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Case study

Title: Implementation of saluto-synergetic land use for outdoor preschool environment in local government

CONFERENCE THEME/SUBTHEME:

2. Planning, Design and Evaluation in Human Environments
2.3 Evidence-based research and its impact on policy and practice

CONTEXT, PARTNERSHIPS AND INSTITUTIONS INVOLVED

Health programs compete for resources and attention, e.g. community-based intervention programs for physical activity vs. skin cancer control. However, a saluto-synergetic approach to improving children's physical outdoor environment may favorably impact both and several other factors relevant to health. Strong reasons motivate intervention at preschool level: Apart from instant beneficial impact, healthy behavior from an early start may track into adulthood, and preschool is the setting where an increasing number of young children spend the lion's share of their waking hours. Moreover, children from all social strata benefit from health-promoting outdoor preschool environment. Children are known to be more physically active during outdoor rather than indoor play. Outdoor play without risk of sunburn should therefore be encouraged (at sun exposure of 100-200 Jm2 dark-skinned children get what they need to form vitamin D, and fair-skinned children do not risk sunburn).

Data for what is required for an environment to maintain and strengthen health among preschool children have been explored in a cross-sectional research project involving universities in Sweden and North Carolina, municipalities (Sweden), and corporations (USA). The focus of these studies was to pinpoint the criteria for preschool outdoor environment to predict self-triggered healthy behavior (increased physical activity, balanced UV exposure) and health outcomes such as few infections, freedom from stress and good night sleep. The aim was an attempt to define universal criteria valid irrespective of climate, landscape of latitude.

RELEVANT OUTCOMES

The impact of preschool outdoor environment on physical activity and sun exposure was explored in various landscapes at different latitudes. The hypothesis was that outdoor environment with high play potential due to space, vegetation and topography would promote health by stimulating play, increased physical activity in terms of step count and sun-protective behavior yielding suberythemal sun exposure sufficient to form vitamin D, irrespective of the landscape or latitude investigated. Studies took place in Stockholm County in 2004, (Lat 59), an area characterized by pine forests and largely rocky land, the Research Triangle Park, North Carolina, US (LAT 36, convenience sample) in 2009, and in Malmö (Lat 55), subtropical and agricultural landscapes respectively. Outdoor preschool environment was assessed using the OPEC tool (Outdoor Play Environment Categories) considering space, vegetation integrated in play (i.e. "dynamic areas" or hubs triggering creative, communicative and physically active play "underneath and between"). Further, behavior settings were defined by behavior mapping, defining the "hot spots" of play. Finally, the contribution of outdoor environment to "unintentional" sun protection was studied by sky view imaging to determine the fraction of free

sky (trees cutting the view) from the play positions thus defined. Physical activity was measured by pedometry and accelerometry, UV exposure by dosimetry, and relative UV exposure by measurement of individual and global UV radiation. In Stockholm 11 preschools (199 children) participated, two in Research Triangle Park (33 children), and 9 preschools in Malmö (169 children). Presence and outdoor stays were clocked, confounders for physical activity controlled by questionnaires to the parents, and effect modifiers controlled by questionnaires to the staff. In Sweden, results show a consistency in the qualities of outdoor environment to promote the children's physical activity and sun protection, irrespective of latitude. Physical activity in terms of step counts increased by 21% and relative sun exposure decreased by 40%, making long spells of outdoor stay possible without the risk of sunburn (Table 1, Figs 1a-c) in environment with vegetation integrated in play space which thus combines increased physical activity and prolonged outdoor stay with little or no risk of sunburn, irrespective of latitude or type of landscape. Results were not related to socioeconomic background of the children, but boys benefitted more from high-score environments than girls. Physical activity was consistently higher and more intense outdoors. This was particularly pronounced at the Swedish high-score sites.

The Swedish National Agency for Education advocates outdoor education as an important and valued part of the day in Swedish preschools. High-score environment has a higher potential for making outdoor stay and learning an attractive combination, and it has also been observed that staff spend more time with the children outdoors when the outdoor environment is of high quality.

RELEVANT OUTPUTS

In the municipality of Nynäshamn outside Stockholm a project (SPRING) was started in 2008 to implement and integrate the new guidelines as routine and make them harmonize with the municipal guidelines of land use. Policies of land use and interior administrative management of outdoor land use have been adapted to monitoring the quality of preschool outdoor environment (upgrading and planning). Skills of conveying the concept of saluto-synergetic preschool outdoor environment across levels and agencies have started to operate inside the municipal organization: a sign of participatory ownership. Detailed records, i.e. continuous tracking of incidents critical for the progress of implementation (process evaluation), of major and minor decisions, procedures and episodes ("what happened when, how, where and why, and who did what when, how, where and why") are made due to the large number of people involved, and staff turnover. The procedure enables reflection, explains different phases of progress, which in turn enables assessment of the next steps to be taken by the project management. SPRING is the first (known) project to directly apply implementation of the research findings on a whole-scale-basis in the form of integration in local government. The first step of this work is a set of guidelines for children's outdoor environment at preschool that thus have been developed (Table 2). Images 1a and 1b give an example of rapid implementation: the design of a new preschool was switched by 180o when the city planners and architects learned about the outcomes of this research. Woodland in the northeast was incorporated, and the originally planned play surfaces used for vegetable beds. And the issue of dangerous wildlife was successfully handled. Now an increasing number of municipalities all over Sweden have started systematic implementation.

An evaluation in the municipality of Nynäshamn of how preschool staff assessed their outdoors and children's play before commencement of the project and three years later. Indications so far are that the upgrading of preschool outdoor environment has resulted in

- more trees, shrubbery and shade
- more use of the outdoors for outdoor education
- more romping, fantasy play, explorative play, symbolic and creative play, and more rest
- more access to adjacent woodland
- more play among trees and bushes ("underneath and between")

Generally preschool staff valued outdoor play to be good for the children in every respect.

On a national level the studies have provided a tool for recommendations of the Swedish Radiation Safety Authority to promote children's sun protection at preschools, as well as they have resulted in an upgrading of pre-existing policy recommendations of the regional administrative councils (proceedings and websites 1-3, image 2). A brochure featuring the guidelines has a synergistic approach in also mentioning the advantages of increased physical activity though the focus is on sun protection. The brochure, titled " Sun protection factors – seven pieces of advice for safer playgrounds and healthier children" has been distributed to all municipalities and also been introduced as a "reader" for preschool staff and city planners and landscape architects in municipalities throughout Sweden. The findings have also been integrated in academic courses for environmental psychologists, landscape architects and specialists in public health sciences.

A deliverable is planned to provide a set of defined criteria for health-promoting outdoor environments (in addition to safety criteria) to be compiled for the build-up of a "criterion" database in analogy with databases for design and monitoring criteria of indoor environment regarding noise level, surface, design, materials etc. The aptitude of these criteria for implementation, monitoring, and evaluation will be further discussed with all parties involved.

The elements of the findings, predominantly from Sweden, may apply to landscapes and social and cultural settings other than those studied so far, and an exploration of what is required for wider applicability is warranted. Inexpensive methods for assessing, selecting, and upgrading preschool land could be adapted to latitude, climate, and varying outdoor play policies (including gender aspects). Criteria could be explored worldwide. On a local level, more detailed discussions on implementation and evaluation methods, considering the role of preschool staff, work routines at preschool, parents, safety, and security aspects (traffic, crime, wildlife etc.) need to be further discussed.

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5. Raustorp A, Pagels P, Boldemann C, Dal H, Cosco N, Mårtensson F. Accelerometer measured level of physical activity indoors and outdoors during preschool time in Sweden and the United States. In press, JPAH, 2011 http://journals.humankinetics.com/jpah-in-press

6. Submitted: Söderström M,' Sahlin U, Boldemann C, Mårtensson F, Dal H, Rosenquist L, Pagels P, Raustorp A, Wester U, Blennow M. Does the outdoor environment influence children's health and stress levels? -A study on children attending child day care center in Sweden (Acta Pediatr)

PROCEEDINGS AND WEBSITES

1. http://www.stralsakerhetsmyndigheten.se/Global/Publikationer/Tidsskrift/Stralsakert/Stralsakert_nr4-11_webb.pdf (pages 14-15, Swedish)

2. http://www.stralsakerhetsmyndigheten.se/Om-myndigheten/Stralsakert/Artiklar/Solskyddade-skolgardar-ar-bade-halsosamma-och-pedagogiska-/ (Swedish, "Sun-protective factors - Seven pieces of advice for safer playgounds and healthier children"

3. http://www.stralsakerhetsmyndigheten.se/Global/Publikationer/Broschyr/2009/Solkyddsfaktorer.pdf

4. http://www.cph-skincancer.com/kidscape

5. http://www.openspace.eca.ac.uk/pdf/appendixf/PROCEEDINGSfinalforwebwithcovers110707.pdf

6. http://www.ced.berkeley.edu/downloads/events/sp11/ucb_death-life-social-factors-2011_conference-publication.pdf

7. http://proceedings.envpsych2011.eu/files/doc/403.pdf

Table 1. The correlation of environment scores vs. physical activity and sun exposure, Stockholm 2004, Raleigh Research Triangle 2009, and Malmö 2009.

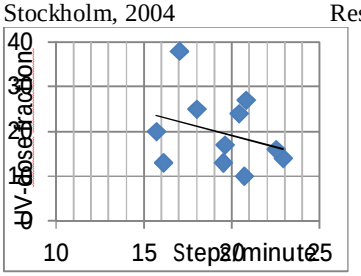
 		Stockholm, 2004, high-score environment. The average sky view factor from favoured play locations was <50%. Physical activity was high, and relative UV exposure low. There was space, and varied terrain. Vegetation was integrated in children's play.
 		Malmoe, 2009, low-score environment. The average sky view factor from play locations was ≥50%. Physical activity was low and relative UV exposure high. Vegetation was scanty and located close to edges/fences and not integrated in children's play.
 		Raleigh , 2009*, At the Research Triangle Park sites, UV exposure was sufficiently low to enable longer time outdoors than was observed, in spite of its position at Lat 36 in March-April, but physical activity lower than in Sweden.

*)Data from the US originated from one social stratum. It is as yet unknown whether this level of physical activity is different in comparison to preschools in socially disadvantaged areas in North Carolina.

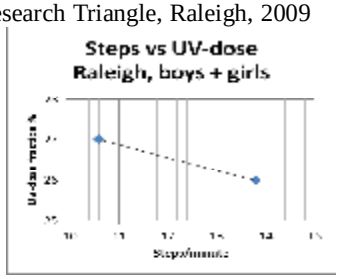
Figures 1 a-c. Correlation between physical activity (step count/minute vs. relative UV exposure from the sun).

Correlations irrespective of latitude or landscape -

Stockholm, 2004



Research Triangle, Raleigh, 2009



Malmoe 2009

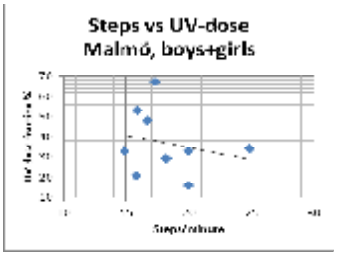


Table 2. Criteria for preschool outdoor environment for planning and upgrading, as applied in local government.

Criteria for preschool environment to promote physical activity and sun protection http://edit.ki.se/ki/jsp/polopoly.jsp?d=35587&a=120380&l=sv	Suggestions for improvement
Surface preferably exceeding 3000 m^2 (33000 square ft.)	Incorporation of adjacent nature/woodland
Space for running, i.e. give the children a chance to "pick up speed"	Removal of high fences segmenting the outdoor environment. For segmentation, barriers of natural material may be used which are high enough to stop toddlers, but sufficiently low to be effortlessly "forced" by 3-5-year-old children
Between half and two thirds of the surface overgrown (trees and shrubbery) and multileveled (irregular topography)	Flat ground may be broken up with e.g. logs on the ground, high mounds of soil (e.g. excavated material), and plantation of shrubbery and by letting "self-planted" saplings grow freely. Use e.g. large objects, e.g. discarded tractor tyres to clutter the environment. Though aesthetically less attractive it is a fine play environment for the children
The free sky view is to be less than 50% (preferably greenery cutting the view), seen from fixed play equipment and favoured play locations	Play equipment is to be placed in a way that they are shaded by trees between 11 am and 3 pm, save vegetation that is used for play. Free space for e.g. soccer is preferably placed east-south-east of the building
Favoured play equipment is to be integrated with nature (trees, shrubbery, stones)	Play locations that are well integrated with nature need not be attended to, for children playing in such locations the sky view is generally below 50%. A rope swing in a branch of a conifer of leafy tree may set a good example
Passages that give access around, between or through buildings (e.g. between walls of buildings and fences), and passages which "tie together" different play environments (behaviour settings) i.e. create "connectivity" (an important aspect in cases where adjacent land cannot incorporated)	Lay out paths among trees and thickets (unless trodden by the children themselves) Build fences at least a half meter (2 ft.) off the walls of buildings or sheds instead of attaching them to each side of the building, and plant bushes at least a half meter (2 ft.) away from the walls of houses
Safety from traffic and criminality	High fences/palisades around the whole area that belongs to the children.

Images 1a and 1b. An example of rapid implementation in the municipality of Nynäshamn outside Stockholm, 2008 (results published 2006). The switch of a design for a new preschool by 180o towards the woodlands owned by the municipality. The issue of dangerous wildlife was successfully handled.

Image 2. The front cover of the brochure: “Sun protection factors – seven pieces of advice for safer playgrounds and healthier children”, issued jointly by the Swedish Radiation Safety Authority and the regional administrative boards.