European Journal of Internal Medicine 40 (2017) 8–15

Contents lists available at ScienceDirect

European Journal of Internal Medicine

journal homepage: www.elsevier.com/locate/ejim

Narrative Review

Physical activity and cardiovascular prevention: Is healthy urban living a possible reality or utopia?

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ARTICLE INFO

Article history:
Received 8 February 2017
Accepted 13 February 2017
Available online 16 February 2017

Keywords:
Lifestyle
Physical activity
Cardiovascular prevention
Obesity
Diabetes, healthy urban life, city planning, public transport

ABSTRACT

Favoring correct lifestyles is the most important measure to contrast cardiovascular diseases and the epidemic of high cardiovascular risk conditions, such as obesity, diabetes, and hypertension. Lifestyle is a broad expression that includes diet, physical exercise, and psychological and socio-economic factors, each of which must be taken into due consideration because of their intertwining influences, which may be a barrier to healthy changes at both the individual and population levels. While physical activity has probably received less attention in the last decades, it is likely the most important among the modifiable risk factors for cardiovascular diseases. Improving the habitual physical activity level is an achievable goal, and even small improvements may have important favorable effects on health. Strategies at the population level have to be urgently taken, and involve not only public health, but also administrators and politicians, starting from a rethinking of our cities.

1. Introduction

Preventing cardiovascular disease (CVD) is an important challenge, given that it is responsible for about 32% and 47% of all deaths in the United States [1] and in Europe [2], respectively. Changing lifestyle is the primary strategy indicated by the WHO and all health authorities for preventing CVD at both the individual and general population levels [3–5]. Physical inactivity, like smoking and unhealthy dietary habits [6], is one of the main targets for effective population-based primary prevention strategies to decrease the high prevalence of CVD [7]. However, only in recent years have global data on physical activity levels and trends become available [8]. Likely underestimated data indicate that the prevalence of physical inactivity is 31% in the world, about 35% in Europe, increasing with age and in high-income countries. Physical inactivity is rapidly increasing in parallel with urbanization and advances in technological innovations. However, our genes were selected when the environment required high levels of physical activity, so that our biological mechanisms probably do not function optimally in our current technological and motorized environment [9]. We need more information on the mechanisms through which physical inactivity favors the spread of non-communicable diseases, but it is also necessary to understand how we can change the current unhealthy way we live, beginning with a rethinking of our cities.

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2. Definition of lifestyle

Defining lifestyle is complex, but can be grossly summarized as "*The way in which a person lives*" (Oxford dictionary; www.oxforddictionaries.com accessed on September 10, 2016). Though this is largely a sociological definition, it has potential health implications. In fact, lifestyle includes psychological, historical, cultural, socio-economic, and environmental factors that influence habits, attitudes, tastes, moral standards, and economic levels, which together characterize the mode of living of an individual or a group. The environment is of particular importance in this context: the metropolitan (and, in the same town, the different neighborhoods) [10] or the rural environment [11] have a substantial impact on the lifestyle of the individual and the general population. When the set of all these conditions influences health, meant as psycho-physical well-being, it is referred to as a "healthy lifestyle." Considering the risk factors for coronary heart disease (CHD), in addition to the non-modifiable risk factors (age, gender, race, family history of CHD), the list of modifiable risk factors includes a number of conditions that are strictly connected with lifestyle, such as type 2 diabetes, obesity, hypertension (and also hypercholesterolemia and dyslipidemia, smoking, low level of physical activity, unhealthy diet, alcohol abuse, stress, low socio-economic status, social isolation, anxiety and, depression).

Lifestyle now has a well-recognized role in the pathogenesis of cardiovascular diseases, and looking in-depth at the different components that define lifestyle, some may have an unfavorable cascade effect that impact other risk factors. For instance, social isolation may promote alcohol consumption or eating behavior disorders, which in turn favor the

http://dx.doi.org/10.1016/j.ejim.2017.02.007
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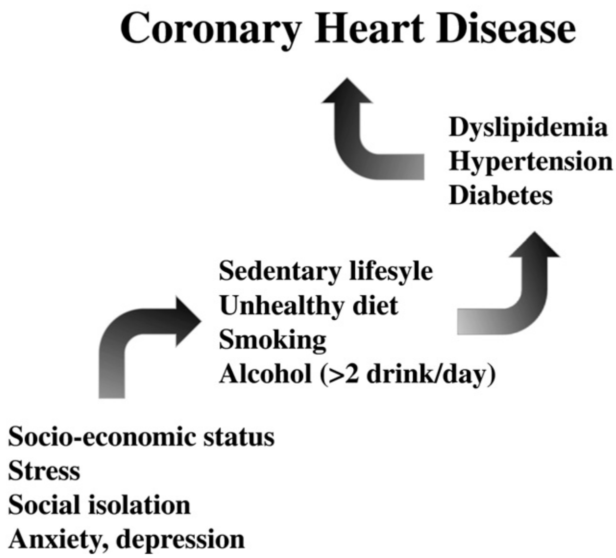

Fig. 1. Interrelationship among cardiovascular risk factors.

appearance of diabetes, dyslipidemia, and hypertension, which can have a significant impact in terms of cardiovascular diseases (Fig. 1). Few studies have demonstrated that interventions at the population level aimed at ameliorating lifestyle are cost-effective [12,13], and recent European guidelines on prevention of cardiovascular disease recommend measures that promote healthy lifestyles at the population level as a class IIa indication, with a level of evidence B [5]. So, it is generally accepted that promotion of a healthy lifestyle at the individual level is mandatory for the prevention of cardiovascular diseases. Diet and physical activity are generally considered the two main components of a healthy lifestyle, and significant results in terms of health are achieved, even in the absence of demanding, structured physical exercise (Tables 1 and 2). However, psycho-social risk factors must be taken into due account since they are a substantial obstacle to lifestyle changes [14–16]. Again, it is of great importance that physicians spend all the necessary time with the patient, listen carefully, and establish a useful dialogue to identify all possible barriers to lifestyle change; the support of questionnaires can be useful to this end. This has been well underscored by current guidelines, which indicate the clinical interviews for identifying psycho-social risk factors and barriers to lifestyle change as a class IIa action, with a level of evidence B [5].

3. The current Western lifestyle

Given the importance of lifestyle, a central question is how far from healthy is lifestyle in Western countries. The ABCD study (Alimentazione Benessere Cardiovascolare e Diabete: a nutritional cardiovascular wellness and diabetes study is a single center cross-sectional and longitudinal observational project [17] that focused on this subject, examining a general population cohort in Palermo, Italy, a city in the Mediterranean Basin http://www.isrctn.com/ISRCTN15840340). This experience was of interest since it gave us a measure of what still remains of the Mediterranean lifestyle, which has long been considered among the healthiest of lifestyles [18]. As reported in Figs. 2 and 3, a very high prevalence of diabetes/pre-diabetes and overweight-obesity were observed [19]. Including people with already known type 2 diabetes, previously unknown type 2 diabetes and pre-diabetes, about one of three adults was affected with these conditions. Similarly, about 70% of the cohort was overweight or obese, a prevalence that is similar to that reported in the U.S. [20]. An analysis of dietary patterns revealed that about 20% of the cohort habitually consumed an unhealthy, fast-food-like diet, and about 60% had a sedentary lifestyle. Only 35% of the cohort consumed a Mediterranean style diet, with a sedentary lifestyle in about 40% of this class of people (the remaining 45% followed an intermediate style diet, and the prevalence of a sedentary lifestyle was 50%) (Fig. 4). Those with an unhealthy lifestyle were roughly 10 years younger than the Mediterranean lifestyle subgroup, and unhealthy lifestyle was associated with insulin resistance [17]. Being less physically active was associated with metabolic syndrome [21], and eating fish at least 2 times a week was protective against carotid atherosclerosis [22]. When compared with the Mediterranean diet subgroup, the unhealthy diet group was also more often composed of single people with no children, and who habitually drank less wine and more hard alcohol. Looking at the teenager cohort ($n = 478$ participants), we collected even less comforting data [19] (Fig. 2). About 16% of the teenagers were overweight, and 5% obese; however, it emerged that 17% were underweight and, interestingly, about 5% refused to be weighed, so these data may hide the presence, to some extent, of no less comforting eating disorders. Among the teenagers, only 20% consumed a Mediterranean style diet, and only 12% played sports with regularity. The prevalence of smokers was 30% (8 cigarettes/day on average), 65% habitually drank alcohol (48% hard alcohol), with no differences in gender. Very alarming data were found in the cohort of children ($n = 245$), aged 9–10 years (Fig. 2). >50% were overweight (20.1%) or obese (33.9%), a result that is not far from that of another survey [23] that indicated a cumulative prevalence of overweight and obesity ≥ 37% in the south of Italy, but once again the data on prevalence that we recorded are very similar to those reported in the U.S. population, even in this class of age [24]. Despite evidence of the favorable effects of physical activity on the physical and mental health of children [25], actual data suggest that the level of habitual physical activity is inadequate even in this age class [26], and that it tends to decline from childhood to adolescence [27]. In our ABCD cohort of children, the prevalence of blood pressure values in the range of hypertension was 29.5% (mild hypertension = 18.5%; moderate = 11.0%) on the basis of systolic values, and 6.4% on the basis of diastolic values, a prevalence that matches that of hypertension in adults [28]. Indeed, both systolic and diastolic blood pressure values ($r = 0.45$; $P < 0.001$) ($r = 0.26$; $P < 0.01$) were significantly correlated with BMI. Interestingly, both systolic blood pressure ($r = -0.22$; $P < 0.01$) and basal heart rate ($r = -0.27$; $P < 0.01$) were inversely correlated with the number of bicycles in

Table 1
Classification of physical activity.

Intensity	Absolute intensity		Relative intensity	
	MET	Examples	%HRmax	Talk test
Light	1.1–2.9	Walking < 4.7 km/h, light household work	50–63	
Moderate	3–5.9	Walking briskly (4.8–6.5 km/h). Slow cycling (15 km/h), painting/decorating, vacuuming, gardening (doubles), ballroom dancing, water aerobics	64–76	Breathing is faster but compatible with speaking full sentences
Vigorous	≥6	Race-walking, jogging or running, bicycling > 15 km/h, heavy gardening (continual digging or hoeing), swimming laps, tennis (singles)	77–93	Breathing is very hard, incompatible with carrying on a conversation comfortably

Adapted from reference [4].
MET: metabolic equivalent (estimated as the energy cost of a given activity divided by resting energy expenditure: 1 MET = 3.5 mL O_2/kg/min).
%HRmax: percentage of measured or estimated maximum heart rate (220-age).

households, which is likely a marker of the propensity for physical activity in families. This result is in agreement with a study that found that while a tendency towards spontaneous physical activity may be partly influenced by genotype, children can acquire from their parents behaviors that affect physical activity [29]. In this respect, based on the ABCD study data, one can also consider that due to their age, parents of these children are probably better described by the subgroup of those with an unhealthy diet presented above (44 years old on average vs. 53 years old of the Mediterranean diet). Current data suggest that any strategy aimed at promoting favorable long-term change in children's physical activity, including school activities, is unlikely to be successful without the involvement of family members [30]. Therefore, the actual picture is particularly alarming, and it can be easily hypothesized that if this trend is not promptly corrected through adequate measures aimed at restoring correct lifestyles in the population, the first objective being children and adolescents, we will face in the coming years unsustainable conditions for any health system.

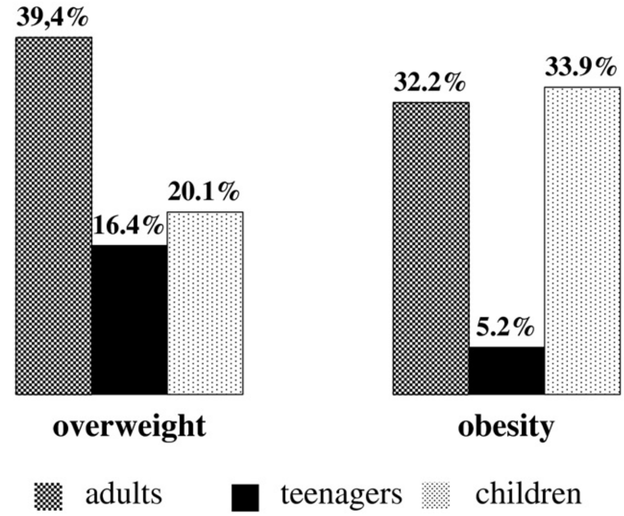

Fig. 2. Prevalence of overweight and obesity in the cohort of the ABCD study. (Adapted from reference [19]).

4. How much physical activity is needed to produce biological changes and healthy benefits?

According to a recent meta-analysis by Barry et al., fitness is probably even more important than body size in influencing health [31]. They reported that the hazard ratio (HR) for all-cause mortality was 2.42 for unfit normal weight individuals; similarly, the HR was 2.46 for unfit obese people, and, surprisingly, the HR was not significant (1.21; 95% CI = 0.95–1.52) in the case of physically active and trained obese people ("fat-fit" people). Even a level of physical activity below current recommendations reduced mortality by 22% in older adults [32]. Despite the importance of engaging in regular physical activity, sedentary physical habits are very widespread, and people often claim "lack of time" as the main barrier to taking up physical exercise [33]. Therefore, developing time-efficient exercise strategies is needed. Yet, from a different point of view, it does not take much to increase the habitual level of physical activity. A systematic review by Bravata et al. [34] reported that the use of a simple pedometer is followed by a spontaneous increase in the physical activity level. In particular, the use of a pedometer was associated with a reduction of the BMI value of 0.38 kg/m^2 ($P = 0.03$), systolic blood pressure reduced by 3.8 mm Hg ($P < 0.001$), and diastolic blood pressure by 0.3 mm Hg ($P = 0.001$). This is a considerable finding given that reducing systolic blood pressure by 2 mm Hg was associated with a 10% reduction in stroke mortality, and a 7% reduction in mortality from vascular causes in middle-aged populations [35]. The pedometer is commonly used in everyday life, even with apps for smartphones, and it is possible to experience that monitoring one's daily physical activity induces a spontaneous increase of physical activity. Studies that compared amounts and intensity of exercise in different combinations in previously inactive men concluded that the results are similar in terms of reducing body weight [36], ameliorating insulin sensitivity, cardiorespiratory fitness, and skeletal muscle mitochondrial content [37]. In particular, brief (10 min) sessions of relatively intense exercise induced the same effects as more prolonged (30 min) sessions of moderate-intensity continuous training. Therefore, suggesting short duration, high intensity training sessions might be a good strategy for those who claim to not have enough time for physical exercise. A recent survey from England and Scotland [38] defined as "weekend warriors" those people that for overcoming the lack of time usually perform the weekly amount of recommended physical activity (Table 2) in 1–2 days instead of 3 or more sessions per week. Interestingly, the weekend warriors have a significant lower risk for all-cause cardiovascular disease and cancer mortality than the inactive people, regardless of adherence to actual physical activity guidelines.

No appreciable results were found in children and adolescents with the strategy of using active video games in terms of long-term efficacy for promotion of physical activity [39,40]; again, family involvement in this age class is likely the cornerstone for adopting correct lifestyles. Unfortunately, for diet style and, in this case for physical activity, younger generations of parents appear to be less able to convey the fundamentals of proper healthy lifestyles. On the other hand, even small amounts of physical exercise promote many well-known favorable metabolic and cardiovascular changes [41,42]. Also, very recent studies have provided additional mechanisms that contribute to explaining the importance of physical exercise. Barrès et al. [43] observed that just 1 h

Table 2
Recommendations for physical activity in adults (adapted from references [4, 5]).

Intensity	ESC	AHA
Moderate	30–60 min/day (5 days/week)	30 min/day (5 days/week)
Moderate to vigorous	25 min/day (5 days/week)[a]	40 min per 3–4 days/week for reducing PAO and/or cholesterol
Vigorous	15–30 min/day (5 days/week)[a]	25 min/day (3 days/week)
Add the following muscle-strengthening activity for additional benefits		
Moderate to vigorous[b] (exercise each group of muscles, 2 groups of muscle/day)	3 sets of 8–12 repetitions (2 days/week)[a]	1 set of 8–12 repetitions (2 days/week)

AHA: American Heart Association; ESC: European Society of Cardiology.
[a] Sedentary people with cardiovascular risk factors, before engaging in vigorous physical activity or sports need clinical evaluation and exercise testing.
[b] Intensity: 60–80% of individual 1 repetition maximum (the maximum load that can be lifted one time).

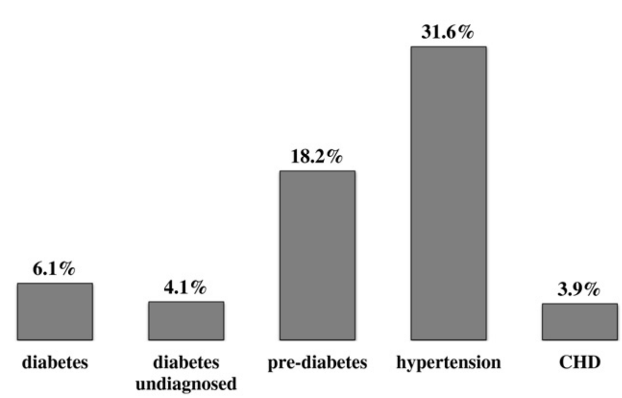

Fig. 3. Prevalence of diabetes and pre-diabetes, hypertension, and coronary heart disease in the cohort of adults of the ABCD study.
(Adapted from reference [19]).

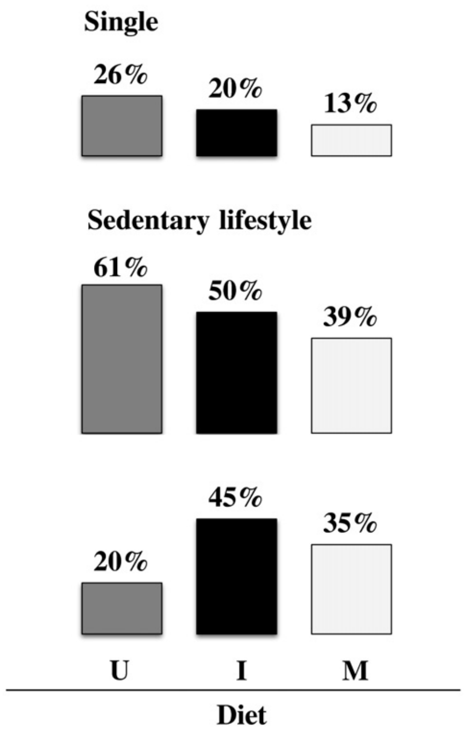

Fig. 4. Prevalence of single people and sedentary life in the three dietary-pattern-based subgroups (U = unhealthy; I = intermediate; M = Mediterranean) of the cohort of the ABCD study.
(Adapted from reference [19]).

after acute exercise a number of metabolic genes were expressed at the skeletal muscle level, independent of whether it was low- or high-intensity acute exercise. Confirming previous data [44], among these genes, the mitochondrial protein peroxisome proliferator-activated receptor gamma coactivator 1α (PGC-1α) mRNA significantly increased following exercise. Traditionally, PGC-1α is known as a transcriptional coactivator that regulates the genes involved in energy metabolism, including mitochondrial biogenesis, and interacts with the nuclear receptor PPAR-γ, which permits the interaction of this protein with multiple transcription factors. More recently, it has been discovered that PGC-1α induces the synthesis at the muscle level of fibronectin type III domain-containing 5 (FNDC5), from which the peptide irisin is cleaved [45]. Irisin is a myokine that is produced following physical exercise, and is able to induce the trans-differentiation of white adipocyte into brown adipocyte, namely the "browning" of white adipose tissue, with a consequent increase in energy expenditure. It is now well established that brown adipose tissue contributes to the maintenance of an appropriate body weight [46] in adult humans, who under different stimuli are able to transdifferentiate white adipocytes into brown adipocytes and vice versa [47]. It seems, therefore, that irisin is the mediator of the benefits of physical activity in terms of energy expenditure through induction of adipocyte browning. We investigated blood irisin concentrations in the cohort of the ABCD study [48] and found a significant correlation with habitual physical activity levels, thus confirming in a general population cohort that irisin is a marker of physical activity. Speculating on the research of Barrès et al., it is striking to imagine that just 1 h after physical exercise a cascade of events takes place, leading to PGC-1α gene expression that induces irisin production and possibly a sustained increase in energy expenditure through the browning of white adipocytes. New mechanisms are currently under investigation on the possibility that physical exercise works as an epigenetic regulator that counteracts unfavorable cardiovascular changes induced by inadequate lifestyle, and diseases [49]. However, this promising field of study has only recently started, and the first results are almost exclusively in animal studies.

5. Lifestyle change at the population level starting from a rethinking of cities

As in the case of an epidemic, governments rather than doctors are called on in the difficult task of cleaning up the environment and influencing a cultural shift towards healthier lifestyles in terms of food preferences and physical activity [50]. Roughly 64% of people with diabetes live in urban areas [51], and it is estimated that in 2050 the urban population will be about 70% of the global population [52]. Current data suggest that our cities likely need to be rethought. The current

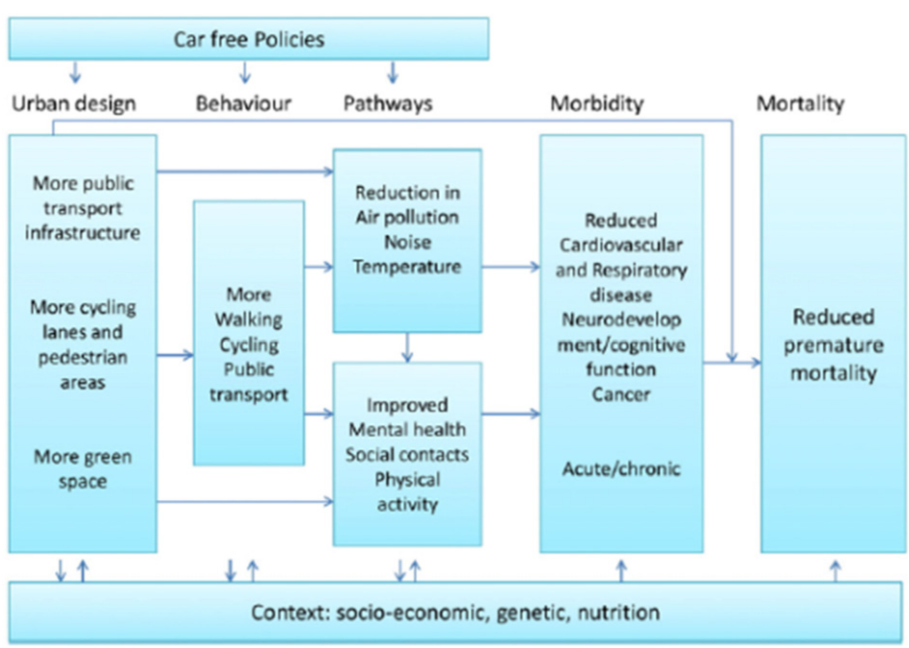

Fig. 5. Links between urban and transport planning, environmental exposures, physical activity, and health.
(Reproduced with permission from reference number [59]; license number 3971220185466).

historical centers of our oldest cities were designed to be lived on foot, and they likely need to be lived on foot now. Even in Palermo, the city where the ABCD study took place, with a high prevalence of obesity and diabetes, experience tells us that when motor traffic is closed, and adequate public transportation with bus or tram is available, people respond positively and start to walk [53]. Given that even slight increases in regular physical activity produce favorable healthy changes, improving cities with better public transport system, parks, cycle paths, etc. will have significant effects at the population level. This point of view finds support in the results of the International Physical Activity and Environment Network (IPEN) study [54]. This study was a cross-sectional investigation conducted in 12 cities in 10 middle-income and high-income countries (Australia, Belgium, Brazil, Colombia, Czech Republic, Denmark, China, Mexico, New Zealand, Spain, UK, U.S.A.), and the physical activity of almost 7000 (18–66 years old) residents was evaluated in relation to the urban environment. Three aspects were independently associated with physical activity: residential density, public transport density, and park density. The authors of the IPEN study calculated that the design of the urban environment was on average responsible for about 90 min a week of physical activity, corresponding to 60% of the 150 min a week that is recommended by current guidelines, concluding that "urban design should be a globally relevant public health priority." This is probably the most important way to increase physical activity in the population on a permanent basis, and contribute to meeting the U.N.'s goals of reducing non-communicable diseases [55,56].

The PESA (Progression of Early Subclinical Atherosclerosis) study likely describes a typical citizen of our modern and frenetic cities of business. It cross-sectionally investigated the dietary habits and lifestyle of >4000 Spanish bank employees [57], considering possible associations with subclinical atherosclerosis. The study confirmed the protective effects of the Mediterranean diet compared with the Western dietary pattern, but identified a new cluster, called the "social-business" cluster, whose workers were at the highest risk for atherosclerosis. The social-business cluster represented about 20% of the cohort, had a male prevalence, and was slightly older than other groups (Mediterranean and Western). It was also characterized by a higher consumption of red meat, processed meats, pre-made foods, appetizers, snacks (including pickled olives and salted nuts), alcoholic and sugar-sweetened beverages, and a low consumption of vegetables and fruits. Concerning other lifestyle-related variables, the social business cluster had higher percentages of high school graduates, higher levels of income, was more likely to include people with director or executive positions, and had higher levels of obesity. Social-business employees were most often smokers, reported short sleep, frequent business trips, high frequency of eating out (restaurants, cafeterias, convenience food), but surprisingly also dedicated more time to moderate or moderate-to-vigorous physical activity. The latter result suggests that promoting urban design suitable for living a less car-dependent lifestyle is probably not the entire solution. The results of the PESA study seem to indicate that we need to consider the overall lifestyle, and that analyzing single components of lifestyle may even be misleading. Therefore, each component of lifestyle needs to be determined since it may have a different influence on each individual, and also change over time. We likely also need adequately validated tools, such as questionnaires, to score individual lifestyle, and make it possible to describe it over time.

6. Healthy urban living: possible reality or utopia?

As already suggested [58], the issue of city planning and population health is not new, and in 19th century urban planning of industrialized cities curbed the spread of infectious diseases, improving in-house sanitation and building adequate sewage systems. Currently, reorganizing cities starting with car-free policies, far from being utopic, is a process that is going to start in many places in the world, with the aim of counteracting the spread of non-communicable disease pandemics. Though still not adequately demonstrated, reducing private-road motorized traffic is thought to produce public health benefits not only due to increased physical activity, but also to many other things, including reduction of motor vehicle crashes and traffic-related environmental exposures such as air pollution and noise [59]. The framework is complex (Fig. 5), and involves many aspects with deep sociological implications. Not of secondary importance, in fact, investing in healthier urban spaces by increasing green areas might produce less income-related disparities in health and mortality [60]. However, the risk also exists that introducing car-free zones, if not adequately planned, may induce a redistribution of car traffic towards low-income neighborhoods thus exacerbating socioeconomic-related health differences [61]. Recently, 8 integrated interventions have been identified to influence transport mode choices (Table 3), but many obstacles and barriers exist and challenge these urban planning programs [58]. It is likely that the main obstacle is the need for significant economic investments that

Table 3
Urban and transport planning and design interventions and features required to create compact cities that enhance health and wellbeing. (Reproduced with permission from reference n.58; license number 4024260700193.

	Urban and transport planning and design features	Examples
Regional planning		
Destination accessibility	Regional employment, facilities and services conveniently accessible by public transport; destinations for daily living available locally	Jobs, facilities and services within 30 min of home by public transport; daily living destinations within walking distance
Distribution of employment	An appropriate mix of employment policies to increase the attractiveness of using alternative travel modes to driving	A job-house balance from 0.8 to1.2 km
Demand management	Parking supply and pricing policies increase the attractiveness of using alternative travel modes to driving	Building codes and other government policies that minimize car parking
Local urban design		
Design	Urban design creates walkable catchments around activity center and incorporates accessible public open spaces; street networks minimize distances between homes and daily living destinations, reduced traffic exposure and create safe pedestrian, cycling and public transport networks; lot[a] layouts designed to increase residential densities and promote natural surveillance	High street connectivity including ped-sheds ≥ 0.6 within 0.8–1.2 km (i.e., 1–15 min walk) of activity centers, transport hubs and schools; separated pedestrian and cycles paths; local public open space provided; housing overlooks streets and public open spaces
Density	Residential densities sufficient to support the viability of local business and high-frequency public transport services	Multiunit housing built around activity centers with shops, services and transport hubs
Distance to public transport	High-frequency public transport located within short walking distances from homes	Bus stop accessible ≤ 400 m; rail stops accessible ≤ 800 m from homes
Diversity	Residential areas built with different types of housing mixed with commercial, public, and recreational opportunities	Different types of housing available near, around and on top of shops and services required for daily living
Desirability	Neighborhoods designed to be safe, attractive, and accessible; public transport that is convenient, affordable, frequent, safe, and comfortable	Crime prevention design principles incorporated into residential and commercial developments; urban greening strategies implemented; traffic minimized, calmed and separated from pedestrians and cyclist, particularly near schools

[a] Also known as plots in some countries, including those in the UK.

Table 4
Changes in physical activity and particulate emissions associated with the compact cities model application.
(Reproduced with permission from reference number [67]; license number 4024260271240).

	Melbourne	Sao Paulo	Delhi	London	Boston	Copenhagen
Change in travel-related METs per week (95% CI)	72.1% (38.9 to 119.5)	24.1% (−4.3 to 65.2)	18.5% (−6.7 to 54.4)	39.1% (10.4 to 78.6)	55.7% (26.8 to 99.0)	28.9% (−2.2 to 69.5)
Change in transport-related particulate emissions (95% CI)	−12.4% (−17.3 to −6.8)	−4.9% (−6.8 to −2.8)	−3.2% (−4.9 to −1.4)	−10.1% (−14.3 to −5.4)	−11.8% (−16.3 to −6.9)	−10.9% (−15.3 to −5.8)

Other vehicles, including powered two-wheelers and three-wheelers, were not modeled in the scenarios because the proportion of travel within this mode was assumed to remain stable. All transport mode changes refer to change in vehicle kilometers travelled from baseline. METs = metabolic equivalents.

have been estimated in about US$ 58 trillion in the next 10–15 years for a worldwide upgrade [62]. Given the complex framework concerning the question of healthy cities (Fig. 5), working towards more healthy city environments actually recognizes an important limitation in communication problems between the three actors of this issue, namely health researchers, decision makers in the policy process, and public opinion [63]. There is a great need for translation of research, a new concept that health researchers have to realize. A strongly limiting problem is in fact that too often health research results do not reach the decision makers and, consequently, the policy processes due to communication barriers. The contrary is also true, and often researchers do not adequately understand policy making-process and consequently are not able to organize a more productive and useful research. Indeed, a point of fundamental importance is that even ordinary people need to understand health research results; in concomitance, decision makers should consider public opinion in order to remove any barrier to change. For instance, people might perceive cycling or walking along city roads unsafe due to the risk of road trauma, or to the exposition to low temperatures in winter. So, predisposing adequate infrastructures and positively influencing public opinion through efficient communication might be of great importance in order to assure successful investing in cycling infrastructure and pedestrianization. Encouraging walking and cycling, and limiting motor vehicle use is problematic in low-income cities [64] [34], while high income cities across the world have already started or have announced to become partly car-free cities [59]. For instance, in London private motor vehicle traffic decreased by 7% from 2004 to 2014 and, in concomitance, cycling increased [65]; similarly, Stockholm reduced car traffic by 20% between 2007 and today [66]. The health impact of the shift from private motor vehicles to public transport, walking and cycling, has recently been analyzed by Stevenson et al. [67] using a complex model referring to different cities in the world. This model included a balance between a predictable increase in road trauma for pedestrians and cyclists and the favorable effects of higher physical exercise levels on type 2 diabetes, and cardiovascular and respiratory diseases. They predicted for the new cities changes in physical activity in the range of +18.5–72%, and reductions of particulate emissions in the range of 3–12% (Table 4). These changes would produce important benefits in terms of health for all cities even though a small increase in road trauma was predicted in the case of highly motorized cities (Table 5). This latter finding might be a further strong suggestion for policy makers aiming to guarantee public safety.

7. Conclusions

> "*Start by doing what's necessary, then what is possible. And suddenly you will be surprised to do the impossible.*"
>
> [(St. Francis of Assisi)]

There is no doubt that physical activity is one of the most important modifiable factors of our lifestyle, and that it has important beneficial effects on preventing and treating cardiovascular diseases. Comparatively, no drug is as powerful [68], at any age. Urgent action is needed to change our habitual level of physical activity, and this action must be taken at the personal, the family, and the political level. Therefore, it is mandatory that interdisciplinary teams are instituted at different levels (national, regional, and local institutions) in order to adopt correct and efficacious measures of public health such as those of reducing private car traffic and favoring walking and cycling.

Is this utopia?

Learning points

Favoring correct lifestyles is the most important measure to contrast cardiovascular diseases.

Lifestyle includes diet, physical exercise, and psychological and socio-economic factors.

Physical activity is likely the most important among the modifiable risk factors for cardiovascular diseases.

Even small improvements in the habitual physical activity level may have important favorable effects on health.

We need strategies at the population level that involve not only public health, but also administrators and politicians.

Table 5
Disability-adjusted life-years (DALYs) gained per 100,000 population in the compact cities model.
(Reproduced with permission from reference number [67]; license number 4024260271240).

	Melbourne	Sao Paulo	Delhi	London	Boston	Copenhagen
Cardiovascular disease (ICD-AM I00-I99)	622 (312 to 1071)	363 (14 to 915)	565 (169 to 1117)	582 (244 to 1053)	765 (355 to 1386)	337 (4 to 832)
Type 2 diabetes (ICD-AM E10-E14)	86 (40 to 159)	55 (−9 to 155)	28 (−10 to 91)	27 (7 to 61)	94 (41 to 189)	53 (−4 to 146)
Respiratory disease (ICD-AM J30-J98)	2 (1 to 4)	3 (1 to 5)	22 (8 to 42)	8 (4 to 14)	3 (−1 to 5)	2 (1 to 4)
Road trauma (ICD-AM V00-V89)	−34 (−64 to −7)	−4 (−71 to 62)	2 (48 to 51)	−41 (−64 to −19)	−34 (−66 to −1)	−1 (−22 to 20)
Total	679 (330 to1181)	420 (12 to 1029)	620 (167 to 1233)	581 (216 to 1084)	826 (352 to 1553)	393 (5 to 967)

Data are 50th percentile estimates (95% CI). Aggregated individual estimates may not equal the total due to rounding and Monte Carlo estimation. ICD-AM = International Classification of Diseases, Australian modification.

Funding source

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Declaration of interest

Nothing to declare.

Conflict of interest statement

The authors state that they have no conflict of interests.

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