–208 (p. 206).
[3] Jean M. Twenge, *iGen: Why Today's Super-Connected Kids Are Growing Up Less Rebellious, More Tolerant, Less Happy – and Completely Unprepared for Adulthood* (New York: Atria Paperback, 2018), pp. 2, 6.
[4] Tyler Nordgren, 'At Night's End', in *The Imagined Sky: Cultural Perspectives*, ed. by Darrelyn Gunzburg (Sheffield: Equinox Publishing Ltd, 2016), pp. 191–214 (pp. 211–212).
[5] Nicholas Campion, 'Preface: Wellbeing and Dark Skies', in *Sark in the Dark: Wellbeing and Community on the Dark Sky Island of Sark*, ed. Ada Blair (Ceredigion: Sophia Centre Press, 2016), pp. xvii–xxvii (pp. xx–xxi).

spiritual contexts, wherein the sacred essence of the sky is manifested through the symbolic relationships between celestial phenomena and people's spiritual beliefs and mythologies.[6] Renowned psychologist Carl Jung has proposed that celestial imagery can reflect the unconscious mind's exploration of the self.[7] This intersection of human psychology and astronomy reveals that the night sky is not just a physical wonder but also a source of deep introspection. Inspiring encounters with the night sky can evoke deep emotional responses, forging a connection between the stargazer and the ancient people who once marvelled at the same sky.[8] This connection can enrich personal and cultural identity, providing individuals a sense of continuity and belonging throughout time. Stuart Clark has explored how modern astronomical interests align with ancient myths, illustrating how ancient stories and cosmic narratives continue to inform and enrich understanding of the universe.[9] Collectively, these perspectives highlight the multifaceted relationship humanity has with the night sky, blending scientific inquiry with cultural, psychological, and spiritual dimensions. By examining the various ways in which Gen Z engages with and perceives the night sky, this study aims to provide valuable insights into the enduring cultural significance of the sky, considering the unique challenges and opportunities faced by young people in the digital age.

Growing up amid increasing digitisation and urbanisation has enveloped young people in a near-constant glow of artificial lighting. It is currently estimated that over 80% of the global population now live under light-polluted skies, causing detrimental effects on ecosystems and human health, as well as contributing to excessive energy wastage, carbon emissions, and economic costs.[10] This surge in light pollution has severely limited young

[6] Mircea Eliade, *Patterns in Comparative Religion*, trans. by Rosemary Sheed (Lincoln and London: University of Nebraska Press, 1996), p. 109.
[7] Sigmund Freud and Carl Jung, *The Freud/Jung Letters: The Correspondence between Sigmund Freud and C.G. Jung*, ed. by William McGuire, trans. by Ralph Manheim and R.F.C. Hull (New Jersey: Princeton University Press, 1974), p. 421.
[8] Oliver Dunnett, 'Contested Landscapes: The Moral Geographies of Light Pollution in Britain', *Cultural Geographies*, 22.4 (2015), 619–636 (p. 625).
[9] Stuart Clark, *Beneath the Night: How the Stars Have Shaped the History of Humankind* (London: Guardian Faber, 2021), p. 251.
[10] Hector Linares Arroyo and others, 'Monitoring, Trends and Impacts of Light Pollution', *Nature Reviews Earth & Environment*, 5.6 (2024), 417–430 (p. 417).; Ron Chepesiuk, 'Missing the Dark: Health Effects of Light Pollution', *Environmental Health Perspectives*, 117.1 (2009), A20–A27 (p. A24).; Adrian West, *The Secret World*

people's ability to experience dark skies, erecting a visual barrier to the wonders of the night. This could mean that current and future generations born under light-polluted skies may never truly understand what they are missing.[11] This resulting form of disconnection from the natural environment can hinder efforts to combat environmental issues, as the emotional bond with the natural world slowly diminishes over time leading to a collective forgetting of what the environment would look like without human interference.[12]

Eco-psychology, which explores the relationship between human beings and the natural world, suggests that this disconnection from the night sky can have profound psychological implications.[13] The night sky is an integral part of the environment, as Campion has stressed, offering not only aesthetic beauty but also opportunities for reflection, inspiration, and a sense of belonging within the cosmos.[14] Tim Ingold's work on phenomenology emphasises the importance of direct and immersive experiences with the night sky helping to foster attachment and meaning, contributing to positive effects on mental health and well-being.[15] Through the perspectives of Campion and Ingold, the sky can be conceptualised as a fundamental part of the natural world. However, until recently, references to the landscape often omitted the sky and its celestial bodies as part of the environment, a notion challenged by these scholars.[16] Furthermore, Dacher Keltner posits that awe-inspiring experiences with nature and the sky are essential to the health and well-being of society.[17] Unfortunately, as dark skies become rarer due to light pollution, young people risk missing out on essential opportunities for emotional and psychological development through these experiences with the natural world. Therefore, this research

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of Stargazing: Find Solace in the Stars (London: Yellow Kite, 2021), pp. 18–19.; Mark E. Bailey, 'Dark Skies for All', *Astronomy & Geophysics: the Journal of the Royal Astronomical Society*, 47.6 (2006), 6.35–6.36 (p. 6.35).

[11] Anna Levin, *Incandescent: We Need to Talk About Light* (Salford: Saraband, 2019), p. 135.

[12] Peter Kahn and Thea Weiss, 'The Importance of Children Interacting with Big Nature', *Children, Youth and Environments*, 27.2 (2017), 7–24 (p. 8).

[13] Ada Blair, *Sark in the Dark: Wellbeing and Community on the Dark Sky Island of Sark* (Ceredigion: Sophia Centre Press, 2016), p. 6.

[14] Campion, 'Preface', pp. xx–xxii.

[15] Tim Ingold, 'Earth, Sky, Wind, and Weather', *The Journal of the Royal Anthropological Institute*, 13.S1 (2007), S19–S38 (p. S25).

[16] Blair, *Sark*, p. 33.

[17] Dacher Keltner and Jonathan Haidt, 'Approaching Awe, a Moral, Spiritual, and Aesthetic Emotion', *Cognition and Emotion*, 17.2 (2003), 297–314 (p. 303).; Paul Piff and Dacher Keltner, 'Why Do We Experience Awe?', *The New York Times*, 22 May 2015. <https://www.nytimes.com/2015/05/24/opinion/sunday/why-do-we-experience-awe.html> [accessed 20 November 2024].

seeks to examine the detrimental effects of light pollution on Gen Z, while also highlighting the advantages that come with access to darker skies.

This dissertation utilised a qualitative approach, drawing on surveys from 29 Gen Z respondents and four semi-informal interviews with select participants. Qualitative research was chosen for this study because it allows for a deeper understanding of participants' lived experiences, capturing their perspectives, opinions, and feelings in their own words.[18] This approach is particularly suited to my research objectives, as it facilitates a comprehensive exploration of the personal and emotional connections that Gen Z individuals have with the night sky. Overall, the study captures phenomenological accounts of stargazing experiences, as well as participants' opinions, beliefs, and emotional responses to the topics of the night sky and astronomy. Employing Kelly's Noctcaelador Inventory statements and open-ended questions, my research delved into the various factors that contribute to Gen Z's noctcaelador, including childhood experiences, cultural and societal influences such as the impact of social media and apps, the perceived benefits of stargazing, and the potential impacts of light pollution. By investigating these factors and others, this dissertation provides insights into the multifaceted relationship between Gen Z and the night sky, offering valuable contributions to the academic discourse on noctcaelador and its significance in contemporary society.

Literature Review

Noctcaelador: Humanity's Connection to the Night Sky

From comets to constellations, humanity has always been irresistibly drawn to the night sky. As Tyler Nordgren has emphasised, for thousands of years people have used the firmament of stars above their heads as an ever-enduring canvas on which they have depicted gods, myths and legends, told tales of adventure and morality, found direction and inspiration, sought beauty and wonder, and reflected on the meaning of existence.[19]

[18] Monique Hennink, Inge Hutter and Ajay Bailey, *Qualitative Research Methods,* 2nd edn. (London: SAGE Publications Ltd, 2020), p. 17.
[19] Nordgren, 'Night's End', pp. 211–212.

Nicholas Campion argued that the night sky has long been a place where human beings have projected their deepest hopes and fears, and cultures and societies the world over have shared in this reverence dating back for as long as records began.[20] The cosmic myths known today, told through celestial phenomena like the constellations, are not just stories, as author Jo Marchant stated, but 'cultural memories'.[21] Some of the mythos may even have their origins in our Palaeolithic past.[22] Historian Julien D'Huy has called these star myths a 'glimpse into the mental universe of our ancestors'.[23] Meanwhile Bernadette Brady has argued that the night sky and its images constitute a 'culture of humanity', a resilient culture that has manifested from a 'blend of humanity with the fixedness of the sky'.[24] The longstanding relationship between people and the night sky highlights the enduring impact of the stars on the cultural and spiritual development of mankind.

In the eighteenth century Immanuel Kant called the night sky 'the noblest spectacle that was ever placed before the human senses'.[25] The sky has the unique ability to make people confront their own mortality and contemplate their place within the context of the wider universe.[26] David Henderson and William Fox respectively argued that the night sky imparts a sense of scale, evoking feelings of being a 'mere speck in the universe' as Kant described.[27] Terrel Gallaway, Freya Mathews and Rebecca Fox have noted that encounters with the night sky and nature can induce transcendental and spiritual experiences.[28] This

[20] Nicholas Campion, *Astrology and Cosmology in the World's Religions* (New York: New York University Press, 2012), p. 1.
[21] Jo Marchant, *The Human Cosmos: A Secret History of the Stars* (Edinburgh: Canongate Books, 2021), p. 15.
[22] Campion, *Ast and Cosm*, p. 44.
[23] Julien D'Huy, *Scientists Trace Society's Myths to Primordial Origins* (2016) <https://www.scientificamerican.com/article/scientists-trace-society-rsquo-s-myths-to-primordial-origins/> [accessed 17 August 2024].
[24] Bernadette Brady, 'Images in the Heavens: A Cultural Landscape' in *The Imagined Sky: Cultural Perspectives*, ed. by Darrelyn Gunzburg (Sheffield: Equinox Publishing Ltd, 2016), pp. 324–358 (pp. 234, 236).
[25] Immanuel Kant and Lewis White Beck, *Critique of Practical Reason* (New York: Liberal Arts Press, 1956), pp. 166−167.
[26] Johan Eklöf, *The Darkness Manifesto: How Light Pollution Threatens the Ancient Rhythms of Life*, trans. by Elizabeth DeNoma (Amsterdam: Sebes Bisseling Literary Agency, 2022), p. 177.
[27] David Henderson, 'Valuing the Stars: On the Economics of Light Pollution', *Environmental Philosophy*, 7.1 (2010), 17–26 (p. 22).; William Fox, cited in Paul Bogard, *The End of Night: Searching for Natural Darkness in an Age of Artificial Light* (London: Fourth Estate, 2013), pp. 257–259.; Kant and Beck, *Critique*, p. 166.
[28] Terrel Gallaway, 'On Light Pollution, Passive Pleasures, and the Instrumental Value of Beauty', *Journal of Economic Issues*, 44.1 (2010), 71–88 (p. 76).; Freya Mathews, *The Ecological Self* (London: Routledge, 1991), pp. 149–151.; Rebecca Fox, 'Enhancing Spiritual Experience in Adventure Programs', in *Adventure*

perspective is supported by Mircea Eliade, who argued that the immense scale and grandeur of the sky drive transcendent experiences and inspire mythology.[29] Additionally, Oliver Dunnett added that awe-inspiring experiences of the night sky can lead to connections with ancient cultures and landscapes, providing a bridge to the ancestral past.[30] It has thus been suggested that present-day appreciation of the night sky can help one achieve a deeper understanding of history, reflecting a shared cultural human legacy.[31]

More recent studies have been conducted to explore this connection on a more psychological level to better understand what drives night sky watching behaviours today. Psychologist William E. Kelly coined the term 'noctcaelador' meaning the psychological or emotional attachment to, or adoration of, the night sky.[32] Kelly's work on this phenomenon has spanned over two decades, developing the Noctcaelador Inventory in 2004 to measure attachment, mood, emotional responses, behaviours and general interests in the night sky.[33] His initial study of 150 participants saw a positive correlation between noctcaelador and night sky watching behaviours and attitudes, suggesting that increased appreciation of the sky may correspond to a more intense attachment to it. Psychologist Robert Zajonc similarly observed that repeated stargazing can foster attachment though exposure and familiarity.[34] In a subsequent 2016 paper, Kelly and Don Daughtry explored the relationship between curiosity and noctcaelador, finding that night sky watchers tend to be more curious in personality.[35] Here, curiosity can be understood as a desire for new experience or knowledge, particularly aroused by ambiguous visual stimuli such as the sky.[36] This fascination can also encompass the search for alien life and UFOs (unidentified flying

Programming, ed. by J. C. Miles and S. Priest (State College, PA: Venture Publishing, 1999), pp. 455–461 (p. 455).

[29] Eliade, *Patterns*, p. 109.

[30] Dunnett, 'Contested Landscapes', p. 625.

[31] Joe Sovick, 'Toward an Appreciation of the Dark Night Sky', *The George Wright Forum*, 18.4 (2001), 15–19 (p. 15).

[32] Kelly, 'Attitudes', p. 196.

[33] William E. Kelly, 'Development of an Instrument to Measure Noctcaelador: Psychological Attachment to the Night-Sky', *College Student Journal*, 38.1 (2004), 100–102 (p. 100).

[34] Robert B. Zajonc, 'Mere Exposure: A Gateway to the Subliminal', *Current Directions in Psychological Science: A Journal of the American Psychological Society*, 10.6 (2001), 224–228 (pp. 224–225).

[35] Kelly and Daughtry, 'Curiosity', p. 206.

[36] Kelly and Daughtry, 'Curiosity', p. 205.

objects), which Carl Jung noted as posing 'insoluble puzzles' for the human psyche.[37] Such curiosity, inspired by something so aesthetically grand and conceptually complex, has inspired technological and scientific advancements such as telescopes and space travel, paving the way for the postmodern era. However, the 21st century has ushered in a plague of excessive outdoor artificial lighting, leading to a generation whose clearest view of a true starry sky is most likely found on a screen.

Gen Z: Growing Up in the Digital Age

Generation Z, often referred to as Gen Z or iGen, encompasses individuals born between 1995 and 2012.[38] This demographic cohort are notable for being the first to grow up with the internet (commercialised in 1995) and digital technology from an early age, earning them the label of 'digital natives'.[39] The oldest members of Gen Z were of high school graduation age in 2012 and 2013, and unlike the enthusiasm of their millennial predecessors, this time period saw teenage happiness and life satisfaction levels plummet significantly.[40] Research suggests a correlation between the sudden rise of depressive symptoms in Gen Z coinciding with the time that smartphones and social media became universal and real-life social interaction dropped.[41] The apparent rise in mental health issues for Gen Z has also been linked with 'climate anxiety'- psychological distress relating to ecological crisis.[42] People who have come of age in the past two decades have been steadily exposed to alarming news about the ecological decline of the planet and this in turn has seen a rise in concern for the environment in Gen Z.[43] Studies have even shown a rising popularity of astrology (such as horoscopes and zodiac signs) among younger generations, seen as a modern means of reconnecting with the night sky.[44] As Jacob Hoerger has posited,

[37] Carl G. Jung, *Flying Saucers: A Modern Myth of Things Seen in the Sky* (Abingdon: Routledge Classics, 2002), p. 19.
[38] Twenge, *iGen*, pp. 2, 6.
[39] Anthony Turner, 'Generation Z: Technology and Social Interest', *The Journal of Individual Psychology (1998)*, 71.2 (2015), 103–113 (p. 104).
[40] Twenge, *iGen*, pp. 95–96.
[41] Twenge, *iGen*, p. 104.
[42] Caroline Hickman and others, 'Climate Anxiety in Children and Young People and Their Beliefs about Government Responses to Climate Change: A Global Survey', *The Lancet. Planetary Health*, 5.12 (2021), pp. 863–873 (p. 863).
[43] Hickman and others, 'Climate Anxiety', pp. 866–867.
[44] Barbara Kempton, 'Looking to the Stars: Millennials and Astrology', *The Arsenal: The Undergraduate Research Journal of Augusta University*, 3.1 (2020), 1–8 (pp. 3–4).

one of the most significant losses of the diminishing night sky is that present and future generations are gradually losing a profound reminder of their place in the universe.[45]

From phone screens to excessive street lighting, growing up in an era of increasing digitisation and urbanisation has meant to be shrouded in a near constant glow of artificial light.[46] It is now estimated that more than 99% of Europeans live under light polluted skies, detrimentally impacting ecosystems and human health.[47] This situation not only leads to energy waste and increased carbon emissions but also places a strain on the economy.[48] This proliferation of light pollution has significantly impacted young people's ability to experience dark skies and has created a visual barrier to the wonders of the night.[49] Instead of seeing thousands of stars, in today's urban towns and cities it is lucky to manage to spot a dozen, and astronomers now warn of the increasing number of satellites obscuring our view even further.[50] As Campion has said, light pollution 'cuts off our heritage, reduces our well-being and deprives us of contact with a huge part of our natural environment'.[51] For younger generations, Anna Levin has noted this could mean an 'extinction of experience' where those born under light polluted skies will not know what they have lost.[52] This has been referred to as 'environmental generational amnesia' by psychologists Peter Kahn and Thea Weiss.[53] This term describes the gradual acceptance of ecological degradation as the expected norm, leading to a collective ignorance of what a clear night sky should look like. In the early twentieth century Max Weber argued that the Industrial Revolution brought rise to a 'disenchantment' with nature, whereby modern people replaced their sense of magic

[45] Jacob Hoerger, 'Missing the Night Sky', *Center for the Study of Technology and Society*, 48 (2016), 115–131 (p. 116).
[46] Fabio Falchi and others, 'The New World Atlas of Artificial Night Sky Brightness', *Science Advances*, 2.6 (2016), 1−25 (p. 4).
[47] Arroyo and others, 'Monitoring', p. 417.; Chepesiuk, 'Missing the Dark', p. A24.; West, *Secret World*, pp. 18–19.; Bailey, 'Dark Skies', p. 6.36.
[48] The Lancet Regional Health – Europe, 'Shedding Light on Light Pollution', *The Lancet Regional Health. Europe*, 31 (2023), 100710 (p. 100710).
[49] Richard J. Wainscoat, 'The Magnificent Night Sky — Why It Must Be Protected from Light Pollution', *Proceedings of the International Astronomical Union*, 5.S260 (2009), 442–448 (p. 443).
[50] Marchant, *Human Cosmos*, p. 3.
[51] Campion, 'Preface', p. xxvii.
[52] Levin, *Incandescent*, p. 135.
[53] Kahn and Weiss, 'Children' p. 8.

and wonder for the environment with soulless rationality, science and apathy.[54] The resulting disconnection from nature can hinder efforts to combat environmental issues, as the emotional bond with the natural world slowly diminishes over time. Addressing light pollution is therefore not only a matter of preserving astronomical observation but as Andrea Sosa argued, it is also maintaining a connection to natural heritage.[55]

The experience of authentic darkness, particularly in the context of celestial observation, is increasingly uncommon among contemporary youth. However, advancements in technology – including high-powered telescopes, stargazing applications, and photorealistic computer graphics – have significantly enhanced our ability to access and understand the cosmos, providing knowledge and imagery previously unattainable. Stuart Clark suggested that recent scientific advancements have sparked a 're-enchantment' with the night sky, as people are awestruck by new discoveries and human achievements.[56] While science may play a role in modern astronomical interests, it is ultimately by stepping outside and gazing up at the night sky that one can truly begin to appreciate the infinite scale of the universe and reap the benefits of relinquishing control to nature. Thus, modern technology compliments rather than replaces the profound, and firsthand personal experience of observing the night sky can help reconnect younger generations with nature.

Sky as Part of Nature: Impacts on Mental Health and Well-Being

Eco-psychology explores the deep connection between human well-being and the environment, emphasising the psychological benefits of engaging and interacting with nature.[57] Phenomenology, particularly as discussed by Tim Ingold, focuses on the lived experience and perception of one's surroundings, highlighting how one interacts with and makes sense of the world.[58] Ingold's work suggests that individual understanding of the

[54] Richard Jenkins, 'Disenchantment, Enchantment and Re-Enchantment: Max Weber at the Millennium', *Max Weber Studies*, 1.1 (2000), 11–32 (p. 12).
[55] Andrea Sosa, 'Let's Turn Off the Lights and Turn on the Night: To the Rescue of Starlight in an Age of Artificial Lighting', *Proceedings of the International Astronomical Union*, 15 (2019), 328–331 (p. 329).
[56] Clark, *Beneath*, pp. 266–267.
[57] Blair, *Sark*, p. 6.
[58] Tim Ingold, *Being Alive: Essays on Movement, Knowledge and Description* (London: Routledge, 2011), pp. 126–127.

environment is shaped by people's sensory experiences and cultural practices, asserting that that the sky 'belongs to the world as it is presented to experience – to the phenomenal rather than the physical order of reality'.[59] Here the sky can be conceptualised as an integral part of the environment and experienced as a force of the natural world. Until recent times references to the environment rarely included the sky or celestial features as part of nature.[60] This has been contested by Campion who pointed out that not only is the sky an essential part of Earth's ecosystem, but also central to mental and emotional well-being.[61] This was similarly echoed in Dacher Keltner's work on the value of awe-inspiring nature experiences on society's health, aligning with the broader view that the sky and its celestial features are fundamental to both ecological and psychological landscapes.[62] These features influence not just environmental health but also human perception and emotional states.

Jung considered the night sky to be akin to a psychological mirror, a place capable of reflecting one's inner thoughts and feelings.[63] The night sky can provide perspective, prompting individuals to seek deeper meaning and contemplate the bigger picture.[64] Additionally, it can offer a means of escape from the stresses associated with contemporary life.[65] This was highlighted in a 2018 study, conducted by King's College London, which found that being able to see the sky has a positive effect on mental well-being.[66] There is a growing body of research that attests to the positive mental health benefits to spending time in nature, leading to feelings of what has been defined as 'nature connectedness'.[67]

[59] Ingold, 'Earth, Sky', p. S25.
[60] Blair, *Sark*, p. 33.
[61] Campion, 'Preface', pp. xx–xxii.
[62] Keltner and Haidt, 'Approaching Awe', p. 303.; Piff and Keltner, 'Why Do We Experience Awe?', 2015.
[63] Freud and Jung, *Freud/Jung Letters*, p. 421.
[64] Tiffany Francis-Baker, *Dark Skies: A Journey into the Wild Night* (London: Bloomsbury Publishing, 2019), pp. 24–25.
[65] Matt Haig, *Notes on a Nervous Planet* (Edinburgh: Canongate, 2018), pp. 273–275.
[66] King's College London, 'Exposure to Trees, The Sky and Birdsong in Cities Beneficial for Mental Wellbeing', *King's College London*, 16 January 2018. <https://www.kcl.ac.uk/news/spotlight/exposure-to-trees-the-sky-and-birdsong-in-cities-beneficial-for-mental-wellbeing-1> [accessed 17 August 2024].
[67] William Van Gordon, Edo Shonin and Miles Richardson, 'Mindfulness and Nature', *Mindfulness*, 9.5 (2018), 1655–1658 (pp. 1655–1656).; Kayleigh J. Wyles and others, 'Are Some Natural Environments More Psychologically Beneficial Than Others? The Importance of Type and Quality on Connectedness to Nature and Psychological Restoration', *Environment and Behavior*, 51.2 (2019), 111–143 (pp. 113–114).

The concept of well-being has been considered by Rachel Dodge to incorporate physical, emotional and even spiritual qualities of a person's life.[68] By reconnecting with the night sky, these aspects of well-being can be nurtured, finding solace and inspiration in the stars. This has been seen in recent years with the growing trend of astrotourism – whereby people travel to areas of minimal light pollution to experience pristine dark skies and observe celestial events like eclipses and the aurora borealis.[69] This form of tourism not only supports mental health through the therapy of stargazing but it also promotes more sustainable travel practices, encouraging the preservation of natural environments and supporting local communities.[70] In her book *Sark in the Dark*, Ada Blair explored the effects of the night sky on well-being and community life on Sark, the world's first officially recognised dark sky island.[71] Blair's research underscored how stargazing can aid mental well-being by reducing stress and promoting relaxation.[72] By immersing oneself in the beauty of the night sky, one can find a renewed sense of wonder and a deeper connection to the universe. These perspectives collectively highlight the importance of the night sky as an integral part of the natural environment, offering profound psychological and emotional benefits. Preserving dark skies and promoting awareness of their value can thus help maintain this vital connection, promoting environmental stewardship and enhancing well-being.

Methodology

This chapter discusses the qualitative methodology followed in my research, including a reflexive section to review the potential impact of my own biases and positionality on participants of the study.[73] Monique Hennink, Inge Hutter and Ajay Bailey stated that qualitative research can be used to better understand the lives of participants,

[68] Rachel Dodge and others, 'The Challenge of Defining Wellbeing', *International Journal of* Wellbeing, 2.3 (2012), 222–235 (pp. 229–230).; Francesco Chirico, 'Spiritual Well-Being in the 21st Century: It's Time to Review the Current WHO's Health Definition?', *Journal of Health and Social Sciences*, 1.1 (2016), 11–16 (pp. 13–14).
[69] Levin, *Incandescent*, p. 211.
[70] Alberto Tapada and others, 'Astrotourism: A Literature Review and Framework for Future Research', *Enlightening Tourism*, 11.2 (2021), 291–331 (pp. 320–321).
[71] Blair, *Sark*, p. 13.
[72] Blair, *Sark*, pp. 116
[73] Hanin Bukamal, 'Deconstructing Insider-Outsider Researcher Positionality', British Journal of Special Education, 49.3 (2022), 327–349 (p. 328).

whereby insight is gathered from participants' own perspectives, opinions and feelings and described using their own words and ideas.[74] This valuable insight can help researchers to explore how people attribute meaning to their experiences.[75] Qualitative data can be obtained through a smaller sample size of participants, conducting more thorough interviews to achieve deeper understanding as opposed to a quantitative statistical overview.[76] As my research sought to explore the personal connection between Gen Z and the night sky, phenomenology played an important role in exploring and understanding the wide variety of lived experiences, views and behaviours of participants.[77] As David Abram noted, phenomenology does not 'seek to explain the world', but rather to describe the world as it arises in 'direct, sensorial experience'.[78] To collect phenomenological data, Judith Bell and Stephen Waters encouraged a mixed-method approach using more quantitative methods (like surveys) in conjunction with the qualitative (like interviews), achieving a more exhaustive comprehension of the subject matter and consequently reducing the weaknesses of adopting either methodology on its own.[79]

Thus, my research utilised both online surveys and one-to-one interviews: firstly, gathering general themes from survey respondents; then, conducting in-depth interviews to probe deeper into the themes previously identified. To gather participants for this study, initially I reached out to 28 astronomical clubs and societies across England via email (for example the Leicester Astronomical Society) with the intention of targeting young people with an underlying interest in the night sky. However, after a few weeks I hit a setback as I had not received many survey responses, and I had several societies admitting that they did not have any members who fit the age demographic of the study. It became evident that I had to adapt my strategy and expand my scope to include other Gen Z who may not attend in-person societies but could still have an interest through their following of online

[74] Hennink, Hutter and Bailey, *Qualitative*, p. 17.
[75] Hennink, Hutter and Bailey, *Qualitative*, pp. 10–11.
[76] Hennink, Hutter and Bailey, *Qualitative*, p. 17.
[77] Alan Bryman, *Quantity and Quality in Social Research*, 4th edn. (London and New York: Routledge, 1995), pp. 51–54.
[78] David Abram, *The Spell of the Sensuous: Perception and Language in the More-Than-Human World* (New York: Vintage Books, 1996), p. 35.
[79] Judith Bell and Stephen Waters, *Doing Your Research Project: A Guide for First-Time Researchers,* 7th edn. (London: Open University Press, 2018), p. 25.

astronomy pages and sites. Bell and Waters recommended posting survey links onto social media as a technique to gather more responses, so I posted the online survey onto Facebook and Instagram and reached out to more UK-based astronomy pages and communities, such as the University of Nottingham Astronomy Group.[80] This strategy was more successful and by the end of the month I had set aside for surveying, I had received a total of 29 responses.

The online survey was designed for accessibility, using a mixture of open-ended and Likert scale question types to gauge interest in common themes, as well as to allow for the emergence of what Alan Bryman described as 'unexpectedly important topics'.[81] Having studied the literature around the topic of noctcaelador, I was inspired by William E. Kelly's work and wanted to incorporate his survey questions into my own research to measure participants' typical behaviours, emotional connections and interest in the night sky.[82] I contacted Kelly through ResearchGate and he kindly shared the Noctcaelador Inventory questions with me through the site. The interviews then helped me to gain more specific and deeper insights into these more personal aspects, using a semi-structured format to allow participants to elaborate and expand on their answers at their own discretion. The interviews were held in a conversational format, creating an open atmosphere that deepened the insights gathered from the participants' nuanced responses.

Pulling from the list of participants who had given their consent to be contacted further, I selected four interviewees who had provided unique and interesting responses to the survey, each approaching the topic of the night sky from different perspectives. I conducted the interviews over Microsoft Teams and in person, at the request of the interviewee, and used recording and transcription during the interviews. Bell and Waters noted that audio and video recordings can sometimes prevent authentic responses as interviewees may feel uncomfortable about the use and storage of the data after the

[80] Bell and Waters, *Research Project*, pp. 170–171, 183–184.
[81] Bryman, *Quantity and Quality*, p.67.
[82] Kelly, 'Noctcaelador', pp. 100–102.

interview is over.[83] To counteract this potential issue, I made sure to explain clearly to participants that recordings were completely voluntary, that they had the option to withdraw from the interview at any point, and that all recordings were to be encrypted, securely stored and subsequently deleted after completion of the research project. Additionally, I emphasised the ethical considerations involved, ensuring participants that their privacy and confidentiality were paramount, and that all procedures strictly adhered to the ethical guidelines and standards of the university.

Compiled data from the surveys and interviews were organised by transcription and codification. First, I extracted the raw data from Google Forms (for the surveys) and Otter Transcription and Teams (for the interview transcripts) into a Microsoft Excel spreadsheet to get an overview of the responses in one place. I then adopted an inductive approach to develop themed codes, using different colour cells to collate and demarcate arising patterns and themes from the data. Rather than using a deductive strategy, which Hennink, Hutter and Bailey noted provides an opportunity of reflection when conducting data analysis in the context of wider literature, this research opted to allow themes to arise organically from the participants themselves without preconceived categories or constructs.[84] That is not to say that the wider literature was disregarded during analysis and reflection of the data (indeed the survey questions themselves were formulated from pre-established concepts and work already in the field), but rather that the themes gathered from participants were not directly influenced by the wider literature.

Reflexivity

As Patrick White has asserted 'research should always be driven by curiosity'.[85] Accordingly, I decided to undertake this research out of curiosity of how and why the digital native generation seek out and maintain a connection to the night sky, taking into account modern-day considerations (such as light pollution, social media, apps and smartphones)

[83] Bell and Waters, *Research Project*, pp. 216–217.
[84] Hennink, Hutter and Bailey, *Qualitative*, p. 355.
[85] Patrick White, *Developing Research Questions: A Guide for Social Scientists* (New York: Palgrave MacMillan, 2009), p. 5.

that have been a defining part of the childhood and adolescence of Generation Z. Reflecting on my own positionality in this research space, let it be noted that I am a Gen Z woman myself from a Caucasian working-class family in Scotland, and thus my perspective on this topic comes from this cultural background. I grew up and have lived under light polluted skies my whole life, never having lived anywhere below a Class 6-7 on the Bortle scale.[86] Despite this impediment, I have always had a fascination with astronomy and was encouraged as a child particularly by my dad and stepmum to learn about the stars. I still remember how it felt seeing the moon through my childhood telescope for the first time.

While conducting this study, I found that my personal opinions about the night sky had likewise been reflected by participants in their responses and therefore I was mindful of potential bias. To combat this, I made sure to keep survey and interview questions open for individual interpretation and tried to be cognisant of my own insights influencing participants' responses in interviews. A researcher can be considered an insider when they share commonalities with those they are studying, such as shared interests, values and cultures, and therefore I could be considered an insider in this research.[87] Although this could potentially be a detriment, as Melanie J. Greene pointed out insider research threatens the objectivity of the researcher, it has also been argued by John L. Aguilar that the researcher-participant interaction occurs more naturally and with less judgement or stereotyping with insider research.[88] This was something I similarly found as my interactions with participants never felt awkward and I consciously tried to foster a safe space for all those involved.

[86] Alison Klesman, 'The Bortle Dark-Sky Scale', *Astronomy*, 49.10 (2021), 10 (p. 10).
[87] Bukamal, 'Insider-Outsider', p. 332.
[88] Melanie J. Greene, 'On the Inside Looking In: Methodological Insights and Challenges in Conducting Qualitative Insider Research', *The Qualitative Report*, 19.29 (2014), 1–13 (p. 5). ; John L. Aguilar 'Insider Research: An Ethnography of a Debate', in *Anthropologists at Home in North America: Methods and Issues in the Study of One's Own Society*, ed. by Donald Messerschmidt (New York: Cambridge University Press), pp. 15–26 (p. 18).

Findings and Discussion

This chapter provides a comprehensive analysis of the nuanced relationship between Gen Z participants and the night sky, examining their concerns and perceptions, and the significant themes that emerged from my qualitative research. For the surveys, I utilised both the 10 Noctcaelador Inventory prompt statements (please see Appendix) and eight open-ended questions, namely:

Q1. As a child, were you encouraged to look at the night sky?

Q2. Why do you observe the night sky? What about stargazing interests or inspires you?

Q3. What is the most powerful experience you have had when looking at the night sky? How did that experience make you feel at the time?

Q4. Do you think that experience has had any longer-term impacts for you?

Q5. Do you feel there are any benefits to watching the night sky? If so, what benefits have you experienced yourself?

Q6. Do you utilise apps and/or social media to aid or enhance your night sky viewing?

Q7. Do modern-day impediments to stargazing, such as light pollution and increased satellites, concern or affect you? In what ways?

Q8. Is there anything else you wish to mention or expand on?

These survey questions were designed to prompt Gen Z participants to consider why they may feel an affinity for the night sky, with Q1–Q4 probing the possibility that their interest in astronomy was fostered in childhood or through direct night sky experiences; why they engage in night sky watching, with Q5 focussing on how they feel this activity benefits them; whether they use contemporary technologies and social media to enhance their astronomical pursuits (Q6); and whether light pollution and other potential night sky impediments affect them (Q7). The 29 survey respondents represented a spread of Gen Z birth years, with two born in 1995; four in 1996; three in 1997; three in 1998; one in 1999;

four in 2001; five in 2002; six in 2003; and one in 2004. Other demographic marking questions, covering for example gender, religion and ethnicity, were deliberately omitted from this research as these factors fell outside the scope of this study.

The selection process for interviewees began with filtering the responses to include only those who consented to participate in an interview (a total of 19) and then identifying those respondents who wrote particularly descriptive or unusual responses to the survey. The responses were, for the most part, detailed and thoughtfully considered, suggesting an eagerness among the Gen Z participants to share their perspectives and experiences on this topic. In the interests of maintaining participant anonymity, the survey respondents and interviewees will be referred to by pseudonyms. The four interviewees, selected for their diverse survey responses, participated in semi-structured, discussion-like interviews that facilitated the introduction of new topics and the expansion of ideas.

Analysis of the Noctcaelador Inventory section of the survey showed a net positive result among Gen Z participants. A total of 10 prompt statements were given and survey respondents were asked to respond on a five-point scale from 'strongly disagree' to 'strongly agree'. Seven prompt statements explored the concept of emotional attachment, such as 'I become mesmerised when looking at the night sky' and 'I very much adore the objects in the night sky'. The responses to these statements (Figure 1) indicated that survey participants showed a positive inclination towards emotional connection and psychological attachment to the night sky. In particular, 'I am very fond of the night sky' and 'Looking at the night sky pleases me' prompted an overwhelmingly positive reaction, with both statements achieving a net positive response (combined totals of agree and strongly agree answers) of 89–93% and no negative responses. These data suggest that Gen Z participants perceive the night sky as a beneficial presence in their lives and that the act of stargazing is a pleasurable activity which they enjoy. The choice of the word 'fondness' in relation to the night sky here also suggests that repeated exposure to familiar celestial objects has helped participants form an attachment over time. It should be noted that, although it is derived from Kelly's Noctcaelador Inventory (2004), Figure 1 displays the results of my research

specifically. A direct comparison with Kelly's quantitative data is not possible, as the specifics of these results were not detailed in the original published material.

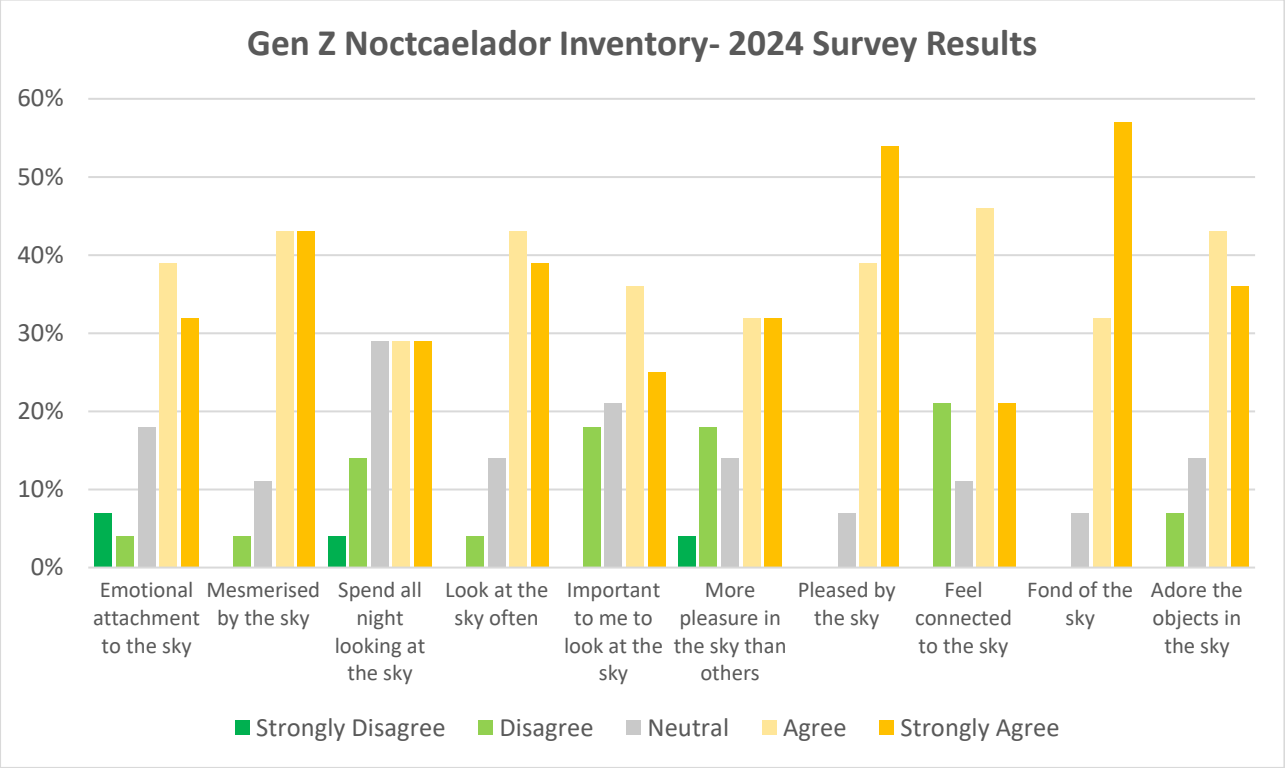

Figure 1– Gen Z Noctcaelador Inventory – 2024 Survey Results.

The remaining three statements focused on behaviours and values, such as 'I like to go outside and look at the sky at night often' and 'Having time to look at the night sky is important to me'. As indicated in Figure 1, these prompts generally elicited positive responses regarding the participants' night sky-watching behaviours and attitudes. However, they also revealed a higher frequency of neutral and negative responses than the emotionally driven prompts. For instance, the statement 'I could spend all night just looking at the sky' prompted 29% neutral responses, 29% agreeing and 29% strongly agreeing, suggesting that while some participants remain interested in the night sky, prolonged stargazing may not have the same importance or may not impact participants' daily lives. This may reflect the busy schedules of the Gen Z participants, who balance work, academia and other commitments, making observations or longer duration less feasible. Moreover,

light pollution could be a contributing factor to the lower scores, given its known detrimental effect on stargazing. These themes will be further explored in the next section to provide a deeper understanding of the factors influencing these behaviours and opinions.

Nostalgia: Reflecting on Childhood Memories

The first theme that emerged from my questionnaire was the arousal of memories and nostalgic feelings from childhood and adolescence. To better understand any potential underlying past connection to the sky, the survey participants were asked whether they had been encouraged to look at the night sky as children (Q1). Eight respondents said that they were not encouraged, while the remaining 21 noted memories linked to learning and socialising with neighbours, teachers, friends and family members. Terrel Gallaway highlighted the recreational value of the night sky, describing stargazing as 'an inclusive, community-building good'.[89] This social aspect of astronomy – bonding through shared astronomical events – was echoed by survey respondents including Beth who reminisced about childhood memories of gathering with neighbours and family to observe night sky phenomena as a community:

> We had a neighbourhood thing going where we would sit out and watch meteor showers. We would get set up with blankets and hot chocolates and just stare for hours watching the sky and making competitions about who might see the most.[90]

A further seven participants similarly shared memories of spotting constellations and planets, counting shooting stars and observing the passing of the International Space Station as formative and sentimental childhood experiences.[91] Aaron and Ryan particularly mentioned asterisms such as Orion's Belt, Ursa Minor and Ursa Major as key night sky features that were pointed out to them as children, and reported that seeing these constellations now can arouse nostalgic feelings for them.[92] Ellie's response to the survey question on the benefits of stargazing underscored the recreational community value proposed by Gallaway, noting that they felt they 'experienced deeper relationships with friends and family' when sharing 'experiences of looking at the sky together and talking

[89] Gallaway, 'On Light Pollution', pp. 76–77.
[90] Survey Respondent 2.
[91] Survey Respondents 3, 11, 12, 18, 22, 25, 27.
[92] Survey Respondents 18, 27.

about how it makes us feel'.[93] For participants like Ellie, the night sky can be seen as a tool for fostering community bonds and personal connections.

Many respondents clarified that these childhood sky experiences occurred during camping trips or visits to the countryside, citing light pollution as a factor determining when they were able to observe the stars.[94] Oliver Dunnett's work on the moral geographies of light pollution has stressed that amateur astronomers' 'affective relationships with dark sky landscapes' are often directly connected to childhood memories of stargazing that inspired awe and wonder.[95] This was reflected in Ellie's interview, in which they recalled moving from a city to a rural area as a teenager and recounted how the changed sky affected them:

> I grew up as a kid in London and then moved to Wales … I didn't really think about the stars when I was a kid. Then when I moved, I was like 'Oh my God, what? This exists? It's not just streetlights all the time?'[96]

In our discussion, Ellie spoke about how this transformation in the skyscape unveiled a new, previously unimaginable, realm of experience for them. As Levin has warned of the erasure of the dark sky experience, accounts such as Ellie's display the dangers of light-polluted skies leading to disconnection with the natural world.[97]

Kahn and Weiss suggested that the incremental rise in light pollution over time has caused people to become less aware of its negative impacts on their health and the environment.[98] Max Weber argued that the rise of the modern industrial world has led to a sense of 'disenchantment' with nature: where in the past people saw magic and spirits, they have now replaced this sense of wonderment with cold rationality, science and apathy.[99] Survey respondent Quinn, who – like Ellie – grew up in an urban setting, reflected this sense of modern-age disenchantment in commenting that not only were they not encouraged to think about the night sky as a child but also that they were 'very aware that other people

[93] Survey Respondent 5.
[94] Survey Respondents 2, 3, 11, 12, 18, 22, 25, 27.
[95] Dunnett, 'Contested Landscapes', p. 625.
[96] Interviewee 5.
[97] Levin, *Incandescent*, p. 135.
[98] Kahn and Weiss, 'Children', p. 8.
[99] Clark, *Beneath*, pp. 173–174.

didn't care so much about the sky'.[100] People cannot miss what they do not know and, for the Gen Z population who live under increasingly light-polluted skies, this visual loss of the night sky poses a 'catastrophic erosion of natural heritage' as highlighted by Jo Marchant.[101] Among the Gen Z participants of my study, however, there was a strong theme of fostering night sky connections through childhood experiences, particularly shared moments with family and neighbours, with a notable value placed on the recreational and social importance of the night sky in adding to participants' sense of connection. Although there were instances of participants not being encouraged to look and learn about the night sky in childhood, and indeed even the suggestion of indifference from adults around them, early exposure to night sky objects and events was crucial for the majority of Gen Z participants in shaping a lasting appreciation of the night sky and contributing to positive feelings of fondness and nostalgia.

Connecting to the Past: Ancestors and Cultural Heritage

Another theme that emerged from the survey responses to Q2 was the night sky serving as a medium for ancestral connection, providing a means for reflection on the past and cultural heritage. Dunnett noted that awe-inspiring experiences of the night sky can often lead to 'associations with the Earth's history', including 'connections with ancient peoples and landscapes'.[102] Five Gen Z participants expressed a reflective fascination with history, noting in response to a survey question about what interests or inspires them about stargazing (Q2), that present observations of the night sky transported them in their minds to the distant past.[103] For Quinn, the connection to historical figures was most fascinating, for example, the notion that 'Cleopatra looked up at the sky and saw those same stars'; they felt comforted 'knowing that other people throughout history have looked at the same sky'.[104] Daniel considered what it must have been like for those in the past to use the stars for navigation, reflecting 'how a lost sailor may have been able to navigate their ship home

[100] Survey Respondent 17.
[101] Marchant, *Human Cosmos*, p. 3.
[102] Dunnett, 'Contested Landscapes', p. 625.
[103] Survey Respondent 4, 6, 11, 17, 26.
[104] Survey Respondent 17.

using only the stars'.[105] Joe Sovick suggested that an appreciation of the night sky can help facilitate an understanding of the past, and these five survey responses conveyed that a fascination with and contemplation of the sky may be a means of reflecting on the shared cultural history of humanity.[106] This idea was echoed by Campion, who emphasised the sky's role in understanding and appreciating past generations and both ancient and contemporary cultures.[107]

Survey respondent Fin expanded on this idea, believing there to be 'some fundamental connection or value in stargazing that we may not yet understand given our ancestors would have done so for millions of years before us'.[108] Fin appears to propose a deeper evolutionary connection that links humanity to the cosmos in a way not yet understood. Academics including Nordgren and Brady have pondered the evolutionary journey of humanity from cave-dwellers to astronauts, noting how the stars and other celestial objects have helped to mould the species into the diverse and rich cultural, spiritual, adventurous and innately curious beings on the planet today.[109] The night sky – and the shared experience of it – can be seen to have helped to shape the cultural and evolutionary path of humanity: Campion noted that 'there is no human society that does not, somehow, in some way, relate its fears, concerns, hopes, and wishes to the sky'.[110] For some Gen Z participants in this study, looking at the night sky inspires them to reflect on their role in the wider human story, with the sky seen as a source of ancestral connection. It was also noted by participants that these reflections on the past can provide a sense of comfort and awe to those moved by the ancient relationship between humanity and the cosmos.

[105] Survey Respondent 4.
[106] Sovick, 'Toward', p. 15.
[107] Campion, 'Preface', pp. xx–xxi.
[108] Survey Respondent 6, 26.
[109] Nordgren, 'Night's End', pp. 211–212.; Brady, 'Images', pp. 234, 236.
[110] Campion, *Ast and Cosm*, p. 1.

Transcendent Experiences: Changing Perspectives and Finding Meaning

The next major theme emerging from both the surveys and interviews was the transcendent quality associated with encounters with celestial phenomena. Both Blair and Freya Mathews have asserted that experiences with nature, including the night sky, can result in transcendent or even spiritual feelings.[111] The concept of transcendent or transpersonal feelings encompasses a range of phenomenological reactions to nature, including feelings of connection, unity and oneness with the environment, perceived changes in sense of time, and even transformations in personality.[112] To assess this claim, the survey participants were asked to share their most powerful experience of the night sky and describe how it made them feel at the time (Q3). For some survey respondents, such as Beth, choosing just one experience was difficult: rarer occurrences such as meteor showers 'tied for most powerful' with more common observations, because 'any day when the moon appears particularly big and bright can make my entire day'.[113] Molly commented that, while shooting stars were their most 'magical experience', it is 'spiritually important to connect with the moon and the sky' as they are 'beautiful, mind-blowing and give perspective'.[114] Gallaway's research on the value of beauty explored the spiritual meaning derived from the night sky, noting that 'the heavens' grandeur and mystery account for part of their spiritual weight'.[115] This was a common theme amongst the 18 survey participants who agreed that they have had powerful night sky experiences (Q3), with many detailing the profound impacts of these encounters, such as spiritual reflection and shifts in perspective (Q4).[116]

The experience of a changed perspective was noted by survey respondents as a powerful aspect of stargazing (Q4), with some, such as Aaron, describing a 'sense of freedom and belonging', and others, like Zara, observing that the sky serves as a 'reminder of how miraculous life is and how small we are in the grand scheme of things'.[117] David

[111] Blair, *Sark*, pp. 116–119.; Mathews, *Ecological*, pp. 149–151.
[112] Blair, *Sark*, pp. 85–86.
[113] Survey Respondent 2.
[114] Survey Respondent 13.
[115] Gallaway, 'On Light Pollution', p. 76.
[116] Survey Respondent 2, 3, 5, 6, 9, 13, 14, 16, 17, 18, 19, 20, 21, 22, 26, 28, 29.
[117] Survey Respondent 26, 27.

Henderson highlighted this idea of feeling humbled by one's place in the wider universe, stating that 'to confront the starry host is to be held accountable in one's smallness'.[118] Kant referred to this feeling as being a 'mere speck in the universe', which often provokes a deeper philosophical contemplation of one's purpose and the meaning of one's life in the context of cosmic eternity.[119] Interviewee Ellie illustrated the existential feelings that can arise from stargazing, stating that 'space genuinely makes me contemplate my very existence'.[120] They expanded on this thought when recalling their most powerful sky experience, which occurred during a trip to India:

> It changed the way I thought about a lot of things. A big thing was perspective, because we were lying there and the stars kept coming closer. It felt like they were hovering right above your face … It's something that has stuck with me forever, because it felt like you were part of the universe.[121]

Ellie's comment reflects William Fox's argument that the only way to 'retain our sense of scale in the real universe' is through first-hand experience of a starry sky.[122] Fox called the feeling described by Ellie 'celestial vaulting', whereby the stargazer experiences a visceral sense of wonder and an imaginative transformation by contemplating the vastness of the universe and their place within it.[123] Johan Eklöf wrote that 'nowhere else in the world do you feel so small, so insignificant, and at the same time so unique' as when experiencing the depth of a starry night sky.[124] Rebecca Fox linked such experiences of the natural world as contributing to feelings of 'transcendence and spiritual enchantment'.[125] For participants such as Ellie, the revelation of a starry night can inspire transcendent and spiritual feelings through the vastness of the cosmos which can paradoxically make one feel both incredibly small and insignificant, as well as profoundly unique and special.

Thirteen survey respondents, in response to the question on the benefits of stargazing (Q5), mentioned spirituality as a key factor in why they feel drawn to the night

[118] Henderson, 'Valuing the Stars', p. 22.
[119] Kant and Beck, *Critique*, p. 166.
[120] Interviewee 5.
[121] Interviewee 5.
[122] Fox, cited in Bogard, *The End of Night*, pp. 257–259.
[123] Fox, cited in Bogard, *The End of Night*, pp. 269–270.
[124] Eklöf, *Manifesto*, p. 177.
[125] Fox, 'Enhancing', p. 455.

sky, with spiritual well-being and connection to something bigger both noted as direct benefits.[126] Tam wrote that watching the night sky made them feel more connected to their spirituality, while Quinn stated that, although they did not consider themselves particularly spiritual, the night sky provoked a 'sense of something bigger'.[127] Mircea Eliade argued that the sky is imbued with religious and spiritual significance by virtue of the sheer scale and sense of power that the 'starry vault' has in driving transcendent experiences, noting that 'atmospheric and meteorological "life" appears to be an unending myth'.[128] This was echoed in Ellie's response where they became very interested in 'spirituality, meditation and astrology' after their transcendent stargazing experience, saying that it 'definitely instilled this knowing in me, or this sense that life is so much bigger than this present moment'.[129] Carina cited in interview similar spiritual impacts of observing the night sky and commented on how stargazing feeds into their faith and belief:

> I do believe in God and when I look at the universe and I see how beautiful it is, I'm like 'How can you not believe?'. It really feels so beyond us, it's just incredible … it really does feel like there's something bigger than you at play.[130]

For Carina, witnessing the sheer presence of the universe, its infiniteness and its beauty elicited thoughts of God or the presence of a higher power. By interacting with the night sky, one can come face-to-face with the bigger picture, which for participants like Carina and Ellie meant an inherently spiritual universe, grander than human minds can begin to comprehend.

Unexpectedly spiritual moments with the sky were also recorded by survey participants. For instance, Ryan's encounter with a shooting star made them feel that the meteor was intended only for their eyes, as they recalled a 'sense of fate and mystery' about the event.[131] For a fleeting second, the universe seemed to be saying something to Ryan, and they found a deeper meaning and purpose through making that celestial

[126] Survey Respondent 3, 4, 5, 7, 8, 12, 13, 17, 18, 20, 22, 27, 29.
[127] Survey Respondent 17, 20.
[128] Eliade, *Patterns*, p. 109.
[129] Survey Respondent 5.
[130] Interviewee 29.
[131] Survey Respondent 18.

connection in that moment. Clark expressed that 'the very fact that we look to the night sky in our search for meaning is one of the indelible hallmarks of our humanity', a sentiment echoed by Tiffany Francis-Baker when she wrote that the night sky can prompt people to find meaning and gain perspective on their place in the wider universe.[132] Indeed, whether through feeling special and unique or small and insignificant, observing the night sky had the power to move and transcend the majority of my participants in emotional and spiritual ways.

Overall, the Gen Z participants found that awe-inspiring experiences with nature and the skyscape can help provide perspective and a sense of place in the context of an infinite universe. Their stories of powerful night sky encounters underscore the timeless human quest for meaning and connection through the stars, reflecting the enduring spiritual role played by the night sky across different cultures. The benefits of stargazing, as discussed by Gen Z participants, reveal profound feelings of being part of something greater and connecting with nature. These insights highlight the significant role of celestial observations in fostering existential reflection and enhancing spiritual well-being. This connection stresses the importance of preserving access to the night sky, as witnessing the 'starry vault' first-hand is the only way in which individuals can begin to contemplate the true scale of the cosmos and their place and purpose within it.

Curiosity: Pursuing Beauty and Understanding

A recurrent theme in the survey and interview responses was the role played by curiosity and aesthetic beauty in the participants' astronomical interests and night sky watching behaviours, including the use of apps, the influence of media such as television and films, and modern-day advances in technology and science. Curiosity can be defined here as the desire for new knowledge or experience, particularly triggered by ambiguous visual stimuli such as when viewing a starry sky.[133] Kelly and Daughtry's 2016 quantitative study on noctcaelador and curiosity found that night sky watchers tend to be more curious

[132] Clark, *Beneath*, pp. 3–4.; Francis-Baker, *Dark Skies*, pp. 24–25.
[133] Kelly and Daughtry, 'Curiosity', p. 205.

people.[134] My qualitative research also found this trend with 11 participants citing 'fascination' and curious 'interest' as the main reason for seeking a connection to the night sky (Q2).[135] For example, Xavier's response to Q2 showed that their curiosity came from pondering how 'life on Earth is actually made from the essence of recycled stars of the distant past', while Ellie wrote that 'it fascinates me to think there is so much else in existence beyond this planet'.[136] Where Max Weber saw the disenchantment of modern man with the natural world, Stuart Clark argued that in the 21st century people are experiencing a re-enchantment with the night sky, based not on occultism or spirituality but rather prompted by scientific and technological advances in recent years that have restored a sense of awe to the mainstream.[137] Recent astronomical news stories, such as the high-definition images captured by the James Webb Telescope and updates on the search for exoplanets, have created a new wave of astronomical interest. As Clark noted 'the combination of the beautiful images and mind-blowing facts generates awe, both at the universe itself and at the human achievement of unlocking its secrets'.[138] Survey respondents Xavier and Ellie particularly noted how scientific facts about the universe enhanced their curiosity about the night sky.

Moreover, five surveys noted an interest in astronomy prompted specifically by media content, such as documentaries and podcasts.[139] Interviewees Xavier, Ellie and Carina cited figures in astronomy and space exploration such as Professor Brian Cox, Tim Peake, Stephen Hawking, Elon Musk and Jeff Bezos as contributing to their interest in learning more about space through their respective books, television programmes, podcasts and other appearances.[140] Xavier commented in interview that Cox's BBC documentaries and Hawking's groundbreaking work on black holes were key parts of their childhood that sparked an interest in astronomy at an early age.[141] Science fiction and other films also

[134] Kelly and Daughtry, 'Curiosity', p. 206.
[135] Survey Respondent 1, 3, 4, 5, 6, 10, 14, 17, 20, 24, 29.
[136] Survey Respondent 5, 24.
[137] Clark, *Beneath*, pp. 268–269.
[138] Clark, *Beneath*, pp. 268–269.
[139] Survey Respondent 3, 5, 24, 29.
[140] Survey Respondent 5, 24, 29.
[141] Interviewee 24.

seemingly played a role in the survey respondents' night sky interests, with the *Star Wars* and *Star Trek* franchises, *Interstellar*, *Ad Astra*, *The Martian*, *Dune* and even *The Lion King* mentioned for their memorable cosmic imagery that captured the imagination of viewers.[142] Clark has pointed out that on-demand accurate depictions of deep space and distant planets in films and television series are fostering a connection with the night sky that is historically unique, stating that 'we now see the universe in full colour, in close-up, and tangible in a way we have never experienced before'.[143] Ellie shared in interview that their love of science-fiction movies stemmed from their ability to 'show you in a very visual way what it could be like to be in space or what could be out there'.[144] While, also in interview, Carina suggested that people are drawn to films set in space because light pollution has cut people off from that aspect of the environment, commenting 'maybe there is an element of when we see the stars in movies, there's something quite magical about it subconsciously because we're not so connected to it daily'.[145] Although the ability to see a clear, unpolluted night sky has become a rarity today, breakthroughs in computer graphics have reintroduced this visual spectacle to the everyday person who may lack this experience of the real night sky.

Another theme that emerged from the surveys was alien life: in response to the question asking what about the night sky interests you (Q2), seven participants wrote they were fascinated by the search for and possibility of alien life.[146] Jen, for example, wrote that 'the idea we might not be alone in the universe' made them pursue their interests in astronomy and stargazing.[147] Similarly, Hannah commented that they like to go out 'on the lookout for UFOs sometimes'.[148] Jung believed that UFO sightings could be interpreted as the projection of collective psychological concerns onto the night sky.[149] He wrote that 'the apparently physical nature of the UFOs creates such insoluble puzzles' and the mystery of apparent alien crafts can spark curiosity.[150] For survey respondent Carina, a fascination with

[142] Survey Respondent 3, 5, 24, 29.
[143] Clark, *Beneath*, pp. 266–267.
[144] Interviewee 5.
[145] Interviewee 29.
[146] Survey Respondent 5, 8, 10, 17, 24, 27, 29.
[147] Survey Respondent 10, 27.
[148] Survey Respondent 8.
[149] Jung, *Flying Saucers*, pp. xiiii–xiv.
[150] Jung, *Flying Saucers*, p. 19.

the search for extraterrestrial life was rooted in a more scientific interest surrounding the probability of whether life can only occur once in the entire universe, concluding 'we don't know, because it's only us'.[151] Marchant observed that the question of whether we are alone in the universe feeds into other more existential enquiries, questions about the nature of life and its meaning.[152] She expanded on this concept, suggesting that recent breakthroughs in the search for exoplanets have forced people today to confront the idea of a universe abundant in planets, thereby making the prospect of extraterrestrial life a distinct possibility and a compelling topic of discussion.[153]

Where Carina seemed more reluctant to make concrete affirmations on the presence of alien life, Quinn spoke with greater confidence in their interview on the likelihood of aliens in the vastness of space:

> I definitely think there are aliens. I just think when you see the pictures of the galaxies, and we're this tiny little grain of sand in this giant thing. I'm like, 'How would there not be other life forms?'. There's got to be something other than just us.[154]

Marchant has noted that 'we become part of something bigger' when speculating about extraterrestrial societies and alien intelligence: when viewed through the lens of a universe full of life, humanity becomes 'one point within a vast ocean of possibility'.[155] In total, the participants who mentioned aliens in their survey responses and interviews were either entirely open to the possibility of their existence or already certain of it.[156] The common thread among these participants was that the unresolved question of extraterrestrial existence fuelled a heightened interest in observing and studying the night sky.

Gen Z has been defined as the first generation to grow up with the internet and digital technology from a young age.[157] Research suggests a link between the rise of

[151] Survey Respondent 29.
[152] Marchant, *Human Cosmos*, p. 237.
[153] Marchant, *Human Cosmos*, p. 253.
[154] Interviewee 17.
[155] Marchant, *Human Cosmos*, p. 261.
[156] Survey Respondent 5, 8, 10, 17, 24, 27, 29.
[157] Turner, 'Generation Z', p. 104.

depression and mental health issues in Gen Z and the increase of smartphones and social media.[158] So synonymous are Gen Z to online living, it is almost impossible to imagine this generation without a digital presence. To assess the degree to which apps and/or social media influenced Gen Z's attachment to the night sky, the participants were asked to share details of what astronomy-related apps/social media they used and why (Q6). Overall, the use of apps to aid stargazing was almost evenly split, with 14 reporting that they do not use apps and 15 that they do. For those who utilise apps, *Skylite*, *Stellarium*, *Star Walk 2*, *ISS Tracker*, *NASA* and *Aurora Tracker* were specified for their help in identifying night sky objects in real time and alerting users when an event of interest such as an aurora was to appear.[159] Survey respondent Zara mentioned an astrology app that helps them to track planetary positions and their astrological energies.[160] It is worth noting that four respondents mentioned astrology as an aspect that interests them about the night sky (Q2).[161] Research into the growing interest in astrology amongst younger generations, such as Barbara Kempton's 2020 paper on the connection between millennials and New Age astrology, has proposed that astrology has become increasingly attractive because of its commodification by major brands, its adoption as a coping mechanism for stress and its ability to reintroduce 'magic' into the banality of modern life.[162] Among the participants of my study, those who reported an interest in astrology seemingly channelled that curiosity into real-life interaction and attachment with the night sky. Thus, interest in astrology could be considered a sky substitute for Gen Z, as it provides another avenue for connecting to the cosmos and searching for meaning. As Marchant noted, astrology and astronomy are 'born of the same fundamental human desire to see patterns, order and meaning in the sky'.[163] The remaining participants who did not use apps mostly gave no additional explanation, but Anna stressed that they deliberately 'try to make my time watching the sky to be void of any technology'.[164] For Anna, stargazing provides respite from being on a device of some kind – an increasingly rare occurrence in this digital age.

[158] Twenge, *iGen*, p. 104.
[159] Survey Respondent 2, 3, 5, 6, 11, 12, 18, 20, 21, 22 24, 25, 26, 29.
[160] Survey Respondent 26.
[161] Survey Respondent 5, 20, 26, 27.
[162] Kempton, 'Astrology', pp. 3–4.
[163] Marchant, *Human Cosmos*, p. 63.
[164] Survey Respondent 1.

When asked why they observe the night sky (Q2), 15 participants cited aesthetic beauty as a major factor.[165] Selena said they 'simply find it pretty' while Louise expanded on this, commenting that 'there's just something about the night sky that mesmerises me, it's just so endless and beautiful'.[166] Some survey respondents shared stories of travelling abroad or out of urban areas to experience the beauty of an unpolluted sky. Louise, for example, recounted that while on holiday in the countryside, they saw 'the most stars I had ever seen in my life, it took my breath away and made me marvel at just how pretty and vast the night sky is'.[167] Ellie particularly noted in interview that they often intentionally travel to be able to see the sky:

> There was a meteor shower a couple of months ago and I purposefully drove out really far into the hills away from the city. If I know there's going to be a cool celestial event, I will make an effort to get away from the light pollution to be able to see it.[168]

Mark Bailey called light pollution 'light in the wrong quantity, in the wrong place … at the wrong time'.[169] The vast majority of the British population lives in urban areas where seeing as few as twenty stars is not out of the ordinary.[170] To put this into perspective, in dark sky reserves such as the island of Sark, it is not uncommon to see over five thousand stars on a clear night.[171] In order to witness a clear night sky, recent years have seen a rising trend in astrotourism, whereby urbanites can travel to unpolluted areas to engage in stargazing and observe other celestial events.[172] For Gen Z participants such as Ellie, travelling in order to see the stars can be both a burden and a pleasure, invoking bittersweet feelings about having to travel to see the sky. The transport costs and the travel time involved are significant barriers to viewing a clear night sky. The small trend of astrotourism amongst the Gen Z participants of my study highlights a growing desire among younger generations to

[165] Survey Respondent 2, 5, 11, 12, 13, 14, 16, 17, 18, 19, 20, 25, 26, 28, 29.
[166] Survey Respondent 12, 19.
[167] Survey Respondent 12.
[168] Interviewee 5.
[169] Bailey, 'Dark Skies', p. 6.35.
[170] Wainscoat, 'Magnificent', p. 443.
[171] Blair, *Sark*, p. 12.
[172] Levin, *Incandescent*, p. 211; Clark, *Beneath*, pp. 268–269.

reconnect with nature and seek out experiences that provide a break from artificial environments.

Today, with the beauty of the night sky frequently obscured for many young people due to light pollution, it is unsurprising that seven participants said they looked at images of the night sky through astrophotography, including following dedicated social media accounts and pages that regularly post astronomical content.[173] Quinn wrote that they follow a TikTok creator who conducts livestreams through their telescope, while Zara noted they follow a 'lot of beautiful social media accounts of night sky photographers' on platforms such as Instagram.[174] This suggests that social media serves as a crucial medium for Gen Z participants to reconnect with the night sky when their physical environment does not allow for direct observation. To explore this area further, I asked interviewee Carina about the role played by social media in their astronomy interests. They reflected on the dual impact of social media: not only does it disseminate aesthetically pleasing cosmic images, but it also raises awareness of celestial events among young people. However, they questioned how many individuals would be aware of or care about astronomical events without social media's influence:

> Everyone lives on social media … if something isn't on social media, it isn't relevant, so I think a lot of people get their space news through it. How many people would know about the aurora or the eclipse without their friends posting it on their stories, right?[175]

Social media can, therefore, be seen as a valuable source of new astronomical information and content, described by Clark as providing 'wonder … at the touch of a button'.[176] Sensing that Carina's tone was becoming more critical, I asked about the overreliance on social media by young people, especially in the context of the recent aurora event that captured significant media attention in the UK in May 2024:

> I get a bit of a negative thought … which is … would people have gone out at 3 AM to take photos of the aurora if they didn't have the intention of posting it on social

[173] Survey Respondent 5, 10, 17, 24, 26, 28, 29.
[174] Survey Respondent 17, 26.
[175] Interviewee 29.
[176] Clark, *Beneath*, pp. 266–267.

> media? How many people would have gone out just on their own volition to see it?[177]

This perspective suggests that observing the night sky with the primary intention of posting on social media could be seen as inauthentic, akin to sacrilege. However, viewed more positively, the widespread media attention around such events, alongside the efforts of online content creators, can encourage young people to go outside and stargaze for themselves.

Ultimately, my research found that Gen Z participants' curiosity for the night sky was driven by a desire for new knowledge and experiences, often triggered by the visual allure of the cosmos. Their sense of wonder was inspired by advances in science and technology, media portrayals and a growing interest in extraterrestrial life. Despite the challenges posed by light pollution, social media and virtual experiences played a crucial role in reconnecting participants with the night sky, with platforms such as TikTok and Instagram, where astrophotography and astronomical content thrive, allowing Gen Z participants to engage with the night sky even when direct observation is not possible. There was also a theme of social media pressure potentially stimulating young people to observe and post about night sky events to gain social approval and validation from their online peers. Participants also reported an interest in contemporary astrology, with Gen Z being seen to utilise their astrological interests as an additional avenue for symbolic cosmic connection and real-life interaction with the night sky. Moreover, the use of apps for stargazing, whether through interactive sky maps or astrological charts, highlighted the diverse ways in which Gen Z participants seek to satisfy their curiosity and integrate the beauty of the night sky into their daily lives.

Escaping Life on Earth: Seeking Comfort in the Stars

The next theme that emerged from the Gen Z survey respondents concerned the therapeutic benefits of stargazing, exploring the potential eco-psychological impacts of the sky on mental health and well-being. In this context well-being can be considered, as Rachel

[177] Interviewee 29.

Dodge and others describe, as incorporating the physical, emotional and even spiritual qualities of daily life.[178] When asked why they observe the night sky (Q2), 13 survey participants said it was 'calming', eight said it was 'relaxing' and six noted that the sky had a 'grounding' effect on them.[179] Other feelings that were commonly cited were the sky's ability to promote 'mindfulness', to 'de-stress' and to bring 'comfort', 'peace', 'a feeling of safety' and 'a way of escaping life'.[180] Campion and Ingold have stressed the importance of considering the sky as part of nature when studying the impact of the environment on human mental and well-being.[181] Carl Jung referred to the night sky as a psychological mirror, a therapeutic medium capable of reflecting one's innermost thoughts and feelings.[182] This sentiment was echoed by participants who recalled using the sky as a means of self-reflection and therapeutic engagement.

For many participants, the sky provides an escape from everyday anxieties, and this formed a crucial aspect of why they sought a connection to the night sky (Q2). For example, survey respondent Bebe found solace in the stars when coping with academic stress:

> Going for walks under the quiet night sky really helped me to clear my head and feel more energised when studying for my degree … The quietness and serenity of the night sky always brought me comfort.[183]

Cameron's survey showed that going outside into nature and stargazing helped them manage their panic attacks, while Anna noted how viewing the night sky helped them cope with their OCD tendencies: they lose track of time when they stargaze and this makes them 'feel more connected to nature as opposed to always looking at devices'.[184] For participants such as Bebe, Cameron and Anna, the night sky can act as a remedy for life's stresses. The act of being outdoors amongst nature, under the stars and away from screens and devices had positive eco-psychological effects on them. This is reflected in Jean Twenge's research, which found that increased usage of social media and screen time amongst Gen Z has been

[178] Dodge and others, 'Challenge' pp. 229–230.
[179] Survey Respondent 1, 2, 3, 4, 5, 6, 7, 8, 9, 13, 14, 15, 16, 17, 19, 20, 22, 23.
[180] Survey Respondent 1, 3, 6, 11, 16, 17, 20, 21, 24, 26, 28, 29.
[181] Campion, 'Preface', pp. xx–xxii.; Ingold, 'Earth, Sky', p. S25.; Ingold, *Being Alive*, pp. 126–127.
[182] Freud and Jung, *Freud/Jung Letters*, p. 421.
[183] Survey Respondent 28.
[184] Survey Respondent 1, 3.

linked to unhappiness and mental health issues.[185] Twenge's work suggests that the apparent rise in depressive issues among Gen Z, compared to the reported positive satisfaction levels of previous generations such as millennials, coincided with the time when smartphones and online social interaction became the everyday norm.[186] Blair's research on Sark similarly underscored how stargazing can aid mental health and well-being, reducing stress and promoting relaxation.[187]As Matt Haig wrote, 'When looking at the sky, all our 21st-century worries can be placed in their cosmic context'.[188] By using the sky as a fixed point of personal reflection, one can begin to minimise daily stresses by placing them in the context of an infinite universe.

The lived experiences described by Gen Z participants highlight Ingold's work on phenomenology and the importance of experiencing the environment through direct sensory interaction.[189] For instance, Gina's response to the survey question on powerful night sky experiences (Q3) capture these sensorial aspects of stargazing while sharing the experience of a night under the stars in Greece:

> On a beach with very little light pollution, the air was a perfect temperature, the sky black and the stars shining so brightly. I felt connected to myself and began reflecting internally on how I got there. The sky was a point of calmness and reflection.[190]

Gina describes the physical sensations of experiencing the environment at that moment, from the temperature of the air to the visual captivation of the twinkling stars, as well as how these sensations added to the emotional impact of the cosmic spectacle. Jung believed that celestial encounters like these allowed people to explore their unconscious minds, fostering a sense of wonder and calming introspection.[191] One interviewee, Xavier, said that these moments brought them 'serenity' through 'being able to feel totally at peace and detached from my earthly self'.[192] Xavier's sentiments echo those of Gina, emphasising the

[185] Twenge, *iGen*, p. 112.
[186] Twenge, *iGen*, p. 104.
[187] Blair, *Sark*, p. 116.
[188] Haig, *Nervous*, pp. 273–275.
[189] Ingold, *Being Alive*, pp. 126–127.; Ingold, 'Earth, Sky', p. S25.
[190] Survey Respondent 7.
[191] Freud and Jung, *Freud/Jung Letters*, p. 421.
[192] Interviewee 24.

emotional and psychological effects of direct sensory engagement with the night sky. These personal narratives illustrate Ingold's concept of phenomenology by highlighting how such encounters with nature can help embody a connection with the environment.

Robert Zajonc has noted that those who engage in repeated night sky watching may form an attachment through familiarity and exposure.[193] Some participants exhibited this kind of familiar attachment, using the sky as a reassuring constant to which they could anchor themselves. For example, Anna said that they routinely look up at the stars each night, remarking that 'it started off as a way of grounding myself before ending the day'.[194] Another interviewee, Quinn, shared a similar nightly routine in which spotting familiar objects in the sky provided a sense of comfort:

> I go out every night just to see what I can see, because I find it really nice looking at them because they're familiar … I look for the Seven Sisters, the Big Dipper or Orion's belt. You know, it's just nice to see things that you recognise. Especially if I get a nice view of the moon. It's more about the familiarity.[195]

Through this recognition of familiar night sky objects, such as the constellations and the moon, participants like Quinn found comfort and security by incorporating the night sky into their daily routine, thus contributing to a sense of attachment through familiarity, as Zajonc suggested. When asked why this routine is important to them, Quinn explained that 'it is the only time I feel in tune with nature'.[196] There is a growing body of literature that attests to the benefits on mental health and well-being of spending time in nature.[197] These health benefits have been linked to feelings of being more closely connected to the environment, often referred to as 'nature connectedness'.[198] Beth reported in the survey a notable sense of this nature connectedness through their affinity to the sky, sharing that the night sky was a 'focal point' in their life and that no matter what they might be going through, they could routinely go outside and 'look at those same stars and moon and be reassured'.[199] For

[193] Zajonc, 'Mere Exposure', pp. 224–225.
[194] Survey Respondent 1.
[195] Interviewee 17.
[196] Interviewee 17.
[197] Van Gordon, Shonin and Richardson, 'Mindfulness', pp. 1655–1656.; Wyles and others, 'Natural Environments', pp. 113–114.
[198] Van Gordon, Shonin and Richardson, 'Mindfulness', p. 1655.
[199] Survey Respondent 2.

participants like Quinn and Beth, the familiarity of particular celestial features provides comfort and reassurance as a result of their consistent presence in the skyscape.

In total, 24 Gen Z participants surveyed noted therapeutic and calming benefits from stargazing, including positive eco-psychological effects of connecting with nature through the night sky. Some of these participants specifically noted the sky's role in helping them cope with daily stresses, whether as a means of managing academic pressure or as a form of therapy for mental health issues. Additionally, a sense of comfort and reassurance was reported by participants who included night sky watching in their daily routine. The findings of this study further indicate a link between the familiarity of celestial objects and a perceived sense of attachment to the sky.

Concern for the Future: The Cultural Impact of Losing the Stars

The final theme explored in the survey was Gen Z's relationship with the modern-day sky and how they feel about night sky impediments, such as light pollution and a greater number of satellites (Q7). As already reported the majority of the British public now live in urban areas where seeing less than twenty stars in inner-city skies and no more than two hundred stars in the suburban outskirts is the typical nocturnal experience.[200] Not only is this visual obstruction an affront to the 'scientific, cultural and environmental heritage of humanity', as Andrea Sosa has argued, but light pollution poses a significant threat to what younger and future generations can see in the night sky.[201] Levin has warned that if this continues people of the future may never know what a dark sky could look like, and astronomers are now raising concerns that the increase in artificial satellites will soon alter the appearance of the night sky beyond recognition.[202] As Aaron remarked in the survey, 'to lose sight of the stars means losing sight of our past and our history'.[203] This growing

[200] Wainscoat, 'Magnificent', p. 443.
[201] Sosa, 'Turn Off', p. 329.
[202] Levin, *Incandescent*, p. 135.; Sosa, 'Turn Off', p. 330; Marchant, *Human Cosmos*, p. 3.
[203] Survey Respondent 27.

disconnect from the night sky threatens the appreciation of its beauty, cultural significance and scientific understanding, leading to a profound loss.

To assess Gen Z participants' relationship to the contemporary night sky, Q7 asked whether potential barriers such as excessive artificial lighting and/or increased satellites concerned or affected them in any way. Overall, the responses showed a lack of concern and a surprisingly positive reaction to satellites, with the two participants who mentioned satellites stating their fondness for them as regular features of the night sky.[204] For instance, Cameron stated that they 'like the fact that there are more satellites, it gives us more to look at'.[205] The affection for satellites demonstrated by these participants reflects Zajonc's theory, suggesting that familiarity with celestial objects, including in this instance artificial ones, can help foster an attachment to the night sky.[206] The survey responses revealed a striking contrast between the favourable perception of satellites and the negative attitude towards light pollution, with 18 Gen Z participants stating that the inability to see stars due to light pollution was a problem that directly affected them or concerned them (Q7).[207] For respondents like Gina and Ellie, the ecological impact of artificial lighting on wildlife was a deep concern.[208] In interview, Ellie expressed worry about how light pollution affects the natural environment and its detrimental effects on human, animal and plant health:

> I feel worried for future generations, and for current generations, because light pollution so immensely impacts our experience of the night sky, our health and our environment. Light pollution worries me more for the environmental impact on nature, plants and animals, but also for human circadian rhythms.[209]

Studies on the impact of light pollution on human health have found links to increased breast cancer risk and disturbed sleep patterns, while the implications for other fauna and flora include disturbances to the behaviour, circadian rhythms, physiology and population sizes of many animals, including insects, fish, turtles, frogs, birds and other nocturnal mammals.[210] Recent research has even indicated a link between light pollution and climate

[204] Survey Respondent 3, 18.
[205] Survey Respondent 3, 18.
[206] Zajonc, 'Mere Exposure', pp. 224–225.
[207] Survey Respondent 2, 3, 4, 5, 6, 7, 10, 11, 13, 18, 19, 21, 22, 24, 25, 26, 28, 29.
[208] Survey Respondent 5, 7.
[209] Respondent 5.
[210] Chepesiuk, 'Missing', p. A24.; West, *Secret World*, pp. 18–19.

change, where poorly directed and excessively bright lighting in the USA and Europe has been shown to be equivalent to the carbon dioxide emissions of almost twenty million cars.[211] These worrying ecological impacts of light pollution are not discussed enough in mainstream discourse, despite their far-reaching consequences. As Francis-Baker wrote, 'The "health" of the night sky is connected with the health of everything else on the planet'.[212]

To better understand Ellie's perspective, I asked them to expand on why they felt these ecological aspects were a particular concern for current and future generations. Ellie reiterated that reconnecting with nature through the night sky can help alleviate the stresses of the modern world:

> With social media, TV, living in a capitalist society, loneliness and mental health issues being so prevalent, I really believe that regaining a sense of connection with the land, nature and the sky is a huge way to reconnect with yourself and others.[213]

In this way, the night sky can be seen as a catalyst for enchantment and a connection with nature. Alongside natural heritage, Campion believes that the sky is crucial in developing a thorough understanding of cultural inheritance.[214] This also concerned survey respondent Xavier, who said that the cultural and physical disconnection caused by light pollution not only worries them regularly but also feels like it is only 'going to get worse in the future'.[215] This concern for the future was a recurring thread in the responses of participants who said they were affected by light pollution. For Gen Z in the UK, light-polluted skies are the norm, but for those who engage in astronomy or stargazing, this fact can be a troubling reminder of humanity's exploitation of the planet.[216]

[211] Eklöf, *Manifesto*, pp. 16–17.
[212] Francis-Baker, *Dark Skies*, p. 126.
[213] Interviewee 5.
[214] Campion, 'Preface', pp. xx–xxii.
[215] Survey Respondent 24.
[216] Falchi and others, 'New World Atlas', p. 4.

The increasing mental health challenges faced by Gen Z are often associated with 'climate anxiety', a form of psychological distress related to the ongoing ecological crisis.[217] Over the past twenty years, those growing up have been consistently confronted with disturbing reports about the planet's environmental degradation, leading to heightened environmental concerns among younger people.[218] When asked how light pollution worries them, Daniel reported how difficult it is to find places unplagued by artificial lighting and how this may impact the level of interest in astronomy for future generations:

> It can be so challenging to find local places where light pollution is limited, and this problem is only going to get worse. As many people would now be reluctant to travel a long journey to find a suitable stargazing spot. The stargazing and astronomy community may shrink in size from generation to generation.[219]

As the experience of a starry night sky fades into obscurity in coming generations, Daniel worries that interest in stargazing and astronomy more generally may fade with it. This was also mentioned in Quinn's interview, where they stressed the importance of being exposed to the night sky in youth to inspire care and an interest in it:

> If you don't know what you're missing out on, you won't be upset about it. For younger people, light pollution is the standard that they have grown up in. That worries me.[220]

Daniel and Quinn express a concern that, as nature is increasingly diminished over time, children raised in such degraded environments come to perceive these conditions as normal.[221] Jacob Hoerger has argued that one of the most profound costs of the diminishing night sky is that current and future generations are incrementally losing 'a powerful reminder of our finitude'.[222] Dacher Keltner's research on the importance of experiencing awe (defined as the feeling experienced when confronted with something vast, transcending one's usual frame of reference) has shown that a healthy society requires access to the bigger picture.[223] Keltner and his colleague wrote in a 2015 *New York Times* article that awe deprivation has played a part in the wide-scale societal shift in the last five decades in which people have become 'more individualistic, more self-focused, more

[217] Hickman and others, 'Climate Anxiety', p. 863.
[218] Hickman and others, 'Climate Anxiety', pp. 866–867.
[219] Survey Respondent 4.
[220] Interviewee 17.
[221] Kahn and Weiss, 'Children', p. 8.
[222] Hoerger, 'Missing', p. 116.
[223] Keltner and Haidt, 'Approaching Awe', p. 303.; Piff and Keltner, 'Why Do We Experience Awe?', 2015.

materialistic and less connected to others'.[224] Thus, the loss of the night sky signifies more than just the absence of stars; it represents a diminishing connection to the natural world and one another.

To counteract this cultural-environmental degradation, Ellie actively tries to encourage their younger relatives to go stargazing and learn about astronomy:

> I've got younger cousins, and I find myself often trying to encourage them to be fascinated by the stars and to make sure that it's something that they're aware of … It's important to protect our right to view the stars. It worries me, mostly for the younger generations.[225]

Quinn and Ellie found it important to try to instil a sense of wonder about the night sky in children while they are young; otherwise, there is a risk that they grow up apathetic to it. Light pollution poses a particular threat to experiencing this wonder, and Gen Z participants found this particularly concerning as they noted that their own fascination and sense of wonder for the night sky were instilled in them during their childhood and adolescence. Carina, in interview, similarly noted uncertainty and a concern for future generations; however, they also observed that space technology and astronomical research are advancing into a new age of exciting discovery and that children of the future will be exposed to currently undreamt-of advances in space science.[226]

In summary, most Gen Z participants voiced significant concerns about light pollution, emphasising its disastrous ecological impacts and its role as a barrier to connecting with nature and cultural heritage. The diminishing night sky raised fears among participants that future generations may lose interest in astronomy and nature, thus jeopardising the legacy of awe and wonder that has long connected humanity to the wider universe. In our discussions, interviewees highlighted the importance of encouraging children to observe and learn about the night sky to inspire future interest in the study and enjoyment of the night sky. Surprisingly, of the two participants who mentioned increasing

[224] Piff and Keltner, 'Why Do We Experience Awe?', 2015.
[225] Interviewee 5.
[226] Interviewee 29.

artificial satellites in their survey, both expressed a fondness for satellite watching, viewing them as regular and enjoyable features of the night sky. This unexpected interest in satellites illustrates the dynamic ways in which technological advancements can shape night sky attachment in the modern age. Despite concerns of light pollution, there was a sense of optimism among some Gen Z participants that advances in astronomical research and technology will empower future generations to reconnect with the universe, fostering a more environmentally conscious society in the process.

Conclusion

This dissertation sought to explore the ways in which young people of Generation Z (classified by Twenge to include people born between 1995 to 2012) seek out a connection to the night sky in the modern age.[227] Gen Z, often characterised by their digital nativity and social consciousness, has a unique relationship with the night sky. Unlike previous generations, this cohort has had access to advanced technology from a young age and this digital advantage has allowed them to engage with astronomical phenomena in ways that were previously unimaginable, fostering a distinct bond with the night sky. Kelly defined the psychological and emotional attachment to the night sky as 'noctcaelador,' and his research on the phenomenon has examined the various ways individuals form and maintain this connection.[228] Using Kelly's Noctcaelador Inventory statements and open-ended questions, results from the 29 surveys revealed the majority of Gen Z participants have a strong positive emotional and psychological attachment to the night sky. The data indicated that stargazing is not only enjoyed by participants but that repeated exposure to celestial phenomena has potentially strengthened this attachment over time. Behavioural prompts (used in this study to assess the physical actions and habits of participants relating to the night sky), while still yielding positive responses, showed a higher frequency of neutral and negative reactions compared to emotion-based prompts, suggesting that commitments like academia and work, and other factors such as light pollution may limit prolonged stargazing for some Gen Z. The analysis of the survey data and the subsequent four interviews from

[227] Twenge, *iGen*, pp. 2, 6.
[228] Kelly, 'Noctcaelador', p. 100.

this dissertation uncovered six major themes among Gen Z respondents: the night sky linked to childhood memories; the night sky as a means for ancestral and cultural reflection; the night sky inspiring transcendent and spiritual experiences; the night sky as a subject of curiosity and beauty; the night sky as a means of escape and comfort; and concern for the loss of the night sky.

Among the Gen Z participants, childhood experiences with the night sky, particularly those shared with family, friends and neighbours, played a vital role in the development of their noctcaelador. These shared moments fostered personal connections and highlighted the recreational and social importance of the night sky in creating a sense of unity. While some participants experienced a lack of encouragement or indifference from adults during their childhood, most emphasised the crucial impact of early exposure to stargazing, which led to positive feelings of nostalgia and wonder in the present day. Research by Gallaway has highlighted stargazing's community-building benefits, while Dunnett proposed a link between noctcaelador and awe-inspiring childhood memories that inspired fascination with the night sky and connections with ancient people and landscapes.[229] Similarly, my research revealed that the night sky serves not only as a tool for fostering community bonds and interpersonal connections, but also as a medium for relating to ancestors and historical people. Participants were able to forge a sense of continuity with the past through direct observations of the night sky, experiencing a connection to historical narratives and cultural traditions. This symbolic connection to the past allowed them to reflect on the shared human experience, underscoring the night sky's enduring importance in understanding cultural heritage as Campion has argued.[230] Light pollution presents a significant threat to authentic night sky experiences for younger generations, potentially depriving them of the opportunity to engage in these profound celestial encounters. In my study, such formative experiences have been shown to spark interest in science, astronomy, and a deeper appreciation for the natural world, fostering a sustained admiration and positive nostalgia for the night sky in Gen Z.

[229] Gallaway, 'On Light Pollution', pp. 76–77.; Dunnett, 'Contested Landscapes', p. 625.
[230] Campion, *Ast and Cosm*, p. 1.

The next significant theme emerging from my research pertains to the profound transcendental and spiritual experiences associated with celestial phenomena, as articulated previously by both Blair and Mathews.[231] The concept of transcendence encompasses a variety of phenomenological responses to nature, particularly the feelings of connection and unity with the environment.[232] A substantial majority of Gen Z participants reported having transformative experiences while gazing at the night sky, highlighting how phenomena such as meteor showers and full moons can evoke spiritual reflections and alter one's perspective. Many respondents articulated a sense of humility and a recognition of their connection to a larger existence, which resonates with Kant's philosophy of perceiving oneself as a 'mere speck in the universe' when surveying a star-studded sky.[233] These insights underscore the spiritual benefits of stargazing, with numerous participants indicating an enhanced spiritual well-being from engaging directly with the sky. This observation suggests that, akin to countless generations preceding them, certain individuals from Gen Z utilise the night sky as a spiritual refuge. This practice continues the enduring human tradition of seeking meaning and solace in the stars. The night sky serves as a poignant reminder of humanity's position within the broader cosmos as well as the transitory nature of our existence. In an era increasingly dominated by digital landscapes, where artificial lighting frequently impedes one's ability to directly observe the cosmic expanse, the preservation of dark skies becomes essential. Such preservation would grant younger generations the opportunity to directly experience the night sky's true magnitude and beauty, a spectacle that is inherently their birthright.

Another consistent theme that arose was the influence of curiosity and aesthetic appreciation on the noctcaelador of Gen Z participants. My findings indicated that their curiosity about the night sky was stimulated by a longing for knowledge and new experiences, often sparked by the captivating visuals of the cosmos. The sense of wonder exhibited by these individuals was found to be further fuelled by media representations and

[231] Blair, *Sark*, pp. 116–119.; Mathews, *Ecological*, pp. 149–151.
[232] Blair, *Sark*, pp. 85–86.
[233] Kant and Beck, *Critique*, p. 166.

advances in technology and fascination about extraterrestrial life. Many respondents reported that their curiosity for the night sky was significantly shaped by various forms of media, including space documentaries and science fiction films, as well as prominent personalities in the fields of astronomy and space exploration, particularly figures like Professor Brian Cox and Elon Musk. Even though true darkness is becoming increasingly rare in the modern age, technology—like powerful telescopes, stargazing apps, and high-definition computer graphics—has granted young people today unprecedented access to astronomical knowledge and imagery. Clark argued that these technological advancements are restoring wonder of the night sky amidst the challenges posed by light pollution.[234] This perspective resonates with the experiences shared by my research participants. For example, nearly half of Gen Z participants reported utilising apps to enrich their stargazing experiences, in turn deepening their understanding and appreciation. Conversely, the remaining participants expressed a sense of indifference towards such applications; some preferred to engage in stargazing as a means of taking a break from their screens, reconnecting with nature without the interruption of technology. For a minority of participants, there was a reported interest in astrology, with some noting use of astrology apps to help track planetary positions. Much like using media portrayals of space to reintroduce the cosmos to the daily lives of modern people, astrology in this context can be conceptualised as a sky substitute for Gen Z, reintegrating the night sky into the lives of young people who may otherwise feel disconnected from direct celestial experiences.

Additionally, social media platforms, particularly Instagram and TikTok, have emerged as significant contributors to the heightened interest in astronomy among Gen Z participants. Discussions with participants captured a discernible pressure on social media that may motivate young people to observe and share experiences of night sky events. This was seen to potentially encourage night sky watching behaviour, but for the purpose of seeking social acceptance and validation. Other participants noted following social media accounts that focussed on astrophotography. This engagement allows them to maintain a connection with the night sky, even when direct observation is not possible. Moreover, a

[234] Clark, Beneath, pp. 266–267.

salient theme that surfaced among Gen Z participants was the inquiry into alien life, with several of them expressing a deep-seated curiosity regarding the existence of aliens and extraterrestrial civilisations. Marchant articulated that this fundamental question incites profound existential reflections pertaining to the meaning of life.[235] Furthermore, recent advancements in space exploration have compelled individuals to confront the prospect of a universe teeming with extraterrestrial beings. This curiosity serves as a crucial impetus driving Gen Z's interest in the night sky, underpinned by the unresolved query of our uniqueness in the cosmos. Considering challenges such as light pollution, these elements collectively foster a renewed sense of wonder and engagement with the night sky among Gen Z, propelled by technological advancements, media influence, and a desire to reestablish a bond with the cosmos.

In the modern age, where there is a focus on living life behind a screen, through new smart devices and social media, there was a strong theme amongst Gen Z participants of my study to use the sky as a way of escaping that digital pressure and reconnecting with the natural world. When asked why they observe the night sky, respondents highlighted the therapeutic benefits of stargazing, revealing the eco-psychological impacts of the night sky on mental health and well-being. An extensive majority reported experiencing heightened feelings of calmness, relaxation, and comfort that stemmed from their engagement with the sky, illustrating its role in fostering mindfulness and alleviating the stresses of everyday life. Campion and Ingold have respectively emphasised the importance of considering the sky as part of nature when studying the environment's impact on psychological health.[236] This perspective was reaffirmed by numerous Gen Z participants, who identified stargazing as a valuable coping mechanism for managing academic stress, panic attacks, and various mental health challenges through a restorative reconnection with nature. The night sky emerges as a sanctuary, offering an escape from terrestrial anxieties. The lived experiences described by participants highlight Ingold's work on phenomenology and the importance of sensory engagement with the environment during stargazing.[237] Participants' recognition of

[235] Marchant, *Human Cosmos*, p. 261.
[236] Campion, 'Preface', pp. xx–xxii.; Ingold, 'Earth, Sky', p. S25.; Ingold, *Being Alive*, pp. 126–127.
[237] Ingold, *Being Alive*, pp. 126–127.; Ingold, 'Earth, Sky', p. S25.

common celestial features, such as constellations and the moon, provided comfort and a sense of reassurance, fostering an attachment to the night sky through familiarity. Some individuals noted incorporating stargazing into their nightly routines, thereby strengthening their connection to nature and ensuring a consistent source of reassurance. These findings reflect the concept of nature connectedness, supported by literature demonstrating the mental health benefits linked to spending time in natural settings.[238]

The final theme explored in my research concerned Gen Z's connection with the contemporary night sky, particularly regarding challenges such as light pollution and the proliferation of satellites. A significant portion of the British population now reside in urban environments that severely restrict stellar visibility due to artificial lighting. This issue has garnered considerable attention from Gen Z, with many respondents expressing feelings of outrage, sadness, and frustration about having to live in a landscape largely devoid of starlight. Most participants identified light pollution as a significant detriment, directly affecting their capacity to observe celestial bodies and eliciting concern over the ecological damage inflicted on the planet. In contrast, reactions to the growing number of satellites were notably more favourable. The two participants who referenced satellites expressed a fondness for them as consistent and recognisable elements of the night sky, suggesting that satellites could serve as alternatives to natural phenomena such as meteors and comets. This unexpected interest reiterates the complex ways in which technological progress influences contemporary nocturnal experiences. However, the persistent detachment from the night sky resulting from light pollution poses a threat to the acknowledgment of its aesthetic beauty, cultural importance, and scientific relevance, as articulated by Campion.[239] This notion resonates with Levin's concern regarding the extinction of dark sky experiences, emphasising the necessity of safeguarding the night for forthcoming generations.[240] Concerns regarding the environmental and health ramifications of artificial lighting were prevalent, with participants noting its negative impact on both wildlife and human health. Additionally, participants expressed fears about future generations potentially losing

[238] Van Gordon, Shonin and Richardson, 'Mindfulness', p. 1655.
[239] Campion, 'Preface', pp. xx–xxii.
[240] Levin, Incandescent, p. 135.

interest in astronomy and nature due to reduced visibility of the night sky. Nevertheless, there was a prevailing sense of optimism that advancements in space technology and astronomical research could help reinvigorate interest in the cosmos for future generations. As the night sky continues to evolve, so too may cultural narratives and traditions adapt in response, ensuring the sky remains an endless source of inspiration for those who engage with its wonders.

To conclude, for Gen Z participants the night sky represents a shared legacy that evokes past connections and future aspirations; their continued interest in stargazing and astronomy influenced by their unique digital upbringing and modern lifestyle. Their insights contribute to a broader understanding of how societal factors shape young people's connection to nature and the wider universe. Despite the obstacles posed by light pollution and the demands of modern living to traditional stargazing practices, this dissertation brings to light the evolving nature of noctcaelador among Gen Z, emphasising the interplay between technological advancement and environmental changes in shaping their cosmic connection. Ultimately, Gen Z participants found profound meaning in stargazing often turning to the night sky for comfort and inspiration —an enduring canvas for reflection and creativity. The night sky stands as a testament to the universe's vastness and humanity's role within it, nurturing a sense of connection and curiosity about the world beyond. Whether through astrophotography, stargazing apps, or simply lying under the stars, Gen Z remain captivated by the mysteries and allure of the night sky, blending ancient wonder with contemporary culture.

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Appendix

Noctcaelador Inventory

Using the following scale, please select the number which best indicates how much you typically disagree/agree with each statement, i.e. how would you describe yourself in general.

1 = Strongly Disagree
2 = Disagree
3 = Not Sure or Neutral (neither agree or disagree)
4 = Agree
5 = Strongly Agree

1. I feel an emotional attachment to the night sky.	1	2	3	4	5
2. I become mesmerised while looking at the night sky.	1	2	3	4	5
3. I could spend all night just looking at the sky.	1	2	3	4	5
4. I like to go outside and look at the sky at night often.	1	2	3	4	5
5. Having time to look at the night sky is important to me.	1	2	3	4	5
6. I find more pleasure in looking at the night sky than most people.	1	2	3	4	5
7. Looking at the night sky pleases me.	1	2	3	4	5
8. I somehow feel connected to the night sky.	1	2	3	4	5
9. I'm very fond of the night sky.	1	2	3	4	5
10. I very much adore the objects in the night sky.	1	2	3	4	5