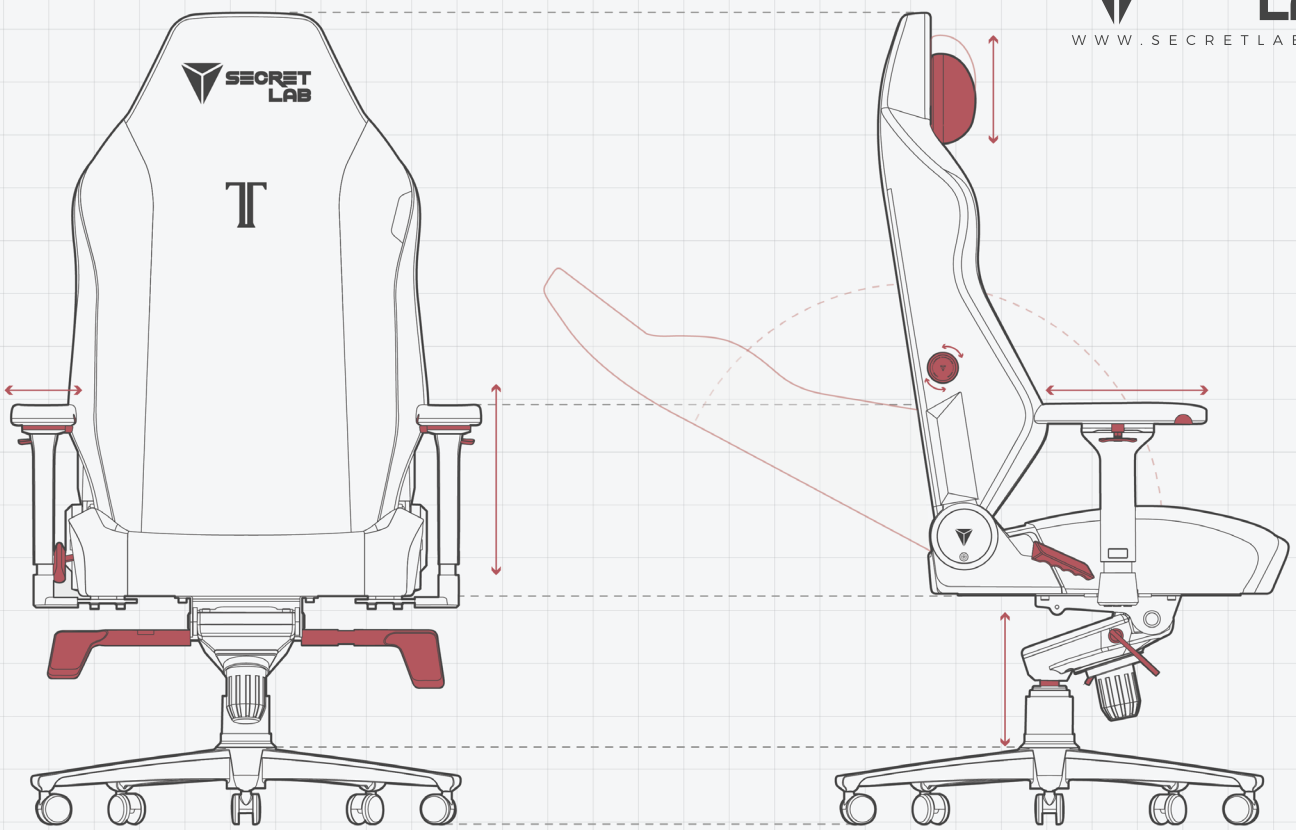


PROMOTING MOVEMENT – AN ADJUSTABLE SEAT FOR GOOD SITTING ERGONOMICS

When it comes to sitting ergonomics, the level of support and adjustability of your chair has a direct impact on your physical wellbeing. A well-designed chair should be equipped to adjust to users of diverse body types and sitting habits, across a variety of tasks.

In this day and age where many types of work and hobbies are sedentary in nature, sitting for prolonged hours has become very common. Where everyone's individual ergonomic needs differ, there is no one-size-fits-all approach. Rather, a well-designed ergonomic chair should be highly adjustable to adhere to every user's physique and preferences, as well as encouraging postural changes throughout the day.

CONTENT

WHAT WE KNOW

Long hours of sitting without good ergonomics can worsen musculoskeletal issues

An anthropometric study conducted on carpet weavers showed that musculoskeletal disorders (MSDs) were found to be a common ailment among those in the same profession. The research concluded that an ergonomic seat purposefully adjusted to support the optimal posture for the act of carpet weaving gave the highest potential to aid in reducing MSDs, improving their general comfort. In turn, productivity and safety of carpet weavers were likely to improve as well (Mahmoudi et al., 2013). We can extrapolate these findings to any task that involves long hours of sedentary behavior with repetitive motions, such as writing or typing on a keyboard at a desk.

Multiple studies have shown that the number of hours people stay seated has been on the rise (Yang et al., 2019). While sitting in itself isn't inherently harmful, prolonged sitting has been observed to inflate the risks of exacerbating pre-existing musculoskeletal issues, especially when studies on intervertebral disc pressure have demonstrated that sitting increases load on the spine.

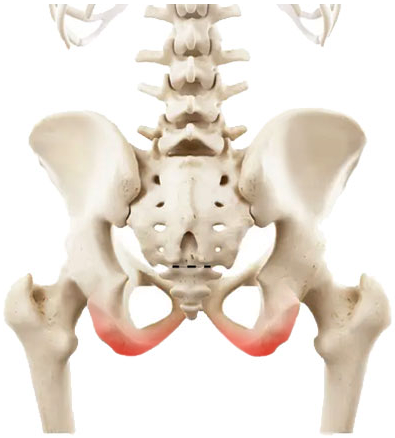


Fig.1: Ischial tuberosities (red) are paired structures of the pelvis that bear significant weight when seated

When we sit, the entire weight of our upper body shifts to the ischial tuberosities and thighs, both of which are in direct contact with the seat base [Fig.1]. Over prolonged periods of sitting, pressure builds up in these areas, especially if the seat base does not adequately distribute the weight evenly to the other regions (Li et al., 2020). Increased pressure at the ischium may change the curvature of the lumbar spine in this scenario, and a lack of back support could promote lordosis in the lumbar region and increase stress on the spinal structure (Makhsous et al., 2012).

WHAT WE KNOW

A good chair built for good sitting ergonomics encourages freedom for frequent postural changes

Fig.2: Paraspinal muscles of the lumbar spine (blue) to support posture

A healthy sitting posture should be one that is active, rather than static (Pynt et al., 2001). Movement while staying seated is shown to mitigate the harmful effects of prolonged sedentary work, as opposed to remaining in one static position (Faulk et al., 2019). This is due to the fact that changes in the shape of the lumbar spine [Fig.2] contribute significantly to the decrease in pressure, and myoelectric activity in the posterior paraspinal muscles.

On the other hand, a lack of movement in the spine reduces fluid exchange and nutrition in the intervertebral discs (Holm et al., 1983). A study conducted on office workers staying in common static sitting positions at an ergonomic workspace concludes that limiting the holding time of a posture can alleviate musculoskeletal discomfort in different body parts. This lowers the risk of MSDs in office workers (Tahernejad, 2022).

Our bodies are not meant to stay in one position, even if it is in optimal posture. That is why there is a need for chair design that encourages movement (Pynt et al., 2002).

WHAT CONSTITUTES POOR CHAIR DESIGN?

1. Lack of adequate adjustability will limit postural change

A poorly designed chair contributes to improper posture and is conducive to the development of MSDs; however, with an ergonomic seat and the appropriate instructions for adjustments, MSDs can effectively be avoided (Vergara et al., 2002). If a chair does not have an adequate range of adjustability, it limits movement and leads the user to conform to a single posture, causing back pain [Fig.3].

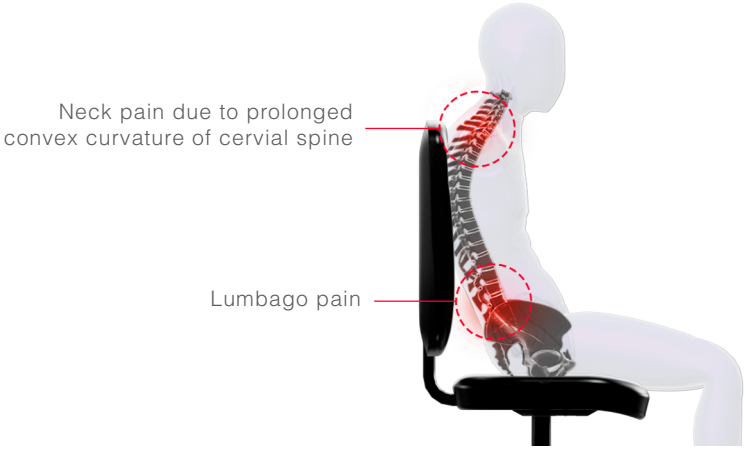


Fig.3: Poor posture in a non-adjustable chair

2. The parameters of the chair are not physically compatible to the user

The anthropometric proportions of the user will dominantly influence the perception of comfort when sitting on chairs of different sizes (Agarwal, 2006), with a study reporting feedback such as “too spacious” or “cramped” from users sitting on chairs that did not fit their physiques. With the exception of the size of the seat, which had a substantial effect on perceived comfort, there was limited discrimination of good and bad ergonomics between the chairs (Helander, 2003). Apart from discomfort, an ill-fitting seat can also cause a variety of problems, including compression of soft-body tissue, which inhibits blood circulation (Wright, 1993).

Furthermore, women have a greater degree of natural lordosis compared to men while sitting (Bridger et al., 1989). Body types, sizes, sitting habits and pre-existing physical conditions also further contribute to the different requirements for optimal lumbar support. Postural health is better served when the depth of lumbar support is appropriate to the degree of individual lordosis (Pynt, 2001), instead of a singular one that caters to all groups of people.

WHAT CONSTITUTES GOOD CHAIR DESIGN?

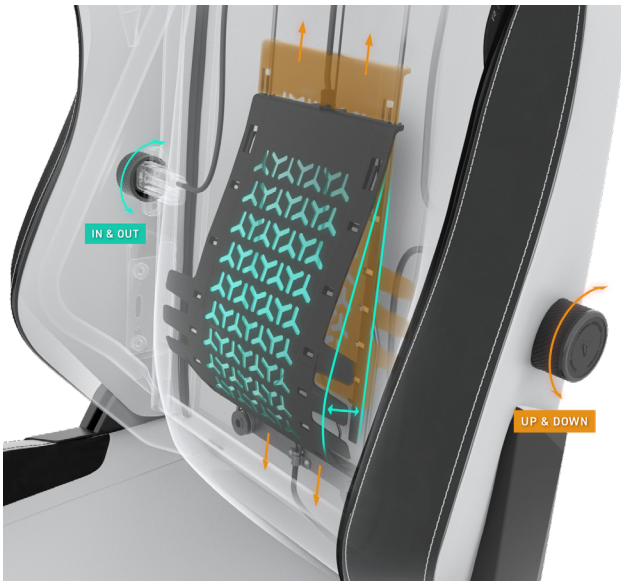
Adjustability that supports comfort while the body is in motion

With the help of precise chair adjustments, a wide variety of sitting postures [Fig.4] can be adapted for. Dynamic seating options are shown to play an important role in maintaining spinal health, particularly in people who work while seated for hours at a desk (Zemp, 2013). In a long-term study, it was found that computer workers who used highly adjustable chairs with flexible lower back support, experienced a reduction in back pain as well as neck and shoulder pain (Amick et al., 2003).

The features of an adjustable, ergonomic chair should be attuned to posture changes. It should be highly adaptive to accommodate your unique body shape, size and weight, with easy and intuitive adjustments that allow you to personalize how you sit. A chair built to respond to shifts in your body and posture plays a significant role in creating good support.

Fig.4: Types of sitting postures

WHAT CONSTITUTES GOOD CHAIR DESIGN?



• **Lumbar support**: Good lumbar support has been shown in studies to reduce intradiscal pressure on the lumbar spine.

The depth and height of the lumbar support ought to be adjustable so that it can fit to every individual's unique spinal curvature. This allows the user to get sufficient support for their back throughout the day regardless of the degree of their lumbar lordosis (Pynt et al., 2001).

• **Backrest inclination**: When the user goes from sitting upright to leaning back on a reclined backrest, there is rotation of the pelvis, which is the main induction of postural change (Andersson et al., 1979).

A backrest that can be reclined to a significant degree can therefore help to promote pelvic rotation, migrating stress across different tissues to prevent accumulation and injury. It also supports the user even at resting positions, alleviating pressure on the head, back, and shoulders from long hours of sitting. It is ergonomically beneficial to have a chair with sufficient recline.

WHAT CONSTITUTES GOOD CHAIR DESIGN?

TITAN Evo Size Small | Regular | XL
(from left to right)

• **Chair size**: A study concluded that users with a smaller physique disliked large chairs because the seat pan was too long for their bodies, and the lumbar support was too high to fit the curve of their backs. Similarly, users with a larger physique disliked small chairs for the opposite reasons (Helander et al., 1987). A chair that comes in multiple sizes provides the option of adjustability to properly accommodate users of diverse builds. Rather than forcing themselves into an ill-fitting seat, users will have the freedom to choose a chair size that caters to their height and physique.

Sitting on a chair that fits the size of the user helps to align each part of their bodies to parts of the chair specifically designed to target them. Accommodating the height of the user offers proper alignment of the head, neck and shoulders with the headrest and backrest, as well as full contact between the chair's lumbar support and the user's lower back for effective strain relief. The user's feet can also properly reach the ground and stay planted for improved ergonomic wellness.

CONCLUSION

With more people adopting a persistent sedentary lifestyle, there is a growing need to analyze whether their chairs are aiding them in achieving good sitting ergonomics. It is established that a dynamic sitting posture is beneficial to alleviate pressure on parts of the body, and reduce the risk of MSDs. Since users have physical disparities in terms of build, there is no chair that can universally fulfill all of their ergonomic needs. However, a chair that's specifically designed to provide a high level of adjustability can be tailored to fit a wider range of users and their body types.

The key to good sitting ergonomics is a chair that adapts to the user and moves with them. With a full suite of adjustable features and a range of three chair sizes to cater to varied anthropometric dimensions, the Secretlab TITAN Evo promotes postural changes while seated as it can accommodate a wider variety of physiques and sitting postures. This allows the TITAN Evo to adapt uniquely to every individual's needs, while encouraging movement in a range of healthy seated postures for ergonomic wellness.

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