RESEARCH IN PROGRESS

DESIGNING EVIDENCE-BASED MANAGERIAL DECISION SUPPORT TOOLS FOR OLDER ADULT MANAGERS

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Evidence-based managerial decision making (EBMDM) is increasingly critical in digital and data-rich organizational environments. At the same time, the managerial workforce is aging, with many senior and experienced managers continuing to make high-stakes decisions well into later adulthood. Prior research suggests that normal age-related cognitive changes can affect how older adults search for, integrate, and synthesize information, particularly in technology-mediated settings. Yet, decision support systems and managerial tools are rarely designed with age-related cognitive variability in mind. This work-in-progress paper presents an ongoing research program that leverages neurophysiological and human–computer interaction methods to understand evidence gathering and decision making among older adult managers at a deeper level and to inform the design of customizable EBMDM tools. By integrating EEG, eye-tracking, physiological and behvioural measures with traditional techniques to observe older adult managers engaged in realistic managerial decision tasks, this research aims to contribute to decsion making theory and develop adaptive decision aids that reduce cognitive burden, mitigate bias, and support high-quality decision making across the adult lifespan.

Keywords:
decision support, older adults, evidence-based, technology design, neurophysiology

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1 Introduction

Organizations increasingly expect managers to make complex, high-stakes decisions based on large volumes of digital evidence drawn from internal databases, analytics platforms, and AI-enabled decision support tools that assist with data aggregation, analysis, and visualization. In today's data-rich and data-driven business environment, such technologies can enhance decision speed and consistency, positively influencing competitive advantage. At the same time, as managerial decision contexts become more data-intensive and technologically mediated, they place greater cognitive demands on decision makers, particularly with respect to attention, reasoning, and the integration of multiple sources of evidence. As a result, decision makers often resort to strategies such as making decisions based on intuition or satisficing, where one settles for suboptimal decisions to reduce one's cognitive burden (Misuraca & Teuscher 2013).

Against this backdrop, demographic shifts are reshaping the managerial workforce (Heyden et al. 2025). Older adults are remaining in managerial and executive roles longer, bringing deep domain expertise and institutional knowledge, but also experiencing normal age-related changes in cognition. Research in cognitive aging shows that while crystallized intelligence and experience often remain stable or improve, fluid cognitive abilities (such as reasoning, pattern recognition, and problem solving) tend to decline with age due to neurocognitive, structural, and functional changes in the brain (Harada et al. 2013). Age-related declines in attention and memory can further affect learning, information synthesis, and interaction with digital technologies, including contemporary AI-supported decision tools (de Bruin et al. 2012). Despite these well-documented changes, most managerial decision support tools implicitly assume cognitively uniform users. This mismatch risks increasing cognitive overload, reinforcing reliance on intuition or satisficing, and ultimately degrading decision quality, particularly for older adult managers operating in digital environments (Sin et al. 2021).

This paper reports on a work-in-progress research program that seeks to understand how aging-related cognitive changes affect evidence-based managerial decision making (EBMDM) and to translate these insights into the design of adaptive decision support tools tailored to older adult managers. Specifically, this research is guided by two interrelated objectives:

Objective 1: To understand the real-time cognitive and neurophysiological mechanisms underlying evidence gathering and decision making among older adult managers in realistic EBMDM tasks.
Objective 2: To design and evaluate customizable EBMDM decision aids that adapt to age-related cognitive characteristics, reducing cognitive burden while maintaining or improving decision quality.

Importantly, we position aging not as a deficit to be corrected, but as a source of cognitive variability that should inform inclusive and adaptive DSS design. By explicitly accounting for age-related changes in attention, memory, and reasoning, EBMDM tools can better support sustained managerial performance across the lifespan.

2 Background

2.1 Evidence-Based Managerial Decision Making (EBMDM)

EBMDM can be viewed as a dynamic process through which managers, supported by information technology, deliberately search for, evaluate, and integrate multiple sources of evidence when making decisions. While EBMDM has been shown to improve decision quality and help mitigate against decision biases (Arnott 2006), it is cognitively demanding, requiring sustained attention, working memory, and executive control. In data-rich digital environments, these demands are amplified by information overload and heterogeneous data formats. When cognitive resources are strained, decision makers often resort to heuristics or satisficing strategies, settling for suboptimal decisions to reduce cognitive effort. For older adult managers, whose cognitive profiles or capacities may differ from their younger counterparts, these pressures may be especially pronounced (Wei et al. 2011).

2.2 Cognitive Aging and Managerial Decision Making

Normal aging is associated with gradual changes in brain structure and function that affect fluid cognitive abilities. Declines in processing speed, working memory, and attentional control can make it more difficult to compare alternatives, detect patterns, and integrate complex information streams (Juras et al. 2025). Importantly, these changes do not imply diminished managerial competence; rather, they suggest

that older adults may benefit from decision environments that better align with their cognitive strengths and limitations (Duffy et al 2025).

In technology-mediated contexts, age-related changes can influence how information is visually scanned, how long attention is sustained on particular evidence sources, and how confidently decisions are made under uncertainty (Frank & Seaman 2023). Yet, empirical research directly examining these processes in realistic managerial tasks remains limited.

3 Methodology

3.1 Experimental Setting and Decision Tasks

The empirical component of this research will be conducted in a state-of-the-art research facility designed to support the synchronized collection of neurophysiological and behavioural data in realistic decision-making contexts. Observation rooms are configured to resemble typical managerial workspaces, including individual offices and conference-room settings, allowing participants to engage with digital decision support tools in contexts that closely approximate real-world managerial environments.

A key focus of the study is on older adult managers, broadly defined as individuals in later adulthood who continue to hold decision-making authority within organizations. Participants who fit our inclusion criteria will engage in a series of realistic EBMDM tasks that reflect common managerial decision domains in digitally mediated environments. These tasks include, but are not limited to, hiring and promotion decisions, supply-chain and vendor selection scenarios, and performance evaluation tasks based on data dashboards and digital reports. Each task requires participants to search for, evaluate, and integrate multiple sources of evidence presented through a computer-based interface.

The experimental design manipulates key characteristics of information presentation, such as data density, visual layout, sequencing, and framing, to examine how these factors interact with age-related cognitive changes. Tasks are structured to elicit varying levels of cognitive demand, enabling comparison of decision strategies and cognitive load across conditions. Both individual and group-based

decision scenarios are incorporated, reflecting the increasing prevalence of collaborative and virtual decision making in contemporary organizations. This design allows the research team to observe how older adult managers adapt their evidence-gathering strategies under different informational and social conditions.

3.2 Neurophysiological and Behavioural Measures

Traditional decision-making research relies heavily on self-report measures and behavioural outcomes, which can obscure real-time cognitive processes and are susceptible to bias. For example, self-reported data are susceptible to subjectivity bias, social desirability bias, and demand effects (Dimoka et al. 2012). Neurophysiological methods (such as EEG, eye-tracking, and physiological arousal measures) offer a complementary approach by capturing continuous, real-time indicators of cognitive load, attention, and engagement (Aimone et al 2016; Huk et al. 2018). These measures provide insight into how older adult managers search for evidence, allocate attention across competing data sources, and prioritize information during decision making. Behavioural performance indicators (e.g., decision accuracy, consistency, and response time) and post-task questionnaires assessing perceived effort and confidence will complement the neurophysiological data, enabling triangulation across multiple levels of analysis. Combining neurophysiological data with HCI methods enables a more holistic understanding of decision processes, particularly in complex, dynamic, and group-based managerial contexts.

3.3 Design and Evaluation of the EBMDM Decision Aids

Insights generated from the empirical analyses will be used to inform the iterative design of customizable EBMDM decision aids. These tools will adapt interface features (such as information chunking, visual emphasis, and decision pacing) to the cognitive needs and preferences of older adult managers. Prototype decision aids will be evaluated through follow-up experiments using the same multimodal measurement framework. Effectiveness will be assessed based on improvements in decision quality, reductions in cognitive workload and stress, and enhanced user experience. Rather than adopting a one-size-fits-all approach, the design philosophy emphasizes flexibility and personalization, allowing decision aids to accommodate individual differences in cognitive capacity and decision style.

4 Expected Contributions

This research is expected to make several important contributions to the literature on decision support systems and managerial decision making by explicitly foregrounding aging as a central design consideration rather than a peripheral demographic variable. First, at a theoretical level, the study advances EBMDM research by integrating insights from cognitive aging and neuroscience into models of managerial decision making. While prior EBMDM and DSS research has largely assumed cognitively homogeneous users, this work highlights how normal age-related changes in fluid cognitive abilities, attention, and memory systematically shape evidence gathering, information synthesis, and decision strategies. In doing so, the research reframes aging not as a deficit but as a source of meaningful cognitive variability that must be accounted for in digitally mediated managerial environments.

Second, the research contributes methodologically by demonstrating the value of multimodal neurophysiological approaches for studying managerial decision making in realistic, technology-enabled contexts. By combining EEG, eye tracking, physiological measures, and traditional behavioural and self-report data, the study provides a more granular understanding of real-time cognitive processes than is possible with conventional methods alone. This approach is particularly valuable for examining subtle age-related differences in cognitive load and attentional allocation that may not be consciously accessible to decision makers themselves. As such, the methodology offers a replicable framework for future researchers interested in studying decision making under conditions of complexity, information overload, and cognitive change.

Finally, the study is expected to generate actionable design knowledge with direct practical implications for organizations facing an aging managerial workforce. The findings will inform concrete design principles for EBMDM tools that reduce unnecessary cognitive burden, improve information presentation, and support sustained attention among older adult managers. By translating insights about cognitive aging into prescriptive guidance for DSS design, the research supports more inclusive decision support technologies that enhance decision quality, reduce reliance on intuition or satisficing, and accommodate cognitive diversity across the managerial lifespan.

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