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Research Paper

Measuring Happiness with a Scientific and Philosophical Perspective: A Brief Review

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Abstract
Happiness is a complex emotion that is only subjectively measured. History and ongoing research have confirmed that different variables influence an individual's degree of happiness, but even with the immense data collected through neuroscience, the epicenter and precise determinants of happiness have not been defined. The primary remaining questions surround how to measure happiness when there is so much variability across cultures, societies, and economic circumstances. Even with the longstanding body of research and historical records, we have much to learn about how to analyze and measure happiness. The future of research needs to incorporate a great synthesis of current knowledge and data while determining new methodological approaches to assessing levels of happiness and well-being. The continuation of this body of research is full of potential and interesting developments in the meaning of happiness.

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I. Introduction

The word "happiness" describes apositive emotion that is felt by most but not widely understood. It is a state of well-being that individuals experience in diverse ways, whether through the joy of receiving a long-awaited gift, the warmth of an embrace from a loved one, or the deep sense of accomplishment perceived after overcoming a significant challenge. Happiness has emotive diversity.Happiness is not always experienced equally; some moments bring greater joy than others, and the intensity and duration of happiness can vary dramatically between individuals. This variability promptsan essentialquestion: Can happiness be measured? Despite significant advancements in neuroscience, psychology, and technology, happiness remains verydifficult to quantify accurately.Moreover, happiness can be an intermittent feeling that one has and then that may diminish over time; in other words, happiness is not a steady emotional state, though it can be experienced for extended periods of time.

The individual's pursuit of happiness has been a central theme in human thought for centuries, deeply embedded in philosophical, psychological, and even political discourse (Myers and Diener, 2018). Historically, the fields of psychology and philosophy have investigated the nature of happiness, with prominent thinkers offering varying definitions and interpretations. Aristotle, for instance, proposed the concept of eudaimonia, often translated as "flourishing" or "the good life," which he argued was achieved through virtue and the fulfillment of one's potential (Reece, C., 2019). In contrast, Confucius emphasized happiness as harmony within oneself and in relationships with others, advocating for a life of moral righteousness, respect, and social balance (Setton, M. et al., 2025). Finally, John Locke, a key figure of the Enlightenment, linked happiness to personal liberty and the pursuit of pleasure, laying the groundwork for happiness to be seen as a fundamental right—a notion later enshrined in the United States Declaration of Independence (Zou, 2025).

In contemporary discussions, happiness is investigated both philosophically and scientifically. The rise of psychology as a distinct discipline in the late 19th and early 20th centuries led to systematic attempts to define and measure happiness through empirical research (Myers and Diener, 2018). In modern psychology, happiness is often investigatedusingsubjective well-being (SWB), a term coined by psychologist Ed Diener (1984), which encompasses emotional experiences, life satisfaction, and an individual's cognitive evaluation of their own well-being. Numerous psychological scales, such as the Satisfaction with Life Scale (SWLS) and the Positive and Negative Affect Schedule (PANAS), have been developed to assess happiness by analyzing people's self-reported emotions and overall satisfaction with life (Myers and Diener, 2018). These tools have

contributed profoundlyto understanding happiness, but they remain limited by their reliance on self-assessment, which can be influenced by personal bias, subjectivity, and external variables. Generally, happiness is fluid and multifaceted and determining its basis takes dedicated and varied research efforts.

Beyond standard psychology, neuroscience has increasingly promoted a more defined and expansive understanding of happiness by investigating the biological and neurological mechanisms underlying positive emotions. Research in this field has revealed that happiness is closely linked to brain activity, particularly in areas such as the prefrontal cortex, the amygdala, and the ventral striatum (Alexander et al., 2020). Furthermore, neurotransmitters such as dopamine, serotonin, oxytocin, and endorphins play a crucial role in regulating mood and pleasure and have been determined to be elevated and active in happiness-associated brain regions (Alexander et al., 2020). Functional Magnetic Resonance Imaging (fMRI) and Electroencephalography (EEG) are commonly used to study brain activity during experiences of happiness, offering insights into how emotions manifest at the neural level (Alexandar et al., 2020). Despite these advancements, however, no definitive neurological marker for happiness has been identified, making it difficult to quantify happiness objectively or discretely.

The challenge of measuring happiness is further complicated by the influence of cultural, social, and economic factors. What constitutes happiness differs across cultures and societies, reflecting variations in values, traditions, and life priorities. For instance, Western beliefs tend to emphasize individual achievement, personal freedom, and material wealth as key contributors to happiness, while Eastern cultures, particularly those influenced by Confucianism and Buddhism, often associate happiness with social harmony, familial bonds, and spiritual fulfillment. The World Happiness Report **(**Helliwell et al. (2024), an annual study that ranks countries based on factors such as GDP per capita, social support, healthy life expectancy, and perceived freedom, highlights the significant affectthat societal conditions play in shaping happiness levels. However, such reports rely heavily on survey data and self-reported well-being, which may not fully capture the intricacy of happiness. Further, individuals may not recognize shifts from happiness to other mood states or be able to identify when or why they occur.

Fundamentally, happiness is inherently dynamic—it fluctuates over time and is influenced by an individual's circumstances, personality, and even genetics. Studies in behavioral genetics suggest that up to 50% of happiness may be heritable **(**Mirjam, S. et al. (2010), meaning that genetic predispositions influence how people generally experience positive emotions. However, external factors such as life events, relationships, career success, and health contribute substantially to promoting happy emotions. Complexinterplay between biological and environmental determinantsmakes the measurement of happiness even more challenging and seemingly out of the realm of possibility.

Great technological advancements could be part of the answer. In recent years, artificial intelligence (AI) and big data analytics have emerged as new tools in the study of happiness (Owaga et al., 2022). By analyzing vast amounts of data from social media, online interactions, and digital behavior, AI algorithms can identify patterns in people's emotional expressions and predict trends in happiness levels across populations. For instance, sentiment analysis of social media posts can provide real-time assessments of public mood, which can be useful for governments and policymakers in designing initiatives to improve well-being (Hu, 2022). Unfortunately, these methods raise ethical concerns, particularly regarding privacy, data accuracy, and the risk of data misinterpretation. These issues are standard with the increased usage of AI as a method to investigate different thoughts and ideas.

Despite the vastefforts across multiple disciplines, the fundamental question remains: Can happiness truly be measured and what might we gain from its measurement? The answer remains unclear. While scientific advancements have provided valuable insights into the biological, psychological, and social determinants of happiness, no single metric has yet captured its full complexity. Some scholars argue that happiness is too subjective and multifaceted to be reduced to a numerical value, while others believe that a more sophisticated combination of neuroscience, psychology, and technology may eventually provide a reliable andsufficientmetric.

Understanding happiness is not just an academic pursuit—it has profound implications for society. Governments, healthcare professionals, and organizations around the world are increasingly recognizing the importance of happiness and well-being in shaping policies and improving quality of life. The emergence of positive psychology, a field dedicated to studying human flourishing and well-being, has led to greater emphasis on fostering happiness through mindfulness, gratitude, and personal growth (Wang, Guo, & Yang, 2023). Similarly, economists are exploring ways to incorporate happiness metrics into policy decisions, shifting the focus from traditional economic indicators such as GDP to measures of Gross National Happiness (GNH), as pioneered by Bhutan (Lepeley, 2017).

In conclusion, happiness is a deeply personal (it is experienced differently interpersonally) yet universally sought-after emotional experience. It has been the subject of philosophical inquiry for millennia and continues to be a focal point of scientific research today. And philosophically speaking, the idea of having happiness is still very interesting to intellectuals.
While the interest in this emotion is still deep, its study creates even further questions to be disentangled.The

accurate measurement of happiness remains elusivedue to its subjective nature, cultural variability, and the limitations of current scientific methods. While advances in psychology, neuroscience, and artificial intelligence have provided valuable insights, they have not offered a definitive method for quantifying happiness. The detectionof a reliable measurement of happiness is an ongoing challenge—one that requires an interdisciplinary approach that combines philosophical thought, scientific rigor, and ethical consideration. As research progresses, the resolutionto understanding and measuringhappiness in an attempt to improve livesand contribute to shaping societies that fundamentally prioritize well-being should be not only a scientific endeavor but an important moral goal as well. .

The deep history of happiness is an interesting place to investigate because of the hundreds of years of thought that helped shape our current ideas on this emotion. While we have started by discussing the basic, modern, methods that are being used to investigate this mood of positivity, it is of pedagogical importance to examine the earliest iterations of happiness. Ancient Greece is a good starting point for this part of the continued discussion.

Ancient Greek Perspectives: Eudaimonia vs. Hedonism

In ancient Greece, happiness was a central concern of philosophy, with different schools of thought offering competing views on its nature and attainment strategy. Aristotle, one of the most influential thinkers in Western philosophy, argued that true happiness, or eudaimonia, was not simply about experiencing pleasure but about achieving a flourishing life through virtuous living (Delle, 2020). In his work *Nicomachean Ethics*, Aristotle maintained that eudaimonia is the highest human good and can only be attained through rational activity in accordance with virtue (Pakaluk, 2005). He identified two types of virtues: intellectual virtues, which include wisdom and understanding, and moral virtues, such as courage, justice, and temperance (Delle, 2020). According to Aristotle, happiness is not an emotion that fluctuates with circumstances, but a long-term state of well-being achieved through personal development and ethical living (Pakaluk, 2005). Considering modern philosophy and research, happiness can be defined as both ephemeral and existing in a long-term state; there are probably different types of happiness that could be classified as possessing these characteristics.

Interestingly, theAristotelian concept of happiness contrasts with the hedonistic perspective of other Greek philosophers, particularly Epicurus and his followers. Epicurus proposed that happiness is found in the pursuit of pleasure and the avoidance of pain (Annas, 1987). However, his idea of pleasurewas not indulgent or excessive but rather centered on ataraxia, a state of tranquility and freedom from distress. He argued that simple pleasures, such as friendship, intellectual pursuits, and the absence of fear, were the key to a happy life. Unlike Aristotle, who saw happiness as an objective condition tied to virtue, Epicurus viewed it as a subjective experience based on personal contentment (Annas, 1987).

Eastern Philosophical Perspectives on Happiness

While ancient Greek thought laid the foundations for much of Western philosophy, Eastern traditions have offered distinct perspectives on happiness, often emphasizing harmony, self-cultivation, and spiritual well-being.

Confucianism and Happiness as Ethical Living

Confucius (551–479 BCE), the Chinese philosopher whose ideas profoundly shaped East Asian cultures, viewed happiness as a byproduct of ethical living and fulfilling one's social responsibilities. In contrast to the individualistic approaches of Aristotle and Epicurus, Confucian happiness is deeply relational and tied to one's role within the family, community, and society. According to Confucius, a harmonious life is achieved through the practice of ren (benevolence), li (ritual propriety), and xiao (filial piety). These values emphasize respect, duty, and moral integrity as essential components of happiness (Wu, 2022).

In Confucianism, happiness is not merely an internal emotional state but a reflection of one's ability to maintain social harmony and uphold ethical principles (Wu, 2022). A well-ordered society, in which individuals act according to moral virtues and honor their responsibilities, is considered the foundation for collective well-being. This perspective continues to influence many East Asian cultures today, where happiness is often associated with fulfilling familial and societal expectations rather than personal gratification.

Buddhism and the Transience of Happiness

Buddhism, another major Eastern tradition, offers a radically different perspective on happiness by emphasizing the impermanence of all emotions, including happiness itself. According to Buddhist teachings, attachment to transient pleasures leads to suffering, or dukkha, which can only be overcome through detachment and the cultivation of inner peace (Tomar, 2023). The Four Noble Truths, which form the foundation of Buddhist philosophy, outline the nature of suffering and the path to liberation (Richard, 2014). The Eightfold Path, which includes ethical conduct, mental discipline, and wisdom, is prescribed to achieve nirvana, a state of ultimate freedom from suffering (Richard, 2014).

Buddhism challenges the notion that external conditions—such as wealth, status, or sensory pleasures—can provide lasting happiness. Instead, it teaches that true well-being comes from mindfulness, compassion, and the realization of impermanence. This perspective has gained increasing attention in modern psychology, particularly in the fields of mindfulness-based stress reduction (MBSR) and positive psychology, where Buddhist-inspired techniques are used to enhance emotional resilience and mental well-being (Tomar, 2023).

Happiness in Western Philosophic Thought: From Enlightenment to Utilitarianism

With the rise of the Enlightenment in the 17th and 18th centuries, Western conceptions of happiness shifted from virtue ethics to individual liberty and personal fulfillment (Schouls, 2018). John Locke, one of the key figures of the Enlightenment, argued that the pursuit of happiness was a fundamental human right, influencing the development of democratic societies (Schouls, 2018). His ideas were reflected in the Declaration of Independence (1776), where Thomas Jefferson famously declared that all individuals are endowed with the right to "life, liberty, and the pursuit of happiness" (McDonald, 1999). This marked a significant transformation in how happiness was perceived—not as a state to be achieved only through virtue but as a fundamental component of human rights and governance.

By the 19th century, utilitarianism, a philosophical movement led by Jeremy Bentham and John Stuart Mill, emerged as a dominant framework for understanding happiness (Mill, 2016). Utilitarianism proposed that happiness could be measured and maximized at a societal level, with policies and actions being judged by their ability to produce the greatest good for the greatest number (Mill, 2016). Bentham even attempted to quantify happiness through his "felicific calculus," an early attempt at systematically measuring pleasure and pain. Mill, refining Bentham's ideas, distinguished between higher (intellectual) and lower (sensory) pleasures, arguing that intellectual and moral satisfaction contributed to a deeper, more meaningful form of happiness (Mill, 2016).

Contemporary Cross-Cultural Perspectives on Happiness

In modern times, governments and policymakers have attempted to quantify happiness as a metric of societal well-being, moving beyond purely economic indicators such as Gross Domestic Product (GDP). One of the most notable examples of this shift is Bhutan's Gross National Happiness (GNH) index, introduced in the 1970s (Lepeley, 2017). The GNH framework evaluates citizens' well-being based on factors such as psychological health, cultural preservation, environmental sustainability, and economic security (Lepeley, 2017). This approach challenges the assumption that material wealth alone leads to happiness and highlights the importance of social and spiritual well-being in defining quality of life.

Similarly, international organizations such as the United Nations have incorporated happiness metrics into their policy evaluations. The World Happiness Report, published annually since 2012, ranks countries based on factors such as income, social support, healthy life expectancy, freedom, generosity, and corruption levels (Helliwell et al., 2025). Countries such as Finland, Denmark, and Switzerland consistently rank among the happiest nations, suggesting that social cohesion, economic stability, and governance play a crucial role in shaping well-being (Veenhoven, 2025).

Additionally, cultural differences in happiness persist (Zia, Shah, & Rashid, 2025). Studies in cultural psychology reveal that individualistic societies, such as those in North America and Western Europe, tend to define happiness in terms of personal achievement and self-expression, while collectivist cultures, particularly in East Asia and Africa, often associate happiness with social harmony and community well-being. These cultural variations underscore the challenge of developing a universal measure of happiness, as different societies prioritize different aspects of well-being (Zia, Shah, & Rashid, 2025).

The historical and cross-cultural perspectives on happiness reveal its multifaceted and context-dependent nature. From Aristotle's emphasis on virtue to Buddhism's focus on detachment, from Confucian ethics to modern economic indices, happiness has been defined and pursued in various ways across different eras and cultures. While contemporary efforts to measure happiness seek to create standardized metrics, cultural differences suggest that no single definition can fully capture the human experience of well-being. Understanding these perspectives allows for a more nuanced appreciation of happiness, acknowledging that it is both a subjective experience and a societal goal shaped by diverse values and traditions.

The Neuroscience of Happiness: Let's go deeper.

The science of happiness is located primarily within the brain, where intricate neural mechanisms and biochemical processes regulate emotional well-being (Alexander et al., 2021). While happiness is often perceived as a subjective and intangible experience, neuroscience has made significant strides in understanding how it is neuralcell generated and electrochemically maintained. When a person experiences happiness, specific brain regions, including the prefrontal cortex, amygdala, striatum, and limbic system, are activated (Alexander et al., 2021). Happiness is closely linked to the release of key neurotransmitters, such as dopamine, serotonin, endorphins, and oxytocin, which regulate pleasure, motivation, and social bonding (Nithya, 2025). Although

significant progress has been made in identifying the biological basis of happiness, many challenges remain to providing accurate analysis and quantification ofthis complex emotional state.

Neuroimaging: A Look at Happiness

Advancements in neuroimaging technologies have provided critical insights into how happiness neurochemically manifests in the brain. Techniques such as Functional Magnetic Resonance Imaging (fMRI), Electroencephalography (EEG), and Positron Emission Tomography (PET) allow scientists to observe and analyze neural activity associated with positive emotions (Shi, 2025). These technologieshave been instrumental in mapping brain regions involved in the experience of happiness and helping further the understanding of how different neurotransmitters interact to regulate mood (Shi, 2025). The colors and blood flow captured by fMRI are telling to scientists and have, literally, started to paint a picture of how the brain's complexity unfolds.

fMRI and Brain Activation in Happiness

Functional Magnetic Resonance Imaging (fMRI) is one of the most widely used neuroimaging techniques in the study of happiness (Shi, 2025). It detects changes in oxygenated blood flow in the brain, which serve as an indirect indicator of neural activity (Jansen et al., 2025). When individuals engage in pleasurable experiences—such as listening to music, socializing, or recalling positive memories—fMRI scans reveal heightened activity in the prefrontal cortex, the ventral striatum, and the amygdala (Jansen et al., 2025).

- The prefrontal cortex, particularly the left prefrontal cortex, is associated with positive emotions, decision-making, and emotional regulation. Studies have shown that individuals who experience greater overall life satisfaction exhibit increased activity in this region (Jansen et al., 2025).
- The ventral striatum, part of the brain's reward system, is activated in response to pleasurable stimuli, reinforcing behaviors associated with happiness and motivation.
- The amygdala, traditionally linked to fear and emotional processing, is also involved in the experience of positive emotions, especially in relation to social bonding and trust.

However, fMRI has limitations in measuring happiness fully or precisely. While it provides valuable insights into which brain regions are active during positive emotional states, the suggestive nature of fMRI results remains a challenge. Increased blood flow to specific areas does not necessarily indicate a direct cause-and-effect relationship with happiness (Shi, 2025). Additionally, because happiness is a dynamic and fluctuating experience, capturing it in a controlled fMRI setting can be difficult. Despite its limitations, neuroimaging is a good starting point for furthering happiness research and promoting our overall understanding of brain functioning.

EEG and Electrical Activity in Happiness

Unlike fMRI, which measures blood flow, Electroencephalography (EEG) records electrical activity in the brain using electrodes placed on the scalp. EEG is particularly useful in detecting real-time neural oscillations associated with different emotional states (Gupta, Srivastava, Bhushan, & Behera, 2025).

Studies using EEG have demonstrated that happiness is linked to increased activity in the alpha and beta frequency bands, particularly in the left hemisphere of the brain. The left prefrontal cortex, which is highly active in moments of joy and contentment, exhibits heightened electrical activity when individuals experience positive emotions (Cai, Wang, Lin, Yang, Kang, Chen, & Wu, 2025). EEG has also been instrumental in identifying how meditation, mindfulness, and gratitude practices enhance happiness by modulating brain wave patterns.

However, EEG has poor spatial resolution, meaning that it cannot pinpoint the precise neural origin of happiness with the same accuracy as fMRI. Despite this limitation, EEG provides a direct and time-sensitive measure of brain activity, making it valuable for studying short-term changes in emotional states.

PET Scans and Neurotransmitter Activity

Positron Emission Tomography (PET) is another neuroimaging tool used to study happiness, particularly by tracking neurotransmitter activity in the brain. PET scans involve injecting a radioactive tracer that binds to specific neurotransmitters, allowing scientists to observe their release and distribution in real time (Zürcher, Chen, & Wey, 2025). This method has been crucial in measuring fluctuations in dopamine and serotonin levels, which play key roles in mood regulation(Zürcher, Chen, & Wey, 2025).

Neurotransmitters and the Chemistry of Happiness

While neuroimaging techniques provide structural and functional insights, the biochemical basis of happiness lies in the intricate interplay of neurotransmitters—chemical messengers that transmit signals between neurons. Four primary neurotransmitters are closely associated with happiness: dopamine, serotonin, endorphins, and oxytocin(Zürcher, Chen, & Wey, 2025).

Dopamine: The Reward Chemical

Dopamine is one of the most well-known neurotransmitters involved in happiness. It plays a central role in the brain's reward system, reinforcing behaviors that lead to pleasure and satisfaction. When individuals engage in rewarding activities—such as eating, exercising, or achieving a goal—dopamine levels increase, generating feelings of motivation and pleasure(Sahu, Yadav, & Rani, 2025).

- Dopamine is released in the ventral tegmental area (VTA) and travels to the nucleus accumbens, a key region in the reward circuitry.
- High dopamine levels are associated with increased motivation, focus, and pleasure, contributing to feelings of happiness.

However, dopamine excess can have negative consequences. Studies have shown that artificially increasing dopamine levels—through substance use or addictive behaviors—can lead to dopamine desensitization, requiring greater stimulation to achieve the same level of pleasure (Davies & Nutt, 2008). This is why dopamine is linked not only to happiness but also to addiction and compulsive behaviors(Sahu, Yadav, & Rani, 2025).

Serotonin: The Mood Stabilizer

Serotonin is another crucial neurotransmitter in the regulation of mood and happiness. Unlike dopamine, which is associated with immediate pleasure and reward, serotonin contributes to long-term emotional stability and well-being (Bruzzone et al., 2025).

- Low serotonin levels have been linked to depression, anxiety, and mood disorders (Stockmeier, 2008).
- Many antidepressant medications, such as Selective Serotonin Reuptake Inhibitors (SSRIs), work by increasing serotonin availability in the brain (Stockmeier, 2008).

Serotonin is primarily synthesized in the raphe nuclei of the brainstem and affects emotion regulation, appetite, and sleep cycles. Unlike dopamine, which is primarily linked to external rewards, serotonin is influenced by factors such as diet, physical activity, and social connections (Bruzzone et al., 2025).

Endorphins: The Natural Painkillers

Endorphins are the body's natural painkillers, released in response to stress, physical exertion, and even laughter. These neurotransmitters interact with opioid receptors in the brain, reducing the perception of pain and inducing feelings of euphoria (Oybeko'g'li, 2025).

- Exercise, particularly high-intensity activities like running, stimulates endorphin release, contributing to the well-known "runner's high (Dishman & O'Connor, 2009)."
- Endorphins also play a role in stress relief and relaxation, helping individuals cope with physical and emotional pain (Pilozzi, Carro, & Huang, 2020) .

Oxytocin: The Bonding Hormone

Often referred to as the "love hormone", oxytocin plays a key role in social bonding, trust, and relationships. It is released during physical touch, childbirth, breastfeeding, and moments of emotional intimacy (Roy et al., 2025).

- High oxytocin levels are associated with increased empathy, generosity, and feelings of connection (Barazza& Zak, 2009).
- Research suggests that oxytocin can reduce stress and promote overall happiness by strengthening social bonds (Roy et al., 2025).

The neuroscience of happiness is a rapidly evolving field, offering valuable insights into the biological mechanisms underlying positive emotions. While neuroimaging techniques such as fMRI, EEG, and PET scans have revealed which brain regions are involved in happiness, they are still limited in providing a definitive measure of subjective well-being. Similarly, the study of neurotransmitters highlights the complexity of happiness, demonstrating that no single chemical serves as a universal indicator of joy. Instead, happiness arises from a delicate balance and interplay of brain activity, neurotransmitter interactions, and external life experiences. As neuroscience continues to advance, a deeper understanding of happiness may pave the way for improved mental health treatments and well-being strategies, enhancing quality of life for individuals and, therefore, societies.

Psychological and Behavioral Approaches to Measuring Happiness: Where is self-report taking us?

Beyond neuroscience, psychologists have developed various methods to assess and quantify happiness. Since happiness is a deeply personal and subjective experience, psychological approaches rely on self-reported well-being, behavioral indicators, and observational data to gauge an individual's overall emotional state. One of the most widely accepted frameworks in psychology is Subjective Well-Being (SWB), which considers happiness as a combination of life satisfaction, positive affect, and low negative affect (Khalil, 2025). While

subjective measures provide valuable insights into personal perceptions of happiness, they are inherently limited by individual biases, cultural influences, and external factors that shape responses.

Subjective Well-Being (SWB) and Self-Reported Measures

Subjective Well-Being (SWB) is a psychological construct developed by psychologist Ed Diener (1984), who proposed that happiness should be assessed based on individuals' reflections on their own life satisfaction and emotional experiences. SWB consists of three primary components:

1. **Cognitive Evaluations** – This refers to life satisfaction, or how individuals assess the overall quality of their lives.
2. **Positive Affect** – The frequency of positive emotions, such as joy, gratitude, and love.
3. **Negative Affect** – The absence or lower frequency of negative emotions, such as sadness, stress, and anxiety.

Several self-report scales have been developed to measure SWB, including:

- The Satisfaction with Life Scale (SWLS) – Developed by Diener and colleagues (1985), this scale consists of five statements that respondents rate on a scale from 1 (strongly disagree) to 7 (strongly agree). It measures an individual's cognitive evaluation of their overall life satisfaction.
- The Positive and Negative Affect Schedule (PANAS) – This scale assesses the frequency of both positive and negative emotions over a specified period, providing a more dynamic understanding of a person's emotional state (Brdar, 2024).
- The Oxford Happiness Questionnaire (OHQ) – A broader measure that includes questions on optimism, self-esteem, and social relationships (Kashdan, 2004).

While self-report measures are widely used, they haveinherent limitations. Individuals may overestimate or underestimate their happiness due to cultural influences, personality traits, or fluidemotional states. Moreover, social desirability bias may cause respondents to report higher happiness levels than they feel. Some researchers have attempted to counteract these biases by incorporating experience sampling methods (ESM), developed by Tacha and colleagues (1985), in which participants are prompted multiple times a day to record their current emotions, providing a more accurate and real-time measure of happiness. Having data collected over multiple measurements during a day can provide a more multifaceted measurement of the emotion.

Behavioral Indicators of Happiness

Since self-reported measures are subject to biases, psychologists and behavioral scientists have explored observable indicators of happiness. Behavioral indicators include:

1. Facial Expressions and Micro-Expressions

- Discussed by Sauter and colleagues (2014), nonverbal cues, such as smiling, laughter, and facial micro-expressions, are commonly associated with happiness.
- Paul Ekman's research on universal emotions suggests that certain facial expressions, such as genuine smiles (Duchenne smiles), are cross-culturally linked to feelings of happiness (Russell, 1994).
- With advancements in artificial intelligence (AI) and machine learning, algorithms can now analyze facial expressions in real-time, offering potential applications in psychology, marketing, and even national well-being assessments (Ogawa et al., 2022). Further, analysis of social media, twitter, Facebook, and other platforms can provide more insight into how happiness is experienced and expressed, socially. While big data on happiness can tell us a lot about social expressions of happiness, it may not capture the depth or specificity of happiness of individuals.

2. Voice Tone and Speech Patterns

- Research indicates that tone, pitch, and speech speed change when people experience happiness (Isa et al., 2019).
- AI-driven speech analysis software is now being used to detect emotional states based on voice modulation (Ogawa et al., 2022).

3. **Social and Physical Activity Levels**

- Studies show that socially active individuals report higher happiness levels than those who are isolated (Isa et al., 2019).
- Wearable technology (e.g., fitness trackers) has been used to measure movement patterns, providing insights into how physical activity correlates with mood (Cormack et al., 2019).

Despite these promising developments, behavioral indicators of happiness still face challenges in standardization and interpretation. Human emotions are highly context-dependent, meaning that expressions of happiness vary based on culture, personality, and social norms.

The Role of Societal and Economic Factors in Happiness

Happiness is not solely a function of brain chemistry or psychological perceptions; external factors play a significant role in shaping well-being. Studies have consistently demonstrated that income level, social

relationships, healthcare access, and cultural values influence happiness on both an individual and societal level (Kyonne, 2019).

Economic Factors and the Easterlin Paradox

One of the most debated questions in happiness research is the relationship between income and happiness. The Easterlin Paradox, introduced by economist Richard Easterlin in the 1970s, suggests that while higher income is correlated with greater happiness up to a certain threshold, beyond that point, further increases in wealth do not significantly enhance happiness (Firebaugh & Tach; Easterlin & O'Connor, 2022).

- Low-income individuals experience higher stress and lower life satisfaction, as financial instability can limit access to basic needs, healthcare, and education (Kyonne, 2019).
- Once basic needs are met, the marginal benefit of additional income diminishes, suggesting that material wealth alone does not guarantee long-term happiness (Easterlin & O'Connor, 2022).

However, some modern studies challenge the Easterlin Paradox, arguing that happiness continues to rise with income, particularly in countries with higher levels of economic inequality.

Social Relationships and Well-Being

Psychological research substantially supports the idea that strong social connections are among the most significant predictors of happiness (Sharma, Argarwal, &Veenhoven, 2024). Studies show that individuals who have close friendships, supportive families, and active social networks report higher levels of happiness and lower stress than those who experience loneliness (Sharma, Argarwal, &Veenhoven, 2024).

- The Harvard Study of Adult Development, one of the longest-running studies on happiness, found that quality relationships are a stronger predictor of happiness than wealth or fame (Fuchsman, 2023).
- Loneliness and social isolation have been linked to depression, anxiety, and even physical health decline (van Winkel et al., 2017).
- Cultural differences shape how relationships contribute to happiness. In individualistic cultures (e.g., the U.S., Canada, Western Europe), happiness is often associated with personal achievements and self-fulfillment. In contrast, collectivist cultures (e.g., Japan, China, Latin America) emphasize happiness through family bonds, community interactions, and well-being.

Healthcare, Education, and Government Policies

In addition to social relationships and income, other macro-level factors influence national happiness levels.

- Access to healthcare and mental health services plays a crucial role in overall well-being (Young, Macinnes Jarden, & Colla, 2022). Countries with universal healthcare tend to report higher happiness levels (Sczepanski, 2023).
- Sosa and colleagues (2021) examined education and its association with happiness, as higher levels of education provide individuals with greater economic opportunities and cognitive resources to handle life's challenges.
- Government policies that focus on work-life balance, social security, and mental health awareness contribute to national happiness. For example, Young and colleagues (2022) describe Scandinavian countries, which rank highest on the World Happiness Report, and often emphasize social welfare, shorter workweeks, and extensive parental leave policies.

II. Conclusions

Measuring happiness remains one of the most complex challenges in both scientific and philosophical discourse. Throughout history, happiness has been examined through multiple lenses—ranging from ancient philosophical theories to modern psychological and neuroscientific approaches. Despite significant advancements in neuroscience, psychology, and technology, happiness remains an elusive and subjective concept that resists precise quantification. While researchers have developed numerous tools and methodologies to assess happiness, research has failed to comprehensively capture its biological, psychological, behavioral, and cultural dimensions.

The difficulty in measuring happiness arises from its multifaceted nature. Neuroscience has demonstrated that happiness is linked to specific brain regions and neurotransmitters, and, simultaneously, that no single brain structure or chemical can fully account for the subjective experience of happiness. Similarly, psychological approaches—such as self-reported well-being surveys and behavioral observations—offer valuable insights but are inherently influenced by personal biases, social norms, and external circumstances. The challenge is further compounded by the fact that happiness is fluid anddynamic, shifting across different life stages and situations.

The Ongoing Challenges of Measuring Happiness

A major challenge in happiness research is the subjectivity of self-reported measures. While tools such as the Satisfaction with Life Scale (SWLS) and the Positive and Negative Affect Schedule (PANAS) provide useful data, they rely on individual perceptions, which are shaped by personality, current mood, and cultural expectations. For instance, individuals from collectivist cultures may underreport personal happiness due to societal norms that emphasize group harmony over personal expression, while those from individualistic cultures may overstate their happiness due to societal pressures to appear successful and fulfilled. Additionally, someone with a reserved personality may not express happiness freely because they tend to underestimate their moods and emotional fluctuation.

Moreover, neuroscientific methods, such as functional magnetic resonance imaging (fMRI), electroencephalography (EEG), and positron emission tomography (PET) scans, have provided crucial insights into the neurological basis of happiness. Studies have identified that happiness involves the prefrontal cortex, amygdala, and the brain's reward circuitry, as well as neurotransmitters such as dopamine, serotonin, oxytocin, and endorphins. However, these methods produceseveral limitations:

1. **Complexity of Brain Activity** – Happiness is not localized to a single brain region; it results from networked interactions among multiple regions. Researchers do not even definitively understand the basic interplay of neural networks; more defined and precise knowledge may still be under ongoing and intense investigation.
2. **Lack of Standardization** – While neuroimaging can track changes in brain activity, there is no universal baseline to define happiness. With no effective baseline assay of happiness, it is difficult to determine changes in the emotional state.
3. **Ethical and Practical Constraints** – Invasive methods, such as direct neurotransmitter measurement, raise ethical concerns and are economicallyimpractical for large-scale happiness assessments.

Cultural and Societal Variables Influence on Happiness

Happiness is not purely a biological or psychological phenomenon; it is deeply embedded in cultural, economic, and societalpractices. Historical perspectives on happiness—from Aristotle's eudaimonia to Buddhist detachment from desires—demonstrate that happiness is defined differently across cultures. This cultural variability challenges the idea of a universal happiness metric; different cultures may need to, specifically, define their methods of analyzing happiness.

For example, Bhutan's Gross National Happiness (GNH) index incorporates spiritual, environmental, and psychological well-being alongside economic prosperity. This contrasts with Western models, which often emphasize material success and individual achievements. Similarly, studies show that income levels, social relationships, and access to healthcare significantly influence happiness. That said, the Easterlin Paradox suggests that beyond a certain income threshold, increased wealth does not necessarily equate to greater happiness, instead emphasizing non-material factors such as social connectedness and mental well-being.

Government policies and societal structures play a critical role in shaping happiness. Countries that consistently rank high on the World Happiness Report—such as Finland, Denmark, and Switzerland—tend to prioritize:

- Work-life balance
- Universal healthcare and social security
- Community engagement and social trust
- Education and mental health resources

In severecontrast, nations with high levels of inequality, economic instability, or social fragmentation tend to report lower happiness levels. These findings suggest that while happiness is subjective at an individual level, it is also collectively shaped by broader societal conditions. This is a profound difference in happiness reporting that is determined by economic circumstances.

Proposed Directions in Happiness Research: Where Next?

Although the precise measurement of happiness remains challenging, interdisciplinary research continues to explore new methods to **redefine, innovate,**and enhance happiness assessments. Multiplepromising areas of future research include:

1. **Progressin Neuroscience**
   - Advancements inimaging techniques, such as high-resolution fMRI and optogenetics, may provide more precise measurements of happiness-related brain activity (Janssen, Janssen, & Erp, 2025).
   - The further development of brain-computer interfaces (BCIs) could allow individuals to track their emotional fluctuations in real-time (Patrick-Krueger, Burkhart, & Contreras-Vidal, 2025)
2. **Artificial Intelligence and Big Data Analysis**
   - Innovations in AI-powered sentiment analysis of social media, online interactions, and wearable technology data could offer real-time happiness tracking at both individual and societal levels.

- As put forth by Wu and colleagues (2025), machine learning algorithms could improve predictive models of happiness, helping policymakers design well-being-focused public policies.

3. **Personalized and Longitudinal Studies**

- Future studies could adopt longitudinal designs, tracking happiness over decades to identify patterns and long-term influences.
- Personalized happiness interventionsbased on genetics, personality, and lifestyle, could be developed to optimize individual well-being. These interventions could be either behaviorally or chemically derived.

4. **Ethical Considerations and Well-Being Policy Integration**

- As technology advances, ensuring ethical standards in happiness research will be crucial. Issues such as data privacy, informed consent, and psychological risks must be carefully addressed.
- Governments may increasingly integrate happiness metrics into policymaking, shifting economic models from purely Gross Domestic Product,GDP-driven growth, to holistic well-being models.

5. Potential Limitations in future research areas

- Long-term behavioral studies could face high rates of participant dropout, therefore providing appropriate incentives through compensation would reduce this potential issue.
- Progress in Neuroscience and Neuroimaging must be evaluated for accuracy and relevance to the study of happiness on an ongoing basis. There should be methods to determine and further the understanding of images and other neural data collected per the use of advanced neuroimaging. The understanding of data must develop at a rate comparable to image acquisition.
- There must be regulations that guide innovations in AI data and safeguards to protect against the sharing of individual data that is intended to remain private; AI obtained data is best shared as representative of large groups of participants.

Closing Thoughts: The Subjectivity and Universality of Happiness

Until science develops more sophisticated and ethically sound measurement techniques, happiness will remain a deeply subjectiveemotion. Despite the biological and behavioral correlates of happiness, individual experiences, cultural values, and social environments shape how happiness is perceived and pursued.

Emotional complexity does not diminish the importance of ongoing and further research. Happiness is not just a personal aspiration but a societal goal, promotingmental health, productivity, and overall life satisfaction. While a perfect measure of happiness may never exist,sustainedinterdisciplinary research—combining insights from neuroscience, psychology, sociology, economics, and artificial intelligence—can help deepenour understanding of what it means to be happy and how it can be effectively assessed.

The pursuit of happiness remains one of humanity's boldestendeavors, and while its measurement remains imperfect, our ability to understand, cultivate, and enhance happinesscontinues to develop. With scientific advancement and innovation, the primary goal is not just to measure happiness, but to create societies, policies, and lifestyles that foster genuine well-being for individuals and within their communities.

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