

Fern: Superior, Evidence-Based Comfort and Support

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Designed with People in Mind

Movement is important throughout the workday.¹ Whether you're concentrating, collaborating, resting, reaching, or contemplating, Fern®—designed with you in mind—moves with you, providing superior support and comfort. Here are the ways Fern provides comfort and support and how we know it is superior.

Avoiding Discomfort While Seated

Knowing that comfort and discomfort are personal experiences, it can be difficult to define a common point at which discomfort motivates people to either adjust posture or seek a different chair. Instead, it's more useful to understand that as discomfort increases the more likely that discomfort will have negative consequences. In addition to typical physical and health consequences of chronic discomfort,² another consequence is that discomfort can be a distraction. When people experience intense sensory input such as discomfort and pain, it may disrupt our ability to perform tasks by diverting resources to managing the discomfort rather than the task at hand.³ Put simply, the goal is to avoid as much discomfort as possible so that people can maintain health and perform well at work.

How can you avoid discomfort and provide proper support while seated in a chair? The backrest and seat pan should provide a high amount of contact area and distribute pressure evenly to avoid concentrated pressure points—for everyone. Fern's seat pan and backrest provide a high amount of contact area and distribute pressure in a manner that reduces areas of concentrated pressure—and subsequently discomfort—for a wide variety of body shapes and sizes.

Fern's Supportive and Flexible Design

The designed contour and foam density of Fern's seat pan relieves pressure best. The flexibility of Fern's backrest contours and provides the best distributed back support without harsh edges, even as you move through different

positions. Fern actively supports seat and back health, and avoids the discomfort that can pull you off task. Look at the evidence.

The Study

Pressure Mapping

An independent ergonomics consulting firm tested four task chairs, Fern and three competitors, with similar claims of comfort and support. Each chair's backrest and seat pan was tested through pressure mapping for its ability to flex and support users in five postures often seen in office settings.⁴



Posture 1
Sitting upright



Posture 2
Viewing phone
with legs crossed



Posture 3
Side twist to look at an object



Posture 4
Thinking with hand on face
and legs crossed



Posture 5
Deep recline

1. Bellingar and Johnson, 2016.
2. Bellingar and Johnson, 2016.

3. Hart, Matelli, and Zaxler, 2000;
Duncan and Barrett, 2007;
Harmon-Jones, Price, and
Gable, 2012.

4. Haworth Internal Research Report,
2017.

The four chairs selected for this assessment are identified by their backrest and seat support designs.

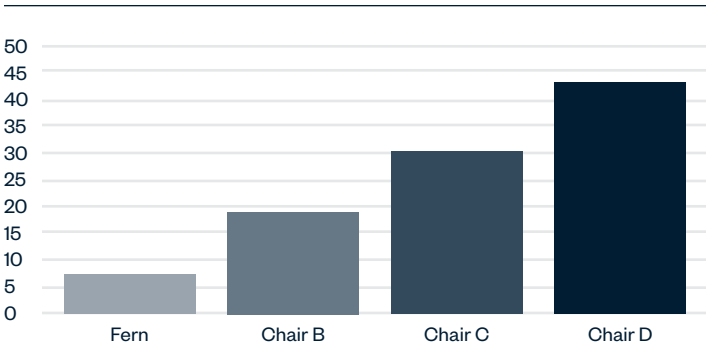
Chair A	Chair B
Fern	Upholstered Back and Seat
Chair C	Chair D
Flexible Back with Frame and Upholstered Seat	Rigid Frame with Mesh Back and Seat

Twenty-two people (men and women of various heights, weights, and ages) sat and were photographed in all the chairs for each posture. Pressure mats measured backrest and seat pan pressure, and participants provided body discomfort feedback on a scale of 0 (no discomfort) to 10 (extreme discomfort) for the neck, shoulders, upper and lower back, hips, thighs, and buttocks.

Comfort and Support Results

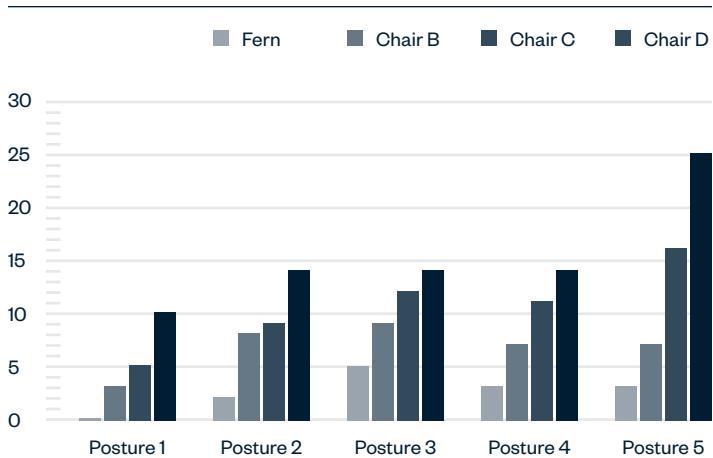
Most people reported no discomfort in the chairs. However, when discomfort did occur, it occurred the least in Fern. Overall, Fern outperformed all other chairs with the lowest occurrences and intensity of discomfort for all five postures. The next “comfortable” chair had over two-and-a-half times of discomfort occurrences than Fern, and the least “comfortable” chair had nearly six times the discomfort occurrences than Fern.

Percentage of Reported Discomfort



Let’s look at some posture specific results. Because some postures tend to be more common and longer in duration than others, at a minimum, all the chairs should be able to support people in upright and reclined postures without discomfort. Looking at the separate postures, Fern had no reported discomfort in the upright posture and only three occurrences in the reclined posture. The following summarizes the results from three of the most common postures.

Occurrences of Discomfort by Posture

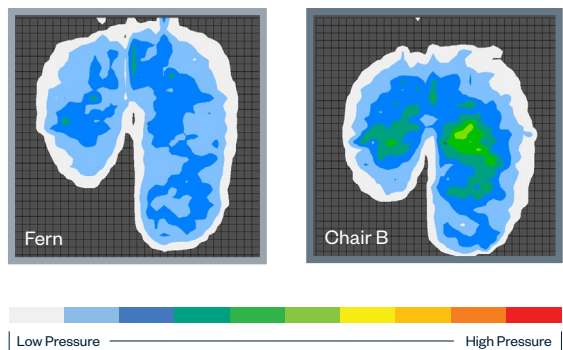


Comfort for Posture 1: Sitting Upright

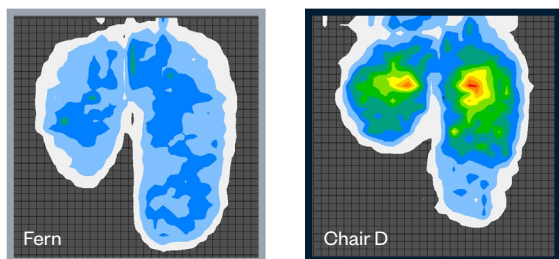
Although instances of discomfort in the upright posture were low, this posture represents a very typical sitting behavior. Minimizing discomfort as much as possible should be optimal when a chair is adjusted properly for its occupant. Fern achieved this with zero occurrences of discomfort, while discomfort occurred in the other chairs across the various body parts.

Seat Pan Support for Posture 2: Crossed Legs While Viewing Phone

Crossing one leg over the other can cause leg and buttock discomfort in some people. Pressure maps show pressure distribution for Fern on the left (the participant did not report any discomfort for Fern) and Chair B on the right. Since both chairs have an upholstered seat pan with foam, the discomfort for Chair B is likely caused by structures under the foam that do not flex as much as Fern’s support structure.

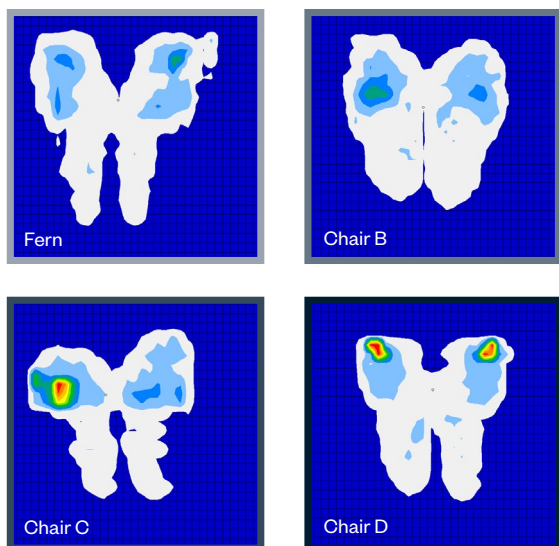


Chair D's pressure map demonstrates how the mesh seat is unyielding under the ischial tuberosities (the "sit bones") as seen in the bright orange and red areas in the middle of the image as well as where the body comes in contact with the front of the seat. In contrast, Fern's pressure map demonstrates how it distributes the pressure better and avoids high areas of pressure.



Backrest Comfort and Support in Posture 5: Reclining

Twenty-nine percent of all reports of discomfort were expressed while sitting in this posture. Compared to the competition for recline posture, Fern provides good levels of pressure and pressure distribution. Chair B pressure distribution shows that lack of support in the lower part of the backrest while Chair C and Chair D show more constricted areas of contact with high points of pressure in the shoulder area. The lack of support in the low back and the pockets of high pressure caused discomfort in the competitive chairs.



Conclusion

Fern Provides Superior Comfort and Support

The perceived comfort and pressure analysis demonstrates that the Fern chair is superior at supporting these five common postures when compared to the other three chairs. Fern was the only chair that had no reports of discomfort while participants sat in the upright posture. In the other four postures, Fern consistently had the fewest reports of discomfort and manages even pressure distribution across all postures consistently.

Fern's Superior Comfort

Fern caused fewer occurrences of discomfort in the seven body parts surveyed: the neck, shoulders, upper and lower back, hips, thighs, and buttocks. When discomfort was experienced in Fern, it was generally at a lower intensity than in the other three chairs for the full range of participants. The pressure maps support these discomfort findings. Fern's seat pan and backrest provide a high amount of contact area and distribute pressure in a manner that reduces areas of concentrated pressure, especially under the sit bones and behind the shoulder blades. This is why Fern is comfortable.

Fern's Superior Support

The pressure maps show that Fern's backrest pressure distribution pattern changes the least as participants moved through the five different postures—evidence that Fern's backrest can contour to the occupant's back shape. Also, Fern's low back curvature delivers more evenly distributed support across all postures to the lumbar and pelvic area than Chair B and Chair D. Fern can do this because its flexible suspension allows the backrest to flex in response to posture changes from the occupant.

- Chair B is marketed as having a flexing backrest design, but it is not as agile as Fern and lacks Fern's responsiveness that manages to keep both the lower and upper portions of the backrest closer to the sitter's back.
- Lastly, Fern's backrest design prevents high pressure points when compared to other chairs.
- Chair C has a flexible backrest with a rigid frame. In some resting postures, this frame created high pressure points for participants. Because of Fern's design, this is not an issue.
- Chair D has a rigid frame with a mesh back. This design causes even more contact and areas of high pressure than Chair C.

Fern has the capacity to ergonomically support a wide variety of body shapes and sizes, even while we move to and between postures. It is clear Fern is ergonomically supportive.

Instead of compensating for chairs that don't support everyone and limit comfortable support to a few specific postures, Fern moves with you while you do your work—no matter who you are and what you do.

Contributors

Teresa Bellingar holds a Ph.D. in Industrial Engineering specializing in Occupational Safety and Ergonomics and is a Certified Professional Ergonomist, as well as a National Certified Pilates Teacher. As Haworth's Senior Corporate Ergonomist, she is responsible for ensuring ergonomics and ADA standards are incorporated into product design, managing ergonomic research, and representing Haworth on North American ergonomic standard committees and BIFMA seating standard committees.

Peter Beyer holds a B.S. in Mechanical Engineering from General Motors Institute. He has 35 years of experience in product research and development and has been granted nearly 30 patents. As a Senior Development Engineer at Haworth, he serves as a technical lead in areas of advanced product design and development, including conceiving new products, utilizing predictive analysis, and developing validation test procedures. Pete is also instrumental in collaborating on ergonomics research as it relates to seating product design.

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