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Flow as a Non-Ordinary State of Consciousness: A Comparative Perspective with Awe, Meditation, and Psychedelic Experiences

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"One cannot lead a life that is truly excellent without feeling that one belongs to something greater and more permanent than oneself."

— Mihaly Csikszentmihalyi

Abstract

This thesis aims to explore flow as a non-ordinary state of consciousness (NOSC) that temporarily alters ordinary consciousness in non-pathological ways. Flow, also referred to as "optimal experience" in positive psychology by Mihaly Csikszentmihalyi, is a state of deep immersion and energized focus in an activity, typically involving an altered perception of time, attentional absorption, and a diminished sense of self. Through a comparative approach, this thesis investigates the phenomenological and neurocognitive mechanisms underlying flow, such as reduced activity in the default mode network (DMN) and transient hypofrontality. Flow is examined alongside other NOSCs and non-ordinary mental expressions (NOMEs), such as meditation, awe, psychedelic experiences, and peak states, to identify both common and distinguishing characteristics. While many of these states involve forms of self-transcendence, flow is uniquely characterized by its active, task-oriented, and autotelic nature. By comparing flow to other altered states, this thesis contributes to a deeper understanding of the dynamic nature of consciousness and its potential role in optimal human experience and well-being, offering insights into how these experiences support psychological functioning.

Keywords: flow, altered states, awe, meditation

1. Introduction

The psychological state of flow, first systematically described by Csikszentmihalyi (1975, as cited in 2014), is a foundational concept within positive psychology and is widely recognized as an optimal psychological experience (Nakamura & Csikszentmihalyi, 2014; Seligman & Csikszentmihalyi, 2014). Flow is characterized by profound engagement, a harmonious balance between task difficulty and personal ability, and an inherently rewarding quality (Nakamura & Csikszentmihalyi, 2014). While often associated with optimal performance (Jackson et al., 2001; Nakamura & Csikszentmihalyi, 2014; Peifer et al., 2022), the precise causal relationships between flow states and performance outcomes remain an active area of research (Shepherd, 2021).

Beyond its conceptualization within positive psychology, flow can also be understood as a non-ordinary state of consciousness (NOSC) (Dietrich, 2004). It shares remarkable similarities with historical accounts of self-transcendent experiences and aligns with concepts such as Maslow's "peak experiences," which he introduced in 1964 (Yaden et al., 2017). These experiences are characterized by significant alterations in attention, subjective perception of time, and self-awareness, moving beyond typical waking consciousness (Dietrich, 2004).

This thesis conducts a comparative analysis of flow with other non-pathological non-ordinary states of consciousness (NOSCs)—specifically meditation, awe, and psychedelic experiences—by analyzing their subjective phenomenological characteristics and neurocognitive profiles (Kotler et al., 2022; Yaden et al., 2017; Isham et al., 2022; Corso et al., 2023; Oswald et al., 2023). The inquiry centers on flow's core features: profound attentional absorption (where attention is consumed by the task), altered temporal perception, and a transient loss of self-consciousness, which removes typical self-reflection (Nakamura & Csikszentmihalyi, 2014).

This thesis employs a neurophenomenological approach that examines subjective experiences through rigorous first-person methods and integrates them with objective neurophysiological data (Timmermann et al., 2022). Examining how flow, as a sober and goal-directed non-ordinary state of consciousness (NOSC), resembles or differs from spontaneous or pharmacologically induced states provides valuable insights into self-regulation within consciousness (Kotler et al., 2022; Timmermann et al., 2022; Isham et al., 2022) and the contribution of such beneficial states to human flourishing (Seligman & Csikszentmihalyi, 2014).

This thesis will address two primary research questions:

1. How does flow resemble or differ from other non-pathological non-ordinary states of consciousness, specifically meditation, awe, and psychedelic experiences, in terms of their subjective phenomenology and neurocognitive profiles?
2. What can this comparison reveal about the nature of self-consciousness and optimal experience within the broader context of consciousness studies?

2. Theoretical Framework

This chapter establishes the foundational theories and definitions for the thesis's comparative analysis. It defines the flow state and its core characteristics (Nakamura & Csikszentmihalyi, 2014), provides a comprehensive conceptual background for the phenomenon, and positions flow within the broader context of non-ordinary states of consciousness (NOSCs) (Tart, 1986; Isham et al., 2022; Timmermann et al., 2022). By integrating both conceptual and empirical insights, this chapter grounds the thesis in existing literature and clearly articulates the rationale for comparing flow with other NOSCs.

2.1 Flow Theory and Conceptual Background

Flow is characterized as an optimal psychological state of profound engagement and concentration that occurs when an individual's perceived challenges are balanced by their personal abilities (Csikszentmihalyi, 2014; Peifer et al., 2022). Mihaly Csikszentmihalyi (1975, as cited in 2014) originally introduced this concept to explain why individuals participate in activities for their inherent enjoyment, independent of external rewards. This state strongly motivates individuals to continue and re-engage with activities, often encouraging them to seek greater challenges and develop new skills (Csikszentmihalyi, 2014; Peifer et al., 2022).

2.1.1 Csikszentmihalyi's Core Model and Characteristics

Csikszentmihalyi (1990) identified nine distinct characteristics of the flow experience, typically categorized as preconditions that facilitate the state and experiential components that describe it. The three primary preconditions are a balance between challenge and skill, clear goals, and immediate, unambiguous feedback (Nakamura & Csikszentmihalyi, 2014). The challenge-skill balance has received considerable attention in flow research (Peifer et al., 2022). Csikszentmihalyi's (2014) Flow Channel Model proposed that flow emerges when skills match situational challenges (Peifer et al., 2022), distinguishing it from boredom (when skills exceed challenges) and anxiety (when challenges exceed skills) (Csikszentmihalyi, 2014). Subsequent models, like the Experience Fluctuation Model (EFM), additionally specified that flow occurs when both challenges and skills are high and well-matched

(Massimini & Carli, 1988, cited by Peifer & Engeser, 2021; Csikszentmihalyi, 2014; Peifer et al., 2022)—a condition empirically associated with an active and pleasant emotional experience (Inkinen et al., 2014, cited by Peifer et al., 2022).

The other preconditions—clear goals and immediate feedback—provide guidance and communicate performance progress (Csikszentmihalyi, 1990; Nakamura & Csikszentmihalyi, 2014), enabling the focused attention that fosters flow's central experiential aspects (Csikszentmihalyi, 2014). When attention becomes fully absorbed, irrelevant thoughts are filtered out (Csikszentmihalyi, 1990), resulting in a merging of action and awareness (Nakamura & Csikszentmihalyi, 2014) and a temporary loss of self-consciousness as the boundary between the individual and their activity fades (Csikszentmihalyi, 1990; Nakamura & Csikszentmihalyi, 2014). This deep immersion (Nakamura & Csikszentmihalyi, 2014; Sheldon et al., 2014) often alters temporal perception, with subjective time seeming to accelerate (Nakamura & Csikszentmihalyi, 2014; Hancock et al., 2019). Ultimately, this blend of fluid action, reduced self-awareness, and complete immersion makes the experience inherently autotelic—intrinsically rewarding in itself (Csikszentmihalyi, 1990; Nakamura & Csikszentmihalyi, 2014).

2.1.2 Updated Models and Key Contributions

Building on Csikszentmihalyi's foundation, researchers have refined flow theory through various approaches. Some scholars developed measurement tools, including the Flow State Scale (FSS) and Dispositional Flow Scale-2 (DFS-2), to systematically assess flow experiences (Jackson & Marsh, 1996, cited by Peifer & Engeser, 2021; Jackson & Eklund, 2002, cited by Peifer et al., 2022). Contemporary research has expanded the flow's relevance to well-being and creativity domains (Peifer et al., 2022). Peifer and Engeser (2021) proposed consolidating flow's elements into three meta-components: absorption, perceived demand-skill balance, and enjoyment. A notable advancement comes from Lavoie, Main, and Stuart-Edwards (2021), who introduced a two-dimensional model of microflow states comprising "fluency" (ease and control) and "absorption" (sustained attention and loss of self). This model challenges traditional unidimensional conceptions by suggesting that fluency may serve as an entry point to deeper absorption.

2.1.3 Conceptual Critiques and Nuances

Despite its explanatory power and widespread acceptance, flow theory faces conceptual challenges, particularly regarding its operationalization and dimensionality (Volpato & Liu, 2023; Abuhamdeh, 2020; Lavoie et al., 2021). A key critique is that the concept can be too broad or vague, creating difficulties for precise measurement (Abuhamdeh, 2020; Volpato & Liu, 2023; Fong et al., 2014; Peifer et al., 2022). This ambiguity fuels ongoing disagreement about its dimensionality, while researchers often treat flow as a unidimensional construct. Recent two-dimensional models challenge this view by suggesting that experiences such as "sense of control" and "time distortion" are qualitatively distinct phenomena (Lavoie et al., 2021). These conceptual issues are further complicated by the variety of measurement scales used across studies, necessitating caution when comparing findings from different investigations (Fong et al., 2014; Peifer et al., 2022; Volpato & Liu, 2023). It's also important to clarify that the loss of self-consciousness in flow (Csikszentmihalyi, 1975, as cited in 2014) differs fundamentally from pathological dissociation (Yaden et al., 2017; Linden et al., 2021); rather than disengaging from reality, flow involves a temporary, healthy alteration of attention that enhances optimal functioning (Csikszentmihalyi, 2014; Peifer et al., 2022).

2.2 Flow as a Non-Ordinary State of Consciousness

This section examines non-ordinary states of consciousness (NOSCs) and establishes flow as belonging to this category (Facco et al., 2019; Kotler et al., 2022; Peifer et al., 2022). It distinguishes between non-pathological and pathological states (Yaden et al., 2017; Facco et al., 2019; Corso et al., 2023), showing how flow's significant changes in attention, self-awareness, and perception qualify it as an altered state (Kotler et al., 2022; Ottiger et al., 2021; Oswald et al., 2023). The section introduces key concepts such as self-transcendence—going beyond typical self-focused awareness—(Yaden et al., 2017; Isham et al., 2022) to demonstrate how flow's temporary loss of self-consciousness resembles that found in other spiritual or altered states (Yaden et al., 2017; Isham et al., 2022; Lynch & Troy, 2021; Millière et al., 2018).

2.2.1 Defining Non-Ordinary States of Consciousness (NOSCs)

Altered states of consciousness (ASCs), also referred to as non-ordinary states of consciousness (NOSCs), are temporary and reversible shifts in conscious perception that diverge from ordinary waking awareness (Ludwig, 1966, cited by Fort et al., 2024; Tart, 1986; Vaitl et al., 2005). These changes must be either subjectively noticeable or objectively measurable, representing a significant shift in the nature and scope of mental functioning (Vaitl et al., 2005; Fort et al., 2024). An important distinction exists between non-pathological and pathological states (Corso et al., 2023; Facco et al., 2019). Although historical definitions sometimes included psychiatric conditions, the temporary nature of these states is now considered a defining characteristic (Corso et al., 2023; Facco et al., 2019). The term "Non-Ordinary Mental Expressions" (NOMEs) was introduced to distinguish beneficial non-pathological experiences like meditation from dysfunctional states, highlighting that certain NOMEs may actually represent enhanced functioning that leads to positive outcomes (Facco et al., 2021; Facco et al., 2019; Corso et al., 2023).

2.2.2 Positioning Flow within NOSC Taxonomy

Flow is considered a beneficial non-ordinary state of consciousness (NOSC), characterized by profound shifts in attention, self-consciousness, and perception that qualify it as an altered state (Csikszentmihalyi, 1990; Dietrich, 2004; Nakamura & Csikszentmihalyi, 2014; Yaden et al., 2017). Within the NOSC taxonomy, flow belongs alongside other non-pathological states such as meditation and awe (Isham et al., 2022; Yaden et al., 2017), yet possesses distinctive characteristics. Flow is uniquely consciously engaged, task-oriented, and intentional, requiring specific activities—distinguishing it from states that arise without deliberate intent or through substance use (Csikszentmihalyi, 1990; Dietrich, 2004; Oswald et al., 2023). This active quality, which demands a balance of high skills against high challenges (Csikszentmihalyi, 1990; Peifer & Engeser, 2021; Fong et al., 2014), contrasts markedly with more passive experiences like awe, where attention is typically captured by external stimuli rather than actively directed (Van Elk et al., 2016; Yaden et al., 2017).

2.2.3 Key Concepts Related to Flow as a NOSC

Understanding flow as a non-ordinary state of consciousness (NOSC) requires grasping several key concepts central to its subjective experience (Csikszentmihalyi, 1990; Kotler et al., 2022; Ottiger et al., 2021). Self-transcendence—the experience of going beyond ordinary self-awareness (Yaden et al., 2017)—appears in flow as a temporary loss of self-consciousness where deep absorption diminishes the everyday sense of self (Csikszentmihalyi, 1990; Isham et al., 2022; Yaden et al., 2017). A related concept is ego attenuation, the quieting of the ego, which in flow manifests as reduced self-reflection (Harris et al., 2017) and a merging of action and awareness (Csikszentmihalyi, 1990; Nakamura & Csikszentmihalyi, 2014). The third key concept, altered perception, involves changes in sensory and cognitive processing where flow states can produce shifts in one's perception of reality, including heightened perceptual experiences (Hancock et al., 2019; Oswald et al., 2023). These perceptual changes contribute significantly to the flow's immersive quality. Together with flow's active nature, these concepts establish its unique profile as a NOSC (Dietrich, 2004; Kotler et al., 2022; Linden et al., 2021).

2.3 Neurocognitive Foundations of Flow and Self-Transcendent States

Understanding flow's neural mechanisms is essential for conceptualizing it as a non-ordinary state of consciousness (NOSC) (Kotler et al., 2022). While flow was traditionally examined through psychological frameworks, cognitive neuroscience now allows for deeper investigation of the brain processes underlying this optimal experience (Kotler et al., 2022; Alameda et al., 2022). This section outlines key neurocognitive theories, identifies the relevant brain systems, and examines how flow compares with other NOSCs (Kotler et al., 2022; Linden et al., 2021).

2.3.1 Key Neurocognitive Theories

Neuroscientific inquiry into flow has been guided by two prominent theoretical frameworks (Gold & Ciorciari, 2020) and a key methodological approach (Timmermann et al., 2022). The first, the Transient Hypofrontality Hypothesis (THH) proposed by Dietrich (2004), suggests that flow involves a temporary decrease in prefrontal cortex (PFC) activation. This "transient hypofrontality" inhibits advanced cognitive processes such as self-reflection, redirecting neural resources to faster, automatic systems essential for peak performance (Dietrich, 2004; Gold & Ciorciari, 2020).

While the THH has received mixed empirical support (Gold & Ciorciari, 2020), researchers have more consistently observed the deactivation of the Default Mode Network (DMN). The DMN is a neural network active during rest periods that supports internal thought processes and self-awareness (Linden et al., 2021; Kotler et al., 2022). Its downregulation during flow likely explains the characteristic reduction in self-awareness and may contribute to the state's positive affect (Kotler et al., 2022; Linden et al., 2021; Ulrich et al., 2016, cited by Harris et al., 2017).

These investigations are guided by Neurophenomenology, an approach that systematically combines first-person experiential data with analysis of dynamic neural processes to comprehensively understand consciousness (Timmermann et al., 2022).

2.3.2 Relevant Brain Systems

Several key brain systems work together to create the flow experience (Linden et al., 2021). The brain's Reward Networks play a central role, with flow's intrinsically rewarding nature closely tied to dopamine activity (Linden et al., 2021). Both nucleus accumbens activation (Ulrich et al., 2014, cited by Linden et al., 2021) and dopamine D2-receptor availability (De Manzano et al., 2012, cited by Peifer & Engeser, 2021) appear to enhance the intrinsic motivation characteristic of flow (Linden et al., 2021).

Simultaneously, Attention Regulation Systems—particularly the dorsolateral prefrontal cortex (DLPFC) and anterior cingulate cortex (ACC)—maintain flow's signature deep focus (Harris et al., 2017; Tan et al., 2023). The Locus Coeruleus-Norepinephrine (LC-NE) system further supports task engagement while potentially reducing self-referential thinking (Linden et al., 2021). These neural processes manifest in specific Brainwave Patterns, notably increased frontal theta and moderate frontocentral alpha activity (Katahira et al., 2018, cited by Alameda et al., 2022). This neural synchronization (Weber et al., 2009, cited by Alameda et al., 2022) likely underlies flow's distinctive absorption and altered time perception (Dietrich, 2004; Kotler et al., 2022; Linden et al., 2021).

2.3.3 Implications for Comparing Flow and Other NOSCs

Flow's neurocognitive profile provides a foundation for comparing it with other non-ordinary states of consciousness (NOSCs), revealing both similarities and differences in their neural and experiential patterns (Kotler et al., 2022). Across flow, meditation, and psychedelic states, researchers have observed consistent DMN deactivation, which contributes to reduced self-referential thinking (Timmermann et al., 2022). The Transient Hypofrontality Hypothesis further suggests that diminished frontal lobe function may underlie many of these altered states (Dietrich, 2004).

However, significant distinctions exist. Flow's intense focus on challenging, goal-directed tasks differs from the experiences typical of meditation or psychedelics (Kotler et al., 2022; Linden et al., 2021; Yaden et al., 2017; Timmermann et al., 2022). Psychedelics, for example, are known for altering self-perception, often producing "ego-dissolution"—an effect linked to changes in brain systems involved in the minimal self, such as the insula and temporoparietal junction (TPJ) (Timmermann et al., 2022).

These neural correlates—from DMN downregulation explaining reduced self-awareness (Kotler et al., 2022; Linden et al., 2021) to the insula's role in altered time perception (Tan et al., 2023)—offer compelling insight into how flow reshapes consciousness, connecting subjective experience with observable brain activity (Dietrich, 2004).

3. Comparative Phenomenology of Flow, Meditation, Awe, and Psychedelics

This chapter compares the first-person experiential qualities (phenomenology) of flow with other notable Non-Ordinary States of Consciousness (NOSCs): meditation, awe, and psychedelic experiences (Isham et al., 2022; Yaden et al., 2017). The analysis identifies common themes across these states—such as intense focus and shifts in self-perception—while highlighting the unique characteristics that distinguish each experience (Timmermann et al., 2022). Through examining how focused attention, self-perception, time perception, and embodiment are distinctly altered in each state, the chapter offers a comprehensive understanding of their immersive natures (Ulrich et al., 2014, cited by Linden et al., 2021; Yaden et al., 2017; Van Elk et al., 2016).

3.1 Attentional Absorption and Focus

Flow is characterized by its immersive quality, where attention becomes completely absorbed in the activity, effectively filtering out irrelevant information (Csikszentmihalyi, 1990). This deep and typically effortless focus is essential for both initiating and sustaining the flow state (Nakamura & Csikszentmihalyi, 2014; Shepherd, 2021). At the neurocognitive level, this absorption corresponds with downregulation of the prefrontal cortex (PFC) and significant reduction in Default Mode Network (DMN) activity, which correlates with diminished self-awareness and enhanced task-focused attention (Isham et al., 2022; Ulrich et al., 2014, cited by Linden et al., 2021). The Synchronization Theory of Flow further proposes that the subjective experience of absorption results from synchronization between cognitive control and reward networks (Weber et al., 2009, cited by Alameda et al., 2022).

Attentional absorption is a common characteristic across other NOSCs, typically accompanied by similar reductions in DMN activity (Isham et al., 2022). In meditation, practices such as mindfulness enhance attentional control through deliberate training (Yang et al., 2024). Awe, by contrast, involves an involuntary capture of attention by vast or novel stimuli (Keltner & Haidt, 2003, cited by Yaden et al., 2017). Psychedelic experiences likewise induce profound, perceptually vivid engagement and significant decreases in DMN activity that correlate with ego-dissolution (Carhart-Harris et al., 2016, cited by Isham et al., 2022).

Despite these parallels, flow's attentional profile is distinctively active and functional (Dietrich, 2004; Linden et al., 2021). It is a volitional (Dietrich, 2004), task-specific (Csikszentmihalyi, 1990, 2014), and performance-enhancing state (Csikszentmihalyi, 1990, 2014). In flow, attention is actively goal-directed (Yaden et al., 2017) and inherently autotelic (Nakamura & Csikszentmihalyi, 2014). This structured focus stands in sharp contrast to the passive attention experienced in awe (Van Elk et al., 2016) and the unpredictable, often diffuse attentional patterns found in psychedelic states (Barnett et al., 2020, cited by Kotler et al. 2022).

3.2 Altered Self-Awareness and Self-Transcendence

A profound reduction in self-consciousness, resulting in a seamless integration of action and awareness, is a defining feature of the flow state (Csikszentmihalyi, 1990; Isham et al., 2022; Shepherd, 2021). As individuals become immersed, their attention is completely absorbed by the activity, filtering out self-focused thoughts (Isham et al., 2022; Rufi et al., 2016; Tang & Zhou, 2020). This shift can be understood as a movement away from the "narrative self" (associated with reflective processes) toward the "minimal or embodied self" (linked to immediate experience) (Millière et al., 2018). Although the conscious perception of oneself as a separate entity diminishes, the self maintains control over actions, resulting in movements that feel effortless and automatic (Isham et al., 2022; Lynch & Troy, 2021; Tang & Zhou, 2020).

Alterations in self-awareness are fundamental to many NOSCs (Millière et al., 2018; Isham et al., 2022). In meditation, advanced practices cultivate "decentering," which can progress to ego disintegration and a sense of unity with one's surroundings (Kitson et al., 2020; Isham et al., 2022). Awe reduces self-importance, creating a "small self" phenomenon (Van Elk et al., 2016; Yaden et al., 2017), while psychedelic experiences often induce ego dissolution, blurring the boundaries between self and environment (Isham et al., 2022; Millière et al., 2018).

Within this spectrum of self-transcendence, flow represents a milder yet highly functional form of the experience (Yaden et al., 2017; Isham et al., 2022). Unlike passively triggered or pharmacologically induced states, flow is actively goal-oriented and task-dependent

(Csikszentmihalyi, 1990; Isham et al., 2022). Its reduction in self-awareness directly enhances performance and enables optimal functioning (Dietrich, 2004), creating a 'paradox of control' (Csikszentmihalyi, 1990; Lynch & Troy, 2021). This functional stability stands in contrast to the deeper, sometimes destabilizing, self-loss observed in high-dose psychedelic states (Millière et al., 2018; Isham et al., 2022).

3.3 Distortion of Time Perception

Flow states are distinctly characterized by a striking distortion of time perception (Shepherd, 2021). Hours can feel like minutes, or the sense of time may vanish completely as individuals become immersed in an activity (Tang & Zhou, 2020). This temporal alteration directly correlates with deep task engagement and attentional absorption (Isham et al., 2022; Lavoie et al., 2021), occurring when present-moment focus redirects cognitive resources away from explicit time monitoring (Shepherd, 2021).

Temporal distortions also feature prominently across other NOSCs. In meditation, deep absorptive states can induce experiences of timelessness (Berkovich-Ohana et al., 2013, cited by Millière et al., 2018; Yang et al., 2024). Awe experiences, typically triggered by vast stimuli, often create a subjective sense of time stretching or slowing down (Rudd et al., 2012, cited by Yaden et al., 2017). Psychedelic states produce even more profound temporal alterations, with subjective durations becoming significantly compressed or expanded, potentially leading to perceptual disarray (Millière et al., 2018; Yaden et al., 2017).

Flow's characteristic time distortion—where time feels accelerated or becomes imperceptible—enhances performance by supporting sustained engagement in goal-oriented tasks (Tang & Zhou, 2020; Peifer et al., 2022). This functional alteration contrasts with the disorienting temporal effects of psychedelics (Millière et al., 2018; Fort et al., 2024) and the passive time expansion experienced in awe, which lacks flow's purposeful direction (Yaden et al., 2017). Despite these distinctions, all these states share a fundamental cognitive mechanism: they divert attention resources away from conscious temporal monitoring through intense attentional immersion (Yang et al., 2024).

3.4 Embodiment and Physical Experience

Flow is characterized by a profound unity between action and awareness, creating a sense of fluidity and effortless action (Csikszentmihalyi, 2014; Lavoie et al., 2021). When immersed, individuals experience diminished reflective awareness, with task mechanics feeling both "automatic yet deliberate" (Csikszentmihalyi, 2014; Lynch & Troy, 2021). This state involves sensorimotor fluency that enhances performance (Kotler et al, 2022; Lavoie et al., 2021). As self-consciousness diminishes, energy redirects from self-monitoring to the activity itself, and this integrated bodily experience supports optimal functioning (Shepherd, 2021; Tang & Zhou, 2020).

Embodiment varies significantly across other non-ordinary states. In meditation, the body-mind relationship spans a spectrum from heightened, non-judgmental bodily awareness to complete diminishment of bodily awareness in advanced states (Millière et al., 2018; Yang et al., 2024). Awe experiences typically generate distinctive physical sensations, such as chills and goosebumps (Grewe et al., 2009, cited by Kitson et al., 2020), and can alter perceived bodily scale (Piff et al., 2015, cited by Yaden et al., 2019; Van Elk et al., 2016). Psychedelic states consistently produce profound alterations in body image, novel somatic sensations, and even bodily dissolution where ego-boundaries fade (Millière et al., 2018; Isham et al., 2022).

While all these states alter physical experience, flow's embodiment is distinctly different. It integrates physical and mental processes so that body and mind function as a unified whole toward achieving a goal (Lynch & Troy, 2021). This integration enables functional, goal-directed performance (Nakamura & Csikszentmihalyi, 2014; Peifer et al., 2022). Flow's unique contribution is an embodied fluency that directly enhances performance in structured activities (Lynch & Troy, 2021).

4. Neurocognitive Correlates of Flow and Other Altered States

This chapter systematically compares brain activity and cognitive mechanisms underlying flow with those observed in meditation, awe, and psychedelic states. It examines findings from neuroimaging and psychophysiological studies to identify shared neural patterns, such as changes in self-related brain networks, while highlighting key differences between these non-ordinary states of consciousness (NOSCs). By analyzing attention networks, self-referential processing, and neurochemistry, the chapter establishes the objective neurocognitive foundations that underpin the subjective experiences explored in Chapter 3.

4.1 Self-Referential Processing: Transient Hypofrontality and DMN Suppression

A shared neural signature across these states is the downregulation of brain regions responsible for self-referential thinking—specifically through reduced prefrontal cortex (PFC) activity (known as transient hypofrontality) and suppression of the Default Mode Network (DMN) (Isham et al., 2022). This decreased top-down executive control appears to be a common neurocognitive mechanism that enables the experiences of selflessness, immersion, and fluid cognition, defining these states (Yaden et al., 2017).

In the context of flow, this neural pattern is consistently observed. Decreased prefrontal activity facilitates effortless concentration and fluid task performance (Dietrich, 2004; Kotler et al., 2022). Simultaneously, reduced DMN activity directly correlates with decreased self-focus and enhanced present-centered attention, enabling deep task immersion (Huskey et al., 2018, cited by Alameda et al., 2022; Ulrich et al., 2014, cited by Linden et al., 2021; Kotler et al., 2022). Together, these processes support the seamless merging of action and awareness and the reduction in self-monitoring that characterize the flow state (Dietrich, 2004; Lynch & Troy, 2021).

Similar patterns of PFC and DMN downregulation occur across other NOSCs, contributing to shared experiences of self-transcendence (Yaden et al., 2017). Neuroimaging studies of advanced meditation show reduced PFC activity and significant DMN suppression, correlating with decreased mind-wandering and dissolution of self-sense (Laukkonen & Slagter, 2021, cited by Yang et al., 2024; Isham et al., 2022). Psychedelic experiences involve altered prefrontal activity and disrupted DMN connectivity, which are associated with less constrained cognition and profound ego dissolution (Carhart-Harris et al., 2012, cited by Isham et al., 2022; Nour et al., 2016, cited by Isham et al., 2022). Similarly, experiences of awe are linked to reduced top-down control and decreased DMN activity, corresponding with diminished self-reflection and a sense of self-diminishment (Van Elk et al., 2019).

While DMN suppression and transient hypofrontality provide a common neurocognitive foundation for attentional absorption and self-transcendence across these states (Isham et al., 2022), the functional significance of this shared mechanism differs critically between them. In flow, this neural shift specifically enables highly functional, goal-directed action and optimal performance (Dietrich, 2004; Kotler et al., 2022; Ulrich et al., 2014, cited by Linden et al., 2021). The resulting transcendent experience remains grounded in and beneficial to the activity at hand (Kotler et al., 2022; Tang & Zhou, 2020). This stands in sharp contrast to the altered connectivity induced by psychedelics, which typically produces a more radical and potentially disorienting restructuring of self-perception without a task-oriented framework (Isham et al., 2022; Timmermann et al., 2022).

4.2 Distinguishing Neural and Physiological Mechanisms

Beyond the shared modulation of self-referential brain networks, these NOSCs are distinguished by their unique neurochemical systems, brainwave patterns, and sensorimotor engagement. These differences explain their distinct subjective experiences and outcomes (Newberg & Yaden, 2018; Timmermann et al., 2022; Kotler et al., 2022).

These states originate from distinct neurochemical pathways. Flow's intrinsically motivating nature is powered by dopaminergic reward circuitry (de Manzano et al., 2013, cited by Peifer & Engeser, 2021; Alameda et al., 2022; Kotler et al., 2022). Psychedelic experiences, by contrast, are driven by interactions with serotonergic systems, specifically through 5-HT2A receptor activation (Isham et al., 2022). Awe experiences are linked to the autonomic nervous system and vagus nerve activation, which triggers a parasympathetic response (Kitson et al., 2020; Yaden et al., 2017).

These distinct neurochemical environments produce unique brainwave patterns and arousal states. Flow typically features heightened physiological arousal with frontal theta and moderate alpha activity (Katahira et al., 2018, cited by Alameda et al., 2022). This differs markedly from psychedelic states, which exhibit widespread changes and increased signal variability—reflecting a highly entropic brain state (Carhart-Harris et al., 2014, cited by Millière et al., 2018; Schartner et al., 2017, cited by Isham et al., 2022)—and from meditation, which correlates with specific alpha and theta band activity (Aftanas & Golocheikine, 2001, cited by Vaitl et al., 2005). From a sensorimotor perspective, flow uniquely combines physical activity with cognitive absorption to enable optimal performance (Nakamura & Csikszentmihalyi, 2014; Lynch & Troy, 2021). This stands in contrast to the radical, non-goal-oriented alterations in body schema characteristic of psychedelic experiences (Timmermann et al., 2022; Isham et al., 2022) and the varied effects of meditation, which span from enhanced body awareness to diminished sensory processing (Kitson et al., 2020; Newberg & Yaden, 2018).

In synthesis, while these NOSCs share high-level features like DMN suppression (Isham et al., 2022; Timmermann et al., 2022), their underlying biology produces fundamentally different experiences (Timmermann et al., 2022; Vaitl et al., 2005). Flow's unique combination of dopaminergic activity, focused arousal, and efficient sensorimotor integration enables a specific form of self-transcendence where altered consciousness enhances, rather than departs from, goal-directed action and optimal performance (Isham et al., 2022; Kotler et al., 2022; Osin et al., 2016).

5. Discussion

This chapter synthesizes the preceding comparative analysis, integrating phenomenological and neurocognitive findings to present a cohesive understanding of flow as a non-ordinary state of consciousness (NOSC) (Kotler et al., 2022; Timmermann et al., 2022). The discussion examines flow's distinctive position within the spectrum of NOSCs and explores what these comparisons reveal about self-consciousness, optimal experience, and human flourishing.

5.1 Integration of Key Themes

A comparison of flow with meditation, awe, and psychedelic experiences reveals significant phenomenological similarities and shared neural mechanisms, which ultimately highlight the unique characteristics of the flow state (Kotler et al., 2022; Dietrich, 2004; Isham et al., 2022; Linden et al., 2021).

5.1.1 Phenomenological Synthesis

Examining subjective experiences reveals a shared phenomenological signature across these diverse states (Corso et al, 2023; Oswald et al., 2023). Two core components stand out: deep attentional absorption in the present moment (Im & Varma, 2018; Nakamura & Csikszentmihalyi, 2014) and significant alterations in self-awareness (Csikszentmihalyi, 1990; Oswald et al., 2023). These self-awareness changes occur along a spectrum—ranging from the temporary loss of self-consciousness in flow (Csikszentmihalyi, 1990) to the "small self" sensation in awe (Piff et al., 2015, cited by Wang et al., 2025) to complete self-dissolution in advanced meditation and psychedelic states (Millière et al., 2018).

The consistent time distortion across these states suggests our subjective experience of time is deeply connected to attentional and self-referential processes, which NOSCs systematically alter (Im & Varma, 2018; Nakamura & Csikszentmihalyi, 2014). These similarities indicate that non-ordinary experiences fundamentally shift awareness away from the narrative self toward direct, embodied experience (Isham et al., 2022).

While sharing this signature, flow maintains a distinct profile: It is uniquely active, goal-directed, and performance-enhancing (Csikszentmihalyi, 1990). Flow is powered by intrinsic motivation (Csikszentmihalyi, 1990), which contrasts sharply with the passive nature of awe (Keltner & Haidt, 2003) and pharmacologically induced psychedelic states (Vaitl et al., 2005). Flow thus uniquely combines self-transcendence (Isham et al., 2022; Yaden et al., 2017) with real-world functionality, allowing individuals to perform at their peak capacity (Csikszentmihalyi, 1990).

5.1.2 Neurocognitive Synthesis

At the neurocognitive level, this shared phenomenological signature has a clear biological basis (Timmermann et al., 2022). The reduction in self-awareness and immersion in the present moment consistently correlates with two robust neural markers: reduced medial prefrontal cortex (mPFC) activity—known as transient hypofrontality—(Dietrich, 2004; Harris et al., 2017; Linden et al., 2021) and suppression of the Default Mode Network (DMN) (Ulrich et al., 2014, cited by Linden et al., 2021; Isham et al., 2022). This downregulation of self-referential brain regions appears to be a key neurocognitive mechanism facilitating the experience of selflessness across these states (Isham et al., 2022; Newberg & Yaden, 2018).

The distinct neurophysiological underpinnings explain the unique subjective qualities and functional outcomes of these states (Newberg & Yaden, 2018; Timmermann et al., 2022). Flow's dopaminergic pathways underpin its rewarding, goal-oriented nature (Linden et al., 2020), while serotonergic activation in psychedelic states produces their radical perceptual shifts (Isham et al., 2022). Flow's stable, task-relevant neural activation enables optimal performance (Alameda et al., 2022; Csikszentmihalyi, 1990), contrasting sharply with the increased global functional connectivity and disorganized brain activity in psychedelic states (Carhart-Harris et al., 2018; cited by Isham et al., 2022). This suggests that while DMN suppression may create the foundation for non-ordinary experiences (Isham et al., 2022), the specific character of each experience is determined by other co-activated neural and chemical systems (Newberg & Yaden, 2018; Linden et al., 2020).

5.1.3 Theoretical Implications

These findings have significant theoretical implications for understanding the relationship between self-consciousness, self-transcendence, and optimal human experience. The consistent pattern of reduced self-consciousness across non-ordinary states of consciousness (NOSCs) highlights its essential role in facilitating these experiences (Isham et al., 2022; Timmermann et al., 2022). Flow emerges as an exemplary model for beneficial altered states, demonstrating that self-transcendence can be achieved through active, goal-directed engagement rather than solely through passive or pharmacological means (Csikszentmihalyi, 1990; Isham et al., 2022). This challenges the assumption that optimal experiences must be effortless, showing how profound intrinsic rewards can arise from challenging activities (Peifer et al., 2022; Shepherd, 2021). By bridging everyday optimal functioning with deeper self-transcendent experiences, flow provides a framework for understanding how individuals can actively cultivate beneficial altered states through purposeful engagement, enriching our theories of consciousness and human flourishing (Peifer & Engeser, 2021; Isham et al., 2022).

5.1.4 Theoretical Significance

The integrated understanding of flow significantly enhances our conceptualization of altered states (Kotler et al., 2022; Ottiger et al., 2021), demonstrating that such experiences can be both transformative (Isham et al., 2022) and performance-enhancing (Peifer et al., 2022). As a cornerstone concept in positive psychology (Nakamura & Csikszentmihalyi, 2014; Csikszentmihalyi, 2014), flow illustrates how profound mental states contribute to human flourishing beyond mere pleasure (Peifer et al., 2022). It challenges the conventional belief that altered states must disconnect from reality (Dietrich, 2004; Lee et al., 2016) by showing how people can actively cultivate positive states (Csikszentmihalyi, 1990; Peifer & Engeser, 2021) that enhance skill development and achievement (Peifer et al., 2022).

Flow serves as a unique bridge connecting everyday optimal functioning with deeper self-transcendent experiences (Isham et al., 2022; Yaden et al., 2017; Csikszentmihalyi, 2014). It provides an accessible and practical pathway to self-transcendence (Isham et al., 2022; Šimleša et al., 2018), enriching our theories of consciousness (Kotler et al., 2022; Peifer et al., 2022) and offering crucial insights into human well-being and peak performance (Lynch & Troy, 2021; Fong et al., 2014).

5.2 Flow's Unique Position

Analysis of flow reveals its unique position within the spectrum of non-ordinary states of consciousness (NOSCs) (Dietrich, 2004; Linden et al., 2021). While sharing phenomenological and neurocognitive features with meditation, awe, and psychedelic experiences (Oswald et al., 2023; Yaden et al., 2017), flow stands apart through its distinctive triggering conditions and functional outcomes (Csikszentmihalyi, 1990; Peifer et al., 2022).

5.2.1 Distinctive Qualities: Functional Self-Transcendence

Flow is characterized by its voluntary, task-dependent nature (Oswald et al., 2023; Alameda et al., 2022) and intrinsically rewarding (autotelic) quality, where the activity itself provides the primary motivation (Nakamura & Csikszentmihalyi, 2014; Ottiger et al., 2021). This active engagement sets flow apart from more passive or spontaneously occurring altered states (Dietrich, 2004; Oswald et al., 2023).

What makes flow unique is its balance between reduced self-consciousness and enhanced performance (Csikszentmihalyi, 1990). During flow, individuals experience a temporary suspension of reflective self-awareness—an egoless state combined with a strong sense of control that eliminates concerns about failure (Nakamura & Csikszentmihalyi, 2014; Kotler et al., 2022; Harris et al., 2017). This powerful combination of deep absorption and heightened agency allows people to function at their peak capacity, making flow a highly functional state that enables superior performance across diverse domains (Csikszentmihalyi, 1990; Ottiger et al., 2021).

5.2.2 Contrasts with Other NOSCs

Flow uniquely combines self-transcendence with practical application (Yaden et al., 2017; Ottiger et al., 2021), distinguishing it from other non-ordinary states of consciousness (NOSCs) (Timmermann et al., 2022). Unlike awe, which is passive and stimulus-driven

(Keltner & Haidt, 2003), or psychedelic states, which are pharmacologically induced (Isham et al., 2022), flow emerges from active, goal-directed engagement (Nakamura & Csikszentmihalyi, 2014; Kotler et al., 2022).

In flow, the reduction of self-consciousness (Harris et al., 2017; Ottiger et al., 2021) enhances rather than disrupts performance, improving practical functionality (Kotler et al., 2022; Peifer et al., 2022). This enhancement is facilitated by stable neural patterns (Linden et al., 2021; Kotler et al., 2022), which contrast with the potentially destabilizing neural changes in high-dose psychedelic states, including reduced Default Mode Network (DMN) activity and altered network dynamics (Carhart-Harris et al., 2012, cited by Isham et al., 2022).

During flow, characteristic features of altered states—such as distorted time perception (Im & Varma, 2018; Hancock et al., 2019) and merged action-awareness (Csikszentmihalyi, 1990; Lynch & Troy, 2021)—seamlessly enhance productive, purposeful activity (Ottiger et al., 2021; Kotler et al., 2022).

5.3 Implications and Future Directions

The comparison of flow with other states illuminates its profound impact and distinctive qualities, revealing significant implications for practical applications and future research (Peifer et al., 2022). Flow's exceptional combination of self-transcendence with real-world functionality makes it particularly valuable for developing interventions and advancing scientific inquiry (Isham et al., 2022; Yaden et al., 2017).

5.3.1 Implications for Mental Health and Well-Being

Flow's capacity to foster peak psychological states (Csikszentmihalyi, 1990; Nakamura & Csikszentmihalyi, 2014) has significant implications for mental health (Peifer et al., 2022). Engaging in flow-inducing activities enhances resilience and psychological functioning through several mechanisms: reducing distress (Freire et al., 2021, cited by Peifer & Engeser, 2021; Corso et al, 2023), elevating mood (Linden et al., 2021), and diminishing cognitive aspects of anxiety such as apprehension (Harris et al., 2017). The ability of flow to reduce rumination, a key feature in depression, further underscores its therapeutic value (Reinhardt et al., 2008, cited by Peifer & Engeser, 2021).

These benefits make incorporating flow principles into therapeutic approaches particularly promising (Freire et al., 2021, as cited in Peifer & Engeser, 2021; Riva et al., 2016, as cited in Peifer & Engeser, 2021). Flow can serve both as an intervention strategy and as a therapeutic outcome, with notable applications in psychiatric rehabilitation (Teixeira & Freire, 2020, as cited in Peifer & Engeser, 2021; Riva et al., 2016, as cited in Peifer & Engeser, 2021) and as a complement to mindfulness practices in clinical settings (Corso et al., 2023).

5.3.2 Applications in Education, Performance, and Creativity

Beyond mental health, flow offers substantial benefits for learning, performance, and creativity (Nakamura & Csikszentmihalyi, 2014; Lee, 2005). In educational settings, flow functions as a key psychological construct that enhances academic engagement and student well-being, promoting skill development and mastery (Csikszentmihalyi, 2014; Peifer et al., 2022). This state consistently correlates with peak performance in areas such as sports and music, while simultaneously improving learning outcomes (Jackson et al., 2001; Peifer & Engeser, 2021).

Flow enhances creative problem-solving by increasing cognitive flexibility and fostering divergent thinking, thereby stimulating innovation (Nakamura & Csikszentmihalyi, 2014; Nijstad et al., 2010, as cited by Peifer & Engeser, 2021). Throughout these domains, flow's intrinsically rewarding nature serves as a powerful motivator for sustained engagement—an essential component for long-term growth (Nakamura & Csikszentmihalyi, 2014).

5.3.3 Future Research Directions

Despite significant advances, understanding flow's underlying processes remains essential (Peifer et al., 2022; Peifer & Engeser, 2021; Linden et al., 2021). Future research should compare flow with other non-ordinary states of consciousness (NOSCs) using both phenomenological and neuroscientific methods to map subjective experiences and neural signatures (Kotler et al., 2022; Newberg & Yaden, 2018; Timmermann et al., 2022).

Methodologically, the field must move beyond correlational studies toward longitudinal research that establishes causal relationships between flow and its outcomes. Cross-cultural studies are also necessary to test the generalisability of flow theory (Peifer et al., 2022; Fong et al., 2014).

Researchers should prioritise experimental designs that integrate neurophenomenological approaches, connecting first-person experiences with neural data from fMRI and EEG (Alameda et al., 2022; Timmermann et al., 2022). This integrated approach is crucial for developing a comprehensive understanding of flow's neurocognitive foundations, enabling more precise conceptualisation, measurement, and development of targeted interventions (Volpato & Liu, 2023; Linden et al., 2021; Alameda et al., 2022).

5.4 Gaps in the Literature and Thesis Contribution

This final section articulates the unique contribution of this thesis by addressing key inconsistencies and blind spots in the literature. While scholars broadly agree on flow's fundamental attributes and their overlap with other NOSCs (Csikszentmihalyi, 1990; Kotler et al., 2022; Ottiger et al., 2021; Yaden et al., 2017), the research contains several notable gaps that require examination.

5.4.1 Inconsistencies and Blind Spots

A key controversy concerns neural deactivation during flow. While Default Mode Network (DMN) suppression is widely accepted (Palhano-Fontes et al., 2015, cited by Millière et al., 2018; Linden et al., 2021), the extent of frontal deactivation remains contested, with some studies finding no support for the hypofrontality hypothesis (Dietrich, 2003, cited by Peifer & Engeser, 2021; Linden et al., 2021). Several methodological limitations contribute to these knowledge gaps. Research often relies on subjective self-reports, and flow is operationalised inconsistently across studies, hindering systematic progress and comparative analysis (Abuhamdeh, 2020). Furthermore, rigorous comparative research between flow and other non-ordinary states of consciousness (NOSCs) is scarce (Kotler et al., 2022). This lack of direct comparison constitutes a significant blind spot, emphasising the need for experimental designs that integrate neurophenomenological approaches to connect subjective experience with objective neural data (Timmermann et al., 2022).

Another critical blind spot is the literature's overwhelmingly positive focus, which often overlooks flow's potentially negative consequences (Peifer & Engeser, 2021). The same mechanisms of deep absorption can facilitate addictive behaviours like Gambling Disorder, sometimes called "dark flow" (Peifer & Engeser, 2021; Trivedi & Teichert, 2017, cited by Zinchenko & Shatochin, 2022). During dark flow, individuals lose touch with reality and experience disrupted self-identification, potentially fostering a pathological desire to repeat the experience despite harmful consequences (Zinchenko & Shatochin, 2022). Research demonstrates a connection between immersion in addictive behaviours, psychiatric distress, and addiction severity (Peifer & Engeser, 2021; Zinchenko & Shatochin, 2022). Acknowledging this darker aspect is essential for a more balanced and critical understanding of the phenomenon (Peifer & Engeser, 2021).

5.4.2 Thesis Contribution

This thesis offers a nuanced taxonomy of self-transcendent states through direct, multi-layered comparison (Kitson et al., 2020; Yaden et al., 2017). It reframes flow not as a mere curiosity within positive psychology but as a prime example of functional self-transcendence—demonstrating how consciousness can be altered to enhance rather than escape real-world engagement (Osin et al., 2016; Yaden et al., 2017; Van Cappellen & Rimé, 2014).

The research clarifies how flow shares fundamental mechanisms with other non-ordinary states of consciousness (NOSCs), such as DMN suppression (Alameda et al., 2022; Linden et al., 2020; Peifer & Engeser, 2021; Tan et al., 2023). However, flow maintains its distinctive position through its active, goal-directed, and volitional nature that enhances performance (Alameda et al., 2022; Csikszentmihalyi, 2014; Peifer & Engeser, 2021; Fong et al., 2014; Harris et al., 2017; Linden et al., 2020; Šimleša et al., 2018).

By highlighting these distinguishing features, particularly its unique combination of self-transcendence and real-world function, this thesis contributes to a more precise and critical understanding of optimal human experience (Linden et al., 2020). This integrated approach provides a robust framework for future research, emphasising the importance of multi-modal, comparative studies to advance both the scientific understanding and practical application of flow (Peifer & Engeser, 2021; Kitson et al., 2020; Peifer et al., 2022).

6. Conclusion

Understanding flow within the spectrum of non-ordinary states of consciousness (NOSCs) has significant interdisciplinary relevance (Kotler et al., 2022; Timmermann et al., 2022; Linden et al., 2021). This comparative perspective enriches theories of consciousness in psychology and cognitive neuroscience by showing how the brain facilitates various states of absorption through shared and distinct neural mechanisms (Dietrich, 2004; Kotler et al., 2022; Linden et al., 2020, 2021; Volpato & Liu, 2023).

Flow's recognition as an optimal psychological experience also has profound implications for mental health. It offers a non-pharmacological pathway to address anxiety and depression by promoting engagement and positive affect (Csikszentmihalyi, 1990, 2014; Peifer & Engeser, 2021; Lynch & Troy, 2021; Martinez & Scott, 2014). In education and creative work, applying flow principles can enhance skill development, performance, and meaningfulness (Csikszentmihalyi, 2014; Peifer & Engeser, 2021; Gold & Ciorciari, 2020; Šimleša et al., 2018). Ultimately, studying functional altered states provides a practical framework for enhancing human flourishing (Seligman & Csikszentmihalyi, 2014; Timmermann et al., 2022).

In conclusion, this thesis presents an integrative framework that establishes flow as a legitimate and highly beneficial non-ordinary state of consciousness (Kotler et al., 2022). Through systematic comparison of its phenomenological and neurocognitive profiles with other states (Kotler et al., 2022), this work illuminates two key aspects: the shared mechanisms underpinning self-transcendent experiences—including profound attentional absorption, altered self-awareness, and decreased DMN activity (Harris et al., 2017; Linden et al., 2020)—and flow's distinctive capacity for active, goal-directed engagement (Alameda et al., 2022; Linden et al., 2020; Nakamura & Csíkszentmihályi, 2014).

The findings highlight flow's unique position as a volitional state (Peifer & Engeser, 2021; Kotler et al., 2022; Peifer et al., 2022). that combines self-transcendence (Osin et al., 2016; Cappellen et al., 2014; Rufi et al., 2016) with real-world functionality and enhanced performance (Peifer & Engeser, 2021; Gold & Ciorciari, 2020). While future research should employ neurophenomenological and multi-modal approaches to further clarify these complex states (Dietrich, 2004; Kitson et al., 2020; Kotler et al., 2022), this integrated perspective offers a pivotal contribution. It redefines optimal experience by demonstrating that human flourishing emerges not from escaping reality's challenges, but through becoming profoundly and functionally absorbed within them (Csíkszentmihályi, 2014; Peifer & Engeser, 2021; Gold & Ciorciari, 2020; Volpato & Liu, 2023).

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