Memory, Mood, and Identity: Episodic Memory Impairments and the Loss of Diachronic Unity in Depression

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Abstract

Diachronic unity, or the perceived continuity of one's identity across time, is thought to be disrupted in depressive disorders, yet the mechanisms through which depression gives rise to these disruptions remain poorly understood. The present review explores the possibility that depression-related changes in sleep contribute to impaired self-continuity by disrupting episodic memory processes. Cognitive models that position episodic memory as foundational to constructing a coherent and continuous identity are first outlined. These models are further discussed in the context of depression, where cognitive impairments, such as overgeneral recall and negatively biased memory retrieval, are known to distort episodic processing. Evidence from sleep research is then integrated to explore how depression-related alterations in sleep architecture may exacerbate these distortions. Finally, this review argues for the potential of sleep-based interventions to support memory functioning and, by extension, self-continuity in depression.

Keywords: diachronic unity, memory, depression, sleep architecture, over-general memory, negative bias

Introduction

Tulving (1985) proposed that episodic memory is not merely a record of past events, but a form of mental time travel, characterized by autonoetic consciousness. From this perspective, episodic memory allows for the diachronic unity of self by preserving the subjective sense that "I" was the one who lived the remembered experience. In contrast, later work by Conway (2005) and Pleydell-Pearce (2000) argued that continuity of self is actively constructed by the conceptual self, which selects and distorts past experiences to maintain a coherent narrative. Despite offering opposing accounts of how self-continuity arises, both frameworks converge on a central claim: that episodic memory plays a constitutive role in maintaining a unified sense of self over time.

But what happens when this system is disrupted? Subsequent research has proposed that the cognitive distortions associated with depression, which disrupt episodic recall, may therefore contribute to fragmented self-concept in this population (Williams et al., 2007, Prebble, Addis & Tippett, 2012; Guerini et al., 2019). Among these distortions, overgeneralized memory, in which memories lack specific detail, and a bias toward negatively valanced content are well documented in major depressive disorder (MDD) (Lloyd & Lishman, 1975; Williams & Broadbent, 1986). Thus, researchers have investigated how these specific biases may undermine self-continuity, drawing on the theoretical frameworks established by Tulving and Conway. Concurrently, emerging evidence from sleep research indicates that altered sleep architecture in MDD, including reduced slow-wave sleep (SWS) and disrupted rapid eye movement (REM) patterns, may exacerbate such cognitive biases in memory processing (Harrington et al., 2023). However, the existing literature has yet to examine how sleep-based interventions might restore self-continuity in depression by targeting episodic memory distortions. I propose that improving

sleep architecture may reduce overgeneral and negatively biased recall, thereby supporting a more coherent sense of self over time.

Constructing the Self Through Memory

The relationship between memory and personal identity has long been theorized, famously articulated by John Locke, who argued that "as far as this consciousness can be extended backwards to any past action or thought, so far reaches the identity of that person" (Locke, 1690/1999). Although formulated centuries ago, this insight remains relevant in contemporary cognitive psychology, where research has elaborated on Tulving's distinction between semantic and episodic memory to investigate how specific memory systems may contribute to the continuity of the self over time (Tulving, 1972,2002). According to Tulving, semantic memory encompasses abstracted knowledge detached from the specific context in which it was acquired. This includes general facts about the world and, in the case of semantic autobiographical memory, facts about oneself (Levine et al., 2002). In contrast, episodic memory involves conscious re-experience of specific past events situated in a particular time and place. Crucially episodic recall involves autonoetic consciousness, referring to the awareness that a recalled event is one you personally experienced (Tulving, 1985; Wheeler, Stuss & Tulving, 1997; Vandekerckhove & Panksepp 2009). By comparison, semantic memory involves noetic consciousness, or the accessing of factual knowledge without re-experience. The autonoetic quality of episodic memory offers a compelling explanation for diachronic unity by allowing individuals to recognize recalled past events as their own, creating a continuous and unified sense of self over time (Prebble, Addis & Tippett, 2012; Guerini et al., 2019).

Alternatively, Conway (2005) and Pleydell-Pearce's (2000) Self-Memory System (SMS) proposes that continuity of self is actively constructed by an ongoing interaction between the working self and autobiographical memory. The working self refers to an executive system that works to align current goals with one's self-perception, maintaining a coherent self-narrative (Conway & Holmes, 2004). This system selectively encodes and reconstructs episodic memories, integrating them into autobiographical knowledge only when they support current goals. It is not the episodic content itself, but the way in which it is organized within the SMS that influences the conceptual self, referring to a stable, coherent representation of identity. This results in a bidirectional relationship, in which autobiographical memories inform the developing self-concept, while the conceptual self concurrently shapes how such memories are interpreted, retained, and retrieved (Conway 2005, Conway & Holmes, 2004; Wilson & Ross, 2003). Unlike Tulving's model, which emphasizes self-continuity through autonoetic consciousness, Conway and Pleydell-Pearce suggest that diachronic unity is actively constructed by the present self through this process of memory selection and reinterpretation. Nonetheless, both frameworks share a common understanding that episodic memory is central to sustaining a unified sense of self across time. In other words, it is not just about storing past events; our memories are what allow us to experience ourselves as the same person throughout our lives.

Depression and the Disrupted Self

Psychopathologies such as depression and suicidality are often accompanied by disturbances in memory processing, which may erode the experience of being a continuous self. A study by Chandler et al. (2003) demonstrated that while most adolescents were able to explain how they remained the same person despite changes throughout their lives, the majority of severely suicidal youth were unable to articulate why they were the same individual now as in

the past, suggesting suicidality may be associated with a disrupted sense of phenomenological continuity.

One possible explanation for the observed lack of self-continuity is overgeneralized memory (OGM), a phenomenon widely documented in depression and suicidality (Williams & Broadbent, 1986; Williams, 1996; Söderlund et al., 2014; Weiss-Cowie, Verhaeghen, & Duarte, 2023; Ricarte et al., 2011; Vrielynck, Deplus & Philippot, 2007). OGM refers to the tendency to retrieve vague or categorical memories rather than specific, detail-rich episodes. To account for levels of specificity in autobiographical recall, the SMS model suggests autobiographical memory is hierarchically organized based on levels of abstraction (Conway 2005; Conway & Pleydell-Pearce, 2000). At the broadest level are lifetime periods, followed by general events, and finally, event-specific knowledge (ESK), which contains the sensory-perceptual details of individual experiences. When individuals deliberately attempt to retrieve a memory, the process involves a top-down generative search through the autobiographical hierarchy, beginning with abstract cues and narrowing toward specific ESK. However, overgeneral memory reflects a breakdown in this process, where the search is prematurely truncated at a general level. Conway and Pleydell-Pearce describe this as dysfacilitation, a failure often rooted in functional avoidance. That is to say, as retrieval approaches ESK, emotionally charged fragments risk disrupting the working self's goal-directed processes, causing higher executive systems to halt the memory search before specific details emerge.

The CaR-FA-X model (Williams et al., 2007) expands this account, by identifying three mechanisms that can contribute to overgeneral recall: Capture and Rumination, Functional Avoidance, and impaired Executive Control. Capture and Rumination refers to how abstract, self-relevant themes (e.g., failure, loss) dominate cognitive resources during retrieval, preventing

further search toward specific details. As previously noted, Functional Avoidance reflects a deliberate halting of retrieval to avoid distressing emotional material. Impaired executive control disrupts the ability to initiate, guide, or sustain the generative search required to access ESK, making it harder to navigate past irrelevant or intrusive material. Together, these factors may prevent individuals with depression or suicidality from accessing specific episodic details needed to support a cohesive, continuous sense of identity.

Although empirical research on the role of memory specificity in identity development remains limited, Vanderveren, Bijttebier & Hermans (2017) argued difficulty in retrieving specific episodic details of past events would interfere with the construction of a stable self-concept. Through the process of autobiographical reasoning, individuals are able to link specific personal experiences into a broader self-narrative, creating a coherent sense of identity (Habermas & Bluck, 2000; Bluck & Habermas, 2000). If OGM disrupts this process by limiting access to ESK, it may prevent the formation of meaningful connections between the self and personal experiences, resulting in fragmented recollections that lack coherence and personal significance (Prebble, Addis & Trippett, 2012; Habermas, & Köber, 2015; Bohn & Berntsen, 2008). Supporting this view, Alzheimer's disease research has demonstrated an association between impaired specificity in autobiographical memory and a disrupted sense of self (El Haj et al., 2015). Such findings suggest that OGM may undermine the narrative processes essential for constructing diachronic unity, which would contribute to the fractured self-experience often seen in depression.

The tendency toward overgeneral memory in depression is often accompanied by a negative cognitive bias, wherein negative events are more accessible and readily recalled than neutral or positive experiences (Lloyd & Lishman, 1975). This bias is often understood through

the mood congruency effect, where the current mood facilitates access to similarly valanced memories (Wittekind et al., 2014; Faul & LaBar, 2023). Consequently, depressed individuals are more likely to recall negative autobiographical memories when prompted and tend to experience impoverished access to positive memories, leading negative content to dominate their personal narratives (Dalgleish & Werner-Seidler, 2014).

The disproportionate influence of negative experiences on autobiographical reasoning was demonstrated in a study by Habermas and colleagues (2008). Participants with and without depression were asked to recount their life stories, including what they identified as the seven most important events in their personal history. The researchers predicted that individuals with depression would identify a greater proportion of negative events and that their narratives would deviate more often from a coherent temporal sequence. Both predictions were confirmed. Depressed participants tended to report a greater proportion of negative events, while their narratives departed from a chronological structure more frequently. While the study did not investigate a relationship between emotional valence and temporal structure directly, the co-occurrence of these features suggests negativity bias in memory retrieval may be accompanied by difficulty situating memories within a stable temporal framework.

The observed negative bias in depression is thought to coincide with impaired access to positive autobiographical memories, in which depressed individuals recall positive memories as less vivid and emotionally intense compared to their non-depressed counterparts (Dalgleish & Werner-Seidler, 2014). The absence of these phenomenological qualities may weaken the experience of autonoetic consciousness (Zaman, 2023). Though speculative, these findings suggest that in depression, the diminished vividness and emotional quality of positive memories may weaken their ability to support a stable sense of identity over time.

Sleep: The Invisible Architect

Emerging evidence suggests that distortions in autobiographical memory central to depression, including OGM and negative cognitive bias, may be rooted in disrupted sleep architecture (Harrington et al., 2023). MDD is consistently associated with alterations in sleep patterns, particularly increased REM density and reduced SWS (Steiger, & Pawlowski, 2019). These changes may distort the consolidation of autobiographical content, potentially biasing memory retrieval toward negative material. In a study by McNamara and colleagues (2010), participants with and without depression were asked to recall personal memories after being awakened from either REM sleep or SWS. Regardless of clinical status, participants retrieved more negatively valenced memories after REM sleep, suggesting that this stage may enhance the accessibility of unpleasant episodic content. Given that MDD is characterized by heightened REM activity, this mechanism may exaggerate the retrieval of negative autobiographical content, reinforcing a mood-congruent cognitive bias and contributing to the construction of a self-narrative dominated by distressing episodes, similar to those seen in depressed individuals in Habermas et al.'s study (2008).

As previously noted, autobiographical memory for positive experiences in depression is often impoverished, with recalled events lacking the vividness and emotional intensity that typically characterize episodic recollection (Dalgleish & Werner-Seidler, 2014). A proposed explanation for this phenomenon is that positive experiences are encoded less elaboratively, leading to weaker and less accessible memory traces in depressed individuals. This may be related to anhedonia, a core feature of MDD, which is thought to limit emotional engagement with rewarding stimuli and could reduce deep, elaborative encoding (Whearty et al., 2024). Support for this view comes from research in schizophrenia, where similar symptoms of

anhedonia have been shown to impair memory encoding. Whearty et al. (2024) found that participants with schizophrenia exhibited poorer recognition of positive stimuli following passive viewing; however, their performance improved significantly when prompted to elaborate on the material, suggesting that the deficit stemmed from shallow encoding. Given that shallowly encoded memories are more susceptible to forgetting, some researchers have suggested that sleep may play a compensatory role in their preservation (Petzka et al., 2021). Denis et al. (2021) investigated this possibility by comparing a nap group and a wake group on a cued recall task, in which participants encoded items at varying levels of depth and were then asked to recall them when presented with associated cues after a six-hour delay. While weakly encoded memories decayed more rapidly in the wake group, this decline was attenuated in the nap group, where forgetting occurred at a similar rate for both weak and strong items. Notably, the preservation of weakly encoded material was positively associated with greater sleep spindle density during non-REM sleep. This finding is particularly relevant to MDD, where reduced spindle activity (Lopez, Hoffmann & Armitage, 2010) may further compromise the consolidation of weakly encoded positive memories. However, Denis et al.'s (2021) correlational design prevents conclusions regarding causality, as it remains unclear whether spindle activity directly enhances memory consolidation or reflects other sleep-related processes. Regardless, the results indicate further research is needed to determine how changes to sleep architecture in depression might disrupt the consolidation of already impoverished positive memories, thereby reinforcing a negatively skewed autobiographical record.

Given that the CaR-FA-X model (Williams et al., 2007) identifies impaired executive control as a key mechanism driving OGM, sleep-related disruptions to executive functioning may play a critical role in sustaining this pattern. As previously mentioned, executive control

supports the generative search process by inhibiting irrelevant information. Diep et al. (2020) proposed that slow-wave activity (SWA) during SWS was necessary for optimal cognitive function, including response inhibition. Using acoustic stimulation to enhance the amplitude of SWA, researchers found improved performance on cognitive assessments such as , the go-no-go task, which measures response inhibition by requiring participants to respond to target stimuli while suppressing responses to non-target stimuli. SWA is often diminished in depression (Yasugaki, 2025) which may impair executive function during generative memory searches. Thus, irrelevant information may not be adequately suppressed, resulting in premature termination of the memory search, and reinforcing the tendency toward over general memory.

Targeting sleep disturbances in depression may thus offer a promising pathway to restore the executive and memory processes needed to counteract maladaptive memory biases and maintain diachronic unity of self. Specifically, I propose that reduced REM latency, reduced spindle activity, and diminished SWA can be understood as targets for intervention. By improving these specific aspects of sleep architecture, it may be possible to reduce the episodic memory distortions that undermine a coherent and continuous sense of self in individuals with MDD.

Modulating Sleep for Memory Repair

Utilizing the proposed pathway developed in this paper, which links specific alterations in sleep architecture to the episodic memory distortions that undermine diachronic unity in depression, this section considers how sleep-based modulation may offer a targeted route to restore diachronic unity. Rather than addressing self-continuity solely through cognitive or

psychotherapeutic means, this approach identifies sleep as an alternative access point for intervention.

While acoustic stimulation has been shown to enhance SWA, as demonstrated by Diep et al. (2020), its effects on sleep spindles are inconsistent within the limited research (Salfi et al., 2020; Papalambros et al., 2017; Papalambros et al., 2019; Schneider et al., 2019). In contrast, transcranial direct current stimulation (tDCS) offers a promising alternative non-invasive approach by directly modulating cortical excitability and synchrony through electrical currents, rather than relying on the less precise entrainment of brain rhythms as seen in acoustic stimulation (Salfi et al., 2020). This mechanism enables tDCS to promote both SWA and spindle activity during non-REM sleep, as initially found by Marshall et al. (2006), addressing the alteration in NREM activity associated with OGM and negative cognitive bias respectively (Ladenbauer et al., 2016; Ladenbauer et al., 2017, Paßmann et al., 2016).

Previous research applying transcranial direct current stimulation (tDCS) during NREM sleep has produced promising findings regarding improvements to declarative memory consolidation in older adults (Marshall et al., 2006, Westerberg et al., 2015, Ladenbauer et al., 2017). However, results can vary depending on the stimulation parameters employed (Eggert et al., 2013; Ladenbauer et al., 2016; Paßmann et al., 2016), thus, additional work is needed to establish optimal experimental protocol and to determine their applicability in clinical populations, including individuals with depression. In particular, investigating whether enhancing SWA and spindle density through optimized tDCS protocol can ameliorate cognitive distortions in episodic memory could help identify sleep-based interventions that promote cognitive and emotional functioning. More broadly, this line of research may contribute to the

development of novel strategies aimed at counteracting the memory distortions and affective biases that compromise diachronic self-continuity in depression

Conclusion

Episodic memory impairments observed in depression, including overgeneral recall, negative bias, and impoverished access to positive events, may disrupt self-continuity by weakening both the phenomenological and narrative foundations of identity. In line with Tulving's framework, the loss of vivid, self-relevant episodic details has been theorized to impair autonoetic consciousness and, in turn, disrupt the experience of diachronic unity (Tulving, 1985; Wheeler, Stuss & Tulving, 1997). In parallel, research grounded in the SMS model suggests that the inability to access specific memories may constrain autobiographical reasoning, limiting the formation of coherent self-narratives that support identity development (Conway 2005; Conway & Pleydell-Pearce, 2000; Habermas & Bluck, 2000).

The proposed relationship between depression-related cognitive distortions and diachronic disunity can be further elaborated upon by integrating emerging evidence from sleep research. Studies linking altered sleep architecture in depression to episodic memory impairments suggest a novel approach to restoring continuity of self (Diep et al., 2020; Denis et al., 2021; McNamara et al., 2010). More specifically, I argue that sleep-based interventions may be able to address disrupted identity processing in depressive disorders, by correcting the abnormal sleep patterns that contribute to episodic memory biases and, in turn, impair self-continuity. Recent research suggests that non-invasive stimulation techniques, such as tDCS, may enhance memory-relevant sleep features and improve cognitive outcomes (Marshall et al., 2006, Westerberg et al., 2015, Ladenbauer et al., 2017). Continued research is warranted to

determine whether these techniques can effectively enhance executive processes and episodic memory in depressed individuals Nevertheless, by targeting the cognitive and emotional distortions that undermine autobiographical coherence, interventions to a patient's sleep pattern may ultimately help re-establish the phenomenological continuity of self that is often lost in depression.

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