STANDING OFFICE WORK
The Rise & Fall

By Marty Dagostino

CHAIRS ARE UBIQUITOUS in the modern world. We sit at home, while travelling, at school and in many work settings. When evaluating the positional alignment most frequently recruited over a lifetime, one can start with the broadly acknowledged recommendation that a healthy lifestyle includes a daily continuous sleep period of seven to eight hours. For most, sleep is conducted while positioned horizontally. What positional recruitments dominate each day's remaining 16 hours? It has been suggested that the average person spends almost 13 hours a day, approximately 80% of each day's waking hours, sitting (Goossens, 1994). Assuming a 72-year lifespan, this equates to 24 years spent sleeping—positioned horizontally—and 38 years seated. Another way of spinning this story is that a mere 10 years in a lifespan of 72 are spent standing upright.

When the author began his career as an ergonomist in 1987, much of the consulting took place in manufacturing settings, where standing jobs dominated and workers lobbied to acquire seated positions. Sometime around the commencement of the 21st century, the work assignments incrementally gravitated away from manufacturing sites and into office settings. Office workers were provided a chair, and their work's design dictated that the chair be sat in.

This evolving positional work trend did not occur in a vacuum. Epidemiological scrutiny suggested that sedentary jobs have increased by 83% since the 1950s (Carr et al., 2016), and one study flagged chronic workplace sitting as an unhealthy job exposure to be replaced by standing (Pronk et al., 2012).

In January 2013, "Sitting Is the Smoking of Our Generation" was published in the *Harvard Business Review* (Merchant, 2013). This piece was likely influenced by a much-cited meta-analysis that concluded that chronic exposure to extended sitting likely doubled an individual's risk of developing diabetes and heart disease (Wilmot et al., 2012). The idea that sitting has an effect on health comparable to smoking likely led to the office standing desk era, with an estimated 2023 market value of $8 billion and a projected annual growth of 5% or greater over the following decade (Gao, 2024).

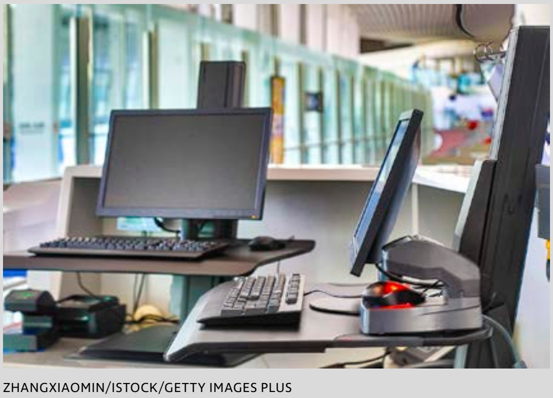
As the idea grew that sitting is bad and standing is better, standing work applications began to populate office workspaces. Soon after, a flurry of studies were published that evaluated the effects of standing office work exposures. Early in this period, studies cited that standing in one place with little movement led to reports of acute foot, ankle, knee, hip and back discomfort, and that standing on an anti-fatigue floor mat contributed to insensible muscle activity in the legs and possibly undesirable lower extremity circulatory pooling (Callaghan et al., 2015; Garcia et al., 2016; Goossens, 1994). One study reported that idle standing, versus sitting, during computer work led to measurable declines in cognition (Baker et al., 2018). In a hold-the-presses moment, people learned that when they are comfortable, they focus, and when they are uncomfortable, they become distracted. If empirical evidence supporting the conclusion that standing in the modern office was an antidote to the potential harmful consequences of extended seated exposures, it was not emerging (Lin et al., 2016).

As office workplace applications designed to permit a switch to standing work became more numerous, the author asked: Why stand? This was answered by another study—and corroborated by numerous office workplace observations—revealing that those with an application that allowed alternation between seated and standing office work labored in a standing position during just 15% of the workday (Barbier et al., 2017). Even the *Wall Street Journal* weighed in on the matter of standing work with an article (Puniewska, 2020), citing a study that evaluated workers sitting and standing while performing an identical office task over a 6-hour period. The reported finding was that standing office workers burned 54 more calories than their seated counterparts (Saeidifard et al., 2018). This discovery suggested a metabolic bump resulting from standing versus seated office work that would permit indulgence in a single candy bar wafer.

Vertical Sit to Stand

The earliest products observed populating office workplaces and touted for their ability to permit a change from seated to standing had vertical footprints and clamped to worktables. They colloquially became known as sit to stand or sit/stands (Figure 1). Vertical sit to stand (VSTS) height changes were accomplished by moving a lever beneath the middle platform and then grasping the keyboard tray or lower platform. Raising or lowering moved all sections up or down, with effort

FIGURE 1
VERTICAL SIT TO STAND



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KEY TAKEAWAYS

- **The industry-standard desk height of 29 in. establishes an incompatible level for most seated work. Height-adjustable tables (HATs) routinely fail to promote seated or standing positional efficiency.**
- **An extended-leg adjustable-height table best promotes seated and standing positional efficiency. Use of extended-leg adjustable-height tables could aid in musculoskeletal disorder prevention.**
- **This article explores these standing office desks and tables, how they were used during the COVID-19 pandemic and after, and whether they yield better health outcomes for the worker.**

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dependent on the weight of equipment adhered to or placed on the application.

Modest maximum height attainments rendered these applications incapable of elevating beyond a standing keyboard height compatible for the 5-ft-9-in.-tall worker (Chaffin & Andersson, 1999). The typical VSTS low adjustment was version-dependent and ranged from 24 to 27.5 in. A 27.5-in. minimum height VSTS, set to its minimum level, established an efficient seated keyboard height for a 6-ft-tall user and inefficient entry work levels for those shorter than 6 ft (Chaffin & Andersson, 1999; Goossens, 1994).

Horizontal Sit to Stand

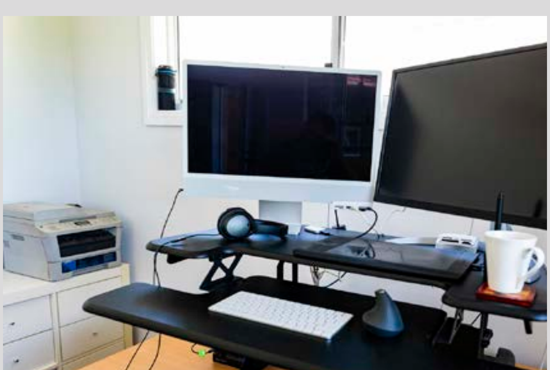
The VSTS office space nonconformance grasping appendage required for tabletop anchoring, modest adjustment range and pinch point safety warnings were extinction-promoting design features. Little by little, supine successors began displacing the upright ancestor.

The typical horizontal sit to stand (HSTS) was a two-tiered product with the lower platform resting on the desktop designated for the keyboard and mouse and the upper, more spacious, second platform designed to hold the monitor or screen and processor (Figure 2). In manually adjusted versions, application height changes required recruitment of musculoskeletal disorder (MSD)-inducing alignments that included but were not limited to bilateral extended arm and handle grasping. Elevation changes were dependent on end-user stature, upper body strength and equipment weight. Motorized HSTS products were another option.

The Sit/Stand Extinction

In today's office work setting, an industry-standard tabletop height is 29 to 30 in. Placement of a HSTS on a typical office desk yields a keyboard height of 30 to 31 in.—an ideal seated keyboard level for a user who is 6 ft 9 in. to 6 ft 10 in. tall (Chaffin & Andersson, 1999; Goossens, 1994). A keyboard situated at this height is a mere 4 to 5 in. below the typical kitchen countertop, where carrot chopping might occur, and is a recommended manufacturing workplace standing level for jobs requiring heavy downward exertions (UAW-GM Center for Health & Safety, 1990). Although it was touted as promoting standing, the HSTS, like its vertical ancestors, had modest maximum standing adjustment ranges of 43 to 45 in. This promoted standing computer work positional efficiency in all within—but not beyond—the 50th to 77th height percentiles. Such design limitations did not go unnoticed, and the once regular television commercials praising the expected health benefits from HSTS use vanished.

FIGURE 2
HORIZONTAL SIT TO STAND



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At the periphery of applications that sat on or connected to tabletops were entire office worktables that could be adjusted up or down. As with versions clamped to or set on desktops, the height-adjustable table (HAT) was promoted as allowing users to work in preferred seated or standing alignments. Some required manual height adjustment, while electric versions incorporated lift mechanisms into a table's legs. One manual HAT, with a name that implied that the effort required to raise or lower it was negligible, featured a front-mounted squeeze control linked to a pneumatic cylinder of the kind found in a standard office task chair. Essentially, this table was a task chair masquerading as an adjustable-height table. The table's cylinder and resistance adjustment port resided in an under-table concealment envelope. Making a height change necessitated using a tool beneath the work surface and performing rotational manipulations, which reportedly exceeded the range of motion and strength capacities of some users. Selected as the default computer worktable for an entire departmental branch of the federal government, the HAT—like its sit/stand predecessors—offered a modest adjustment range of 27 to 43 in. This table maximum rendered the HAT incapable of elevating sufficiently to promote efficient office computer work alignments for those taller than 5 ft 9 in. and was observed in a few instances to result in a HSTS placement on the HAT to secure greater table heights. Other users sought keyboard tray-to-table installs to attain seated keyboard and pointing device levels below the table height minimum.

Within the HAT cost-cutter niche was the HAT kit, which came with everything required to make a HAT minus a tabletop. One product that the author observed in a production facility came in a hand-cranked version. The kit's height change cylinder was identical to those that permit raising and lowering of a vehicle hatchback. With this HAT, turning a handle yielded a rotational to linear motion conversion, cylinder hydraulic fluid displacement and raising or lowering of the table. As with sit/stands, this product's twin-cylinder office application had a modest adjustment range of just under 12 in., rendering this made-for-the-office HAT kit unaccommodating for anyone taller than 5 ft 7 in.

Arguably supporting the theory health benefits were associated with standing office work (Pronk et al., 2012) was a supply chain inundating consumers with a dizzying array of adjustable-height options. Perhaps coinciding with what the author observed as a standing health benefit belief ubiquity was the trend away from models that were attached to or placed on the worktable in favor of the motorized HAT, which was perceived as more sophisticated. The increasing frequency of the healthcare professional standing work prescription, received sans product specification, served to tacitly endorse the adjustable-height application with no need to vet it.

In federal worksites the author visited, standing work application funding was evident, although use tutorial and outcome assessment protocols were not. At one federal office building, a request arrived for an ergonomics assessment of a specific area where a makeover included introduction of 270 motorized HATs at a cost of more than $1,200 each. The chosen adjustable-height application was found to have an adjustment range of 27 to 43 in. and identified as incapable of lowering sufficiently to encourage efficient seated work recruitments in those shorter than 6 ft or elevating high enough to promote efficient standing computer work alignments in those 5 ft 8 in. or taller. Adding insult to injury, all 270 HATs had been reverse-assembled, with the rear feet at the table front and the front feet at the table back. The backward table leg assembly was deemed necessary by the project manager to accommodate the monitor arm selected for it. The project manager worried that affixing the arm to properly assembled tables could cause the tables to tip over toward the worker.

In 2020, working to promote efficient office work practices at six federal jobsites and within two government branches, the author observed thousands of HATs and sit/stand desks. Many were of the kind described in this article as extinct or trending in that direction. Many of the extant workstations were collecting dust, idle due to reduced jobsite reporting requirements in response to COVID. If recommended practices for federal worker home office set-ups were provided—and coinciding with the COVID directive to work from home—virtual home office ergonomics assessments the author conducted confirmed that best practices either were not provided, were not assimilated or were being ignored by the workforce. Also evident was the absence of a home office HAT procurement guideline or recommended product list.

Extended Leg Height-Adjustable Tables

From the earliest reports that office workers need to stand to avoid the deleterious health outcomes associated with sitting, one class of HATs was designed to promote efficient entry work and accommodate users of all heights, whether seated or standing (Chaffin & Andersson, 1999). These were the extended leg height-adjustable tables. Notable in an extended leg HAT is that each leg has three lift columns (Figure 3). A basic HAT has legs with two lift columns, a design that yields a smaller range of minimum and maximum heights and adjustment ranges comparable to the vanishing tabletop sit/stand.

Throughout the pandemic, many of the author's ergonomics consultations were government dispatches to the homes of federal office workers. A common complaint was an inability to find a seated work sweet spot, despite a computer workstation complete with a motorized HAT. With greater production material costs and more moving parts, the extended-leg HAT was priced beyond the average consumer's budget and exceeded funds that organizations had set aside. The belief appeared to be that a fitter workforce could be built by providing the "healthier" option of standing work, and HAT producers or sellers did not miss these outcomes. With HATs that were less positionally accommodating selling quickly, what benefit could there be to advertise, produce, or even maintain an inventory of the more costly and positionally inclusive extended-leg HATs?

One company's third iteration of its extended-leg HAT has an adjustment range of 22.25 to 48.5 in., which promotes seated or standing work positional efficiency for users 5 ft to 6 ft 5 in. tall. The table can be programmed to preferred work heights and includes a position change timer based on user-specified intervals that nudges the user to change positions through a slight table rise and fall. An application can be downloaded onto the user's device that permits device synchronization to track time seated and standing, and the north-south travel of the switch facilitates intuitive table operation for users with visual impairment or limited dexterity.

Near the end of 2024, the author recommended an extended-leg HAT for use in a federal worker's home office. The procurement was approved; the purchase commenced, stalled and was then canceled. The recommended product had been discontinued 5 years previously, although it was still advertised on the government

FIGURE 3
HEIGHT-ADJUSTABLE TABLE LEGS ON DESK

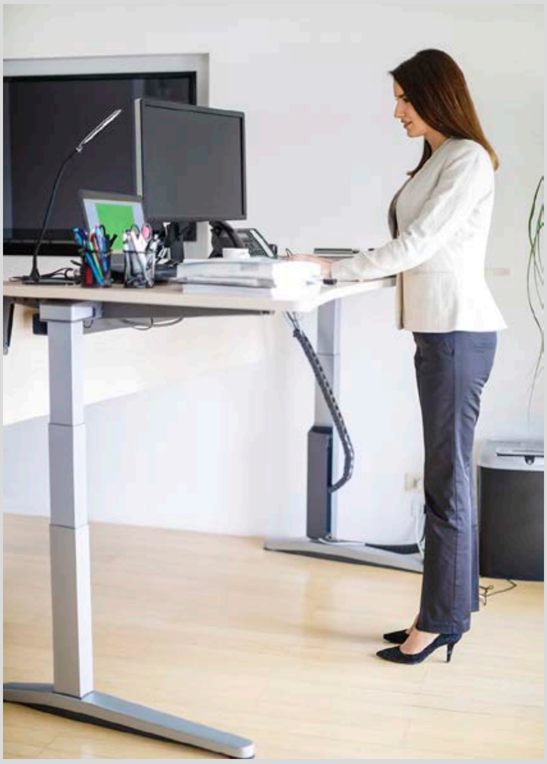

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TABLE 1
OFFICE ERGONOMICS RECOMMENDED PRACTICES

Factor	Biomechanics	Location	Interval
Sitting	Feet flat on floor. Full-back backrest support. Thighs intersecting trunk at 90°. Shoulders and arms relaxed. Upper arms touching trunk. Forearms perpendicular to upper arms, wrists straight or neutral.	Centered in front of keyboard and screen	Comfort dictates. Leave chair regularly. Walk.
Standing	Feet flat on floor. Shoulders and arms relaxed. Upper arms touching trunk. Forearms perpendicular to upper arms or slight forward incline (negative tilt), wrists straight or neutral.	Centered in front of keyboard and screen	Comfort dictates. Sit or walk regularly.
Worktable	Height permits alignments described in sitting and standing.	Centered in front of end user	Comfort dictates. Leave workstation regularly.
Keyboard	Level encourages alignments described in sitting and standing.	In front of and near end user	Comfort dictates. Leave workstation regularly.
Pointing device	Position supports alignments described in sitting and standing.	Right, left or between end user and keyboard. Same level as keyboard. Minimal reach.	Comfort dictates. Leave workstation regularly.
Screen	Straight on gaze. No head turning. Chin straight or lowered, not tilted upward.	In front of end user. Screen top between eyebrows and nose. Distance is arm's length.	Comfort dictates. Expand monitor viewing distance every 20 minutes.

purchasing website. The procurement site's recommended replacement had an adjustment range of 30.5 to 50.5 in. with a seated height minimum compatible for a 6 ft 9 in. worker (Chaffin & Andersson, 1999).

Days before the conclusion of 2024, the author was working with a visually impaired employee who worked from home full-time. This worker was on their second in-home HAT introduction. Both workstations had been recommended, assembled and introduced by a state disability assistance group. The first table, which the employee rejected after installation, used a hand crank for table raising and lowering that required rotational forces that exceeded the worker's upper extremity strength capacity. The second HAT was motorized, but the table control was not usable by a visually impaired worker.

In another instance, the author was contacted by an office worker who is 5 ft tall. They had previously suffered a stroke, are diabetic and take medication for high blood pressure. The employee was insistent that a VSTS taken from the workplace be returned to their workstation as they were convinced that standing work was healthier. Against VSTS reintroduction pushback, the employee turned to their physician for a standing work prescription that arrived in an email on the healthcare provider's letterhead consisting of two words: "standing work."

In late 2024 and early 2025, two scientific papers were published that assessed outcomes from standing office work exposures. One evaluated the circulatory system response to static standing office work based on data from more than 80,000 participants. This study suggested that exposure to standing office work could result in undesirable, possibly permanent, changes in lower extremity circulatory anatomy (Ahmadi et al., 2024). The other evaluated standing work exposures on blood pressure and found that idle standing exposures led to higher-than-normal 24-hour blood pressure outcomes, a study result not observed in seated participants (Norha et al., 2025).

The author has observed that office workers with adjustable-height applications spend scant workday time standing, and organizations intent on promoting standing job performance lean heavily into price point as an adjustable-height application vetting variable. The author has not observed or participated in an organizational adjustable-height application rollout where the application introduced had an inclusive adjustment range for efficient seated and standing work recruitments. Thus, it came as no surprise when a university colleague shared that in a surplus equipment repository, the most discarded equipment aside from dilapidated office chairs were office adjustable-height applications.

In today's office work settings where the average worker's jobsite physical demands can be objectively classified as light (Astrand & Rodahl, 1986), health concerns such as rotator cuff tendinitis, thoracic outlet syndrome, epicondylitis, carpal tunnel syndrome and back ailments are routinely diagnosed and linked to computer work exposures. Such MSDs are more commonly associated with manufacturing workplaces, where physical demands can vary, duties are likely to have inherent MSD-inducing risks and job tolerance may wane as exposures accumulate. The emergence of these injuries in the office workplace, some with long-term health consequences, are not likely to be mitigated or prevented through spending 15% of the workday standing. If the goal is MSD prevention, the extended-leg HAT is an exceptional tool. If deployed appropriately, it should encourage the recruitment of MSD-preventing efficient work alignments in nearly all employees, whether seated or standing (Table 1).

Conclusion

In most work environments, including office settings, regular changes in position and alignment are recommended to yield physiologically favorable outcomes (Garcia et al., 2016) and the benefits of adopting a routine exercise regimen are well understood and documented (American College of Sports Medicine, 2021). The march of time makes our movements fewer in number, slower and less robust, erosions acknowledged to contribute to physical decline. That said, a belief that standing office work cancels out the negative health outcomes purported as consequences of extended seated work exposures by inducing an upright positional catharsis, metabolic challenge sufficient to aid in weight management or improved cardiovascular health is not empirically supported, and these benefits are not realistic deliverables from many office adjustable-height worktables and applications currently available. PSJ

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Cite this article

Dagostino, M. (2026, July). Standing office work: The rise and fall. *Professional Safety, 71*(7), 18-23.