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Active City Innovation

Research on Active City Programmes – A Summary Report

Background

Physical inactivity is one of the leading risk factors for premature death worldwide. The World Health Organization (WHO) has implemented physical activity (PA) guidelines to reduce the risk of related diseases such as obesity, diabetes or high blood pressure (1). Globally, 81% of adolescents and 27.5% of adults do not meet WHO's recommended levels of PA (2). Several studies considering diverse populations have investigated the advantages of PA in different settings.

The *Active City Innovation* project investigates what drives but also prevents people from engaging in PA and how urban areas' transformation into attractive environments can initiate PA.

Initiating change in an individual's behaviour – e.g. increasing daily PA – requires a profound knowledge of existing research of barriers and motivators. With this report, we therefore aim to outline practical solutions for further developing and improving interventions intending to increase PA by focusing on existing practical resources, recommendations and practical barriers highlighted in the published literature. We further aim to identify key elements, which can influence PA among individuals in different settings and by this enable people to shape their lives and thus their settings more healthily.

Existing research focused on PA enhancing interventions in a wide range of living environments. We subsumed the identified results under four main areas:

- 1) General Active City Approach
- 2) Active Transport
- 3) Active School Transport
- 4) Active Workplace



Summary of Existing Research

Overview of Existing Research

SETTING	TYPE OF STUDY	TOTAL
GENERAL ACTIVE CITY APPROACH	Experimental Study: 0 Observational Study: 5 Literature Review: 2 Viewpoint: 6	13
ACTIVE TRANSPORT	Experimental Study: 2 Observational Study: 5 Literature Review: 7 Viewpoint: 4	18
ACTIVE SCHOOL TRANSPORT	Experimental Study: 0 Observational Study: 4 Literature Review: 5 Viewpoint: 0	9
ACTIVE WORKPLACE	Experimental Study: 1 Observational Study: 2 Literature Review: 6 Viewpoint: 0	9
		49

Methods: Our Summary Report is characterized by a narrative summary of published scientific peer-reviewed articles, governmental and non-governmental reports. We aimed to provide an overview regarding the published literature focusing Active City Programmes. In the Overview of Existing Research (see above), we yielded 47 studies in total, of which two were categorized in two settings, leading to a total sum of 49 studies. We do not consider our research as exhaustive.

1) General Active City Approach

Existing Practical Resources

A rising percentage of the global population lives in cities. Therefore, it becomes increasingly important that urban environments provide suitable possibilities for PA for citizens to maintain a healthy and active lifestyle. Further, many children, adolescents and adults do not fulfil the recommend levels of PA (2, 3). This leads to the need for promoting urban development. It is essential to establish programmes and/or initiate built environment



changes to enhance opportunities for individuals living in cities to undertake PA, as well as for stakeholders to implement more effective interventions regarding physical activity (4).

Research furthermore suggested that the physical environment has an influence on the citizens' PA.

Generally, an active city provides conditions for an active lifestyle represented by high levels of active transport such as cycling and walking and high levels of participation in sports activities. (4, 5).

According to Edwards & Tsouros, cities investing in PA policies and programmes have benefits such as the following (6):

- Saving money on health care and transport services
- Having more productive citizens and workers
- Increasing liveability and attractiveness to residents, employers, visitors
- Reducing air and noise pollution and improving access to green spaces
- Enhancing neighbourhood revitalisation, social cohesion and community identity
- Expanding social networks

In addition, a report from the WHO highlighted the following benefits of an active city (7):

- Feelings of safety and security for citizens
- Reduction in antisocial behaviour and criminality
- Increased mental health and well-being of citizens
- Increased economic prosperity including employment creation
- Reduction in carbon dioxide emissions

Recommendations

This part of the report focuses on practical recommendations to create urban cities and places enabling citizens to be active and healthy. Sallis et al. argues that in order to achieve substantial population health benefits, policies should prioritize pedestrians, cyclists and public transport in municipalities (8). In order to create effective common policies for a general improvement in the health of citizens, municipalities have to abolish the typically existing separation of traffic department, sports office and the public health department (5). Community based health promotion can only be successful when including all three perspectives and creating partnerships. Since the responsibilities for health promotion in municipalities do not only lie with the government, building intersectional collaborations across different disciplines is crucial. Having an interdisciplinary team can help address policy issues, represent the public opinion and needs and create PA enhancing programmes (5, 8, 9).



The intersectional collaboration also includes community organisations such as schools, transport agencies or health care organisations ([5](#), [9](#)).

It is further important to target specific groups by implementing programmes or changing the built environment ([5](#)). According to Breda et al., the following sectors need more investment ([10](#)):

- *Senior citizens*
- *Workplace environment*
- *Environment, urban planning, public safety*

The opportunity for an active lifestyle can only be improved if different partners work to change the infrastructure accordingly. Several studies investigated the importance of a reconsidered and adapted infrastructure and outlined the following practical recommendations for an active city:

- Strategies need to be specific to the region ([8](#))
 - Young, low-density cities need to expand and improve existing areas
 - Older cities in Europe should focus on developing cycling facilities
 - High-density cities should improve their walking and cycling infrastructure and invest in affordable public transport
- Dividing bike paths from pavements ([5](#))
- Providing available and accessible bike paths and pavements ([5](#))
- Improving cycling infrastructure between cities ([11](#))
- Enabling access to existing sport facilities ([5](#))
- Establishing more green spaces ([12](#))
- Engineering local infrastructure (e.g. shops or leisure facilities) in a way that an equal ease of access by walking and biking is ensured ([5](#))
- Providing and promoting safe and accessible active travel networks (well-lit pavements and bike lanes, etc.), green and open spaces (public parks, woodland trails, etc.) and the usage of existing infrastructure (community halls, school buildings, outside sports pitches, etc.) are all impactful in creating opportunities for citizens to maximise their PA potential ([6](#))
- Creating “PlayStreets”: an intervention organized by the local government or community organizations, involving a temporary closing of streets to create space in which people can be physically active ([13](#), [14](#))
- PA interventions should take supportiveness of the built environments into account, especially when offering less structure or require PA in an outdoor setting ([4](#)).



Practical Barriers

Although various recommendations for how to create an active city and furthermore for how to improve PA of citizens exist, the number of cities which practically implement theoretical frameworks in order to promote active living is rather low ([11](#)). In addition, some cities experience barriers of urban planning which would encourage active living.

Faskunger identified difficulties in integrating health perspectives into the processes of regenerating city areas, such as establishing green areas or urban open spaces, and their funding ([11](#)).

Another problem is that the practical organisation of PA promotion activities is not a direct task of the government. Even though cities may be responsible for providing necessary facilities for sport clubs/programmes and supporting them financially ([5](#)). Based on this, we conclude that it is not only an issue of the government but also of the private sector and several community organisations.

2) Active Transport

Existing Practical Resources

PA promoting interventions should consider AT. Several studies investigated a positive influence of AT on PA and population health when switching from car use to cycling, walking or public transport ([15](#), [16](#)). Rissel et al. predicted that if 20% of all inactive adults increase their walking by only 16 minutes a day for five days a week, there would be a substantial 6.97% increase in the proportion of the adult population considered *sufficiently active* ([17](#)). Dutch citizens meet the WHO recommended minimum level of weekly PA – 150 minutes of moderate intensity PA aerobic activity – just by using AT. Dutch men and women exceed the recommended minimum PA-level by 41% and 55% respectively by spending 24 and 28 minutes a day walking or cycling ([18](#)).

Increasing PA numbers could have a major impact on population health. In London, a 50% increase in walking or cycling mode share (the proportion of people using different modes of transportation in a specific area or city) could reduce 2.5% of premature deaths in the adult population ([19](#)).

A number of scientific studies investigate further benefits from using AT, e.g.:

- Impacting public health by increased PA ([15](#), [20](#), [21](#))
- Impacting public health by reducing obesity levels, risk of diabetes ([21](#), [22](#))
- Impacting public health by reducing the risk of traffic accidents ([15](#), [23](#))
- Impacting public health by reducing air pollution ([15](#), [23](#))
- Impacting the economy by saving 15 billion euro per year through shifting 10% of trips to active mobility ([24](#))
- Impacting the environment by substantially lowering CO₂ emissions ([25](#), [26](#))



The studies emphasise the importance of improving cities' built environments and infrastructures to further promote AT among citizens. According to Brown et al., a couple of positive steps have already been made. An increasing amount of studies focus on the important links between transport, health and the environment ([27](#)). The following part of the report summarises recommendations and barriers of AT interventions based on scientific research.

Recommendations

Relying on the current existing research, policies, programmes or environment changes to promote AT can be assessed in different ways. There are consistent positive effects of physical built environment components and AT infrastructure on the PA behaviour of individuals, AT usage and participation in activities ([16](#)).

The following practical factors lead to significantly higher levels of walking and cycling:

- Possessing high quality parks and playgrounds ([23](#))
- Having closer access to public transport points ([17](#), [27](#))
- Fulfilling multiple urban- and streetscape components for walking and cycling ([9](#), [16](#)):
 - Pedestrian crossing and pavement improvement
 - Safe places to walk (greenways)
 - Improved and covered bike parking
 - Installation of traffic calming features
 - Installation of fitness/playground equipment
 - Temporary road closures
 - Higher residential, destination and recreating density
 - Increased street connectivity
- Living in a walkable neighbourhood ([16](#), [20](#))
- Having a low residential address density ([18](#))
- When creating transportation policies, it is crucial to not only take air quality improvements and climate change mitigation into consideration but also how active transportation can impact PA and public health ([19](#))
- Pisoni et al. differentiate between the needs of countries without and with a “cycling culture” ([24](#)):

Needs of countries without a cycling culture:

- Good active mobility infrastructure (e.g. pedestrian streets or bike lanes)
- Increased security (or perceived security) that could lead to different utilization of bikes
- Promotion of a cycling-culture and bicycle ownership

Needs of countries with a cycling culture:

- Integrated planning organization and cycling policies



- Investigating determinants of walking and cycling and creating a tailored approach
- Fulfilling AT influencing factors independent of environmental components: Low Age, higher income, bicycle ownership, higher education ([18](#)). Introduction of car-free days, discourage the use of cars and encourage multi-modality by enhancing the connections between AT and public transport, offering space for bikes on trains, etc. ([7](#), [22](#)).

Generally, community-scale urban design interventions, as well as street-scale urban design interventions using policy instruments, such as zoning regulations, environmental changes brought out by governmental initiatives, are efficient in order to increase walking and cycling ([28](#)). Furthermore, safety and aesthetic components are of great importance for individuals when using AT ([28](#)). Given the citizens' desire of safety and aesthetics, policies improving street lighting or redesigning streets tend to be efficient. Negative outcomes related to walking as a mode of transport include littering, vandalism and decay ([9](#)).

Policies outside the health care sectors are needed to successfully implement the practical recommendations. Cities should aim for an intersectional collaboration in improving the built environments. An intersectional collaboration is further important for setting political guideline, recommendations and programmes. An increased collaboration between health care practitioners, transport specialists and urban planners will help to produce the health perspectives in transport policies. Furthermore, international organisations (UN, WHO, World Bank) should provide a leadership by setting targets and indicators for countries in promoting PA interventions. Focusing on an intersectional collaboration with researchers, planners, community leaders and other public health decision makers involved, the recommendations should serve well the needs in exploring and promoting ([29](#)).

Practical barriers

Translating the scientific information into meaningful public health programmes and policies—a substantial factor in improving AT interventions—poses a huge challenge that needs to be solved ([16](#)). Little information exists on how to implement the effective interventions practically on a large scale ([16](#)). Cities often do not have the expertise to convert the research-based recommendations into practical programmes, which meet the city's needs. It is important for future urban development to support cities in implementing AT interventions. Profound theories should be used more often to improve intervention development, execution and evaluation. Traditionally, the social ecological theory, social cognitive theory and theory of planned behaviour are well known as behaviour explanation theories, which should be considered while implementing an intervention ([30](#)).



The set of recommendations and barriers should point out the important role of political and environmental approaches towards an increase of PA through AT.

Enhanced AT can combat inactivity among citizens.

3) Active School Transport

Existing Practical Recourses

Active school transport (AST) of children and adolescents is another important field for enhancing AT and furthermore PA. Existing interventions promoting the active way to school by walking or cycling, underline the importance of AST in children's PA (31, 32). Faulkner et al. outlined that AST is an innovative solution to increase PA time among children, without adding pressure to the school curriculum. Active school commuters overall tend to be physically more active than passive commuters (31). De Jesus et al. observed that AST through bike usage among children contributed to maintaining a consistent daily PA, which was higher compared to children and adolescents using passive forms of transportation (33). AST is furthermore associated with a lower sedentary behaviour (SB) (34).

According to Jones et al. the most effective intervention types are education and encouragement of active travel and "walking buses" (children walk together to school accompanied by an adult). Especially for children and adolescents, these interventions tend to be effective (35). AST's impact on the activity levels of children were comparatively low (31). Possible reasons are that they live closer to their elementary schools, or that they are only allowed to walk to school when the school is located close to their home, or if parents, guardians or siblings accompany them (31).

Recommendations

Larouche et al. examined potential mediators and moderators of travel behaviour change in order to further refine and develop current interventions on promoting children's AST and identified three important factors to increase AST (32):

- Safe routes
- Greater acculturation, more positive parental self-efficacy and outcome expectations
- Interventions including both educational activities and infrastructural changes
- Awareness raising campaigns on the benefits of AST

In addition, one main finding was to consider behaviour as determined by multiple factors including individual, interpersonal, community, policy and built environments (32). Kobel et al. have also considered the approach of a multiplicity of independent correlates influencing AST. According to their results, the understanding of independent correlates of AST might



support the development of effective health promoting interventions. Focusing on both, child and family, the efficiency of AST interventions can be affected (36). Low agreement between parent and child perceptions on barriers to AST highlights the need for programs to consider these discrepancies (37). Aranda-Balboa et al. found that involving parents in the decision-making process of an intervention could reduce the perception of safety and increase awareness of AST. This finding is especially important considering that children tend to be more physically active when their parents set positive behaviors and attitudes towards PA. Therefore, reducing parental barriers regarding AST (see below) can improve the effectiveness of future interventions (37). Lastly, a systematic review showed that most studies on that topic reported a small effect size and a weak quality design (38). Future research should therefore focus on higher quality study designs to ensure effective future interventions.

Practical Barriers

Different barriers might complicate the possibility of AST. Kobel et al. defined the following factors negatively influencing walking and cycling to school (36):

- Long distances
- Unhealthy weight status
- Migration status
- Assessed family education level
- Low household income

Barriers reported by parents provide a different point of view, as the major parental barriers for AST were (37):

- Built environment
- Traffic safety
- Distance
- Crime related safety
- Social support

Given this information, interventions enhancing AST should be further established and researched in order to increase children's PA. The known recommendations and barriers can guide the development of new AST models.

4) Active Workplace

Existing Practical Resources

Interventions should take place in different settings in order to reach a large number of adults.



Health and well-being is highly correlated with work environment factors. By improving these factors and implementing workplace interventions, worker's physical and mental health can be impacted positively (40). Promoting PA and reducing SB to increase movement in the workplace leads to significant health benefits spanning physical, mental, social, and economic aspects, affecting both individuals and organizations (41). According to epidemiological studies, people workers spend at least two-third of their workday sitting, which is a longer sitting duration during working hours than non-working hours (42, 43). Furthermore, participants who were physically active before the intervention and had a better health status at baseline were more likely to succeed at work (44).

Recommendations

As the workplace is an important setting for successful interventions, it is necessary to establish key factors for successful programmes increasing PA. Lock et al. found the most effective intervention components to be the combination of self-monitoring with a goal, along with onsite or nearby exercise sessions (45). The meta-review of Jirathananuwat & Pongpirul classified effective interventions promoting PA at the workplace into five domains (46).

1) Predisposing: information delivery, self-motivation and programme training

Practical solutions and PA enhancing interventions should aim to change employees' basic knowledge, skills and attitude towards PA by introducing different forms of information spread: mass media, education, teaching, training, or counselling. Furthermore, the aspect of predisposing can be classified into three components. Firstly, information delivery, which contains any kind of health education information, counselling, professional coaching or cognitive restructuring. The second component, on which interventions should focus, is employees' self-motivation. A person's perception of ability to engage in PA, the subjective goal setting as well as self-monitoring/self-management are components which were identified as efficient in promoting PA. The last component, which has a large influence on the effect of workplace PA promotion programmes, is the physical exercise programme training and guidance of training interventions.

2) Enabling: instrument recourse and health service facilities

This aims to promote the availability and accessibility of resources or services that facilitate motivation to change behaviour. Two sources were identified as efficient in targeting individuals and communities. The first component is the access to instruments for controlling and matching one's ability to perform PA. This instrument can be a pedometer/accelerometer, a print material, a weight watcher, a diary, a measuring tape, a workbook etc. The second recourse are health service facilities, which describe government systems or private organisations that provide facilities for particular types of activities. The health facility interventions include coaching, feedback, problem solving and health assessment/screening-checks.



3) Reinforcing: incentives and social support

Constructing interventions encourages participants to perform well in the health programme by the reinforcement of the desired behaviour change using social support and economic rewards. Rewards can be competitions, prizes or financial incentives. Furthermore, social support greatly influences someone's ability to perform. Possibilities to increase social support are creating group meetings/group support as well as individual family support.

4) Policy regulation

Policy regulation contains procedures or protocols, which are generally adopted by the board within an organisation. The committee should control a strict implementation and weekly surveys of the realization by contacting the project staff or arranging systematic PA breaks during work.

5) Environmental development

Changing the workplace environment can influence PA processes. Efficient interventions used environmental development such as posters in places with high employee traffic (e.g. break rooms, bathrooms, elevators) forming lunchtime walking or cycling groups, promoting stairway signs, indoor and outdoor walking routes, employee showers/changing areas, bike-parking facilities.

Interventions that focused on at least one of the five factors tend to have a high chance to succeed. Multidisciplinary interventions are recommended. Combining all factors seems most efficient in order to increase employees' PA habits ([46](#)).

Based on a systematic review, Pieper et al. set following recommendations for practitioners, focusing on musculoskeletal disorders, psychological and behavioural disorders, as well as older employee and economic evaluations ([40](#)):

- Implementing stretching exercise programs, vibration feedback on mouse use or workstation forearm supports in practices to prevent musculoskeletal disorders, if applicable to the work context
- Implementing workplace-based cognitive-behavioural and job-stress management programs as part of preventing and managing stress and mental disorders
- Adapting interventions on diverse occupational groups and workplace settings
- Participative approach for employees to be included in the intervention decision-process

Pieper et al. mainly identified individual focused interventions and recommends employers to significantly expand their programs on the organizational level ([40](#)).



In addition, several studies outline success factors of workplace interventions aiming at an increase of PA:

- Creating interventions with less rigorous research designs (47)
- Including activities at social and environmental levels (47)
- Using applied internet-based approaches (47)
- Applying personalised programmes: assumption of homogeneity of all employees reduces engagement and motivation (44)
- Enabling neighbourhood walkability/attractive built environments promoting greater utilitarian walking and greater PA (48)
- Regulating future workplace and health promotion initiatives to reduce sedentary occupations (43)
- Executing high quality assessment of behaviour that occurs during employees' actual working hours (43)
- Implementing multidisciplinary interventions (46)
- Focusing on employees' intrinsic motivation (44)

Generally, workplace interventions' success also relies on three important aspects, which should be considered: a) deciding to enrol in programmes, b) sustaining participation and c) actually engaging (44). An attracting, retraining and benefiting programme can reach a variety of individuals and promote their initial motivation (44).

Practical Barriers

Several practical barriers, which influence workplace intervention programmes, exist. The assumption of heterogeneity of the employees poses a large difficulty concerning the individual's attitude, motivation and behaviour at baseline. A one-size fits all programme, whereby all employees are exposed to the same PA intervention programme ignores differences in relation to motivation and other important factors. Due to this fact, a programme tailored to the specific intervention group should be implemented (44). Specific attention should be paid to the employees' individual motives to be physical active. Because of intrinsic and extrinsic motivational factors, individual performances differ significantly. Individuals motivated by extrinsic factors and less confident in their ability to perform an action are the least likely to succeed in workplace programmes targeting PA (44).



Conclusion

There is an urgent need to develop approaches that enable large groups of people to live a more active life. This is the only way to tackle the alarmingly high number of people who do not move enough.

It seems that AT and school travel in particular is a field that is already attracting a certain amount of interest. Active workplace, on the other hand, has been relatively little researched. Of course, the two areas can only be compared to each other to a limited extent, as they have to deal with completely different success factors and barriers and address a fundamentally different target group.

Nevertheless, it seems reasonable to conclude that interventions and approaches do exist that contribute to increasing PA, even if their effectiveness should not be universally presumed.

Key Learnings

1. New approaches for an active city need to be developed and implemented to improve PA of citizens.
2. Active workplace needs to be more researched.
3. AT and AST need to be differentiated from active workplace.
4. Interventions seem to contribute to increasing PA and therefore should be continued.

Recommendations on how to transfer these learnings into a “how to” guide for the project

How can we implement these learnings in the project “Active City Innovation”?

General Active City Approach

About the general Active City approach, we have learned that intersectional collaboration is essential in order to create effective common policies for a general improvement in the health of citizens. This means for the project that we need to establish more partnerships and work with different departments, community organisations and companies. Moreover, in anticipation of improving the health of residents of communities, we need to target specific groups and start there, where we can actually make a change.

Active Transport

As we have seen in existing research, AT has a positive influence on PA and population health. A practical barrier of AT is that there is little information on how to transfer the scientific information in effective interventions and that cities often do not have the knowledge how to



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convert the research-based recommendations into practical programs. This is where Active City Innovation can support with its expertise, broad spectrum of experts as well as its large scope and help cities to implement effective AT interventions.

Active School Transport

In this report we have learned that AST is another important field that impacts PA positively. We have been also informed about the fact that the approach of a multiplicity of independent correlates might influence AST. Thus, we have to focus on and do more research on different variables that impact the effectiveness of the interventions.

Active Workplace

Since individuals can spend more than a third of their waking hours at work, Active Workplace is an ideal setting for health promoting interventions (49). There is no such a thing as a PA intervention program that is suitable for everybody. For that reason, different programmes need to be established that fit to specific intervention groups. Hence, the task of Active City Innovation is to create and implement multidisciplinary interventions that take the assumption of heterogeneity of the employees into account.

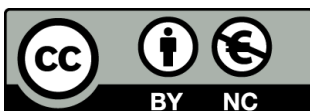
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