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Maternal Identity Integration: The MINDS Framework

Amanda Wilde

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Psilocybin Mechanisms in the Matrescent Brain: A MINDS-Based Model

Situating psilocybin within maternal neuroplasticity depends on recognizing matrescence as a hormonally primed, high-plasticity developmental window rather than as a brief, purely obstetric phase. As outlined in earlier chapters, the transition into motherhood involves substantial hormonal changes as well as coordinated changes to grey and white matter and large-scale networks: DMN, salience, executive-control, and reward. When this biological process unfolds within supportive environments, it facilitates maternal identity integration and a secure mother-baby dyad (Barba-Müller et al., 2018); when constrained by inadequate resources, chronic stress, trauma, or systemic neglect, the same plasticity can consolidate into rigid patterns of depression, anxiety, or disconnection that compromise wellbeing of the dyad (Kim, 2021).

Against the backdrop of this critical window, psilocybin, a leading candidate for neuromodulation through combined molecular and network-level effects (Carhart-Harris et al., 2012; Ross et al., 2016; Schmitz et al., 2025), emerges as a potential intervention when matrescent plasticity has been disrupted, blunted, or stalled. Acting primarily as a serotonin 2A receptor agonist, psilocybin engages glutamatergic and brain-derived neurotrophic factor-linked cascades that promote dendritic spine formation and synaptic remodeling in higher-order association cortex (Shao et al., 2021; Szpręgiel & Bysiek, 2024; Vargas et al., 2023). Altered thalamocortical gating disrupts the information balance between networks (Gaddis et al., 2022) and reduces intranetwork integrity to favor more globally integrated connectivity (Daws et al., 2022). These neurobiological shifts co-occur with distinctive experiential states—intensified emotion, self-transcendence, time distortion, awe, etc.—that have been associated with sustained changes in psychological flexibility, self-related beliefs, and relational orientation (Griffiths et al., 2018; MacLean et al., 2011; Metastasio et al., 2025; Slosower et al., 2024).

Building on this foundation, the present chapter situates psilocybin within the specific neurobiological landscape of matrescence and develops a mechanistic account of the MINDS framework: Matrescent Integration via Neuroplasticity, Dyads, and Psilocybin. Rather than treating psilocybin as a generic antidepressant, it introduces the claim that psilocybin may be especially suited for postpartum health. It may re-open or amplify the matrescent plasticity window at molecular, structural, and network levels to uniquely facilitate the integration of maternal identity and a secure mother–baby dyad.

The sections that follow trace the shared molecular substrates of plasticity in matrescence and psilocybin; detail grey-, white-, and experience-dependent remodeling; and map psilocybin's

effects onto matrescent reconfiguration of large scale networks. These strands articulate MINDS as a network-level, developmentally grounded mechanistic model that generates empirically testable hypotheses for psilocybin-assisted interventions for women in the postpartum period.

Shared Molecular Plasticity Substrate

The MINDS model posits that matrescence and psilocybin share a common molecular plasticity substrate organized around serotonin 5-HT_{2A} receptors, glutamate, and BDNF-mediated synaptic remodeling. Biologically, pregnancy and postpartum hormones are thought to recalibrate the serotonin–5-HT_{2A}–BDNF axis to reorganize maternal corticolimbic circuits (Jiang et al., 2016; Pawluski et al., 2019; Schiller et al., 2014; Vaidya et al., 1997). Pharmacologically, psilocybin engages this same pathway through psilocin’s 5-HT_{2A} agonism and downstream glutamatergic cascades that promote dendritic spine growth and synaptogenesis in overlapping prefrontal–limbic networks (Sonda et al., 2025; Szpręgiel & Bysiek, 2024; Vargas et al., 2023). Psilocybin may intervene directly on the molecular mechanisms that underlie matrescent adaptation.

Matrescent Molecules

Throughout pregnancy, rising estradiol strengthens serotonergic tone by increasing the activity of enzymes that synthesize serotonin, upregulating serotonin transporters and receptors, and boosting serotonin release (Hudon Thibeault et al., 2019). The abrupt withdrawal of estrogen and progesterone after birth removes this trophic support and downregulates serotonergic signaling which exposes a critical period open to plasticity and vulnerability (Barba-Müller et al. 2018; Dukic et al. 2024; Rybaczyk et al. 2005). Within this broader serotonergic recalibration, signaling specifically at serotonin 5-HT_{2A} receptors plays a central role in restructuring the maternal brain (Barba-Müller et al., 2018; Kraus et al., 2017; Pawluski et al., 2019). Serotonin engages 5-HT_{2A}-linked cascades that promote neurogenesis, synaptogenesis, dendritic remodeling, and axonal growth in prefrontal and hippocampal networks, areas that support memory, stress regulation, emotion, and psychological flexibility (Kraus et al., 2017; McEwen et al., 2015).

A key arm of this pathway is serotonin-dependent upregulation of the brain-derived neurotrophic factor (BDNF), which supports synaptic plasticity and structural remodeling (Popova et al., 2017). By coupling serotonin to BDNF through glutamate-dependent signaling, matrescent plasticity links the molecular changes at synapses and dendritic spines to refinement of in grey matter microstructure and white-matter connectivity within large-scale networks: default mode, salience, executive-control, and reward systems (Hoekzema et al., 2016; Orchard et al., 2023; Popova et al., 2017). When 5-HT_{2A}-mediated pruning and reconfiguring proceeds as within supportive physiological and psychosocial conditions, they are

more likely to consolidate into neural patterns that support integrated maternal identity and a bonded mother–baby dyad; under adverse conditions, the same plasticity can consolidate into configurations associated with postpartum depression, anxiety, or dyadic impairment.

Psilocybin Molecules

Psilocybin introduces a second, exogenous entry point into this same molecular plasticity. Psilocin binds to serotonin receptors, with particularly strong functional impact at cortical 5-HT_{2A} sites (Madsen et al., 2019). At the circuit level, 5-HT_{2A} activation engages glutamatergic cascades and downstream intracellular pathways—including BDNF-linked signaling—that together increase excitatory drive in association networks that project to limbic and prefrontal hubs and promote neurogenesis, synaptogenesis, dendritic spine remodeling, and axonal growth, and synaptic remodeling in the prefrontal cortex and hippocampus, regions already involved in matrescent change (Hatzipantelis & Olson, 2024; Szpręgiel & Bysiek, 2024; Vaidya et al., 1997). Evidence shows that psilocybin can produce rapid, robust increases in markers of neuroplasticity, with enhanced synaptic density and structural remodeling in associated grey-matter and white-matter that outlast the acute psychedelic window (Raval et al., 2021; Shao et al., 2021).

These molecular changes are reflected at the network level by transient disruption of default mode network integrity and increased flexibility in communication between DMN, salience, executive-control, and reward systems (Madsen et al., 2021; Siegel et al., 2023). Functionally, this translates into loosened habitual self-referential narratives, increased psychological flexibility, and greater capacity to update entrenched emotional and cognitive patterns; shifts that map closely onto the adaptive identity work of matrescence (Lebedev et al., 2015; Metastasio et al., 2025; Slosower et al., 2024). In this sense, psilocybin's 5-HT_{2A}–glutamate–BDNF cascade recapitulates, and in some cases amplifies, the very mechanisms that underlie matrescent cortical and limbic remodeling.

Re-Opening the Matrescent Plasticity Window

Because psilocybin taps into overlapping 5-HT_{2A}–glutamate–BDNF pathways, a carefully timed therapeutic session could redirect the plasticity window. In this case psilocybin may mobilize the molecular substrates that support maternal identity consolidation and engagement with the infant. This idea aligns with work on critical period reopening in adulthood, which suggests that certain interventions can transiently reinstate juvenile-like windows of plasticity in otherwise stabilized circuits (Hensch & Bilimoria, 2012). Within MINDS, this reopening is contingent on a carefully designed therapeutic context that centers the mother–infant dyad, analogous to how set and setting shape outcomes in psychedelic therapy and how relational environments shape matrescent trajectories.

Structural Similarities

Just as matrescence is marked by targeted grey matter refinement and white matter remodeling, psilocybin appears to act on partially overlapping anatomical substrates of structural plasticity. Increases in dendritic spine density, synaptogenesis, neurite complexity, and experience-dependent plasticity suggest that psilocybin can modulate many of the same corticolimbic territories that are reshaped during matrescence. In line with the MINDS framework, these convergent effects provide a potential therapeutic pathway in which psilocybin may redirect stalled or maladaptive plasticity.

During pregnancy and postpartum, pronounced reductions in grey-matter volume are observed in medial prefrontal cortex, posterior cingulate cortex, and temporal association areas, changes that are best interpreted as synaptic pruning and microstructural fine-tuning rather than degeneration (Barba-Müller et al., 2018). These volume reductions reflect targeted refinement of cortical networks central to maternal cognition and caregiving (Hoekzema et al., 2017; Orchard et al., 2020). This time is also associated with increases in white-matter microstructural integrity, particularly within major association tracts which support long-range communication among default-mode, salience, executive-control and reward networks (Barba-Müller et al., 2019; Hoekzema et al., 2020; Martínez-García et al., 2021; Paternina-Die et al., 2024; Pritschet et al., 2024). These changes peak in late gestation and partially normalize after birth, suggesting that a transient period of heightened axonal and myelin-related efficiency helps mothers more rapidly detect infant cues, align internal states with external demands, and sustain flexible, dyad-centered engagement (Barba-Müller et al., 2019; Kim et al., 2010; Pritschet et al., 2024).

Psilocybin-occasioned states enhance synaptic remodeling and dendritic growth in many of the same corticolimbic regions that change during matrescence (Calder et al., 2023; Ly et al., 2018). Preclinical studies show that a single psilocybin dose can induce rapid and persistent increases in dendritic spine density, spine head size, and synaptic strength, with effects that are detectable days to weeks later (Shao et al., 2021). Additional studies report increased neurite complexity and synaptogenesis in hippocampal and prefrontal circuits, suggesting that psilocybin engages a structural plasticity program in regions that substantially overlap with those reshaped during matrescence (Calder et al., 2023; Sonda et al., 2025).

Psilocybin's capacity to increase neuroplasticity and reorganize the communication between large-scale networks implies that, when administered within the postpartum window, it could influence structural configurations that favor integrated, flexible coordination between systems. Where matrescence naturally sculpts grey- and white-matter architecture toward caregiving, psilocybin offers a strategic means of re-engaging or amplifying this structural plasticity when endogenous processes are blunted, stalled, or distorted.

Experience Plasticity

A third, crucial layer of matrescent plasticity is experience-dependent changes to architecture and network connectivity. In this domain, the lived experience of caregiving—moments of attention, presence, synchrony—determine how axonal conduction, myelination dynamics, dendritic remodeling, and synaptogenesis are sculpted over time (Feldman, 2015; Fu & Zuo, 2011; Swain et al., 2008). The content and quality of mother-infant interactions drive structural adaptations bidirectionally across the dyad (González-Mariscal & Melo, 2017). In this sense, the maternal brain and the infant’s developing limbic-prefrontal systems co-evolve through repeated interactions, and matrescent structural plasticity remains contingent on the ongoing relational environment.

Psilocybin-occasioned states are, in and of themselves, immersive experiences that directly feed experience-dependent plasticity. At the cellular level, they evoke dendritic spine remodeling, synaptogenesis, and refinement of axonal conduction and myelination (de Vos et al., 2021; Ly et al., 2018; Shao et al., 2021), while at the network level they disrupt rigid default-mode patterns and increase cross-talk between salience, executive-control, and reward systems (Gattuso et al., 2023; Madsen et al., 2021). Additionally, the degree to which an individual experiences the features of the acute session—heightened emotions, ego dissolution, a sense of unity, etc.—has been shown to positively predict the magnitude and durability of therapeutic change (Brudner et al., 2025; Ko et al., 2022; Romeo et al., 2025; Roseman et al., 2018).

In the context of matrescence, a psilocybin session could therefore function as a relational and experiential event that provides adaptive information into an already plastic maternal brain. The experience can alter the inputs that drive experience-dependent plasticity: how a mother feels in relation to herself, to her baby; what she notices and prioritizes about infant cues; how she interprets distress; which self-narratives become plausible; whether feelings of connection to the infant and others are available to consolidate. Within the MINDS framework, this intervention is conceptualized as a targeted pharmacological attempt to re-engage matrescent grey- and white-matter remodeling and as a deliberate effort to shape the experiential conditions under which that remodeling consolidates. In doing so, the structural and network changes have the opportunity to organize around a coherent maternal identity and a secure, co-regulated mother-infant relationship.

Bridge to Networks

These molecular, structural, and experiential layers indicate that matrescence and psilocybin converge on partially overlapping plasticity mechanisms that operate across scales.

These shared substrates can be organized in terms of four large-scale brain systems that are selectively recalibrated in the maternal brain: the default mode, salience, executive-control, and reward networks. Each network supports a distinct dimension of matrescent adaptation—identity, threat detection, planning for the dyad, and caregiving motivation—and each is also modulated, in different ways, by psilocybin. The next sections therefore map how psilocybin's 5-HT_{2A}-driven changes in connectivity and network dynamics may, in principle, engage or amplify matrescent adaptations within these four systems, to form the core of the MINDS mechanistic account.

Default Mode Network: Matrescence

The default mode network is a midline–parietal system centered on the medial prefrontal cortex, posterior cingulate–precuneus, and inferior parietal cortex (Raichle, 2015) that supports autobiographical memory, self-referential mentation, and mental time travel (Spreng et al., 2009). It interacts with attention and control networks, including the salience and executive control systems, to integrate internal cues, past experience, and anticipated futures in ways that shape how the brain allocates attention, interprets incoming information, and organizes behavior (Menon, 2023). During matrescence, this network undergoes substantial structural and functional remodeling (Nehls et al., 2024; Pritschet et al., 2024). Grey matter volume and cortical thickness decrease in default mode hubs: changes that appear to streamline DMN processing and allowing greater influence from salience and executive-control networks (Azarias et al., 2025; Hoekzema et al., 2017; Liang et al., 2016; Pritschet et al., 2024). Connectivity between limbic regions such as the amygdala and hippocampus shift (Dufford et al., 2019) alongside synaptic pruning, dendritic remodeling, and increased myelination (Martínez-García et al., 2021) that refine self-referential circuits and increase global communication with salience, executive-control, and reward networks (Hoekzema et al., 2017).

Functionally, DMN adaptations support the integration of prematernal and maternal selves into a cohesive sense of self in which the mother can increasingly experience herself as capable, competent, and oriented toward caregiving (Hwang et al., 2022; Molnar-Szakacs & Uddin, 2013). Rather than signaling global cognitive loss (Orchard et al., 2023), the remodeling appears to fine-tune DMN activity for a more relationally anchored sense of self (Spreng & Grady, 2010), such that the autobiographical narrative begins to organize around the mother–infant dyad and the infant becomes a stable point of reference in past and future thinking (Hoekzema et al., 2022). When this reorganization proceeds adaptively, DMN activity supports a flexible matrescent identity that can move fluidly between attending to the mother's own needs and entering into attuned, present-moment engagement with her infant; when it is disrupted, DMN dysregulation may manifest as ruminative self-focus, intrusive negative thoughts, and identity fragmentation that undermine caregiving and dyadic presence (Berman et al., 2011; Zhu et al.,

2017).

Default Mode Network: Psilocybin

Psilocybin acts on the same higher-order association cortices and limbic–prefrontal circuits that anchor the DMN, primarily through psilocin’s agonism at cortical 5-HT_{2A} receptors (Smausz et al., 2022). Activation of 5-HT_{2A} receptors in medial prefrontal and posterior cingulate regions engages glutamatergic and BDNF-linked cascades that promote synaptogenesis, dendritic spine remodeling, and increased neurite complexity and leads to durable changes in DMN-related microstructure (Shao et al., 2021 ; Vargas et al., 2023). Within the MINDS framework, these 5-HT_{2A}-BDNF-dependent changes are interpreted as a pharmacological means of engaging the same plasticity mechanisms that, during matrescence, help recalibrate self-referential networks around the mother–infant dyad.

At the network level, psilocybin reliably disrupts intrinsic DMN integrity, reduces within-network coherence and loosens the dominance of midline self-referential regions, while temporarily increasing global communication between the DMN and salience, executive-control, and sensory networks (Preller et al., 2020; Siegel et al., 2023; Yu et al., 2024). These patterns are thought to transiently relax long-held narratives about the self and world, which allow alternative interpretations and autobiographical configurations to become accessible (Carhart-Harris & Friston, 2019; Kangaslampi & Lietz, 2025). Phenomenologically, this pattern corresponds to unselfing and ego dissolution (Letheby & Gerrans, 2017), and a sense of time distortion (Shebloski & Broadway, 2016) that align with the exposure phase of the phenomenological arc. Features of the expansion phase—intensified emotions, heightened connectedness, awe, and existential inquiry—may also emerge from these network dynamics.

Recent studies indicate that the magnitude of DMN disruption (Artin et al., 2021; Gattuso et al., 2023), and the associated intensity of these experiential features, correlate with sustained improvements in mood, increased psychological flexibility, and durable shifts in values toward connection, care, and meaning (Krabbe et al., 2024; MacLean et al., 2011). Long after the acute psychedelic state has resolved, many participants describe living with a more flexible, less self-critical narrative (Sloshower et al., 2024; Søndergaard et al., 2022), a greater sense of belonging and relational embeddedness ((McCulloch et al., 2022; Roseby et al., 2025), and a clearer prioritization of values towards benevolence, universalism, and concern for others (Kähönen, 2023)—changes that map closely onto the adaptive identity work and value realignments characteristic of healthy matrescent integration. In this sense, psilocybin-occasioned DMN disintegration is a potential catalyst for lasting changes that move the mother toward the same relational, dyad-oriented stance matrescence is biologically oriented.

Default Mode Network: MINDS

In the context of matrescence, a carefully supported psilocybin session could transiently desynchronize DMN patterns and relax over-learned assumptions, expectations, and self-beliefs about motherhood, consistent with relaxed-belief (REBUS-like) models of psychedelic action. By re-opening a window of DMN-linked plasticity, such a session may permit alternative, more adaptive identity narratives to emerge, consolidate; hereby offering mothers a renewed opportunity to enter the integrative phase of the arc. For mothers whose matrescent DMN reorganization has stalled in ruminative, fragmented patterns, psilocybin-occasioned unselfing and ego dissolution may provide a time-limited opportunity in which the autobiographical self can be rewritten to integrate maternal identity, reprioritize caregiving relationships, and restore a sense of continuity between prematernal and maternal selves. Within the MINDS model, this process is conceptualized not as generic mood enhancement (do I like the negative first?) but as targeted support for identity integration and narrative reorganization.

Salience Network: Matrescence

The salience network is a large-scale system anchored in the anterior insula and dorsal anterior cingulate cortex that detects behaviorally relevant stimuli (Seeley et al., 2007). Through its intrinsic connectivity to default-mode and executive-control hubs, it flexibly coordinates these systems so that attention and cognitive resources are allocated to the most pressing demands (De Ridder et al., 2023).

Via tight coupling with limbic structures that drive hypothalamic–pituitary–adrenal (HPA)-axis activation, the salience network plays a central role in shaping stress responses by influencing when and how strongly cortisol is mobilized in response to perceived threat or need (De Ridder et al., 2023; Thomason et al., 2011). During matrescence, salience circuitry is recalibrated to prioritize detection and interpretation of infant-related cues (Dufford et al., 2019; Gholampour et al., 2020). Structural and connectivity changes strengthen communication between salience regions and limbic and reward circuits, such that subtle shifts in the baby’s facial expression, vocalizations, or physiological state register as meaningful and action-relevant (Dufford et al., 2019; Orchard et al., 2023; Piallini et al., 2015).

When these adaptations unfold within a supportive hormonal and environmental milieu, responding to the baby can feel intuitive and natural (Feldman & Bakermans-Kranenburg, 2017). By contrast, when salience-network plasticity unfolds in the context of chronic stress, limited social support, trauma, or endocrine dysregulation, threat detection can become pathologically biased (McCutcheon et al., 2019). Chronic stress or inadequate support can amplify or dysregulate cortisol output, further entrenching hypervigilant or numbed states that disrupt matrescent neural plasticity (Leuner et al., 2014; Radley et al., 2015). This may give rise to either

hypervigilant, anxious reactivity or, conversely, blunted, emotionally numbed responses, both of which interfere with sensitive caregiving and heighten vulnerability to postpartum mood disturbance (Heinisch et al., 2019; Yatziv et al., 2021). As a core maternal gating system, the salience network is a powerful influence on the mother's moment-to-moment caregiving responses, her felt sense of competence in the maternal role, and the quality of the mother–infant bond; making it a key neural pathway through which a mother organizes her identity and forms the dyad (Ho et al., 2020; Swain et al., 2007).

Salience Network: Psilocybin

Psilocybin also acts on core nodes of the salience network through dense expression of cortical and limbic 5-HT_{2A} receptors (Madsen et al., 2021; Weber, 2010). 5-HT_{2A}-mediated glutamatergic and BDNF-linked cascades in these regions promote synaptogenesis, dendritic remodeling, and network-level reorganization that can alter how emotional and interoceptive signals are tagged as salient (Agnorelli et al., 2025). In non-perinatal samples, psilocybin has been associated with reduced coupling between hyperreactive threat circuits and self-referential processing, patterns that accompany decreases in pathological anxiety and avoidance (Barrett et al., 2020; Gattuso et al., 2023; Kraehenmann et al., 2015). MINDS interprets these salience-network effects as a way of loosening maladaptive threat-based tuning while preserving, and potentially enhancing, sensitivity to cues of safety and connection within the mother–infant dyad.

Through its interactions with HPA-axis circuitry, psilocybin may also modulate stress response at the level of salience-driven cortisol signaling (Huang et al., 2025; Khan & Malik, 2025; Mason et al., 2023). In experimental contexts, psilocybin-assisted therapy has been linked to reductions in stress reactivity and improved regulation of anxiety and avoidance (Kometer et al., 2012). These changes are consistent with a shift in emotional bias away from negative interpretations toward more neutral or positive appraisals (Stroud et al., 2018). This aligns with matrescent needs: a maternal brain that can rapidly detect infant distress while exiting threat mode when the environment is safe is better positioned to sustain co-regulated, emotionally present caregiving (Leerkes et al., 2016). In MINDS, psilocybin is thus hypothesized to support recalibration of salience circuits away from globally elevated threat or emotional numbing and toward a pattern in which infant cues are prioritized without being overwhelming.

Matrescence and psilocybin both appear to act on the salience network (Cárdenas et al., 2020; Madsen et al., 2021) in ways that heighten perception, intensify emotions, amplify felt connection, elicit awe, and bring previously avoided fears into awareness, often in the context of intensified existential inquiry—states that exemplify the expansion phase (Metastasio et al., 2025; Orchard et al., 2023). During acute states, individuals frequently encounter highly salient scenes of fear, grief, or vulnerability, in a context where these emotions can be felt, observed,

and re-interpreted; previously over-weighted threat cues can lose some of their grip (Hipólito et al., 2023; Kelly et al., 2021). For a mother whose salience network has become locked into chronic alarm or shutdown, such psilocybin-occasioned exposure could provide a structured opportunity to renegotiate the meaning of bodily arousal, infant cues, and relational threat, and potentially transform undifferentiated anxiety into more specific, workable concerns (Sloshower et al., 2024). As the session transitions into integration, the same heightened salience can shift toward signals of safety, love, and connection—particularly when therapeutic support explicitly orients attention to caregiving values and the mother–infant relationship—thereby scaffolding a salience profile that flags dyadic synchrony and soothing as intrinsically important (Liebnau et al., 2025; Stauffer et al., 2021).

During the postpartum period, a thoughtfully structured psilocybin-assisted process could rewire salience-network patterns that over-prioritize threat or suppress emotional responsiveness, while opening a plasticity window in which infant-related cues can be re-encoded as meaningful without feeling overwhelming. If salience-network recalibration has been impacted by trauma, social isolation, or chronic stress, psilocybin may allow a woman to re-experience how internal sensations and infant signals map onto action and cultivate more nuanced, context-sensitive caregiving responses. Through the MINDS model, these shifts are understood as opportunities for targeted support to recalibrate a core gating system that links stress physiology, emotional salience, and caregiving behavior in the service of a secure, attuned mother–infant dyad.

Executive Control Network: Matrescence

The executive-control network is a fronto-parietal system centered on the dorsolateral prefrontal cortex, dorsal anterior cingulate, and lateral parietal regions (Breukelaar et al., 2017). It supports working memory, planning, cognitive flexibility, and inhibitory control—capacities that allow individuals to maintain goals, organize behavior, and adjust responses when circumstances change (Niendam et al., 2012). Structurally, pregnancy and the postpartum period are associated with transient changes in white-matter refinements that link the executive-control cortex with subcortical motivational and affective circuits (Barba-Müller et al., 2018; Niu et al., 2025); an adaptation that may provide a more efficient anatomical backbone for cognitive control in the service of caregiving. At the level of connectivity, studies indicate postpartum mothers show strengthened and more flexible coupling between executive hubs and regions within salience, limbic, and reward networks (Dufford et al., 2019; Orchard et al., 2023), to, potentially, support faster translation of newly prioritized infant cues into organized behavioral responses.

In terms of network interactions, salience hubs flag infant-related signals as high priority (Piallini et al., 2015), the executive network sequences and updates plans for the dyad (Friedman & Robbins, 2022), and default-mode activity supplies autobiographical and future-oriented context to allow mothers to consider multiple demands while keeping the dyad at the center of decision-making (Smith et al., 2021). Successful executive-network adaptations allow mothers to feel a sense of competence and agency and help integrate a coherent maternal identity (Ghadimi & McCormack, 2025). When compromised, executive overload can manifest as disorganization, decision fatigue, and harsher or inconsistent parenting which undermines maternal self-confidence and the quality of the mother–infant relationship (Deater-Deckard et al., 2012; Perez et al., 2025).

Executive Control Network: Psilocybin

Psilocybin engages the executive-control network through dense 5-HT_{2A} expression (Madsen et al., 2021) in hubs that support working memory, cognitive flexibility, and inhibitory control (Zhang & Stackman, 2015). 5-HT_{2A}-driven glutamatergic and BDNF-linked cascades in these areas promote synaptogenesis, dendritic spine remodeling, and strengthened connectivity within fronto-parietal control circuits and between executive hubs and limbic systems (Moliner et al., 2023). These connectivity changes correlate with sustained improvements in depressive symptoms and measures of cognitive flexibility (Daws et al., 2022). Individuals show enduring gains in cognitive flexibility and goal-directed behavior as executive systems become less rigidly bound to habitual patterns and more capable of updating behavior in line with current goals and values (Sloshower et al., 2024; Teixeira et al., 2022). In the MINDS model these effects are considered a way to enhance cognitive capacity to plan and solve for the dyad.

Clinically, psilocybin assisted therapy has been linked to durable gains in psychological flexibility; defined as the ability to stay present and adjust behavior in service of chosen values rather than repeating entrenched habits (Kashdan & Rottenberg, 2010). Participants often describe increased capacity to interrupt maladaptive routines, consider alternative perspectives, revise cognitive and behavioral patterns and make more deliberate choices in relationships and daily life (Belser et al., 2017; Metastasio et al., 2025). Conceptually, these shifts align with the demands of matrescence, where mothers must continually juggle competing needs, revise routines, and improvise caregiving strategies under conditions of sleep disruption and emotional load. In MINDS, psilocybin's effects on executive-control circuits are therefore hypothesized to support a transition from reactive, symptom-driven coping toward more intentional, dyad-centered planning and decision-making.

After psilocybin experiences, many individuals describe a gradual shift from raw insight to deliberate reorganization of everyday life: priorities reordered, longstanding habits interrupted,

and a more coherent sense of self begins to take shape (Whitfield, 2021; Kähönen, 2023; Metastasio et al., 2025). In phenomenological terms, features such as an updated identity, clarified values, experiences of unity, and enduring psychological flexibility align with the integration phase. For a mother navigating matrescence, strengthened executive flexibility could translate into more adaptive planning for sleep, feeding, work, and support, as well as greater capacity to choose responses that protect both her wellbeing and the integrity of the mother–infant relationship.

Executive Control Network: MINDS

From a MINDS perspective, psilocybin-assisted postpartum care could improve executive-control network flexibility in ways that help mothers translate newly accessible perspectives—about themselves, their babies, and their relationships—into practical, sustainable changes in daily life. For mothers whose executive systems are overloaded by chronic stress or mood disturbance, this may create a window to interrupt rigid coping strategies, experiment with alternative caregiving routines, and strengthen a sense of competence and agency in the maternal role. These shifts are conceptualized as targeted support for the executive scaffolding of matrescent integration: helping a reorganized DMN and recalibrated salience and reward networks translate into lived patterns of behavior that sustain a coherent maternal identity and a secure, well-supported mother–infant dyad.

Reward Network: Matrescence

The reward network is a dopaminergic circuit centered in the ventral tegmental area, nucleus accumbens, and ventral striatum that assigns value to stimuli and generates motivation to pursue them (Hamid et al., 2016; Michel et al., 2015). During matrescence, oxytocin modulates this circuitry so that the baby’s scent, cry, and touch become among the most potent and reliable sources of reward in the mother’s environment (Strathearn, 2011). Oxytocin enhances connectivity between mesolimbic hubs and social–emotional regions (Day & Shea, 2025) to amplify dopaminergic responses to infant cues (Grieb & Lonstein, 2022) and make caregiving behaviours feel intrinsically gratifying rather than effortful, even in the face of sleep loss and increased demands (Pechtel et al., 2013).

In this state, functional connectivity findings suggest that the reward network works in tandem with the salience and executive-control networks (Barnett & Vasii, 2026): +oxytocin-sensitized salience circuit flags infant needs, executive system organizes a response, and mesolimbic pathway delivers an oxytocin-modulated “reward signal” that reinforces sensitive, synchronous caregiving experienced as enlivening and sustainable+. When these oxytocin–reward loops recalibrate adaptively, maternal identity gradually reorganizes around a felt sense that investing

in the mother–baby dyad is both meaningful and energizing (Cainelli et al., 2024; Grieb & Lonstein, 2022). This attunement strengthens bonding, supports co-regulation, and enhances shared wellbeing (Feldman, 2007). When reward processing is blunted or dysregulated, the pull of infant cues is weaker and caregiving may feel less intrinsically rewarding (Laurent & Ablow, 2012; Pechtel et al., 2013). If the demands of caregiving feel like a draining obligation, mothers may withdraw attention or effort. These patterns make it difficult for mothers to access the motivating aspects of the dyad and increase the risk for disrupted bonding and postpartum mood disturbance (Harasawa et al., 2025; O’Dea et al., 2023).

Reward Network: Psilocybin

Psilocybin engages the reward network through 5-HT_{2A} signaling in cortical-limbic regions that project on to mesolimbic dopaminergic hubs (Pasquini et al., 2024; Wojtas et al., 2023). During and after dosing, psilocybin modulates dopaminergic tone and functional connectivity (Siegel et al., 2023; Vollenweider, 1999) within these pathways to alter how social and emotional stimuli are valued and how strongly they motivate behavior (Bhatt & Weissman, 2024; Nardou et al., 2023). Clinical and naturalistic studies suggest that psilocybin-occasioned states are associated with increased feelings of social connectedness, prosocial motivation, and warmth toward others, alongside reductions in anhedonia and social withdrawal (Bhatt & Weissman, 2024; Forstmann et al., 2020; Weiss et al., 2021). Connectivity between reward circuitry and socio-emotional regions appears to shift in ways that make relational, prosocial, and emotional interactions more salient and reinforcing (Pokorny et al., 2017). In this context, caregiving-relevant experiences are preferentially highlighted and woven into an updated sense of what “really matters” (Metastasio et al., 2025; Watts et al., 2017). These relational shifts overlap with oxytocin-modulated processes described in maternal reward circuitry, where caregiving and social contact become intrinsically rewarding (Day & Shea, 2025; Grieb & Lonstein, 2022). The MINDS framework views these mesolimbic effects as a way of returning reward sensitivity toward affiliative, care-oriented stimuli.

Studies indicate that a single psilocybin dose is associated with durable changes in reward-related functioning (Barrett et al., 2020; Liebnau et al., 2025). These include sustained increases in positive affect, improvements in prosocial attitudes and interpersonal functioning and reduced negative affect and anxiety (Liebnau et al., 2025). These effects likely reflect a combination of direct actions on serotonergic modulation of mesolimbic circuits and indirect effects via enhanced affiliative processing—potentially including oxytocin-linked mechanisms—that give rise to experiences of intense warmth, gratitude, and connection that many participants retrospectively identify as among the most meaningful of their lives.

Reward circuitry, which reshapes what feels compelling, satisfying, and worth pursuing, is likely implicated in several of the phenomenological features that arise in matrescence and psilocybin: heightened perception, emotional salience, and redefined values. Across the expansion and integration arcs, these reward-linked shifts often coalesce into a more relational orientation, in which connection and caregiving may feel increasingly central and intrinsically worthwhile (Strathearn et al., 2009; Weiss et al., 2021). For a mother navigating matrescence, such shifts could re-sensitize her to the micro-rewards within everyday interactions with her baby.

In the postpartum context, psilocybin experiences could augment maternal reward circuitry in a way that strengthens, or restores, the intrinsic value of the dyad. By transiently intensifying experiences of connection, care, and meaning, such states may re-establish caregiving, dyadic synchrony, and shared moments of calm as activities that feel compelling and satisfying. In this framework, psilocybin can be understood as pharmacologically and experientially engaging the oxytocin–dopamine loop in ways that define the reward hierarchy around the mother–baby dyad. These behavioral and emotional investments may sustain a secure, enlivening bond and support ongoing matrescent integration.