Allostatic Load, Flow, and Learning in Older Adults

Abstract

Our previous pilot study at the intersection of flow, aging, and cognition investigated the effects of an applied embodied cognitive approach to learning and motor skill acquisition in older adults. Specifically, the study looked at how age-positive mindset priming, self-regulating challenge-skills balances, and group flow dynamics in a low-stakes cooperative environment would improve the learning of eight novel motions and increase flow while skiing and snowboarding. In older adults, it may be that flow is more difficult to achieve as one of flow's primary antecedents, the relationship between the challenge and the task-relevant skillsets becomes increasingly unbalanced. Flow is an altered state of consciousness that is thought to occur when we are fully engaged in a relatively challenging task or activity that is matched to our skills (Kotler et al., 2022). Here we extend this research with a more quantitative approach by proposing a physiological mechanism: allostatic load (AL). AL, originally proposed by McEwen and Stellar in 1993, has been operationalized, and thus quantifies the amount of physiological dysregulation due to an accumulation of chronic stress on the body. It has been correlated with several negative health outcomes including, impaired health, accelerated aging, reduced longevity, decreased neuroplasticity, burnout, work-related stress, negative emotional response to life events, and importantly, decreased performance (Rodriguez et al., 2019; Guidi et al., 2020; Maestripieri and Hoffman, 2011; McEwen and Gianaros, 2011). Several biological markers of AL have been researched, including glucose and cortisol levels, lipid profiles, interleukin-6, and heart rate variability (HRV; Guidi et al., 2019). Viljoen et al., 2017 found a negative correlation between HRV and AL in full time employed males. In this study, we hypothesize that by introducing a technical behavioral intervention we term group dynamic deliberate play, this will lower allostatic load thereby bringing relative perceived challenge and skills into balance, and that this will, in turn increase learning vis-a-vis flow. In other words, we propose that AL is a causal mechanism that reduces the likelihood to reach a flow state in older adult learning. We propose to use a wearable device that combines actigraphy and photoplethysmography to track HRV, and other related measures that can give insight into AL. By introducing specific methods to reduce AL, we expect to see increased learning rates, as well as increased instances of performance and flow in older adults.