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ORIGINAL ARTICLE

The Emergence of CBD-Running Cultures

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Summary

Urban running is an evolving urban sporting lifestyle trend among professionals and knowledge workers in mostly developed cities. As a result of changing attitudes towards body health, rising individualism and the popularisation of inner-city living, the incorporation of habitual running into local workplace environment has recently been observed in high-concentration employment zones located mostly in the Central Business Districts (CBDs), giving rise to the emergence of CBD-running cultures and offering a promising global active lifestyle promotion strategy. This cross-disciplinary article proposes a framework outlining the key factors for incorporating running into workplace environment, predominantly in Economic Clusters (EC) with high-volume employment. It also introduces the central districts of Singapore, Tokyo and Melbourne as potential CBD-running hubs located in the Asia-Pacific region by examining the key structural, environmental and socio-cultural circumstances. Eventually, this article argues that cities should consider incorporating this emerging health-enhancing active lifestyle aspect into their city branding strategies and inner-city liveability concepts.

1. Introduction

Recreational running has over the past decades emerged as one of the most popular moderate-to-strenuous physical activities. Given its well-documented health-enhancing effects[1,2,3,4] and its compatibility with commercial, wearable activity trackers[5,6,7], this form of exercise has become emblematic of the increasingly health-conscious and performance- and feedback-driven urban societies in the predominantly developed world. Furthermore, running is one of the most independent and least capital-intensive active lifestyle activities, offering a convenient lifelong physical activity option for city residents from various socio-economic backgrounds.

Recently, augmented urban running activity has been observed in numerous key commercial and administrative inner-city districts[8,9,10]. Over the past three decades the establishment of knowledge-based industries in key inner-city districts and the rising influence of the finance and business sector in the Central Business Districts (CBDs) have led to agglomerations of the new economy, commerce and banking clusters, attracting large numbers of educated workers to the central districts of large

metropolitan areas[11,12,13]. At the same time, these increasingly health-conscious CBD-based professionals and knowledge workers have gradually incorporated recreational running into their workplace environment, regularly turning suitable public space around Economic Clusters (EC) with high-volume employment – predominantly in city centres and CBDs – into vibrant running zones during lunch-breaks and/or after-work evening hours. Urban features such as large parks, gardens, river and waterfront trails and pavements that are located in close proximity to inner-city workplaces are the most common choices for these joggers.

Given this societal trend of adopting this CBD-running practice for health and fitness reasons, it is plausible that in the near future urban running in central districts could become the key sporting lifestyle activity among young professionals and white-collar workers around the developed world. In the sociological and philosophical context such an emergence – that is, the surge of a novel, coherent and synergistic pattern[14,15,16] – habitually surfaces as a collective behaviour of many individuals, epitomised by the imitation of desirable trends and ideas[17]. Such mutual interest in recreational running has recently been discussed with regard to the establishment of shared identities, implying the manifestation of group subcultures among recreational runners[18]. In other words, the ascent and maturation of CBD-running could emerge as a product of a cumulative process of cultural evolution and cultural transmission, permanently transforming suitable inner-cities districts into vibrant CBD-running hubs as a result of the continuous exchange of active lifestyle- and health-related ideas among CBD-based knowledge workers.

The occurrence and expansion of such CBD-running hubs, however, largely depend on the confluence of various factors that would enable CBD-based workers to incorporate recreational running into their worksite environments. Thus a framework will be proposed in this article, outlining eight key factors for the emergence of CBD-running. Besides, the objective of this article is to present and compare the evolving CBD-running cultures in three exemplary major cities located in the Asia-Pacific region – Singapore, Tokyo and Melbourne.

After-work CBD-running culture in the central district of Singapore.

2. Framework for CBD-Running

Built Environments

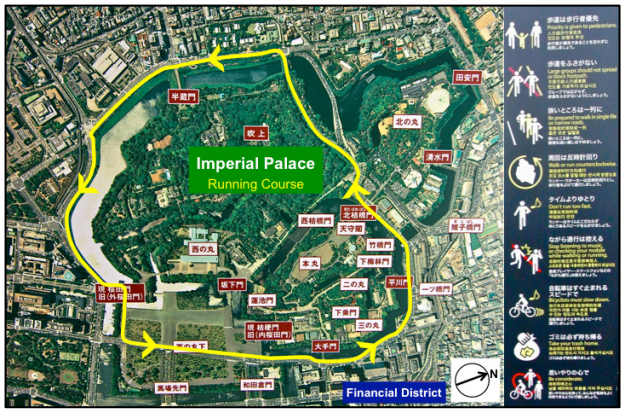
In general, creating built environments that facilitate and promote health-enhancing physical activities – such as running – has been proven to be critical to boosting physical activity participation levels within urban communities[19,20,21,22,23,24]. Hence, workers and residents based in central districts are therefore more likely to engage in running activities, if suitable urban planning features are present in close proximity to their inner-city workplace or residence – trails and pavements in large parks and gardens, or along rivers, creeks and bay front areas are critical features for CBD-running. That is, the probability of the establishment of CBD-running zones largely depends on the presence of adequate built environments within central districts. Inner-city areas lacking sufficient and visually-stimulating public outdoor areas are therefore less likely to be able to provide their physically-active, health-conscious workers and residents with an urban settings that could initiate a local CBD-running culture. In short, the suitability of the built environment is a critical pre-condition for the ascent of CBD-running.

In Singapore's CBD, for instance, the construction of the iconic *Marina Bay Sands* complex and the creation of the futuristic-looking *Gardens by the Bay* have certainly played a crucial role in popularising Singapore's after-work CBD-running among knowledge and finance workers. On weekdays between 6.30 and 7.30pm large crowds of devoted CBD-joggers – who mostly work in the adjacent financial district – populate this panoramic bay area by turning its waterfront into busy running zones.
Yet this waterfront-running hyperactivity among local workers has emerged rather unexpectedly. The *Marina Bay* area is, by and large, designed as a pedestrian-friendly, circular promenade for both tourists and shoppers, lacking any designated running trails. This apparent absence of running infrastructure, however, has not deterred a critical mass of avid joggers from transforming this large CBD-waterfront space into an after-work running hub – a typical example of a collaborative, resident-led approach. In short, recreational running on conventional pavements has become an acceptable active lifestyle option among sporty knowledge and finance workers.

The most favourite CBD-running course starts along the *Marina Boulevard*, bypasses the luxurious shopping complex at the *Marina Bay Sands* and the *ArtScience Museum*, and continues all the way to *Marina Barrage* (joggers typically run back to the *Marina Boulevard* from here). With its panoramic skyline this 5km loop has become the route of choice for workers commencing their run in the financial district. The other popular running route follows along the northern shore of the bay and crosses it via the *Helix bridge* (see illustrative map of the popular running routes around *Marina Bay*).

Key CBD-running routes around the Marina Bay in Singapore (URA Centre's city model, modified).

Across Tokyo's numerous central districts the most suitable site for a potential CBD-running hub appears to be the *Imperial Palace* (the residence of Japan's Imperial family and the geographical centre of this capital city) in the Chiyoda ward, which is located within walking distance to some of the key high-concentration employment areas, such as the main financial centre and numerous national political institutions.
Although the *Palace* itself is not a sporting or recreational area, the fairly wide pavement that encircles the large, historic walled site offers a running loop of 5km. This running route is particularly popular with the local business and political elite as well as the white-collar workers who typically utilise this historic location for their after-work running activities. Similar to Singapore's *Marina Bay* the pavement encircling Tokyo's *Imperial Palace* is not specifically built as a running trail. Rather, the joggers themselves have turned this convenient area into the most noteworthy running site within the inner-city districts of Tokyo, establishing an impressively vibrant after-work CBD-running zone.



Circular CBD-running route around Tokyo's *Imperial Palace.*

In the southern parts of Melbourne's city centre the designated jogging trails around the large *Domain Parklands* as well as along the *Yarra River* offer excellent running routes for CBD-based knowledge workers as well as inner-city residents who live in close proximity to these top-notch recreational sites. The *Domain Parklands* comprises of the *Royal Botanic Gardens*, *Kings Domain*, *Alexandra Gardens* and the *Queen Victoria Gardens* and it is the largest green space within Melbourne's inner-city districts. With its length of 3.8 km the circular *Tan Track* is the most popular running route at this cultural and recreational site. As the lighting of the track remains switched off only between midnight and 5.30am, CBD-joggers can utilize this key outdoor sporting space until late at night. Moreover, the adjacent inner-city *Yarra River* contains paved trails that are interconnected with various creek trails via the 29-km *Capital City Trail*, linking the south-eastern, eastern, northern as well as the north-western suburbs with the CBD (see the illustrative map of the most popular CBD-running routes in the central district of Melbourne).

High-Volume Employment Zones

The rising influence of the finance and business sector and the formation of knowledge-based industries have over the past four decades altered the urban landscape and the socio-demographics of inner-

The *Yarra River* trails connect the CBD with Melbourne's sprawling metropolitan areas via an expansive trail network.

CBD-Running routes in Melbourne. Joggers can access the *Yarra River* trails and the circular *Tan Track* at the *Domain Parklands* through various easily accessible entry points.

city districts across the globe. Particularly, large-sized metropolitan areas in the developed world have created concentrated agglomerations of the new economy, commerce and banking clusters, thereby attracting large numbers of educated workers[11,12,13,25,26]. Recently, the growing popularity of recreational running among these increasingly health-conscious white-collar workers have led to an emergence of local CBD-running cultures around such high-volume employment locations for finance, business and knowledge production.

With the projected expansion of these high-concentration employment zones[27], more white-collar jobs will continue to be clustered in inner-city areas, resulting in greater demand for urban running. Thus cities with high-volume employment settings in their central districts are more likely to experience an emergence of CBD-running in the years to come. In short, the growth of the finance and business sector and the new economy industries in the central districts will play a critical role in popularising the incorporation of CBD-running into the workplace environment among white-collar workers.

In Singapore, *Marina Bay* is the most vivid inner-city location in which a high-concentration employment zone has been established. It is a reclaimed bay area in the southern-central region that over the past two decades has been transformed into a commercial zone for finance and knowledge workers, shoppers as well as tourists[28,29,30]. As described above, this *Marina Bay* area is also the most popular site for CBD-running among the local workforce. As a result of the ever-growing global clout of the finance industry and knowledge economy, more jobs will in future be clustered around the *Marina Bay*, potentially boosting demand for after-work CBD-running at this scenic location.

Tokyo's decentralisation of its ECs across its numerous inner-city districts has resulted in a number of high-volume employment areas, e.g., Shibuya, Shinjuku, Marunouchi and Shiodome. Of all the existing city parks and trails in Tokyo's central districts the 5-km running route around the *Imperial Palace* provides workers based in Marunouchi, the financial district in the Chiyoda ward, with the best CBD-running experience, while the other ECs largely fail to offer suitable urban space for recreational running[31].

In Melbourne about 350,000 people now work in the *City of Melbourne*[32] – i.e., this key inner-city

The accessibility to green space has been a critical aspect of Melbourne's thriving CBD-running culture.

local government area offers job opportunities for nearly 20% of all employed Greater Melbourne residents (overall, 31 local government areas define the metropolitan region of Greater Melbourne). Given that much of this inner-city workforce is located in the southern parts of the CBD, that is, in proximity to the large *Domain Parklands* and the trails along the *Yarra River*, it can be expected that the popularity of CBD-running will continue to rise.

Urban Transformation

Apart from the formation of high-volume employment zones in central districts, the ongoing popularisation of high-density, inner-city living observed in various developed and emerging cities also increases the likelihood of the emergence of CBD-running cultures. Over the past two decades a high-rise residential apartments construction boom has taken place within central districts of numerous large-sized cities[33,34,35,36], transforming large parts of city centres into denser and more vertical urban landscapes. As a result, these recent urban developments have attracted large numbers of new CBD-residents – predominantly young and middle-aged knowledge workers.

In Singapore, for instance, more high-rise luxury apartment blocks for the high-net-worth individuals (HNWIs) are being built around the *Marina Bay*, mostly near the *Bayfront Avenue*, potentially increasing the number of CBD-running enthusiasts even further. There has also been a noticeable expansion of high-rise residential housing areas in the central districts of Melbourne since the mid-1990s[35,37], transforming large parts of the city centre into a high-density, high-rise urban setting while simultaneously gentrifying the inner-city communities. Similar to other inner-cities districts across the globe[33,34,36], these urban developments in central Melbourne have attracted large numbers of new city residents – predominantly young knowledge workers, overseas migrants and foreign students from Asia. As demonstrated in the **Chart 1**, the demographic makeup of the residents living in these thriving residential CBD-districts is much

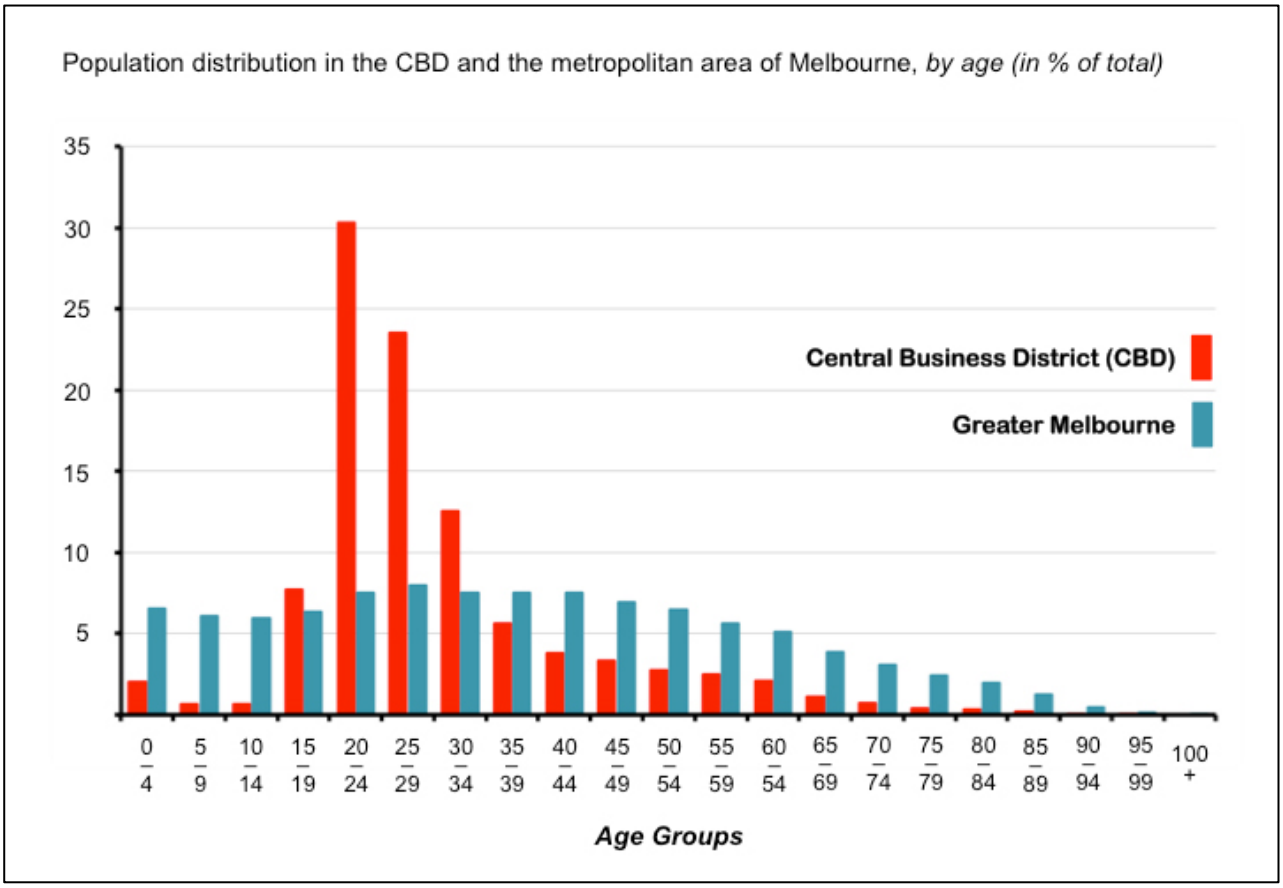


Chart 1. Demography of Melbourne. Young adults account for the large majority of the CBD-based residents compared to Melbourne's metropolitan area[32].

younger compared to the age distribution observed in the entire municipality of Melbourne. And this youthifaction of its inner-city districts, in particular, has largely contributed to the CBD-running boom noticed on the running trail around the *Domain Parklands* during the morning and early evening hours.

Sanitation

As moderate-to-vigorous running quickly increases the perspiration levels, managing personal post-running hygiene after a run will become a critical aspect of any prospective CBD-running culture. Ideally, inner-city-based workplaces could offer on-site access to shower facilities. Alternatively, CBD-joggers could join a nearby health and fitness club, thereby enabling them to utilise external sanitation services after an outdoor run. In most EC areas employees lacking access to shower facilities at their workplace typically have abundant commercial gym facilities to choose from. Although this refreshment option comes with extra costs, workers could enhance their overall physical health by combining multifunctional workout sessions in the gym with endurance-enhancing outdoor running.
That said, it is fair to say that there is no clear evidence as to what extent the access to private or public sanitation facilities could result in the emergence of local CBD-running cultures. And the existing studies on the impact of worksite shower facilities provision on physical activity participation among employees has been largely limited to the subject of bicycle commuting[38,39]. Nevertheless, it is reasonable to assume that an effective implementation of habitual running into workplace environment – mostly during lunch-breaks or after regular working hours – generally requires adequate on-site sanitation amenities.

Socio-Cultural Adoption

Much of the emerging CBD-running generally takes place through imitation by inner-city-based workers and residents. This emulation of social behaviour and cultural trends is associated with the imitation processes in human brain function – an innate neuroplastic capacity of the mirror neuron system[40,41]. In short, human beings tend to replicate observed behaviours of others, frequently resulting in socio-cultural transmission. As city living aspects are the products of human behaviour, local residents are inclined to imitate appealing urban trends – this universal emulation process is termed socio-cultural adoption. The ascendancy of urban running in Singapore is a good example of such emulation of a societal trend. Within just five years the number of city running events, for instance, has surged by 100%, totalling 122 in 2016 and offering up to 6 events on a single weekend[42].

It is reasonable to argue, however, that due to the diversity of strong cultural norms prevailing in various regions across the globe[43], the adoption of CBD-running will in future occur more rapidly in cities with comparable socio-economic and cultural fabric. That is, cities with greater urban sporting lifestyle tradition and societal knowledge of the relationship between health benefits and physical activity are more likely to experience such socio-cultural emulation of CBD-running and its incorporation into local workplace environments.
Furthermore, the pervasiveness of the CBD-running lifestyle largely depends on the local working culture. As CBD-joggers typically opt to go for a run during lunch-breaks or after-work evening hours, the inflexibility of local employers regarding lunch break duration as well as the present long working hours in various metropolitan areas could hamper the emergence of local CBD-running cultures.

Biometeorology

It has been demonstrated that comfortable (not too cold) weather conditions result in greater physical activity levels[44,45,46]. In general, it can be argued that seasonality plays an important role in increasing CBD-running participation levels and that cities with relatively short and mild winters and with no extremely high heat levels over long periods of time are more likely to establish CBD-running cultures.
In this regard, Melbourne demonstrates a relatively pleasant climate throughout much of the year. Overall, its air temperatures are mostly suitable for outdoor sporting activities, enabling physically-active Melbournians who live and/or work in the CBD to embed running into their city lifestyle and/or workplace environment. The city is located in the oceanic climate zone, which is characterised by warm summers and cool winters – based on the *Köppen climate classification* system[47]. Although

between December and February the maximum day air temperatures can occasionally exceed 40°C (while the humidity levels typically drop to nearly 10% on such hot days), Melbourne's summer period is, for the most part, fairly accommodating – with air temperatures mostly fluctuating between 20 and 35°C[48]. As trees are planted along the circular *Tan Track*, the natural shade provides joggers with the essential protection from the extremely high Ultra Violet (UV)-levels, i.e., UV-Index of 12 or beyond, monitored on sunny days during the peak summer period[49]. The winter temperatures in Melbourne, on the other hand, are relatively mild and fairly consistent, with maximum air temperatures usually ranging from 10 to 15°C **(see Chart 2)**. Hence, the best meteorological conditions for jogging on a hot and dry summer day prevail in the early morning and late evening hours, while the early afternoon is the most suitable time of the day for CBD-running on a typical winter day.

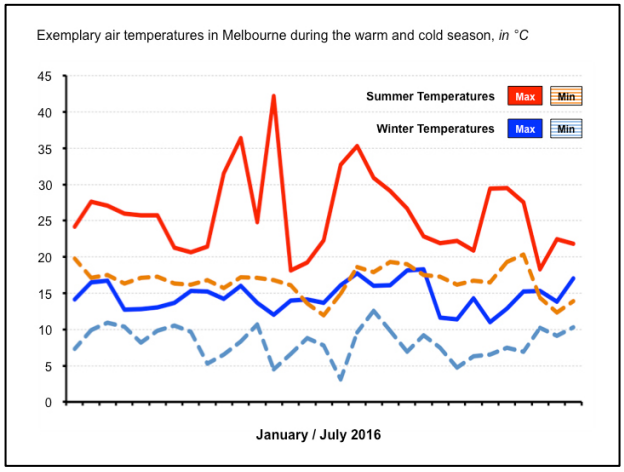


Chart 2. Day-by-day temperatures in Melbourne during an exemplary peak summer and winter period[49].

Being located in the tropical rainforest climate zone, Singapore demonstrates high temperatures and high humidity levels all-year-round. Despite being better acclimatized to hot and humid circumstances compared to the non-tropical natives[50], residents of Singapore nevertheless have to adjust their daily active lifestyle arrangements in the light of the rather inhospitable heat and humidity levels prevailing during daytime hours. After all, strenuous running under such meteorological conditions can increase the risk of hyperthermia-caused medical emergencies due to the impaired response of the cardio-respiratory system[51].

On a day without rainfall midday air temperatures in Singapore usually reach 32°C and the humidity levels remain fairly high at around 55%[52]. In choosing the slightly more pleasant after-work evening hours, however, local CBD-joggers largely avoid being exposed to high ambient temperatures and humidity levels. And although the air temperatures usually do not drop below 28°C and the humidity reaches values of slightly above 70% on a typical late evening with no reported rainfall[52], CBD-joggers in Singapore do not seem to be deterred by these somewhat challenging meteorological conditions all-year-round (for more information on climate and exercising in this tropical Asian city, see the Sportify Cities special report on Singapore[53]).

Air Quality

Persistently high levels of man-made air pollution are associated with having adverse cardio-respiratory effects on individuals[54,55,56]. Thus good urban air quality is one of the key criteria for the popularisation of local CBD-running cultures. The fine particulate matter of less than 2.5 micrometres, PM2.5, particularly, is believed to be hazardous to joggers, as it has the ability to deeply penetrate into the lung airways, potentially leading to detrimental effects of the cardio-respiratory system[57,58].

In Tokyo the circular running route around the *Imperial Palace* is located next to the main road, exposing CBD-joggers to dangerous exhaust fumes.

PM2.5 concentrations vary widely across the globe, depending on local environmental regulations and topographical surroundings. In the latter case, sprawling low-density cities located in Canada,

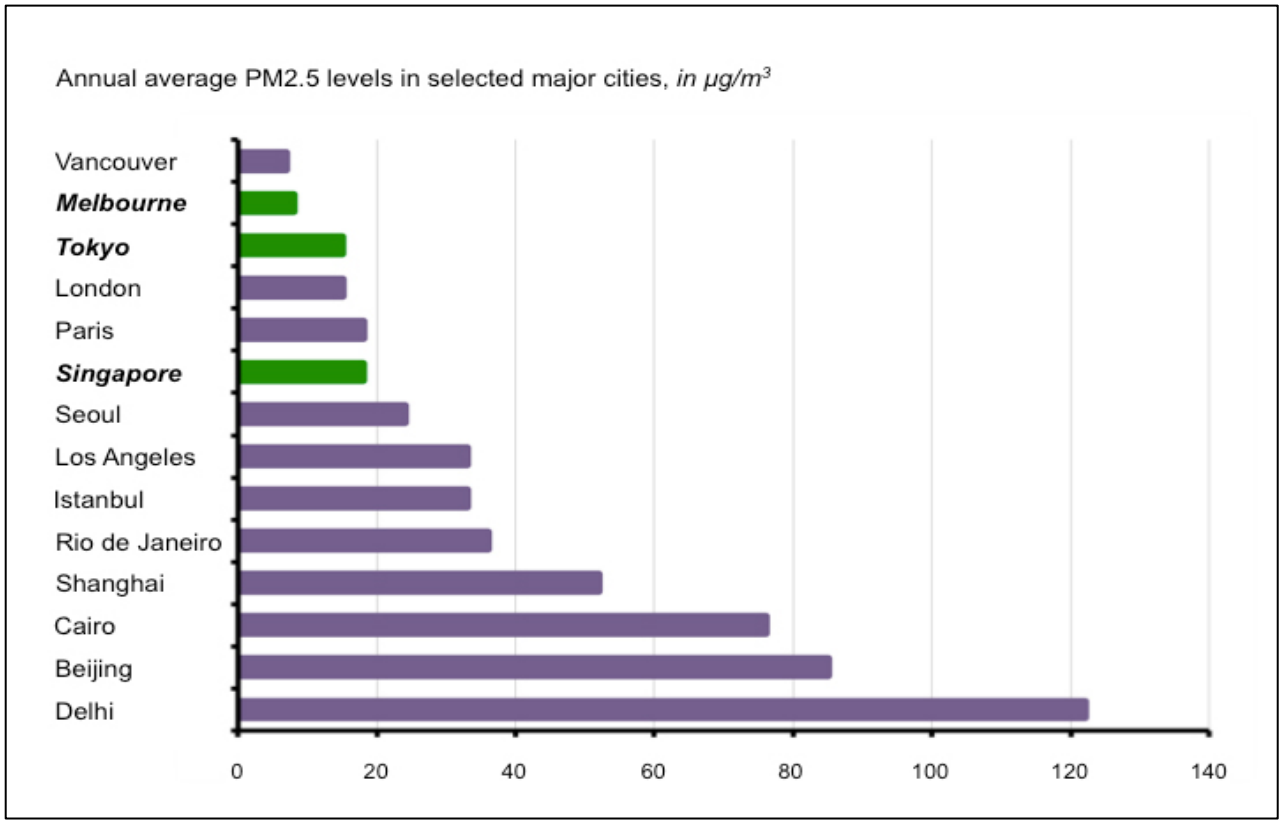


Chart 3. Urban Air Quality. Annual average PM2.5 levels in selected large-sized cities[59,61,63]

Australia, New Zealand and in most parts of the United States of America are generally better positioned to sustain their PM2.5 concentrations at lower levels due to air pollutants' dispersion effects; as a result, Vancouver, Canada, is with 7 µg/m^3 the least polluted large city in the world, while the average PM2.5 values in the other large, low-density cities rarely exceed 10 µg/m^3. In large-sized, high-density European cities the PM2.5 concentration levels typically fluctuate between 15 and 20 µg/m^3, offering fairly acceptable air quality levels for CBD-running. In the prosperous Asian cities, such as Tokyo, Hong Kong, Singapore and Seoul, the annual PM2.5 levels range between 15 and 30 µg/m^3, highlighting the cities' mixed success of managing their domestic air pollution. Cities across China currently offer rather inhospitable environmental conditions for the emergence of local CBD-running cultures, with Shanghai and Beijing reaching 52 and 85 µg/m^3, respectively. With an average PM2.5 level of 122 µg/m^3 Delhi, India, tops the ranking of the most polluted major city in the world[59] **(see Chart 3)**.

Due to Melbourne's favourable geographic location, the reoccurring northern and southern winds usually disperse much of its man-made fine-particle pollution. With an annual average of 8 µg/m^3 Melbourne demonstrates one of the lowest PM2.5 values in the urban world, indicating that the city's air quality is suitable for outdoor sporting activities such as running. Compared to other major cities Tokyo's annual PM2.5-value of 15 µg/m^3 is fairly low, too. Yet local CBD-runners on the popular 5km-loop around the *Imperial Palace* are exposed to harmful exhaust fumes during the early evening peak-hours due to the heavily motorized traffic on the main roads encircling the *Palace*.

With 18 µg/m^3 Singapore demonstrates the lowest annual PM2.5 value of all large cities in Asia, bar the Japanese metropolitan areas[59,60]. And only few busy main roads are located in proximity to the popular CBD-running route around the *Marina Bay*. That said, Singaporeans are occasionally exposed to hazardous smoke haze originating from deliberately set fires that rage across the Indonesian archipelago, significantly increasing the levels of some of the key pollutants and affecting its outdoor sporting lifestyle. The long lasting and unusually severe haze season in 2015, for instance, restricted running activities for as long as nearly three months[61,62].

Taken together, if the environmental conditions are perceived to be unsuitable or hazardous to the individual's health, recreational running will barely emerge as a viable health-enhancing aspect of urban living. Hence, prospective CBD-running cities will have to address the scale of urban air pollution in their future urban active lifestyle strategies. Apart from adopting stricter urban anti-pollution regulations, the exposure levels of CBD-joggers to hazardous exhaust fumes could be reduced by redirecting busy traffic routes away from the key CBD-running routes. In future, however, the inclusion of less polluting transportation technologies will eventually be the more forward-looking and effective urban health policy.

Personal Safety

CBD-running cultures, in particular, can only thrive if workers and residents can pursue running in public space without being concerned about their personal safety. One valid measure of this aspect is the homicide rate per capita. In this regard, numerous (South)-East Asian cities provide their residents with the highest levels of personal safety. Among large-sized cities, for instance, Singapore and Tokyo typically lead the international city rankings in the crime and safety criteria[64,65], enabling local CBD-running enthusiasts to safely utilise the public space. Most European, Canadian and Australian cities, too, demonstrate relatively high levels of personal safety, whereas cities in the USA typically reveal the highest homicide rates among developed countries **(see Chart 4)**. With substantially higher homicide rates per capita cities across Latin America and Africa remain at the bottom of the crime and safety ranking, deterring potential CBD-runners from utilising public space around their workplace.

3. City Liveability and City Branding

Incorporating running into workplace environment in urban districts with high-volume employment is a promising approach to increasing physical activity participation levels. Hence, this article proposes

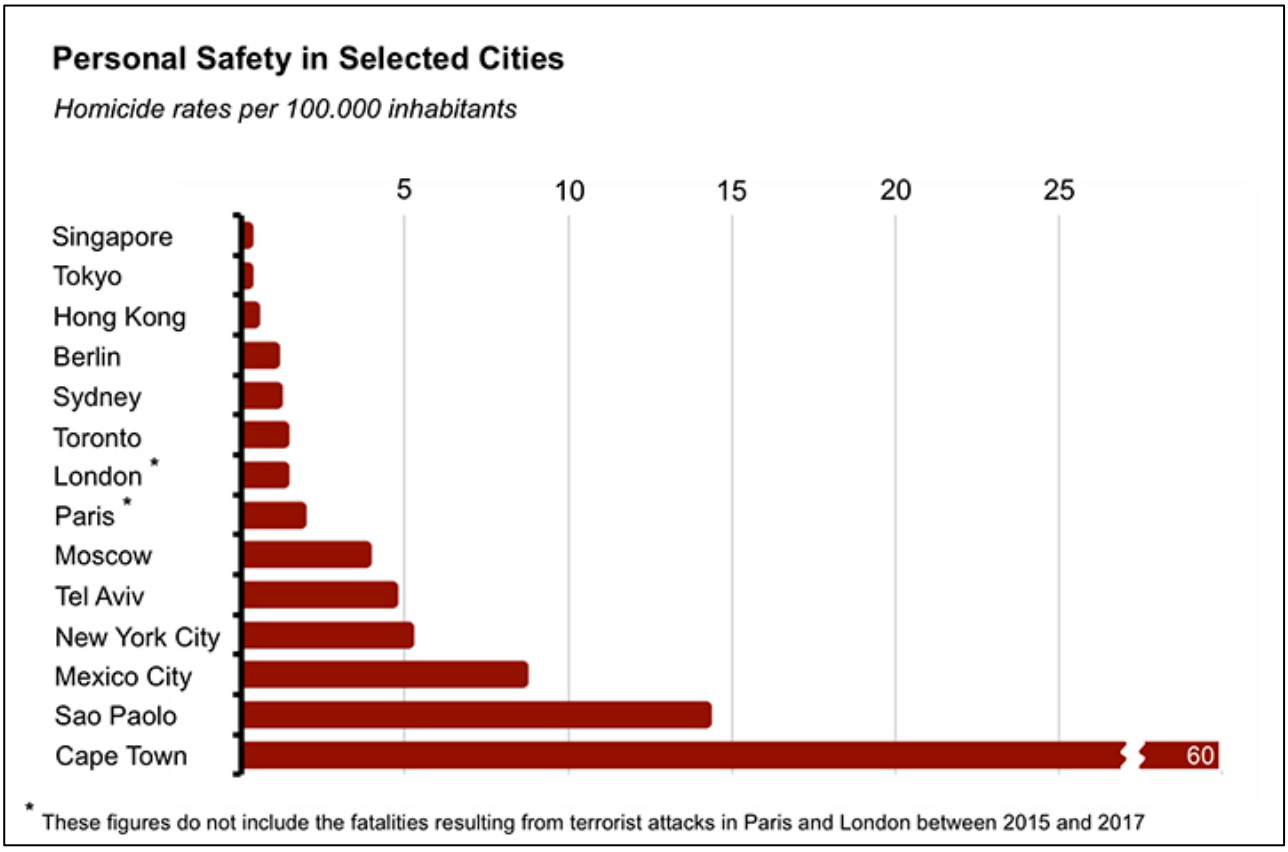


Chart 4. Homicide rates per 100.000 inhabitants in selected large-sized cities[65]

a framework outlining the key criteria for providing the present and future generations of CBD-based workers and residents with this viable urban sporting lifestyle option.

In future, the dissemination of eye-catching images and aspiring narratives of sporty inner-city workers and residents pursuing running around scenic CBD-locations could potentially result in the formation of vibrant CBD-running cities. To benefit from this societal trend emerging in their central districts local governments should consider the inclusion of local CBD-running cultures into their future city branding. In addition, organising larger numbers of recreational running events within inner-city areas could be a useful CBD-running promotion tool for recreational running in high-density urban environments. After all, community running events have been associated with augmented physical activity participation levels[66,67].

For local governments the most lucrative prospect of marketing their emerging CBD-running zones could come in the form of business relocation and human capital, thereby attracting large numbers of global-minded urbanites of desired qualification[26,68]. Given that this health-enhancing trend of CBD-running would result in greater quality of life of inner-city-based workers and residents alike, this profitability objective could eventually boost the cities' position in the global city competitiveness for greatest urban liveability. Hence, incorporating this novel aspect into, for instance, the concept of inner-city liveability[64,69,70] would also be a crucial step towards extending the soft power effect of CBD-running beyond the physical activity, exercise and sports communities.

Tokyo, for instance, could seize on an upcoming one-off marketing opportunity that would make its evolving CBD-running culture globally recognisable. As the hosting city of the 2020 Summer Olympics Tokyo could potentially establish an inner-city brand by promoting its emerging CBD-running zone at the *Imperial Palace*. After all, images and reports of sporty residents engaging in after-work running around Tokyo's most significant and most scenic location could be a powerful symbol of sporting lifestyle and greater inner-city liveability. Hence, the local government should at least reflect on the notion of incorporating CBD-running strategies into their future Tokyo 2020 city branding.

A potential CBD-running hub? Singapore offers their CBD-runners an extensive network of waterfront running trails, green space and scenic views.

4. Conclusion

This original article introduces CBD-running as a novel aspect of urban sporting lifestyle by proposing a framework and by briefly outlining this emerging socio-cultural trend of incorporating urban running into the workplace environment in the inner-city districts of Singapore, Tokyo and Melbourne. Due to the ever-growing status of CBDs as the key high-volume employment locations for finance, business and knowledge industries[27], more white-collar jobs are expected to be clustered in inner-city areas, resulting in higher demand for worksite sporting lifestyle options, such as CBD-running.

While densely populated inner-city districts around the world often lack sufficient public outdoor areas for their physically-active city residents, the central districts of Singapore, Tokyo and Melbourne offer large open public spaces that are embedded in their high-density inner-city landscapes. Thus these three large-sized cities located in the Asia-Pacific region could potentially position themselves as credible examples of CBD-running cities and aspire other cities to emulate this trend. Eventually, the emergence and maturation of other CBD-running cultures could also help the physical activity, sports and exercise organisations to exert more influence over future urban health policies and raise the international profile of urban sporting lifestyle.

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