

Gebaute Umwelt und körperliche Aktivität Studie der Hochschule Luzern - Wirtschaft

Das Institut für Tourismuswirtschaft ITW der Hochschule Luzern legt eine Studie vor, welche den empirischen Zusammenhang zwischen ausgewählten Merkmalen der gebauten Umwelt und Bereichen körperlicher Aktivität untersucht. Daraus wurden Massnahmenvorschläge zur Förderung des Zufussgehens, des Velofahrens und körperlich-sportlicher Aktivitäten formuliert und Handlungsempfehlungen für die Umsetzung einer Strategie der Bewegungsförderung abgeleitet.
(Sprache: deutsch, französisch und englisch)

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Milieu bâti et activité physique Une étude de la Haute école de gestion de Lucerne

L'Institut de Tourisme et d'Economie de la Haute Ecole de Gestion Lucerne a rendu publique une étude démontrant de manière empirique la corrélation entre certaines caractéristiques de l'environnement bâti et l'activité physique. Des propositions visant à mettre en place des mesures favorisant l'exercice y sont formulées, de même que des recommandations visant à mettre en application des stratégies pour la promotion de l'activité physique. (langue: allemand, français et anglais)

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Built environment and physical activity

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Analyses and recommendations for Switzerland

- Summary -

**Study in the scope of the Swiss research concept
„Sports and physical activity” 2004 – 2007**

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Abstract

Taking a comprehensive analysis of the literature as a starting point, this study analyses the empirical connections between selected features of the built environment and two areas of physical activity: a) walking and cycling as moderate physical activity, b) vigorous physical activities that cause people to perspire or be short of breath. The analyses are based on data from the Swiss Microcensus on Traffic Behaviour 2005, which included an additional module about physical activity. Features of the built environment were created using GIS analyses and cover the following dimensions: population density in the neighbourhood, a balcony or garden at home, accessibility of local facilities and services for daily needs, sports facilities and larger facilities in the area. Participation in walking and cycling is a positive contribution to people's general physical activity. The participation and the duration of walking and cycling are, as expected, correlated with features of the built environment. The results of foreign studies have been confirmed to a great extent, although the empirical evidence for Switzerland was weaker than in some of the foreign studies. It was shown that cycling should be analysed separately from walking and that cycling requires specific interventions, since it partly correlates with other socio-demographic and spatial features. Compared to walking and cycling, vigorous physical activities that cause people to perspire or be short of breath, showed little empirical evidence for an effect from the features of the built environment. Suggested measures to promote walking, cycling and vigorous physical activities are formulated in three fields of action. Finally, the study provides recommendations for the realisation of a multi-sector strategy for the promotion of physical activity.

Summary

Initial position, goals and method

The insufficient physical activity of a part of the Swiss population poses the risk of a whole range of illnesses and leads to high treatment expenses in the public health system. A cautious estimate for Switzerland from data from the late 1990s estimates direct treatment expenses of 2.4 billion Swiss francs (1.6 billion euros) per year. The various health benefits of physical activity were assembled in the current Physical Activity Guidelines by the Physical Activity Advisory Committee of the USA on the basis of a comprehensive review of the specialist literature. According to this, there is strong empirical evidence that physically active adults and elderly people are less prone to general mortality rates, coronary heart disease, hypertension, strokes, diabetes (type 2), metabolic diseases, cancer (intestinal and breast) and depression. Furthermore, physically active people are empirically proven to be more fit, have a better body mass index and a biomarker profile that counteracts the emergence of cardiovascular diseases and diabetes and strengthens their bones. Therefore, the promotion of physical activity for better health is of high economic importance. Hence, the promotion of physical activity was one of several fields of research in the Swiss research concept: Sports and Physical Activity 2004 – 2007, which also featured this current study.

The study analyses the correlation between features of the built environment and physical activities in the following fields:

- moderate physical activity: participation in and duration of walking and cycling
- vigorous physical activity: duration of physical activities that cause people to perspire or be short of breath.

The built environment can be characterised by population density, accessibility of sports and recreation infrastructure, shops and service facilities, the composition of the neighbourhood and working environment as well as the availability and quality of traffic infrastructure. This study does not cover the analysis of the impact of the natural environment (e.g., the accessibility and aesthetic quality of natural landscape units) on physical activity, since this topic is already covered by the study *Landschaft und Gesundheit* (Landscape and Health) by the University of Berne (ISPM).

Methodologically, this study is based on three principles:

- An interpretation of specialist literature of various disciplines on the correlation between features of the built environment and physical activity as well as on the instruments of spatial- and traffic planning that are suitable for influencing the level of physical activity, especially the participation in walking and cycling.
- A secondary analysis of survey data of the Swiss Microcensus on Traffic Behaviour 2005, which also includes a partial sample on physical activity.
- An interpretation of results of interviews with experts in the fields of the promotion of vigorous physical activity as well as walking and cycling.

The theoretical and analytical goal of the study is to investigate the correlation between the built environment and physical activity. The goal is to identify evidence-based measures in the field of structurally effective spatial planning and traffic planning that are suitable for raising the level of physical activity in the Swiss population. Thus, the study shall contribute to the Swiss outline concept of the promotion of physical activity, which is committed to a basic multi-sector approach.

Results of the literature analysis

There are a great number of empirical studies for the USA, Australia, Great Britain and some European countries that include features of the built environment as possible determinants of physical activity. These were carried out by medical doctors, sports and social scientists with reference to physical and athletic activities and by traffic scientists with reference to walking and cycling.

In the empirical research, the dominating (cross-section) analyses are those based on observations of a single point in time. There have mostly been case studies for specific areas; national surveys are rare. In some studies, features of the built environment have been characterised with the aid of data from a geographical information system (GIS). More often though, subjective indicators about the environment as perceived and evaluated by the people consulted have been used and applied to data about people's behaviour. Some of the studies are explicitly based on a socio-ecological or environment-psychological explanatory model. However, many studies have a rather weak theoretical foundation or a more explorative orientation.

In most studies, an empirical correlation between features of the built environment and physical activity has been identified. Among others, the settlement density, the accessibility of activity areas/sites and infrastructures on foot, and sometimes the aesthetic qualities of the built environment have been identified as features promoting walking and cycling. The effectiveness of features of the built environment with regard to physical activity is rated differently by various approaches in research. The prevailing assumptions are those ranging from a weak to average evidence.

A number of studies hint at interventions that start with basic conditions regarding settlement structures and traffic. In environment-related planning, there is a broad range of approaches that promise an effect on physical activity:

- regulative measures by the federal, cantonal and community governments
- market economy planning instruments
- organisational measures regarding land use
- experimental case studies
- methods for the ex ante and ex post evaluation of the effect of building measures
- information measures with inhabitants, planners and political decision-makers as target groups

In the field of transport planning, the currently dominant measures are mainly technical and infrastructural.

Empirical analyses of the effect of the various approaches to spatial and traffic planning on physical and athletic activities, as well as resulting health effects, however, are still very rare. They are not yet regularly executed as part of the evaluation of the sustainability of plans. In addition, the measuring indicators that can be used for measuring possible changes in behaviour are still heterogeneous. Taking the still weak data into account, the following effects of interventions have been identified in a study by WHO Europe (in decreasing frequency):

- changes in the level of autonomous mobility (walking and cycling)
- changes in the choice of means of travel towards cycling and walking
- specific health effects
- change in the level of physical activity in general.

Results of the data analyses

Our database analyses are based on data acquired on traffic behaviour of the Swiss population.¹ In that study, participation in traffic was assessed on a target date between Monday and Sunday using the project step concept. This included walking stages and cycling stages in combination with other means of transport, e.g., in combination with public transport. In a partial sample, the physical activity in general, i.e., regardless of the target day, was collected. There were approximately 28,500 cases available for the analyses of walking and cycling and approximately 8,400 cases for physical activity.

- In the studies, the central indicators for behaviour related to physical activity were fulfilment of minimum requirements for physical activity (in all areas of activity)
- duration of physical activities per week that cause people to perspire (adults)
- levels of physical activity ranging from inactive to exercised (adults)

With regard to walking and cycling, the predominant indicators for the adult population were:

- participation in walking and cycling on the target day of acquisition
- duration of participation in walking per target day
- fulfilment of minimum requirements for walking and cycling per day (at least 30 minutes with stages of at least 10 minutes duration)

The indicators for vigorous physical activity (on the basis of perspiration and shortness of breath) and for walking and cycling are significantly positively correlated. In the year 2005, 43% of the adult population can be classified as physically active, 36% as partly active and 21% as inactive. 62% of the adults participated in walking and cycling on the target day. The median of the duration of walking and cycling of all mobile and non-mobile people was 12 minutes for adults and 28 minutes for children and adolescents. In the group of people active in walking or cycling, the median for adults was 37 minutes, while for children and adolescents, it was 40 minutes. On the target day, the recommended duration of more than 30 minutes of walking and cycling was reached by 33% of the adults, if steps of at least 10 minutes were considered. Without this restriction, this criterion was met by 38%.

The features of the built environment in the place of residence of the interviewees derived from GIS. Analyses of the built environment have been grouped into five areas of influence:

- domestic circumstances: living in a house with garden or balcony; in a detached or semi-detached house
- population density: in the extended neighbourhood (1000 m radius around the house)
- Proximity of (local) facilities and services for daily needs such as grocery stores, restaurants/cafes, post office, bank)
- Proximity of sports facilities (sports centres, fitness centres) and other facilities on a communal level
- Proximity of larger facilities in the area, e.g., theatre, shopping centres.

Bivariate analyses of features of the built environment and behaviour have shown:

- mostly significant positive correlation between the distance to facilities and infrastructure and levels of vigorous physical activity (the greater the distance the higher the level of vigorous physical activity)
- significant negative correlation between distance to local facilities and services for daily needs and the participation in walking (the nearer these local facilities and services for daily needs the higher the likelihood of walking)

Population density correlates significantly negatively with vigorous physical activity and positively with the duration in walking and cycling. According to these first bivariate analyses, a tendency towards a stronger vigorous physical activity (with sweating, out of breath) can be observed in less concentrated and less central residential areas. In contrast, the reverse pattern can be observed for walking and cycling.

Differentiated explication models have been assessed with the aid of multivariate analyses. The contribution of the built environment for the statistical explication of people's behaviour was generally larger with regard to walking and cycling than with vigorous physical activity.

Walking:

For walking a higher population density in the neighbourhood as well as proximity to facilities in the local area is beneficial. Furthermore, there are positive statistical correlations with the possession of season passes for public transport and negative correlations with the availability of cars. This availability of "mobility tools" is again correlated with the settlement density and local facilities, for these also indirectly promote walking. The duration of walking increases with population density, distance to local facilities (if available in the neighbourhood), possession of public transport passes and proximity of sport and other facilities at the community level.

Cycling:

Participation in cycling is more probable under the following conditions:

- tendency towards higher population density in the residence area
- living in the vicinity of sports facilities
- flat with a garden or balcony
- possession of public transport passes
- low availability of cars.

These residential areas, which are conducive to cycling are often in the urban areas but tend to be less central in relation to the city centre.

Vigorous physical activity:

In German-speaking Switzerland, the intensity of vigorous physical activity increases with larger distances from neighborhoods' centre, yet is independent of the population density. In the French-speaking population, stronger physical activity is slightly more probable in neighbourhoods with a low settlement density. The correlation with the proximity to sports facilities are either not significant or with regard to the intensity of physical activity significant in an unexpected direction, i.e., negativ. People with a car at their disposal and people with public transport passes have a higher likelihood for vigorous physical active than people who lack these "mobility tools".

Results of the expert workshop

In general, the German-speaking Swiss experts assume the built environment has a big influence on people's physical activity. However, they identify a number of institutional obstacles with regard to the promotion of physical activity in the field of spatial planning and traffic planning. These are: the lack of binding planning guidelines and of specialist departments in the cantons, a low awareness and knowledge by political decision-makers and planners with respect to aspects of physical activity as well as a low capital endowment of public departments for supportive action.

Most experts agree that in spatial and traffic planning, a range of measures or a comprehensive, interdisciplinary conceptual approach is needed in order to establish the promotion of physical activity and walking and cycling. According to the experts, action should be taken both on the supply-side (e.g., the composition of residential areas and the availability of traffic infrastructure) and the demand-side (e.g., the formation of a "culture of physical activity"). Furthermore, the experts

think a high priority should be given to the organisational and regulatory framework of the planning as well as the promotion of physical activity. According to them, criteria of effects of the built environment on physical activity and health should be integrated into the evaluation methods established in spatial planning and traffic planning. This would also allow the evaluation of corresponding political efforts.

According to the experts, measures should be based on the following fields of action:

- Improve walkability in the immediate neighbourhood
- Increase the attractiveness of public spaces
- Improve traffic infrastructures for walking and cycling with regard to functionality, safety and comfort
- Promote physical activity-related attitudes in the groups of decision-makers, planners and in the general population, e.g., through information on the benefits and the possibilities of interventions in the built environment.
- Improve the legal, organisational and financial determining factors for the realisation of physical-activity-based political efforts.

Actions promoting physical activity

Based on the data analyses and estimations of the experts interviewed, action plans for the promotion of walking, cycling and vigorous physical activity have been formulated. The empirical evidence suggests a focus on walking.

Walking:

In order to create a pedestrian-friendly settlement structure, which is likely to increase the probability of people walking, the following, empirically based initial measures are appropriate:

- Guarantee of an adequate, rather high settlement density in core cities of agglomerations, in communities of the agglomeration belt and in regional centres of the rural areas
- Guarantee of the continued existence of local facilities and services for daily needs (shops, service facilities) in the neighbourhood within walking distance
- Development of settlements along the axes of public transport, as this leads to positive effects for walking, due to a more frequent use of public transport.

On the basis of the estimations from experts further measures are suggested in the following fields of action:

- Creation of pedestrian-friendly neighbourhoods (e.g., by creating pedestrian priority zones)
- Increase the attractiveness of public spaces for relaxing or recreation (e.g., by realising the composition principles of “design for all”, “living streets” and “pedestrians first”)
- Creation of pedestrian-friendly traffic infrastructures
- Promotion of pedestrian-focused attitudes of planners, political decision-makers and multipliers (with the aid of information and consultation)
- Improvement of determining factors for the realisation of structurally effective measures (improvement of base data, multi-sector organisation of sets of measures, implementation of model efforts, evaluation of plans and projects).

Cycling:

On the basis of empirical evidence, the following measures can be recommended to promote cycling:

- Guarantee of an adequate population concentration in core cities and sub-centres of the agglomeration areas.
- Elimination of deficiencies of the cycling network along the connections to the centres and cities and in interfaces to public transport.

- Motivating people to bike to work.

Other than walking, the priorities in this field of action are not so much in the measures related to the settlement structure and the neighbourhood, but rather in the field of bicycle-related traffic infrastructure.

Vigorous physical activity:

In contrast to moderate physical activities like walking, vigorous physical activity that cause people to perspire or be short of breath, could not easily be accounted for statistically by the settlement structures in the area of residence. Therefore, changes in the built environment are rather a supplemental measure, in addition to more prominent communication and motivational interventions. This is because the socio-demographic features of the respective persons are of higher importance in these fields of behaviour. For the measures having the settlement structure as a starting point, the recommended measures are mainly those promoting favourable conditions for physical activity in public spaces in the more central neighbourhoods of German-speaking Switzerland and in areas with a higher settlement concentration of French-speaking Switzerland.

Discussion and need for further research

Participation in walking and cycling is a positive contribution to people's general physical activity. For the first time in Switzerland, statistical correlations between objectively defined features of the built environment and various indicators of physical activity have been explored on the basis of a national sample. In relation to walking, the results of foreign studies have been confirmed to a great extent, although the empirical evidence for Switzerland was weaker than in some of the foreign studies. It was shown that cycling should be analysed separately from walking and that cycling requires specific interventions, since it partly correlates with other socio-demographic and spatial features. Compared to walking and cycling, vigorous physical activities that cause people to perspire or be short of breath, showed little empirical evidence for an effect from the features of the built environment. The differences from some foreign studies could have several reasons, both of method and content.

In Switzerland, there are comparatively small spatial differences with regard to the accessibility of facilities for physical activities and for walking and cycling. Under these circumstances, a relatively small contribution of the built environment is to be expected compared to countries with substantial spatial disparities.

Foreign studies with strong empirical evidence are often based on comparisons of very differently structured areas, whereas the Swiss study covered a national sample.

Not all of the potentially influential features of the built environment could be integrated in the analysis. For example, the following features were not included: information about the accessibility of parks and greens, the mobility-friendliness of public spaces, the qualities of the aesthetics of settlements and landscape, the quality of traffic infrastructures for walking and cycling and the type of sport and recreation centres in the vicinity of the homes of the interviewees.

The features of the built environment were only present as "objective indicators", which were a result of the GIS analyses. Unlike some foreign studies, information about the subjective perception and evaluation of the built environment from the point of view of the interviewees could not be integrated into the analyses because they have not been collected nationally for Switzerland.

The characterisation of the built environment of the interviewees was primarily based on their neighbourhoods and not on various selected destinations for activities.

A flaw of the database at hand was that the features that are needed to consolidate more complex social-psychological and environment-psychological models were not available. Thus, possibly influential features, e.g., the perceived behaviour control of the “theory of planned behaviour” (the assessment of the possibility of really being able to practice a specific physical activity in the built environment of the interviewees) could not be analyzed.

A need for research is primarily perceived in the following fields:

- Develop of more complex explanatory models for various forms of physical activity
- Operationalise features of the subjectively perceived and evaluated realm of behaviour of the residents
- Integrate features from social- and/or environment-psychological explanatory models in empirical analyses.
- With the inclusion of this fundamental information the explanatory power of analytical models in cross-section analyses can be expected to further improve.

With regard to interventions, it is also necessary to examine the causality between interventions and physical activity more than is presently being done. It is recommended to complement statistical cross-section analyses more often with the aid of quasi-experimental methods of analysis. For this, the following forms of analysis can be considered:

- Evaluate large sets of measures in the field of spatial planning and traffic planning: additional identification of the effect on the residents’ physical activity and health (ex ante and ex post after the realisation of the planning) in the field of the assessment of the sustainability of these interventions.
- Evaluate fairly long-term model tests that involve focused interventions for physical activity in the field of the built environment.
- Evaluate temporary, and smaller, experiments in the built environment, e.g., the opening of public and private zones for sports and games or the offer of sports equipment in public spaces (trial projects).
- Analyse of the changes in the physical activity of the people who change their spatial environment temporarily or permanently.

The expert interviews carried out have shown the need for a multi-sector strategy for the promotion of physical activity. With regard to the sphere of influence “built environment”, the following courses of action have been deduced from the empirical analyses:

- Aim for a change of those features of the settlement-structure that have a statistical correlation with physical activity
- Focus structural and motivational interventions on those areas that generally have favourable conditions for the types of physical activity to be promoted, as this increases the efficiency of the interventions
- Develop and implement combined strategies that bring together interventions in the field of the built environment with other incentives, e.g., information, consulting or social assistance.

The study provides various suggestions for the basic institutional conditions that would assist the realisation of such multi-sector strategies.

Final report (only german):

Gebaute Umwelt und körperliche Aktivität. Analysen und Empfehlungen für die Schweiz.
Schlussbericht.

<http://www.hslu.ch/download/w/itw-gebaute-umwelt-schlussbericht.pdf>