

Jürgen Kühnis^{a,b}, Andreas Hurschler^a, André Pfister^a

^a University of Teacher Education of Central Switzerland, PHZ Schwyz

^b Private University (UFL), Liechtenstein

Commuting to school – a pilot study among 5th grade pupils in a Swiss rural district

Abstract

Due to the increasing prevalence of overweight, inactivity and motor disorders among growing children the way to school provides a suitable opportunity to incorporate physical activity into the daily routine and to enhance a healthy lifestyle. To date, only few data on Swiss primary school children's journey to school exist. This study used a short questionnaire and a weekly diary that recorded detailed information on the daily way to school. 78 randomly selected 5th grades primary pupils (aged 11.2 ± 0.6 years) were recruited from a Swiss rural district. On average the route to school amounts to 1032 m, whereas 55.1 % of the pupils live less than 1 km from school. The mean distance travelled was 3.2 km per day and 16.2 km per week. The majority of the children (85.3 %) showed an active commuting to school and contributed on average 27.5 min from moderate to vigorous physical activity per day. Between boys and girls no statistical differences could be detected.

Zusammenfassung

Aufgrund der zunehmenden Prävalenz von Übergewicht, Inaktivität und motorischen Defiziten bei Heranwachsenden gewinnt auch die körperlich-aktive Schulwegbewältigung an präventiver Bedeutung, zumal sie eine besondere Chance zur frühzeitigen Integration von Bewegung in den Tagesablauf bietet. In der Schweiz liegen bislang jedoch nur wenige Daten zur Schulwegmobilität vor. Im Rahmen der vorliegenden Studie wurden mittels Fragebogen und Wochenprotokoll differenzierte Schulwegdaten von 78 Kindern der 5. Primarstufe (11.2 ± 0.6 Jahre) in einem schweizerischen Gemeindebezirk erhoben. Die Schulwegstrecke umfasste durchschnittlich 1032 m, wobei 55,1 % der Kinder eine Wegdistanz unter 1 km besaßen. Die mittlere Wegdistanz betrug pro Tag 3.2 km und 16.2 km pro Woche. Die Mehrheit der Kinder (85.3 %) legte den Schulweg aktiv zurück und trug damit durchschnittlich 27.5 min zur Zeit mittlerer bis intensiver körperlicher Aktivität pro Tag bei. Zwischen Mädchen und Jungen zeigten sich keine signifikanten Unterschiede.

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Introduction

Various motor experiences and a sufficient dose of daily physical activity are an essential source of development and health for children and young people (Dordel, 2007; Marti et al., 1999; Strong et al. 2005). According to current studies, many children and adolescents reduce their physical activity in favour of sedentary and media-dominated lifestyles, resulting in poorer motor skills and a tendency to be overweight (Boreham und Riddoch, 2001; Bös, 2003; Graf et al., 2006; Lobstein et al., 2004). Today many growing children and youth fail to meet the recommended guidelines of at least 1 h of moderate to vigorous physical activity (MVPA) per day (Andersen and van Mechelen, 2005; Opper et al., 2009). The early school years are a very important period of life, in which motor skills and healthy long-term lifestyle patterns can be established (Ahnert and Schneider, 2007; Dordel, 2007; Janz et al., 2000).

On the focus of this background and the need to counteract the loss of motor activity in the daily routine, the way to school becomes a central source of promoting children's health. A continuous human powered mobility (HPM) to school has the potential to make an important contribution to the daily degree of activity, stimulates the cardio-vascular system, is environmentally friendly and an ideal start-up for less active or overweight children (Alexander et al., 2005; Cooper et al., 2005; Morris and Hardmann, 1997; Murphy et al., 2002).

Until now, Swiss primary school children's home to school journey has hardly been investigated although the Swiss microcensus on travel behaviour from the years 2000 and 2005 showed

extensive results (Sauter, 2008). Today, many procedures for the collection of data on school mobility and its subdimensions are available. The spectrum ranges from parent and children questionnaires, interviews, mobility diaries up to accelero- or pedometers. Questionnaire studies have been criticised due to their subjective and partly retrospective estimations and document the real duration and distance of the commuting to school only inaccurately. The aim of this pilot study was therefore to test a methodology, which reveals different information (frequency, duration, distance, mode of transport, route) about the journey to and from school and permits a digital visualisation of the routes to school. Our special interest was to analyse the daily HPM proportion compared with official activity recommendations (BASPO, 2006).

Methods

This study was carried out in May and June 2009. Before data collection, all the teachers involved were instructed how to do the observation set-up and the survey instruments were handed out. 78 pupils (41 girls and 37 boys) aged from 10 to 13 years, from six schools in the rural district of Einsiedeln (canton Schwyz) were randomly recruited.

General information about the participants were collected by using a short questionnaire, which included socio-demographic items and questions about physical activity habits. Data on duration, frequency and mode of transport for the journeys to and from school were obtained by using a weekly diary. To collect objective

data on travel duration, we delivered a set of 25 digital stop watches class by class. In addition, the children were asked to draw their routes to school on to a map-sheet of the respective community area. The questionnaire and the map were completed on the first day in the presence of the teachers; the diary was updated daily in the classroom. Afterwards, the routes to school were digitised via geographical information system (ArcGIS 9.3). Thereby they were divided into sections and junctions (i.e. crossing of several routes) which enabled a diagram of the respective pupil frequency on the different route sections to be drawn. The digitalisation expenditure per pupil took approximately 10 min. Analyses were performed using SPSS (version 16). Gender differences were assessed with χ^2 -test and Mann-Whitney-U-Test, drawn at significant level of 5 %.

Results

Distance and duration

The characteristic dimensions and analyses of the journey to and from school are presented in *Table 1* and *Figure 1*. On average, the route to school amounts to 1.032 km, whereas 55.1 % of pupils live less than 1 km from school. The majority of children did the trip to and from school between 3 and 4 times per day (mean 3.2) resp. 16–18 times per week (mean 16.1), i.e. spent lunch hour at home. *Figure 2* shows an exemplary graph of the route to school in an observed school site. On average (*Table 1*), the travel time between home and school was 8.3 min (home → school = 7.3 min; school → home = 9.1 min), whereas 56.4 % of the routes were under this time value.

Mode of transport

The most important mode of transport to school was walking and the use of kickboards or inline-skates (*Fig. 1*). Only a small minority travelled by car or bus. Overall the proportion of children who were active on their daily route to school was 85.3 % and 6.6 % were less active (i.e. combined walking/bus). This active commuting contributed on average 27.5 min MVPA per day (*Table 1*). 14.4 % of the children were active every day between 40–60 min, 8.6 % even achieved the recommended guidelines.

Discussion

In summary, this study indicated that the majority of the children (85.3 %) were physically active on their way to/from school. In the national Swiss travel survey this proportion among the 10- to 12-year-olds was 80 % (Sauter, 2008). Walking was the predominant mode of transport to school (*Fig. 1*); the degree of motorisation was 8.1 %. On average active commuting to school contributed to nearly 30 min MVPA per day. This is half the time children are recommended to spend daily and corresponds with findings from Jimmy et al. (2009) in a comparable Swiss sample.

In comparison to negative trends in other industrialised countries, this high level of activity is pleasing. In the US about one third of children take a bus to school and half are driven by car (Staunton et al., 2003). In Australia, the proportion of 5- to 14-year-old children, who walk to and from school, has more than halved between 1971 and 2003 while the proportion of children driven has more than tripled (van der Ploeg et al., 2008).

Variables	All				Gender*	
	N	Min.	Max.	Mean ± SD	Girls	Boys
Distance						
Distance to school (m)	76	50	3250	1032.0 ± 742.2	958.4 ± 698.8	1118.1 ± 791.6
Distance per day (km)	76	0.2	9.5	3.2 ± 2.3	2.9 ± 2.1	3.7 ± 2.6
Distance per week (km)	76	0.8	47.3	16.2 ± 11.6	14.4 ± 10.3	18.3 ± 12.8
Duration						
Travel time (min.)	78	0.4	20.2	8.3 ± 5.1	7.6 ± 5.2	9.2 ± 5.0
Duration per day (min.)	78	2.2	72.5	30.5 ± 18.2	27.2 ± 18.3	33.1 ± 18.0
Duration per week (min.)	78	12.0	364.3	150.2 ± 92.0	136.2 ± 92.5	165.4 ± 89.5
Mode of transport						
HPM per day (min.)	69	2.2	72.5	27.5 ± 18.2	26.0 ± 18.4	30.1 ± 17.5
HPM per week (min.)	69	12.0	364.3	139.3 ± 91.3	130.1 ± 93.4	151.0 ± 89.0

Table 1: Summary analysis of the journey to school. Min. = minimum, Max. = maximum, HPM = human powered mobility. *No significant group differences (Mann-Whitney-U-Test).

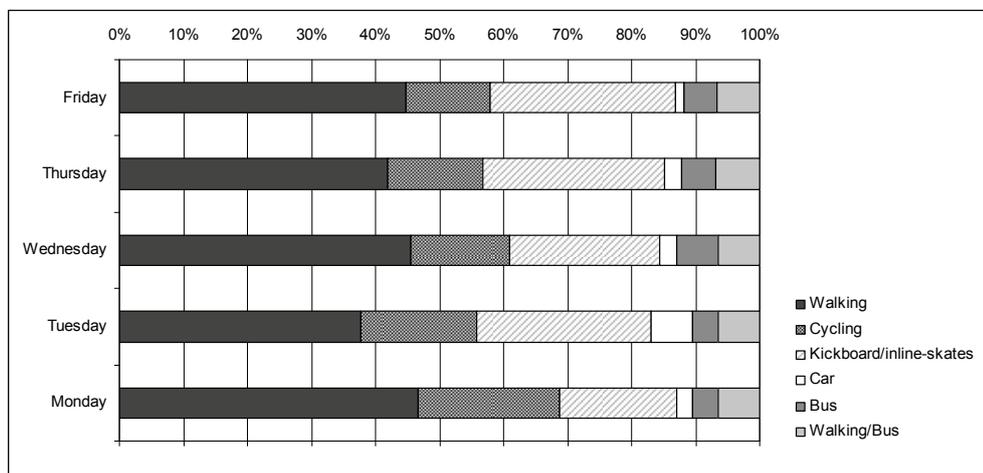


Figure 1: Activity and transportation choices during schoolweek (in %).

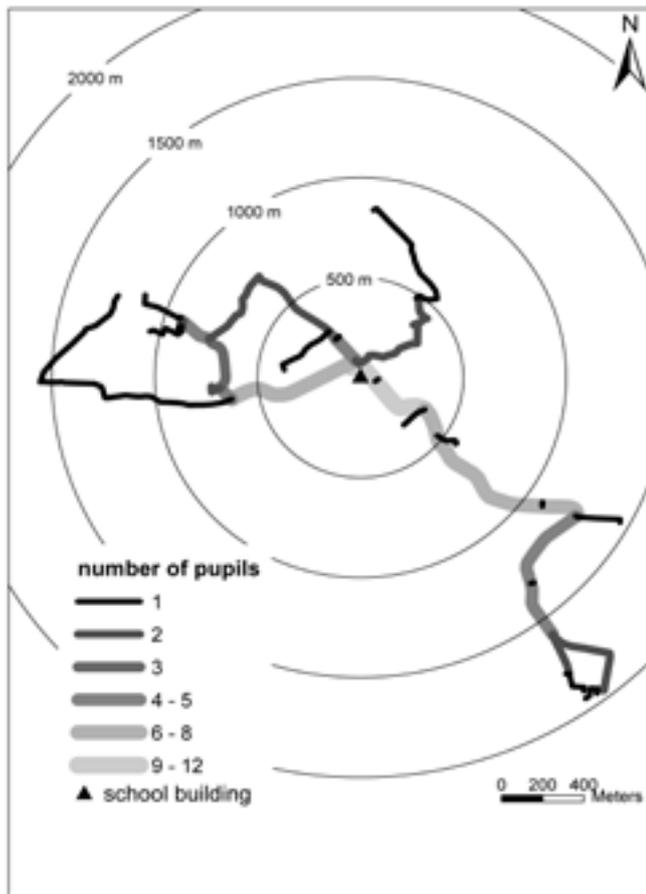


Figure 2: View of exemplary routing (village of Bennau, N=22), analysed with ArcGis.

Although the results of this pilot study are limited to one school district, the combined measurement offers a detailed description of commuting to school for 5th grade pupils. The use of an objective methodology provides an accurate and differentiated picture of the school mobility. All instruments experienced a good acceptance and proved to be practicable. Especially the fact that teachers granted time every day to update the diary resulted in exact data. In contrast to a one-off questioning, this procedure is less susceptible to daily influences and falsifications due to general or retrospective estimations. With the use of the GIS, new ground was touched upon and therefore the many possibilities of this mapping software and its applications have not been exhausted yet. This study rather intended to create simple but meaningful graphs of the routes to schools and the strongly frequented sections. Although this system concerns a very profitable instrument, some limiting aspects are indicated. With an average processing time of 10 min per subject, it is a relatively extensive procedure, which furthermore assumes a certain experience. Drawing the route to school also necessitates general map skills and local geographical knowledge which is why this method is suitable for older children.

For future studies, it would be recommendable, based on an additional school environment analysis (elimination of sources of danger and neuralgic points by questioning all protagonists), to provide detailed, local school routes.

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Adress for correspondence:

Prof. Dr. Jürgen Kühnis, University of Teacher Education of Central Switzerland, PHZ Schwyz, Zaystrasse 42, 6410 Goldau; juergen.kuehnis@phz.ch

References

- Ahnert J., Schneider W. (2007): Development and stability of motor skills from preschool age to early adulthood. Findings of the Munich longitudinal study LOGIK. *Zschr. Entwicklungspsychol. Päd. Psychol.* 39: 12–24.
- Alexander L.M., Inchley J., Todd J., Currie D., Cooper A.R., Currie C. (2005): The broader impact of walking to school among adolescents. Seven day accelerometry based study. *Br. Med. J.* 331: 1061–1062.
- Andersen L.B., van Mechelen W. (2005): Are children of today less active than before and is their health in danger? What can we do? *Scan. J. Med. Sci. Sports* 15: 268–270.
- BASPO (2006): Gesundheitswirksame Bewegung bei Kindern und Jugendlichen. Empfehlungen des Bundesamtes für Sport, des Bundesamtes für Gesundheit, Gesundheitsförderung Schweiz und des Netzwerks Gesundheit und Bewegung Schweiz, Magglingen.
- Boreham C., Riddoch C. (2001): The physical activity, fitness and health of children. *J. Sports Sci.* 19: 915–929.
- Bös K. (2003): Motorische Leistungsfähigkeit vom Kindern und Jugendlichen. In: *Erster Deutscher Kinder- und Jugendsportbericht*. Schmidt W., Hartmann-Tews I., Brettschneider W.-D. (Hrs.). Hofmann, Schorndorf, S. 85–107.
- Cooper A.R., Andersen L., Wedderkopp N., Page A., Froberg K. (2005): Physical activity levels of children who walk, cycle, or are driven to school. *Am. J. Prev. Med.* 29: 179–184.
- Dordel S. (2007): Bewegungsförderung in der Schule. *Handbuch des Sportförderunterrichts*. Verlag Modernes Lernen, Dortmund.
- Graf C., Dordel S., Reinher T. (2006): Bewegungsmangel und Fehlernährung bei Kindern und Jugendlichen. *Deutscher Ärzte Verlag*, Köln.
- Janz K.F., Dawson J.D., Mahoney L.T. (2000): Tracking physical fitness and physical activity from childhood to adolescence: The muscatine study. *Med. Sci. Sports Exerc.* 32: 1250–1257.
- Jimmy G., Praz M., Martin-Diener E. (2009): Self-reported physical activity behaviour in 4th- to 6th-grade students in a Swiss community. *Schweiz. Zschr. Sportmed. Sporttraumatol.* 57: 72–74.
- Lobstein T., Baur L., Uauy R. (2004): Obesity in children and young people. A crisis in public health. *Obesity Rev.* 5 (Suppl 1): 4–104.
- Marti B., Bühlmann U., Hartmann D., Ackermann-Liebrich U., Hoppeler H., Martin B., Seiler R., Kriemler S., Stüssi C., Narring F., Birrer D., Jimmy G., Imhof U., Vuille J.-C. (1999): Fakten zur gesundheitlichen Bedeutung von Bewegung und Sport im Jugendalter. *Schweiz. Zschr. Sportmed. Sporttraumatol.* 47: 175–179.
- Morris J.N., Hardmann A.E. (1997): Walking to health. *Sports Med.* 23: 306–332.
- Murphy M., Nevill A., Neville C., Biddle S., Hardmann A. (2002): Accumulating brisk walking for fitness, cardiovascular risk, and psychological health. *Med. Sci. Sports Exerc.* 34: 1468–1474.
- Opper E., Woll A., Worth A., Bös K. (2009): Zusammenfassung der Ergebnisse, Fazit und Perspektiven. In: *Motorik-Modul: Eine Studie zur motorischen Leistungsfähigkeit und körperlich-sportlichen Aktivität von Kindern und Jugendlichen in Deutschland*. Bös K., Worth A., Opper E., Oberger J., Woll A. (Hrs.). Nomos Verlag, Baden-Baden, S. 300–310.
- Sauter, D. (2008): Mobilität von Kindern und Jugendlichen. *Fakten und Trends aus den Mikrozensus zum Verkehrsverhalten 1994, 2000 und 2005*. Im Auftrag des Bundesamtes für Strassen ASTRA. *Materialien Langsamverkehr*, Nr. 115. Bern. 127 S.
- Staunton C.E., Hubsmith D., Kallins W. (2003): Promoting safe walking to school: the Marin county success story. *Am. J. Pub. Health*, 93: 1431–1434.
- Strong W.B., Malina R.M., Blimkie C.J.R., Daniels S.R., Dishman R.K., Gutin B., Hergenroeder A.C., Must A., Nixon P.A., Pivarnik J.M., Rowland T., Trost S., Trudeau F. (2005): Evidence based physical activity for school-age youth. *J. Pediatr.* 146: 732–737.
- Van der Ploeg H.P., Merom D., Corpuz G., Baumann A.E. (2008): Trends in Australian children traveling to school 1971–2003: Burning petrol or carbohydrates? *Prev. Med.* 46: 60–62.