

Designing for Human Performance: Reframing Active Design as a Productivity Strategy in Smart Office Buildings

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ABSTRACT

The built environment strongly influences employee movement, wellbeing and performance at work. Active Design in the workplace promotes physical activity and healthier behaviours each day through purposeful spatial and architectural interventions. Active design is gaining global recognition, however there is a paucity of empirical evidence documenting its productivity-related outcomes in the South African office-building context. We explore how active design projects enhance end-user performance and productivity, based on empirical data from an exploratory mixed-methods study. A qualitative-dominant comparative case study approach was employed, with two corporate office buildings chosen, one with active design interventions and the other representing a more conventional workplace environment. Data were collected through structured and semi-structured interviews with building occupants, employers and built environment professionals. The analysis concentrated on end-user perceptions of movement, wellbeing, fatigue, workplace satisfaction, productivity and organisational value. Results suggest that active design strategies, such as attractive staircases, walkable internal pathways, daylight, flexible workspaces and infrastructure supporting wellness, positively influence perceived productivity and performance. The greatest benefits were non-direct with participants linking active design environments with greater activity, improved mental wellbeing, reduced fatigue, improved morale and increased satisfaction at work. But the findings also suggest that organisational culture, employee engagement and management support play a role in productivity outcomes. The paper ends by suggesting that active design be conceptualized as a workplace productivity strategy that supports human performance indirectly via wellbeing- and behaviour-related pathways rather than an explicit, measurable productivity mechanism. Further studies with objective productivity indicators are recommended.

Keywords: Active design, Built environment innovation, Human performance, Smart office buildings, Workplace productivity

INTRODUCTION

Office buildings are more than just places to work; they are environments that impact daily behaviour, movement patterns, health, wellbeing and employee performance. Employees spend a large part of their working day inside, often sitting for long periods, which may contribute to sedentary behaviour and associated health risks (Marsh, Erickson and Bleckner, 2016). Therefore,

the built environment can reinforce inactivity or promote healthier routines through spatial layout, circulation routes, stair placement, access to daylight, flexible workspaces and supportive wellness infrastructure (Lopez, 2012; Romaniuk, 2015; Forooraghi et al., 2019). In this context, active design is a design-based response that employs architectural and spatial interventions to make movement and healthier choices more accessible, visible and attractive for building users (Engelen et al., 2016). This positions active design as a possible approach to workplace productivity in office environments where performance is acknowledged not only in terms of financial output, but also in terms of physical movement, mental wellbeing, engagement, concentration and perceived work quality. Globally, there is increasing interest in active design, but empirical evidence on its workplace productivity outcomes in the South African construction context is limited (Voordt, 2021; Al-Obaidi et al., 2022; Coppens et al., 2023). The concept is still fairly new in South Africa and the lack of knowledge amongst Quantity Surveyors and construction professionals of its benefits, cost implications and implementation has led to uncertainty amongst clients and consultants (Knox et al., 2013; Romaniuk, 2015; Khairuddin et al., 2021). This paper thus moves existing empirical case-study data on end-user performance and productivity to an active design office building and a more conventional office environment. This paper contributes to the context-specific evidence of the relationship between active design, workplace wellbeing and perceived productivity in South African office buildings. The following research question guides this paper: How does active design implementation affect building end users' performance and productivity? The paper contributes an Active Design–Human Performance interpretation by demonstrating how workplace design can impact productivity indirectly through movement, wellbeing, reduced fatigue, workplace satisfaction and perceived organisational support.

LITERATURE REVIEW

Active Design, Workplace Wellbeing and Movement

Active design is based on the principle that the built environment can affect everyday behaviour by making physical activity and healthier choices easier, more visible and convenient. Active design employs spatial, architectural and environmental strategies to promote movement as part of everyday routines, rather than relying only on individual motivation (Engelen et al., 2016). In office environments this can include attractive staircases, walkable internal routes, visible circulation spaces, access to daylight, outdoor areas, flexible workspaces, and facilities that support informal movement during the workday (Öhrn et al., 2021). So the design of the workplace can facilitate or hinder sedentary behaviour and provide subtle opportunities for movement, interaction and wellbeing. Active design principles relevant to office buildings include movement at work, attractive internal walking routes, daylight, stairs, exercise facilities, outdoor working areas, building programming and flexible work environments (Price and Fenton, 2015; Romaniuk, 2015). Such interventions are important because employees spend a large proportion of their day indoors, often sitting for long periods of time (Meghani et al., 2023; Mustafa and Ali, 2023). Design strategies that promote stair use, walking,

active breaks and informal interaction can help support a healthier workday routine without necessitating major lifestyle changes on the part of users (Newsham et al., 2022). In this sense, wellbeing should be understood as both physical and psychological, as healthier workplace environments may support comfort, social connection, mental alertness and a stronger sense of organisational care (Heidari et al., 2016; Marsh, Erickson and Bleckner, 2016; Ali and Mustafa, 2023; Kapri et al., 2023).

Active Design and Productivity

Productivity should be understood broadly as active design environments. It is not restricted to measurable output or financial performance, but also includes concentration, levels of energy, morale, satisfaction at the place of work, absenteeism, presenteeism, perceived quality of work and organisational performance (Engelen, 2020; Newsham et al., 2022). Poor health, inactivity and sedentary behaviour have been associated with absenteeism, presenteeism, increased health-related costs and reduced employee productivity, suggesting that employee wellbeing has both direct and indirect implications for organisational performance (Trent, 2015; Heidari et al., 2016). Several indirect pathways may be influenced by active design to enhance productivity. More movement throughout the workday can help to reduce sedentary behaviour and support physical wellbeing while access to daylight, outdoor spaces and flexible work areas may help to promote mental wellbeing, reduced fatigue and improved concentration (Newsham et al., 2022; Öhrn et al., 2021). Workplaces that promote social interaction and collaboration can also boost employee engagement and morale. But it shouldn't be assumed that productivity improvements are automatic. Organisational culture, employee involvement, management support and the appropriate use of the spaces provided will need to underlie active design features. A staircase, outdoor area or active workspace will only add to performance if users are encouraged and able to use these features as part of their day to day.

Research Gap

The existing literature acknowledges the relationship between the built environment, health and workplace productivity. However, limited South African evidence explains how end users experience productivity-related outcomes in active design office environments. Active design is still very new in the South African construction context and knowledge about its cost, socioeconomic and implementation implications amongst Quantity Surveyors and construction professionals is still limited. This paper addresses this gap by analysing case study data from two comparable office buildings to assess the extent to which active design supports perceived end-user performance and productivity. Figure 1 provides a visual explanation of the focus of the study by illustrating the relationship between active design features, behavioural responses, wellbeing outcomes and productivity related

outcomes. It emphasizes how active design can indirectly improve end-user performance through movement, wellbeing and workplace experience.



Figure 1: Active design human performance pathway (authors' own compilation).

METHODOLOGY

Research Design

The paper is based on empirical data collected in the study and adopts a qualitative-dominant comparative case-study approach. The case-study approach was appropriate because the research question is concerned with how active design is experienced in real office environments, in particular with respect to end-user performance and perceived productivity (Yin, 2018). The study was conducted in two comparable office buildings in Gauteng, Building A which implemented active design strategies and Building B, a typical office building with minimal to no active design features. This comparison provided an opportunity to investigate the differences in user experiences between an active design workplace and a traditional office environment.

Data Collection

In this paper, we use the empirical data collected from a total of 24 participants, including 19 case-study participants from Building A and Building B and 5 industry experts. Participants were employees, employer representatives, construction related professionals and Quantity Surveyors. Case-study participants were identified by purposive sampling and expert participants were included to offer broader industry perspectives on the challenges of implementation, professional awareness and adoption. Structured and semi-structured interviews were used to gather data. The interview guides were developed to compare active design with conventional office environments,

and asked questions about workplace experience, health and wellness, productivity, socio-economic value and implementation considerations. For this paper, only data related to end-user performance and productivity were analysed in detail.

Table 1: Summary of respondents and data sources.

Participant Group	Source	Participant Type	Data Collection Method	Purpose in This Paper
Building A respondents	Active design office building	Employees and employer representatives	Structured and semi-structured interviews	To assess end-user experience in an active design workplace
Building B respondents	Conventional office building	Employees and employer representatives	Structured and semi-structured interviews	To compare experiences in a workplace with limited active design application
Industry experts	Built environment sector	Quantity Surveyors and construction-related professionals	Semi-structured interviews	To support interpretation of productivity, implementation and adoption issues

Data Analysis Approach

Thematic analysis of the dataset was undertaken for the purpose of this paper. The analysis was restricted to data that were relevant to the research question: To what extent do active design projects improve the performance and productivity of the end users? Responses related mainly to cost, Quantity Surveying roles and general implementation barriers were only considered where they helped explain productivity-related outcomes. The analysis was organised around five themes: movement and activity during the workday; health, wellness and mental performance; workplace satisfaction and employer value; fatigue, active breaks and productivity; and business performance and employer perceptions. Thematic structure of this kind enabled the study to interpret productivity broadly, not only as measurable output, but also as a combination of physical movement, mental energy, engagement, workplace satisfaction and perceived work quality.

FINDINGS

The findings are presented under five themes related to productivity derived from the dataset. There is an emphasis on the effects of active design in improving end-user performance and productivity through movement, wellbeing, satisfaction, fatigue management, organisational culture and perceived business value. The findings compare Building A which incorporated active design principles with Building B, a more conventional office environment with minimal use of active design.

Table 2: Productivity-related outcomes identified from the case study data.

Productivity Dimension	Building A: Active Design Environment	Building B: Conventional Environment	Productivity Pathway
Movement during the workday	More opportunities for movement and active breaks	Fewer active design opportunities	Movement may reduce sedentary behaviour and support energy
Health and wellbeing	Stronger perception that the building supports wellness	Wellness less strongly embedded in the workplace environment	Wellbeing may support concentration and engagement
Workplace satisfaction	100% valued employer contribution to health and wellness	58% indicated this affected employment preference	Employer care may strengthen morale and motivation
Fatigue and workday energy	Fewer respondents reported feeling overworked or drained	More respondents reported feeling overworked or drained	Active breaks may support recovery and focus
Business performance perception	Employers linked health to productivity and work quality	Employers were more hesitant and conditional	Culture and participation influence productivity outcomes

Theme 1: Movement and Activity During the Workday

Respondents in Building A reported more opportunities for movement and active breaks than respondents in Building B. The active design environment encouraged more natural movement throughout the workplace via stairs, internal walking routes, informal circulation areas and opportunities for short active breaks. Building B, however, had fewer spatial prompts for movement, indicating that users were less likely to be prompted by the building itself to break sedentary work routines. This supports the claim of Engelen et al. (2020) that active design works by triggering healthier choices through everyday spatial cues and not only by individual motivation. It also supports Romaniuk's (2015), Ali and Mustafa's, (2023) and Kapri et al's., (2023) argument that buildings that are activity-friendly can help facilitate healthier habits at work. The productivity implication is that movement may aid energy, alertness and engagement during the workday. Active design seems therefore to support productivity indirectly through a decrease in sedentary behaviour rather than directly through increased output.

Theme 2: Health, Wellness and Mental Performance

Respondents in Building A connected the active design environment to improved health and wellness benefits. The building was thought to be more conducive to movement, relaxation, interaction and mental wellbeing. In this sense, wellness was experienced not as an organisational programme per se

but as something inscribed in the physical workplace environment. Building B respondents were less likely to indicate the workplace actively supported wellness. This is consistent with Lopez (2012), Newsham et al., (2022) and Öhrn et al., (2021) in stating that the built environment influences daily living and exposure to health risks. This also agrees with the findings of Marsh, Erickson and Bleckner (2016) that the interior environment affects health outcomes, especially in areas where employees spend a lot of time indoors. The productivity implication is that wellbeing at work may facilitate concentration, motivation and sustained engagement. Thus, active design can potentially enhance productivity not only through physical activity but also by improved mental performance and workplace experience.

Theme 3: Workplace Satisfaction and Employer Value

A strong comparative finding concerns employer care and job satisfaction. In Building A, 100% of respondents favoured a company that contributes to their health and wellness, compared to 58% of respondents in Building B. This means that employees in the active design environment valued features in the workplace that supported their wellbeing highly. This finding supports literature that indicates healthier workplace environments can enhance morale, workplace satisfaction and even organisational performance (Trent, 2015; Heidari et al., 2016; Engelen, 2020; Newsham et al., 2022). Employees may feel more valued, supported and connected to the organisation when they feel their employer has invested in their wellbeing. The productivity implication is that active design can support performance by improving motivation, morale and organisational loyalty. In this way, productivity is affected not only by the physical space itself, but also by how employees view the organisation's commitment to their wellbeing.

Theme 4: Fatigue, Active Breaks and Productivity

The results suggest that active design can help employees to cope with fatigue during the workday. The value of short active breaks was recognised by respondents, who used these breaks to reset mentally, reduce tiredness and return to work with better focus. Less respondents felt overworked or drained in building A. Respondents in building B more commonly associated their work day with fatigue and feeling drained. This is in line with literature that links inactivity, poor health and fatigue in the workplace to lower productivity, absenteeism and presenteeism (Trent, 2015; Heidari et al., 2016; Öhrn et al., 2021; Newsham et al., 2022). It also bolsters the larger argument that productivity should be measured in energy, focus and cognitive ability, rather than output alone. The productivity implication is that active design may enhance perceived performance by supporting recovery and mental reset during the workday. Small moments of movement, informal interaction, or active breaks, therefore, may contribute to sustained concentration and quality of work.

Theme 5: Business Performance and Employer Perceptions

The employers' responses are further evidence of the link between active design and perceived productivity. Employers in Building A were generally positive about active design, suggesting that healthier employees are more productive, energised, motivated and able to produce better quality work. The responses of employers in Building B were more circumspect. The productivity benefits were frequently viewed as contingent on the appropriate use of the available spaces by employees, and whether active design features were supported by management practices. This finding is consistent with the literature's caution that benefits of active design should not be assumed (Lopez, 2012; Romaniuk, 2015; Forooraghi et al., 2019). Active design features must be translated into meaningful performance outcomes through organizational culture, employee participation and management support. The implication for productivity is that design provides the possibility of improved performance but organisational behaviour decides whether that possibility is realised. A well-designed workplace can be conducive to productivity but only if employees are encouraged and enabled to use the space as intended.

RESULTS AND DISCUSSION

The findings suggest that active design increases end-user performance and productivity to a moderate but significant level, mostly indirectly. Active design seems to create workplace conditions that support movement, wellbeing, morale, reduced fatigue, satisfaction and engagement, rather than providing productivity gains through a single measurable mechanism. So, productivity should be understood broadly, not only in terms of financial output but also as a human performance outcome influenced by concentration, energy, collaboration, motivation and the perception of work quality. A comparison of Building A and Building B supports this interpretation. Building A, which had active design principles embedded within it, was more strongly associated with opportunities for movement, active breaks, wellbeing support and positive views of employer care. Conversely, respondents were less inclined to link Building B with design-based prompts for movement and more inclined to connect the workday with fatigue or feeling drained. This suggests that active design can boost productivity by improving the daily environment in which employees work rather than by directly increasing output. But the results also show that the effectiveness of active design depends on more than just the physical building. The use of active design features as intended depends on organisational culture, management support and user participation. Responses from Building A showed a stronger belief that healthier employees are more motivated, productive and able to produce better quality work, whereas responses related to Building B were more cautious and conditional. This means that active design should be viewed as part of a broader workplace performance strategy, rather than as a design solution in its own right. In practice, the findings mean that active design should be part of the early briefing and feasibility stages, not an optional

aesthetic or wellness add-on. For Quantity Surveyors and project teams this means assessing active design not just against capital cost but lifecycle value, employee wellbeing and potential productivity related benefits. The results should also be interpreted in the light of the limitations of the data available. The study contributes useful perception-based evidence, but lacks objective productivity indicators such as absenteeism records, presenteeism scores, work output rates, retention data or financial performance measures. The study, consequently, does not show a direct causal connection between active design and measurable increases in productivity. Instead, it shows how active design can positively impact perceived productivity, specifically, through increased movement, improved wellbeing, reduced fatigue, increased workplace satisfaction and increased perception of employer value.

CONCLUSION AND RECOMMENDATIONS

This paper explored the effect of active design projects on end-user performance and productivity through the use of existing case-study data from two South African office buildings. The results suggest that active design can improve perceived productivity, but mainly through indirect wellbeing- and behaviour-related pathways rather than through a direct measurable productivity mechanism. Active design features seem to promote more movement, less sedentary behaviour, higher morale, less fatigue, better mental wellbeing and greater satisfaction with the workplace. These factors create conditions that may enhance concentration, engagement and perceived work quality. This paper contributes to the active design and workplace productivity literature by demonstrating, through South African office case-study data, that active design can improve perceived end-user productivity through increased movement, enhanced wellbeing, reduced fatigue, increased workplace satisfaction and increased organisational value perception. Workplace wellbeing, employer value perception and improved workday energy were more strongly associated with active design environment when comparing Building A to Building B. But the research also shows that design alone is not enough. The productivity benefits depend on organizational culture, employee participation, management support, and the extent to which active design features are actively used and maintained. Therefore, active design should be considered a workplace performance strategy rather than simply a health-promoting design feature. It is recommended that active design principles are integrated into the initial planning and design stages of office projects. The value of the lifecycle should also be taken into account, not only the initial construction cost. Design should involve end-user engagement to ensure active design features respond to employee needs and work patterns. Active design should also be supported by wellness policies, encouragement from management, and a workplace culture that normalises movement during the workday. Active design is ultimately a strategic workplace investment that affects not only building use, but how people move, feel, engage and perform in them. Future research should include objective productivity indicators such as absenteeism records, presenteeism measures, movement tracking, retention data and post-occupancy evaluations to improve the evidence base for active design in South African office buildings.

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REFERENCES

- Ali, J.S. and Mustafa, F., 2023. Active workplace – Association between workplace layout and physical activity among employees: A cross-sectional study. *Al-Qadisiyah Journal for Engineering Sciences*, 16, pp. 14–20. <https://doi.org/10.30772/qjes.v16i1.842>
- Al-Obaidi, T., Prior, J. and McIntyre, E., 2022. Conceptual approaches of health and wellbeing at the apartment building scale: A review of Australian studies. *Sustainability*, 14(23), 15536. <https://doi.org/10.3390/su142315536>
- Coppens, E., Hogg, B., Greiner, B.A., Paterson, C., De Winter, L., Mathieu, S., Cresswell-Smith, J., Aust, B., Leduc, C., Van Audenhove, C., Pashoja, A.C., Kim, D., Reich, H., Fanaj, N., Dushaj, A., Thomson, K., O'Connor, C., Moreno-Alcázar, A., Amann, B.L. and Arensman, E., 2023. Promoting employee wellbeing and preventing non-clinical mental health problems in the workplace: a preparatory consultation survey. *Journal of Occupational Medicine and Toxicology*, 18. <https://doi.org/10.1186/s12995-023-00378-2>
- Engelen, L., 2020. Does active design influence activity, sitting, wellbeing and productivity in the workplace? A systematic review. *International Journal of Environmental Research and Public Health*, 17(24), 9228. <https://doi.org/10.3390/ijerph17249228>
- Engelen, L., Dhillon, H.M., Chau, J.Y., Hespe, D. and Bauman, A.E., 2016. Do active design buildings change health behaviour and workplace perceptions? *Occupational Medicine*, 66. <https://doi.org/10.1093/occmed/kqv213>
- Forooraghi, M., Wallbaum, H. and Ryd, N., 2019. Health & wellbeing in offices: A study of literature on the Nordic perspective. In: *IOP Conference Series: Earth and Environmental Science*. <https://doi.org/10.1088/1755-1315/297/1/012013>
- Kapri, V., Gulati, R. and Omar, A., 2023. Healthy workplaces: Offices that support employee health and well-being. *International Journal for Research in Applied Science and Engineering Technology*, 11. <https://doi.org/10.22214/ijraset.2023.51242>
- Khairuddin, R., Ibrahim, I.L., Jain, A., Amin, I. and Maharimi, F., 2021. Active design: Promoting physical activity through building layout. In: *IOP Conference Series: Earth and Environmental Science*. <https://doi.org/10.1088/1755-1315/842/1/012068>
- Knox, E.C., Esliger, D.W., Biddle, S.J.H. and Sherar, L.B., 2013. Lack of knowledge of physical activity guidelines: Can physical activity promotion campaigns do better? *BMJ Open*, 3(12), e003633.
- Lopez, R., 2012. *The Built Environment and Public Health*. 1st ed. USA: John Wiley & Sons, pp. 20–59.
- Marsh, M., Erickson, I. and Bleckner, J., 2016. Transforming building industry and health outcomes through social data-supported design. In: *Bloomberg Data for Good Exchange Conference*. New York City, NY, USA: Bloomberg Data for Good Exchange Conference, p.1. Available at: <https://arxiv.org/abs/1609.08778> [Accessed 13 April 2026].

- Meghani, N.A.A., Hudson, J., Stratton, G. and Mullins, J., 2023. Older adults' perspectives on physical activity and sedentary behaviour within their home using socio-ecological model. *PLoS ONE*, 18. <https://doi.org/10.1371/journal.pone.0294715>
- Mustafa, F.A. and Ali, J.S., 2023. Active design: Architectural interventions for improving occupational health through reducing sedentary behavior – A systematic review. *American Journal of Health Promotion*. <https://doi.org/10.1177/08901171221111108>
- Newsham, G.R., Veitch, J.A., Zhang, M.Q. and Galasiu, A.D., 2022. Comparing better building design and operation to other corporate strategies for improving organizational productivity: a review and synthesis. *Intelligent Buildings International*, 14. <https://doi.org/10.1080/17508975.2019.1588700>
- Öhrn, M., Wahlström, V., Harder, M.S., Nordin, M., Pettersson-Strömbäck, A., Bodin Danielsson, C., Olsson, D., Andersson, M. and Slunga Järvholm, L., 2021. Productivity, satisfaction, work environment and health after relocation to an activity-based flex office—the Active Office Design Study. *International Journal of Environmental Research and Public Health*, 18, 7640. <https://doi.org/10.3390/ijerph18147640>
- Owen, C.G., Limb, E.S., Nightingale, C.M., Rudnicka, A.R., Ram, B., Shankar, A., Cummins, S., Lewis, D., Clary, C., Cooper, A.R., Page, A.S., Procter, D., Ellaway, A., Giles-Corti, B., Whincup, P.H. and Cook, D.G., 2020. Active design of built environments for increasing levels of physical activity in adults: the ENABLE London natural experiment study. *Public Health Research*, 8, pp. 1–162. <https://doi.org/10.3310/phr08120>
- Price, J. and Fenton, K., 2015. *Active Design: Planning for Health and Wellbeing through Sport and Physical Activity*. London: [n.p.].
- Romaniuk, O., 2015. Two architects on how to design for wellbeing. *Interior Design*. Available at: <https://www.interiordesign.net/articles/11298-two-architects-on-how-to-design-for-wellbeing/> [Accessed 6 May 2026].
- Van der Voordt, T., 2021. Designing for health and wellbeing: various concepts, similar goals. *Gestão & Tecnologia de Projetos*, 16. <https://doi.org/10.11606/gtp.v16i4.178190>
- Yin, R.K., 2018. *Case Study Research and Applications: Design and Methods*. 6th ed. Sage Publications.