

The Ergonomics of Motion: Considerations Relevant to Sum™



Sum is designed to automatically promote and facilitate beneficial movements, while discouraging movements known to cause discomfort and introduce ergonomic risk factors.

The following summarizes key points from Rani Lueder's review of the research on the ergonomics of movement. This review highlights research that relates to the way Sum addresses ergonomic issues in today's workplace.

The major finding of this research review is that movement is critical; it is essential for avoiding discomfort, for long-term well-being, and for effectiveness at work. Even so, not all movements are equal and some movements should even be avoided.

This review also describes the implications of the research on movements for sitting and seating.

Movements to avoid:

- Unsupported sitting
- Forward-oriented movements
- Awkward postures such as twisting

Sum helps users:

- Freely change postures with minimum intervention
- Assume a range of beneficial postures
- Promote healthful "micro-movements," i.e. individual vertebra
- Continue to maintain full back support during shift and position changes
- Sit in neutral postures, such as with an open torso during recline
- Utilize a wide range of fully supported sitting positions

"Over the last two decades, our focus has gradually shifted from identifying the best single sitting posture towards a more dynamic view of sitting movement." – Rani Lueder, CPE

Additional issues discussed in the paper include:

- Seat adjustments do not guarantee that the actual adjustment ranges will accommodate the employee population
- Adjustability is not enough; adjustments are often not used or used incorrectly
- Intensive computer work in the "real world" characteristically involves static and awkward postures as users work with the back unsupported for most of the day. Take a walk around any office to see many examples of this

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- Long-term sitting tends to be associated with static and constrained postures. Chair designs should encourage movements at the macro (full backrest movement) and micro (live back) levels. Sum's Avatar 2™ and AutoFit™ both address this issue
 - The emphasis on motion has ignored the increase in risk inherent in certain movements. For example, research indicates that over time, sitting in static positions tends to lead to anterior (forward leaning) postures that are known to be harmful
 - The spine is a complex and “live” system that benefits from dynamic movements of individual segments of the spine. Sum encourages and supports constant movement
 - Individuals differ in their susceptibility to risk and to the potential impact of certain postures on injury

Many of today's office workers are at risk. These days, scientists (and most of the rest of us) realize that static postures associated with intensive computer work are hazardous:

- Sitting more than half the time at work increases risk of disc herniation in those older than 35
- More than 70% of people over 40 experience intermittent back pain
- Ultimately, fixed postures are as likely to lead to disabling back pain as heavy manual work

There are also implications for the aging workforce. In particular, as we age the spine becomes increasingly susceptible to back injury from low-level, yet often repeated forces. Further, the individual segments of the spine may sustain injury as sitters perform awkward postures and sustain higher loads, such as twisting and reaching at the same time. Very small twisting movements of individual segments of the spine of about 2° can benefit users.

Sum aims to discourage movements that introduce ergonomic risk factors for some users. This issue is particularly important now, with the aging of the baby boom generation; much of this workforce is susceptible to injuries in ways that are difficult to predict.

“The only truly effective way to maintain a seated posture for extended durations is to continuously cycle through the upright, reclined and forward tilting positions.” – Rani Lueder, CPE