Posture vs. Performance in a Dual-Task Paradigm

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Background & Rationale

Poor posture is common during computer work\(^1\), leading to long-term neck pain\(^2\).

- This pain is thought to result from compression of vertebrae\(^3\).
- Biofeedback interventions are poorly validated\(^4\) and rely on awareness of posture\(^5\).
- Cognitive factors influence alignment\(^6\).
- Reaching with the head when anticipating movement
- Poor inhibitory control relates to neck shortening during movement preparation

Hypotheses

Main idea: Effective use of biofeedback requires movement preparation

- Reaching with the head when anticipating movement
- Cognitive factors influence alignment
- Biofeedback interventions are poorly validated

Method

- Basic postural instruction: workspace adjusted to OSHA standard\(^7\)
- 10 minute computer game performed twice (counterbalanced)
- No posture feedback
- Posture biofeedback

Procedure

- Simple Reaction Time: Respond as fast as possible
- Go/No-Go: Fast as possible unless it’s X
- Inhibition/processing speed: Go/No-Go: Fast as possible unless it’s X
- Simple Reaction Time: Respond as fast as possible

Measures

- Initial measured during “best posture” recording
- Neck length decreases over time without feedback
- Neck length decreased over time: (p=0.001). Time was subject to an interaction with condition (p=0.001).
- Neck length decreased (p<0.001), but with biofeedback it did not. Condition was subject to an interaction with block (p=0.01).
- Neck length was lower without feedback than with biofeedback for those who did the task 1st (p=0.049), but not for those who did the task 2nd.

Results: posture and task performance

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Results: posture and cognition

- Greater neck length is associated with lower cognitive dual-task cost
- More slowing during GNG task was associated with larger effect of biofeedback on posture

Conclusions

- Biofeedback improved posture and led to retention
- Biofeedback interfered with task performance and improvement
- Lower dual-task cost was associated with better posture using biofeedback
- Higher information processing cost was associated with greater feedback-dependence to maintain posture

Our results support the hypothesis that attention is required to maintain posture with biofeedback. The dual-task tradeoff may explain resistance to biofeedback. Future studies should examine ways to remediate this effect. These findings open new paths for understanding the relationship between cognition and posture.

References