

CORECHAIR RESEARCH

A RESEARCH BASED, ERGONOMIC SEATING SOLUTION

Background

The traditional office chair as we know it was first developed 150 years ago and while it has evolved in terms of aesthetics and hardware engineering, there has been no significant advancement in terms of human health benefits.

Recent evidence based research on the negative effects of sitting (“sitting disease”, “sitting is the new smoking”), suggest that the sedentary impact of static sitting is very hazardous to one’s health, especially in areas of vascular response and regulating blood chemistry, among other critical measures. Additionally, the effect of poor posture (arising from either improper use or limited design features) contributes to widespread back issues. Studies suggest that 80% of our population has experienced at least one significant musculoskeletal or specifically back pain diagnosis in their lifetime and almost 30% are seeking some form of therapeutic intervention.

Emerging studies on standing desks now suggest that standing is equally as problematic as static sitting if the person is not moving.

Response

The most obvious response to these troubling realities was to introduce standing desks. However, this intervention was introduced and embraced in the absence of sound research.

Emerging studies on standing desks now suggest that standing is equally as problematic as static sitting if the person is not moving. Another trend, sit/stand desks results in the same issue if the user does not engage in movement whether in the sit or stand mode, not to mention the likelihood of long term compliance to a new routine.

Active Sitting

Intuitively, active sitting provides the opportunity to employ movement while in the seated position. The initial solution was the use of an exercise ball to replace ergonomic chairs.

Studies have now demonstrated that any benefits derived from movement on the ball are offset by the lack of postural support in addition to the instability and perceived liability issues which have caused many workplaces to disallow their use.

CoreChair was inspired by the need for movement and the inability of the ball to adequately address issues of sedentary sitting and postural support.

Founder and CEO Patrick Harrison had previous success designing seating solutions for people dependent on wheelchairs for mobility, who in some cases were at risk for further debilitating and potentially fatal pressure sores. Using this experience, the CoreChair was designed with an aggressively shaped seating surface that mechanically redistributes sitting pressure. For the desk bound employee this increases sitting comfort and provides a balanced sitting foundation, and a sensitive cause and effect activation of the mechanism. Complementing the seating surface is a low back support – the two elements work together to embrace the pelvis and prevent slumping, allowing movement both above and below this region.

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By supporting the PSIS (posterior superior iliac spine) the user benefits from a more vertical pelvis which in turn optimizes extension in the ascending spine. This natural extension reduces the need for additional lateral supports such as armrests by optimizing the interface of the intervertebral facets. In addition, the user now has greater lateral and rotational mobility of the mid to upper back.

CoreChair was developed with a research based approach to address sitting challenges. We assumed a noble disregard of existing solutions, instead adopting a design path that steps outside of the normative expectations of what an office chair should look and perform like in an attempt to deliver a truly unique approach and sitting experience.

CoreChair is effective in providing both functional postural support and an opportunity to engage core stabilizing muscles.

RESEARCH OVERVIEW

University of Waterloo, Study 1 (Final Report 2012)

Initial investigation on the benefits of the CoreChair design focused around a review of anthropometric standards and field trials to validate this.

In 2010, prototype progressions were evaluated at the University of Waterloo, Dept. of Kinesiology in the form of a pilot study which set the stage for a full kinematic study completed in 2012 by Dr. Jack Callaghan and his team (available upon request).

This study investigated the kinematics comparing sitting experiences on a high end ergonomic office chair, an appropriately prescribed exercise ball and a CoreChair. The outcome demonstrated that CoreChair provided enhanced pelvic support and overall comparable functional support to the ergonomic chair. When engaged in choreographed exercise routines both the CoreChair and the exercise ball demonstrated comparable recruitment of core muscle groups.

The study concluded that CoreChair was effective in providing both functional postural support and an opportunity to engage core stabilizing muscles. The CoreChair also encouraged movement to counteract the sedentary outcomes of traditional office chairs. The initial publication arising from this study has been published as of October 2015 but has not yet been assigned to a journal issue.

This is a link to the pubmed citation:

<http://www.ncbi.nlm.nih.gov/pubmed/26113019>

Users of the CoreChair can expect to incur increased metabolic demand of 20%.

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University of Waterloo, Study 2 (Follow-up Report 2015)

A subsequent study investigated *Reaching* with focus on lateral movement of the spine and margin of safety (MOS). This study concluded that the margin of safety was highest on the CoreChair when compared to the traditional office chair and the exercise ball.

CoreChair provides enhanced pelvic support and overall comparable functional support to ergonomic chairs.

Mayo Clinic / Arizona State University (Final Report 2015)

CoreChair is proud to be NEAT™ certified (*NEAT™ stands for the science of Non Exercise Activity Thermogenesis, developed by Mayo Clinic*). The NEAT™ mark signifies that a product has undergone scientific evaluation by the Mayo Clinic and has been determined to be a viable help for people to achieve specific goals related to activity.

NEAT™ protocol, under the leadership of “obesity solutions” expert Dr. James Levine MD PhD, identifies that an increased metabolic output of approximately 5% can have a profound affect in countering the negative consequences of deleterious sedentary health consequences associated with static sitting.

Research results of their study concluded that the CoreChair, when used passively to perform common office tasks, results in 20% increased energy expenditure (calories burned) vs traditional office chairs when performing the same tasks. When the user followed our web based CoreFit videos, actively sitting and performing seated exercises, the result was a substantial increase in energy expenditure equivalent to walking at a pace of 2mph. Previous studies have concluded that this pace of activity has a positive impact on healthy outcomes.

Sedentary lifestyles pose an enormous health risk, taking a toll on individuals as well as on employers. According to the World Health Organization, “physical inactivity has been identified as the fourth leading risk factor for global mortality causing an estimated 3.2 million deaths globally.”

The science of NEAT™ tells us that activity, *all activity*, is important and has an impact on metabolic demand (caloric expenditure) and cardiovascular health. Even minimal activity increases one’s metabolic rate, and over the course of a day the cumulative results of NEAT™ activity is significant.

Cornell University (Final Report 2015)

Dr. Alan Hedge investigated three variables surrounding “productivity”, “posture” and “anthropometrics”. Outcomes validate CoreChair as a viable alternative to conventional ergonomic chairs with enhanced pressure distribution and the introduction of movement.

CoreChair is effective in addressing a variety of benefits including but not limited to cognitive alertness, low back pain, rehabilitation of post surgical hip reconstruction, neck and shoulder discomfort and long term sitting tolerance.

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Safety Testing

ASTM stability test and BIFMA stability tests have been passed and further reinforced by the aforementioned "Reaching Study" by the University of Waterloo.

Cal 117/133 Fire Standards

Both the polyurethane foam cushion and the fabric upholstery are certified to meet these standards.

Durability Testing

The full array of BIFMA Standards was used as the guide to engineering specifications with the durability test becoming the highest standard that we set out to achieve. CoreChair exceeded 1 million cycles where the product had a 250-pound weight on the seating surface and the chair was mechanically moved through the full range of 14 degrees at highest resistance. All other BIFMA standards were exceeded as our bare minimum of product design engineering specification. The 3-D knit upholstery fabric is composed of 100% post consumer polyester and has been tested to exceed 200,000 double rub.

Real People Testing

In addition to the engineering, testing and research based validation investigations, CoreChair engaged in "real people trials" that included a variety of environments and a diverse range of individual needs to assist in the design process. We concluded that this product is indeed effective in addressing a variety of benefits including but not limited to cognitive alertness, low back pain, rehabilitation of post surgical hip reconstruction, neck and shoulder discomfort and long term sitting tolerance. Currently CoreChair has approximately 80 chairs in long term trial use in order to continue to gather feedback on the benefits from users and to explore further opportunities for innovation.

CURRENT RESEARCH

Guelph University

Dr. Leah Bent will be researching changes in blood flow both in lower extremity and carotid vessels to link movement to enhanced circulatory function. They will also be investigating a number of different variables such as sensation on lower extremities and pressure mapping on the seated surface. The study will also investigate cerebral blood flow vs cognitive function.

Memorial University

Dr. Diana DeCarvalho will study the effect of an "active" office chair design (Core Chair) on spine biomechanics and perceived pain during prolonged sitting, with a secondary goal of examining whether differential responses to the chair occur between pain groups. This project will help improve the understanding of spine biomechanics and the effects of prolonged sitting and could help develop more effective guidelines and strategies for reducing/mitigating sitting associated LBP at work.

Embedded Technology

CoreChair has partnered with 35E, a Redwood City, California design company, to create a "smart" CoreChair with embedded technology and a companion app which will provide the user feedback on their personal movements. Working in conjunction with the Mayo Clinic, the technology will calibrate tracked movement on the CoreChair with caloric expenditure.

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