

**Summary:**  
**Exploring the Design of Fixed and Adjustable Ergonomic Keyboards and How It Relates To the Reduction of Ergonomic Risk Factor Exposure To Users**

A recent study has provided conclusive evidence that the design of alternative keyboards, like the Goldtouch Adjustable Ergonomic keyboard, can have significant effects on wrist posture, ulnar deviation, wrist extension and keying techniques when typing.

The purpose of this study was to explore how standard and/or alternative designed computer keyboards may increase or decrease exposure to ergonomic risk factors by users. The intent was to explore two popular alternative keyboard designs in conjunction with the standard QWERTY keyboard design and through the collection of quantitative and qualitative data determine which one, if any, provides the greatest benefit to the user.

These benefits are defined as having minimal or no exposure to ergonomic risk factors such as awkward postures (ulnar deviation and wrist extension greater than 5-degrees), static postures, and contact stress. Typing speed and error was also assessed to determine learning curves associated with new motor learning of an alternate keyboard design.

Using an initial pool of 90 subjects (30, 30, and 30); all participants were recruited on a volunteer basis.

Goldtouch group (n=31 after one individual requested to participate at last minute)

QWERTY group (n=30)

Microsoft Natural/NEK group (n=26 after 4 dropped out of the study in first week due to discomfort)

A preliminary baseline ergonomic assessment of all subjects' typing habits (including speed and error counts), workstation setup and ergonomic risk factors were measured at the beginning of the study. Goniometric measurements were obtained for wrist angle analysis.

Each group performed a typing test at the end of Weeks One, Two and Four to gauge any effects on speed and accuracy with the new keyboard layouts. All participants were asked to provide feedback on the keyboards and complete pain assessment surveys before, during and after the study had concluded.

It was found that the Goldtouch keyboard provided the greatest benefits in:

- Reducing right hand ulnar deviation- from a range of 28-35 degrees down to 3-8 degrees on average for those who used the Goldtouch versus the standard QWERTY and Microsoft keyboards
- Minimizing risk exposure to unhealthy keying techniques such as contact stress from users planting their wrists on a hard work surface or on the plastic wrist rest located at the front portion of the Microsoft keyboard.
  - By the end of the study, the number of users planting their wrists went up by 2, from 16 to 18, when using the Microsoft, versus a decrease of 5 (from 11 to 6) using the Goldtouch.
- The Goldtouch had greater relative benefit than the Natural keyboard on right and left hand wrist extension in addition to left ulnar deviation.
- Users of the Goldtouch experienced fewer errors when acclimating to the new keyboard layout compared to the Microsoft keyboard.
- 90% of users who used the Goldtouch did not want to go back to their standard keyboard, nor did they want to try the Microsoft Natural due to the increase in comfort and the ability to adjust it to their personal stature.
- 50% said they had less shoulder pain from mousing due to the smaller footprint of the Goldtouch, and the ability to keep the mouse closer to their body was more comfortable.

For more information about this study, please contact Christopher Lowe at [clowe@keyovation.com](mailto:clowe@keyovation.com) .