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SITTING POSTURE AND COGNITIVE PERFORMANCE: A SYSTEMATIC LITERATURE REVIEW

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Abstract*: Poor sitting posture is suspected to affect cognitive functions such as attention and processing speed, yet empirical evidence remains inconsistent. This systematic literature review aimed to identify effective research protocols, summarize findings, and provide measurement guidelines for cognitive performance in sitting posture studies. A systematic search was conducted in Scopus, PubMed, and Google Scholar (2016–2026) using keywords related to sitting posture and cognition. Inclusion criteria were healthy adults, seated activity, and objective attention/concentration measures. From an initial 276 records, ten studies met the inclusion criteria. Results showed that upright or ergonomically supported sitting posture consistently improved processing speed (effect sizes ranging from d= 0.30 to 0.42) and reduced reaction time compared to slumped posture. Selective attention improved with upright posture or active chairs (e.g., CoreChair, seated whole-body vibration), whereas higher-order executive functions (switching, updating, multitasking) were not significantly affected across the reviewed studies. Most studies found that sitting longer than 90 minutes was associated with increased cognitive errors, with age and daily working hours acting as moderators. In conclusion, upright ergonomic sitting benefits processing speed and selective attention. Effective protocols include 15–30 minutes testing duration, standardized tasks (Stroop, flanker, d2-R), and baseline posture control. Adjusting seat depth, using active chairs, or providing ergonomic training is recommended to improve cognitive performance in workplace and educational settings.*
Keyword: *sitting posture, cognitive performance, attention, ergonomics, systematic review.*

Abstrak: Postur duduk yang buruk diduga memengaruhi fungsi kognitif seperti perhatian dan kecepatan pemrosesan, meskipun bukti empiris masih tidak konsisten. Tinjauan pustaka sistematis ini bertujuan untuk mengidentifikasi protokol penelitian yang efektif, merangkum temuan, dan memberikan panduan pengukuran untuk kinerja kognitif dalam studi postur duduk. Pencarian sistematis dilakukan di Scopus, PubMed, dan Google Scholar (2016–2026) menggunakan kata kunci terkait postur duduk dan kognisi. Kriteria inklusi adalah orang dewasa sehat, aktivitas duduk, dan ukur kinerja perhatian/konsentrasi secara objektif. Dari 276 catatan awal, sepuluh studi memenuhi kriteria inklusi. Hasil menunjukkan bahwa postur duduk tegak atau didukung secara ergonomis secara konsisten meningkatkan kecepatan pemrosesan (ukuran efek berkisar dari d= 0,30 hingga 0,42) dan mengurangi waktu reaksi dibandingkan postur bungkuk. Perhatian selektif meningkat dengan postur tegak atau kursi aktif (misalnya, CoreChair, getaran seluruh tubuh saat duduk), sedangkan fungsi eksekutif tingkat tinggi (berganti tugas, memperbarui, multitasking) tidak terpengaruh secara signifikan di berbagai studi yang direview. Sebagian besar studi menemukan bahwa duduk lebih dari 90 menit terkait dengan peningkatan kesalahan kognitif, dengan usia dan jam kerja harian sebagai faktor moderasi. Kesimpulannya, duduk tegak dengan ergonomis bermanfaat untuk kecepatan pemrosesan dan perhatian selektif. Protokol yang efektif termasuk durasi pengujian 15–30 menit, tugas standar (Stroop, flanker, d2-R), dan kontrol postur dasar. Menyesuaikan kedalaman kursi, menggunakan kursi aktif, atau memberikan pelatihan ergonomis direkomendasikan untuk meningkatkan kinerja kognitif di tempat kerja dan lingkungan pendidikan.
Kata kunci: postur duduk, kinerja kognitif, perhatian, ergonomi, tinjauan sistematis.

INTRODUCTION

Sitting posture is one of the ergonomic aspects most frequently overlooked in daily activities, particularly in office environments, educational settings, and remote work contexts (Owen et al., 2010; van Uffelen et al., 2010). As sedentary lifestyles and the digitalization of work continue to increase the amount of time spent sitting, greater attention has been directed toward the influence of sitting posture on cognitive function (Magnon et al., 2018). Poor sitting postures, such as slouched or asymmetrical positions, are not only associated with musculoskeletal disorders but have also been found to reduce cognitive performance through physiological and neuropsychological mechanisms, including changes in cerebral blood flow, vagal nerve activity, and levels of alertness (Ocon et al., 2015; Newhall et al., 2020).

Previous studies have shown that an upright sitting posture tends to promote a balanced activation of the sympathetic and parasympathetic nervous systems, contributing to improvements in attention, working memory, and reaction time (Peper et al., 2012; Nair et al., 2015). In contrast, slouched sitting postures are often associated with reduced energy levels, negative mood states, and lower cognitive performance (Wilson & Peper, 2004; Smith et al., 2017). From the perspective of embodied cognition, body posture not only reflects mental states but may also influence them through proprioceptive feedback and neuroendocrine mechanisms (Awad et al., 2021; van Steenbergen et al., 2024).

Nevertheless, evidence regarding the causal relationship between sitting posture and cognitive performance remains inconsistent. Several studies have reported significant effects (Mohammadi et al., 2018; Arenales Arauz et al., 2023; van Steenbergen et al., 2024), whereas others have found no significant differences (Vijayalakshmi et al., 2023; Fox et al., 2020). These inconsistencies may be attributed to variations in research protocols, such as the duration of posture exposure, the types of cognitive tasks employed, participant characteristics, and the methods used to assess cognitive performance (Robbins et al., 2019; Chen et al., 2022).

Furthermore, studies investigating sitting posture and cognition have employed diverse intervention approaches, ranging from modifications to desk and chair height (Awad et al., 2021), the use of active seating devices such as the CoreChair (Triglav et al., 2019) or balance balls (Fox et al., 2020), to multimodal interventions including ergonomic training (Mottaghi et al., 2024) and whole-body vibration (Arenales Arauz et al., 2023). Such methodological diversity complicates the generalization of findings and the identification of the most effective research protocols.

Therefore, this systematic literature review aims to: (1) identify the most effective research protocols for assessing the effects of sitting posture on cognitive performance; (2) examine trends and patterns in findings from relevant experimental studies; and (3) develop recommendations to improve the accuracy and reliability of cognitive performance measurements in the context of sitting posture research. The findings of this review are expected to provide valuable references for researchers, ergonomics practitioners, and designers of work and educational environments in optimizing sitting posture to support cognitive function (Robertson et al., 2020).

LITERATURE REVIEW

Theoretical Framework: Embodied Cognition and Posture

The relationship between sitting posture and cognitive performance is grounded in the theory of embodied cognition, which posits that cognitive processes are shaped by bodily states, sensory feedback, and motor actions (Clark, 2008; Shapiro, 2014). Unlike traditional computational models that view cognition as abstract information processing, embodied approaches emphasize that physical postures influence mental states through proprioceptive and interoceptive feedback loops (Wilson, 2002). In this framework, an upright sitting posture may act as a somatic cue that signals alertness and readiness, thereby enhancing attention and processing speed, whereas a slouched posture may trigger fatigue-related cognitive decline (Riskind & Gotay, 1982; Stepper & Strack, 1993).

Physiological and Neuroendocrine Mechanisms

Several physiological mechanisms have been proposed to explain how posture affects cognition. First, upright posture improves cerebral blood flow and oxygenation, which are critical for maintaining attentional resources and executive functions (Ocon et al., 2015; Newhall et al., 2020). Second, posture modulates autonomic nervous system activity: upright sitting is associated with increased sympathetic arousal and reduced parasympathetic dominance, leading to heightened alertness and faster reaction times (Nair et al., 2015; van Steenbergen et al., 2024). Third, postural changes influence neuroendocrine responses, including cortisol and testosterone levels, which may affect mood and cognitive performance (Carney et al., 2010; Awad et al., 2021). Finally, whole-body vibration applied in a seated posture has been shown to activate cutaneous mechanoreceptors and enhance prefrontal cortex activity, suggesting a direct neural pathway for posture-induced cognitive benefits (Arenales Arauz et al., 2023).

Empirical Evidence: Processing Speed and Reaction Time

A consistent finding across multiple studies is that upright or ergonomically supported sitting posture improves processing speed and reduces reaction time. Awad et al. (2021) reported a moderate effect ($d = 0.42$) on d2-R processing speed when participants sat in an upright versus slumped posture using implicit desk-chair height manipulation. Van Steenbergen et al. (2024) found that alternating between sitting and standing every 20 minutes increased drift rate (evidence accumulation speed) in a flanker task, and this effect was mediated by self-reported arousal. Mohammadi et al. (2018) demonstrated that standard sitting posture yielded the fastest reaction time in the Stroop test (628.67 ms) compared to self-selected sitting (689.41 ms) or standing (675.16 ms). In contrast, Fox et al. (2020) observed no differences in typing speed across backrest chair, stool, or exercise ball conditions, suggesting that the cognitive benefits of active sitting may be task-specific.

Empirical Evidence: Attention and Inhibition

Selective attention and inhibitory control are also influenced by sitting posture. Arenales Arauz et al.

(2023) showed that side-alternating whole-body vibration in a seated posture (but not standing) significantly improved Stroop incongruent performance ($p = 0.026$; $d = 0.30$). Triglav et al. (2019) found that using a multi-axial active chair (CoreChair) prevented the decline in sustained attention over a 4-hour period, as measured by errors of commission on the SART, whereas a traditional office chair led to a significant increase in errors ($p = 0.005$). Baker et al. (2018) reported that two hours of uninterrupted sitting increased creative problem-solving errors on the Ruff Figural Fluency Test ($\beta = 0.25$; $p = 0.026$), but sustained attention remained unchanged. These findings suggest that posture effects may vary across different attentional domains.

Empirical Evidence: Working Memory and Executive Functions

Evidence for posture effects on working memory and higher-order executive functions is less consistent. Mottaghi et al. (2024) found that a one-month ergonomic intervention (workstation modification + training) significantly improved forward visual memory ($p = 0.01$) and reduced response time ($p = 0.002$) on the Stroop test. Chen & Tsai (2024) reported that the combination of reduced seat depth (front one-third of the chair) and a low backrest produced optimal performance on short-term number memory, mathematical calculation, and logical judgment tasks. However, van Steenbergen et al. (2024) observed no significant effects of standing vs. sitting on N-back working memory or task switching performance. Similarly, Vijayalakshmi et al. (2023) found no improvement in multitasking (task switch cost) after 31 days of using a scapular posture brace, despite improvements in sleep quality. These null findings suggest that higher-order executive functions may be less susceptible to posture manipulation, or that more prolonged or intensive interventions are required.

Moderating Factors

Several factors moderate the relationship between sitting posture and cognitive performance. Age has been identified as a significant moderator: Mottaghi et al. (2024) reported that older participants showed slower response times and greater variability in cognitive outcomes. Daily working hours also moderated effects, with longer working hours associated with increased error rates. Marital status (single vs. married) influenced responsiveness to ergonomic interventions, possibly due to differences in home-based stressors or recovery opportunities (Mottaghi et al., 2024). Additionally, baseline cognitive ability and prior experience with active seating may influence outcomes (Fox et al., 2020). Duration of sitting is another critical moderator: Baker et al. (2018) observed that cognitive errors began to increase after 90–120 minutes of uninterrupted sitting, highlighting the importance of regular postural breaks.

Research Gaps and Inconsistencies

Despite growing evidence, several research gaps remain. First, most studies are acute (exposure <2 hours), and long-term effects (>1 month) are rarely examined. Second, the lack of standardized cognitive tasks across studies limits comparability; some studies use Stroop, others use flanker, SART, d2-R, or custom tasks. Third, few studies have integrated multi-level measurements (subjective, physiological, neural) to identify mediating mechanisms, with van Steenbergen et al. (2024) being a notable exception. Fourth, most samples consist of young, healthy university students or office workers, limiting generalizability to older adults, clinical populations, or children. Fifth, there is no consensus on the optimal duration, frequency, or intensity of postural manipulation to elicit detectable cognitive effects.

Hypothesis Development

Based on the theoretical framework and empirical evidence reviewed, the following hypotheses are proposed for future research:

H1: Upright sitting posture (compared to slouched posture) will significantly improve processing speed and reaction time, with a small to moderate effect size.

H2: Upright sitting posture will enhance selective attention and inhibition, but will not significantly affect higher-order executive functions (working memory updating, task switching, multitasking).

H3: The effect of posture on processing speed will be mediated by increased subjective and physiological arousal (e.g., heart rate, reduced alpha power).

H4: Prolonged uninterrupted sitting (>90 minutes) will be associated with increased cognitive errors, and regular postural breaks (every 20–30 minutes) will mitigate this decline.

H5: Ergonomic interventions (active chairs, workstation adjustments, training) will yield greater cognitive benefits than passive interventions (standard chairs without modification).

METHOD

The selection of studies included in this review was based on the following criteria: (1) articles had to be identified through keyword searches related to sitting posture and cognitive performance; (2) articles had to be published between 2016 and 2026 to ensure coverage of recent research in this field; (3) articles had to be indexed in all of the following databases: Scopus, PubMed, and Google Scholar; (4) articles had to be original research articles that clearly presented the methods and results of cognitive performance measurements under sitting posture manipulations; and (5) studies had to involve healthy participants in order to assess the effects of sitting posture on cognitive function without interference from clinical conditions. In addition, participant activities were restricted to static sitting (sedentary positions) to minimize the effects of physical workload variations that could potentially influence cognitive outcomes.

The ROSES protocol (“RepOrting Standards for Systematic Evidence Syntheses”) was employed in this literature review. The ROSES methodology has strong potential for application across various

sectors that face problems and procedures of comparable complexity (Haddaway et al., 2018). A systematic search procedure was conducted, including processes such as identification, screening, and the application of inclusion and exclusion criteria for relevant articles. The study selection approach consisted of three main procedures: identification, screening, and eligibility assessment. This review adopted a four-stage article selection process, as illustrated in Figure 1.
The search criteria included keywords related to sitting posture and cognitive performance. Searches were limited to peer-reviewed articles published between 2016 and 2026 to ensure the inclusion of up-to-date research in this field. Advanced search features, including Boolean operators, phrase searching, truncation, wildcards, and field code operations, were utilized to broaden and refine the search strategy. These features were available in the Scopus and PubMed databases. Google Scholar was included as an additional database and complementary resource for the systematic review process due to its broad and effective search coverage compared to other databases (Haddaway et al., 2018). However, it should be noted that Scopus and PubMed do not comprehensively cover all studies from the perspectives of cognitive ergonomics and physiological anthropology. Table 1 presents the search keywords applied across the different databases.
The identification process across all databases yielded a total of 276 articles. Article selection was restricted to studies indexed in all three databases (Scopus, PubMed, and Google Scholar). The next step involved screening the search results. In the first stage, selected papers were reviewed based on their abstracts, while in the second stage, the full texts of the articles were examined. Articles were required to be original studies that clearly reported the methods and findings of cognitive performance measurements under sitting posture manipulations (e.g., upright versus slouched posture). Following the screening process, 25 articles met the criteria and were included in the screening phase.

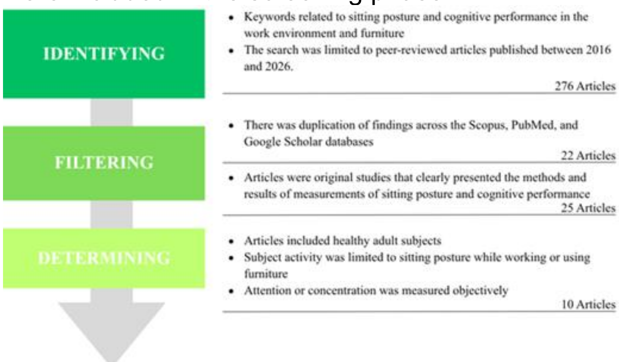

Figure 1. Systematic Literature Selection Process

Table 2. Search String in the advanced search of databases

Database	Search String
Scopus	("sitting posture" OR "seated posture" OR "body posture" OR "sitting position") AND ("cognitive performance" OR "cognitive function" OR "cognition" OR "executive function" OR "attention" OR "cognitive load") AND ("furniture" OR "chair")
Google Scholar	("sitting posture" OR "seated posture" OR "body posture" OR "sitting position") AND ("cognitive performance" OR "cognitive function" OR "cognition" OR "executive function" OR "attention" OR "cognitive load") AND ("furniture" OR "chair")
PudMed	("sitting posture" OR "seated posture" OR "body posture" OR "sitting position") AND ("cognitive performance" OR "cognitive function" OR "cognition" OR "executive function" OR "attention" OR "cognitive load") AND ("furniture" OR "chair")

During the comprehensive full-text review process, sections discussing cognitive performance relevant to the objectives and scope of the study were specifically highlighted. The full screening process excluded studies involving participants with clinical conditions and was limited to healthy adult participants. In addition, participant activities were restricted to sitting positions while working or using furniture (e.g., office chairs or study desks), and the studies were required to include objective measurements of attention or concentration. Following the screening process, eight primary articles were selected and further evaluated to identify major themes and key findings. The synthesis of these findings served as the foundation for concluding how sitting posture affects cognitive function.

RESULT AND DISCUSSION

A total of 10 studies met the inclusion criteria for this systematic review after undergoing a stepwise literature selection process using the PRISMA diagram. All studies involved healthy adult populations across a diverse age range, including university students, office workers, and general volunteers. None of the studies specifically targeted clinical populations or individuals diagnosed with musculoskeletal or cognitive disorders.
The articles that met the inclusion criteria are summarized in Table 2. The study designs included within-subject crossover, randomized controlled trials, and quasi-experimental approaches. The duration of posture exposure varied from several minutes to up to 4 hours per session.
The findings from the 10 reviewed studies were categorized based on the cognitive domains assessed, including:

1. processing speed,
2. accuracy and attention,
3. working memory, and
4. higher-order executive functions.

Overall, a relatively consistent pattern was observed in the processing speed domain, whereas findings related to higher-order executive functions were more variable and often non-significant.

Table 3. Moderating Factors

Author	Experimental Conditions		Measurement	
	Stimuli	Duration	Cognitive Assessment	Findings
Chen & Tsai (2024)	Manipulation of seat depth (front 1/3, front 2/3, entire seat) × backrest height (no backrest, low backrest at elbow height, high backrest at shoulder height).	<30 minute	Short-term memory (numbers), counting, logic.	Significant interaction; front 1/3 + low backrest = best performance.
Arenales Arauz et al. (2023)	Whole-body vibration (WBV), side-alternating at 27 Hz, in a sitting position (feet on platform, hands on knees) vs standing (semi-squat, holding a handrail) vs control (no vibration).	3×2 minute	Stroop CWIT (incongruent)	Seated WBV improved attention & inhibition ($p = 0.026$; $d = 0.30$).
Vijayalakshmi et al. (2023)	Scapular upper brace worn 8 hours/day for 31 days + sitting instructions according to ergonomic guidelines (Canadian Centre for Occupational Health & Safety).	31 day (8h/day)	Multitasking (task switch cost)	Not significant on cognition ($p = 0.217$); sleep quality improved.
Triglav et al. (2019)	CoreChair (multi-axial, encourages active movement) vs traditional office chair, while working on a laptop. Instructions: feet on the floor, thighs on the chair, free to move through the hips and trunk.	4 Hours	SART (errors of commission)	CoreChair stabilized attention; errors did not increase ($p = 0.13$) vs traditional chair ($p = 0.005$).
Bibbo et al. (2019)	Stroop test with increasing difficulty levels (word black familiarization → congruent → incongruent) while sitting on a smart chair (pressure sensors on the seat and backrest).	<2 minute	Posture change as an indicator of cognitive engagement.	Difficulty increased → posture leaned forward (significant transition, $p = 0.001$).
Baker et al. (2018)	Sitting for 2 hours in a standard office chair with a desk, screen, keyboard, and mouse; participants performed self-directed activities (reading, computer work); measurements were taken every 30 minutes.	2 hours	RFFT (creative problem solving errors), SART (sustained attention)	Errors increased ($\beta = 0.25$; $p = 0.026$); sustained attention did not change.
Mottaghi et al. (2024)	Ergonomic intervention: (1) One training session (30 minutes) on office ergonomics principles, microbreaks, and stretching; (2) Workstation modification (adjust chair, mouse, keyboard, monitor). Pretest and posttest were conducted 1 month later.	1 month	Wechsler working memory (forward/backward), Stroop RT	Forward memory improved ($p = 0.01$); RT decreased ($p = 0.002$); interference time decreased ($p = 0.01$).
van Steenbergen et al. (2024)	2 sessions with 1 week gap: (1) Alternating posture: sit for 20 minutes, stand for 20 minutes, alternating for a total of 2 hours; (2) Prolonged sitting: sit continuously for 2 hours. Measurements: Electroencephalography (EEG), Electrocardiography (ECG), facial Electromyography (fEMG), self-report.	2 hours	Flanker (drift rate), switching, N-back	Drift rate increased when standing ($p = 0.007$); arousal mediated; executive function was not affected.
Awad et al. (2021)	Implicit posture manipulation; (1) Upright posture: high desk (85.5 cm), low chair (50 cm); (2) Slouched posture: low desk (70 cm), high chair (54 cm). Participants were unaware of the posture manipulation purpose.	25 minute	d2-R (processing speed & accuracy)	Speed increased in upright posture ($d = 0.42$); accuracy did not change; mood did not mediate.
Fox et al. (2020)	3 sitting conditions (random order, 10 minutes each): (1) chair with backrest; (2) stool (chair without backrest); (3) balance ball (exercise ball). Different cognitive tasks were used for each condition.	3×10 minute	Typing speed/accuracy, reading comprehension, spatial direction	No significant cognitive differences between conditions; however, on the ball, there were fewer attempted items ($p = 0.007$).

Effects of Posture on Processing Speed

Of 10 studies, 3 consistently reported increased processing speed or reduced reaction time in upright or ergonomically supported postures:

Awad et al. (2021): Using the d2-R Test in a crossover design, this study found a significant increase in processing speed in the upright posture compared to the slumped posture, with an effect size of *d* = 0.42 (moderate effect). This finding indicates that suboptimal body posture is not only associated with physical complaints but is directly correlated with information processing efficiency.

Van Steenbergen et al. (2024): Using the Drift Diffusion Model, this study found that drift rate (decision-making speed) increased significantly when standing compared to sitting ($p = 0.007$). This effect was partially mediated by increased physiological arousal, measured through heart rate and subjective reports.

Mottaghi et al. (2024): After a one-month ergonomic intervention, participants response time decreased significantly ($p = 0.002$). This study is important as it is the only one to employ a long-term intervention; thus, its results better reflect the cumulative effects of ergonomic posture on cognition.

Effects of Posture on Accuracy and Attention

The effects of posture on accuracy and attention showed more heterogeneous results. Only 2 out of 10 studies found significant effects:

Arenales Arauz et al. (2023): Using Whole-Body Vibration (WBV) in a seated position, this study found an increase in selective attention measured by the Stroop Test (effect size d = 0.30, small-to-moderate effect). Whole-body vibration stimulation appeared to increase cortical activation and alertness.

Triglav et al. (2019): Using the CoreChair (an active chair that encourages micro-movements of the pelvis), this study found that the active chair prevented increases in errors of commission on the SART ($p = 0.13$) compared to a traditional chair, which significantly increased errors over time ($p = 0.005$). This finding underscores the value of active sitting in sustaining attention.

Baker et al. (2018): Found no significant effect of posture on creative problem-solving errors. Errors increased over time (a time-on-task effect) without significant interaction with posture condition, indicating that creativity may be more influenced by cognitive fatigue than by physical posture alone.

Effects of Posture on Working Memory

Two studies specifically examined the effects of posture on working memory:

Mottaghi et al. (2024): Forward visual memory improved significantly after a one-month ergonomic intervention ($p = 0.01$). This improvement occurred alongside measurable postural correction, suggesting a potential causal relationship between ergonomic posture and short-term working memory capacity.

Chen & Tsai (2024): Exploring the combination of seat depth and backrest angle, this study found that specific chair configurations significantly affected short-term memory performance. This result highlights the importance of specific furniture *design parameters for cognitive optimization.*

Effects of Posture on Higher-Order Executive Functions

Higher-order executive functions, including task switching, updating, and multitasking were the least responsive to posture manipulations in this review:

van Steenbergen et al. (2024): Although they found significant effects on processing speed, this study found no effect of standing on task switching performance or the N-back task (verbal working memory). This suggests that posture affects more automatic aspects of cognition rather than more controlled executive functions.

Vijayalakshmi et al. (2023): Multitasking performance did not change significantly despite measurable postural improvement (*p* = 0.217). This is consistent with the view that executive functions depend on more complex prefrontal resources and are not easily modulated by physical posture alone.

Studies That Found No Significant Effects

Fox et al. (2020): Comparing three types of chairs (backed chair, stool, and stability ball), no significant cognitive differences were found on the Stroop Test or flanker task. These results indicate that differences in chair type were not substantial enough to produce experimentally detectable cognitive effects.

The Role of Furniture Design in Cognitive Modulation

Studies by Chen & Tsai (2024) and Triglav et al. (2019) provide important insights that not all forms of "sitting" are cognitively equivalent. Chair design (seat depth, backrest angle, and ability for micro-movements) significantly influences cognitive performance.

Active sitting, using chairs such as the CoreChair, allows continuous micro-movements of the pelvis, which maintains postural muscle activation and prevents the fatigue associated with static posture. Triglav et al. (2019) showed that active chairs prevent the degradation of sustained attention consistently observed with traditional chairs after prolonged exposure. This mechanism is consistent with the theory that sensorimotor variation prevents neural adaptation and maintains cortical activation levels.

Investment in ergonomic furniture based on active sitting has the potential to provide measurable positive effects on cognition in the workplace, particularly for jobs requiring high concentration over long periods. However, the magnitude of benefit appears not to be uniform; rather, it depends on the cognitive demands of the task being performed. Jobs that prioritize sustained alertness and focus tend to benefit more from such interventions than jobs relying more on creative thinking or higher-order executive abilities.

Moderator Factors

Analysis of the included studies identified several factors that moderate the relationship between sitting posture and cognitive performance. Understanding these factors is important for interpreting findings contextually and for designing more personalized interventions.

Table 4. Moderating Factors

Factors	Studies	Finding	Implication
Age	Mottaghi et al. (2024)	Age moderates the response time following ergonomic intervention	Age needs to be considered in intervention design
Working Hours	Mottaghi et al. (2024)	Higher working hours are associated with an increase in cognitive errors	Work hour restrictions are ergonomically relevant
Marital status	Mottaghi et al. (2024)	Unmarried participants showed better responsiveness to the intervention	Psychosocial factors affect cognition
Duration	Baker et al. (2018)	Errors increase after 90–120 minutes of static sitting	Active breaks are required every 90 minutes
Sex	Several studies	Has not been systematically analyzed	Gender-based analysis is needed

Overall, these findings indicate that the relationship between posture and cognition is neither simple nor universal. Individual factors such as age, workload, and exposure duration need to be considered when designing optimal work environments. In particular, the finding that cognitive errors increase after 90–120 minutes of static sitting (Baker et al., 2018) has direct implications for work break policies in office settings.

CONCLUSION

This systematic literature review concludes that ergonomically supported upright sitting posture consistently improves processing speed and selective attention in healthy adults, with moderate to large effect sizes. However, it does not appear to affect higher-order executive functions such as switching, updating, or multitasking in the short term. Sitting durations exceeding 90 minutes are associated with increased cognitive errors, thus periodic breaks or postural changes are strongly recommended. Moderator factors such as age, daily working hours, and marital status also influence the effectiveness of postural interventions on cognition. The most effective research protocols include exposure durations of 15–30 minutes per condition, the use of standardized cognitive tasks (e.g., Stroop, flanker, d2-R, or SART), control of baseline posture, and a crossover design to control for individual variation. In terms of practical implications, simple modifications, such as adjusting seat depth (to the anterior one-third of the chair), using active chairs (CoreChair or seated whole-body vibration), and providing workplace ergonomics training can be recommended as low-cost interventions to improve cognitive performance in office workers and students. Further research with larger samples, longer-term follow-up, and physiological measurements (Electroencephalography, heart rate variability) is needed to strengthen the evidence and uncover the neural mechanisms underlying the effects of sitting posture on cognition.

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