

Promoting Bicycle Use and Preventing Bicycle-Related Injuries: Recommendations for School Communities in Canada, Germany and the United States

Kelly White, BA
Lauren Ratner, BA
Katrin Markeli, Dipl. Oec. troph.

ABSTRACT

Physical inactivity is currently a leading public health concern in Western Europe and North America. This indicates a need to consider options for adding physical activity into the daily lives and activities of children. A possible means of adding physical activity to the daily routine of children and families is to increase active transportation, such as walking and cycling, as a means of commuting to and from school. Current research on active transportation indicates that commuting to school by bicycle has the potential to reduce bicycle injuries, enhance health and wellness, and improve the health of communities. However, the current number of children cycling to and from school in Canada and the United States is extremely low, due in part to concerns over cycling safety. Therefore, developing coordinated and comprehensive bicycle safety programs in schools can address and alleviate some of the barriers to children cycling to school as well as prevent injury and improve overall health.

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Introduction

Cycling safety researchers and advocates, such as Pucher and Dijkstra (2003), argue that cycling has the potential to address inactivity and air pollution among other public health benefits. Cycling as a means of transportation is considerably lower in Canada and the United States than in Germany (Pucher & Dijkstra, 2003). Approximately 15% of United States adults report cycling at least once a week for recreational or exercise purposes, as compared with 24% in Canada (Clarke, 2003). In terms of cycling for commuting purposes, rates of cycling are three times higher in Canada than in the United States, and the Canadian figure of 1.2% is dwarfed by the 11% of Germans who cycle for transportation (Clarke, 2003). Furthermore, cycling among children and youth as a means of commuting to and from school is particularly low, with less than 5% of Canadian students riding a bicycle to school most of the time (Go for Green, 1998). This paper will explore methods and considerations for including bicycle safety within school health education programs in Canadian, United States and German school communities to encourage active transportation to and from school.

Background

Increasing cycling among children has unlimited benefits to public health and well-being. The obvious benefits at a population level include: the increase of physical activity; warding off chronic and preventable diseases; and reducing harmful carbon

emissions as a result of active rather than automotive transportation. The issue of physical inactivity is particularly important for many industrialized countries currently facing obesity epidemics among children and youth. For example, in Canada, the proportion of obese children has nearly tripled in the past 25 years, due in part to the increased use of automated transport (Health Canada, 2008). In the United States, an estimated 17 percent of children and adolescents from ages 2 to 19 years old are overweight, according to the 2003-2004 National Health and Nutrition Examination Survey. Furthermore, 300,000 premature deaths occur annually in the United States due to lack of physical activity (Clarke, 2003). In Germany, 15% of all children aged 3-17 years are overweight and 6.3% are obese. The number of overweight and obese children and adolescents in Germany has increased approximately 50% in comparison with data from 1980-1990 (Kurth & Schaffrath, 2007). The health care costs associated with obesity is estimated at 15 million Euros per year (Kielman & Herpertz, 2002). At an individual level, the psychological benefits of active transportation are particularly relevant to school aged children. Pretty, Peacock, Sellens, and Griffin (2005) have found that green exercise, which is physical activity outdoors and in nature, is more effective than exercise alone in improving cardiovascular and mental health. The evidence suggests that nature can positively influence health, including protecting individuals from stress, and improving concentration (Pretty et al., 2005).

Improved concentration and mental well-being among children can contribute to better learning and improved cognitive functioning in the classroom, which is particularly relevant when considering a school-based active transportation program.

Encouraging parents and children to consider modes of active transportation is one way countries such as Canada, Germany, and the U.S. can address physical inactivity and the chronic diseases associated with obesity. Furthermore, the school setting provides an opportunity to target school-aged children, thereby increasing the likelihood that physical activity will continue and be sustained into adulthood (Merom, Tudor-Locke, Bauman, & Rissel, 2006). Cycling to and from school adds more physical activity for children in their daily routine. Unfortunately, the number of children cycling to school in Germany, Canada and the U.S. is low. In Canada, 9 out of 10 children own a bicycle, but only 5% of Canadian students ride their bicycles regularly to and from school (Go for Green, 1998). In 1969, about half of all schoolchildren in the United States biked or walked to school, while current estimates show that fewer than 15% of children in the United States use an active form of transportation to go to school (Martin, 2005). In Germany, where overall rates of cycling are considerably higher than in the United States and Canada, the number of children cycling to school are still comparably low (Pucher & Dijkstra, 2003). Although most children in Germany live three to five kilometers away from school, only 30% of children in grammar school and 6% of secondary students ride to and from school (Müller, 2005).

One possible reason for few children cycling to and from school is concern over safety. McMillan (2005) and Racioppi, Dora and Rutter (2003) argue that commuting decisions for children getting to school are often made by the caregiver and as such concerns over safety take precedence. In Canada, the 1998 National Survey on Active Transportation found caregiver concern over safety to be the second most significant barrier to children cycling to school after concern over distance to school (Go for Green, 1998). Similarly, in Germany caregiver concern for road safety has been referred to as the most significant reason why more children do not cycle to school (Müller, 2005). In the United States, the 2004 ConsumerStyles Survey and follow-up, found that the most common barriers faced by parents in the United States with children aged 5-18 was “distance to school”, followed by “traffic-related danger” (Martin, 2005). These findings are consistent with research from other industrialized countries where safety issues around traffic and crime are major

determinants of active commuting to and from school, apart from distance (Merom et al., 2006).

Bicycle injury statistics for the Canadian population suggest injuries among children have been in decline with the rate of hospitalization at 35.9 per 100,000 population (Canadian Institute for Health Information, 2004). Cycling fatalities among children also have been in decline since the mid-1980s, due in part to widespread helmet use among Canadian children (Canadian Institute for Health Information, 2004). In the United States, bicycle-related crashes kill approximately 800 people every year, and result in an additional 567,000 hospital emergency room visits with non-fatal injuries (Schatz, 2001). In 1998, data provided by the United States Department of Transportation’s Fatality Analysis Reporting System noted that 98% of bicycle riders who were killed in bicycle crashes were not wearing helmets (Schatz, 2001). In the United States, bicycle-related injuries account for 10% of all pediatric deaths, and in 1998, 203 children age 14 and under died due to bicycle-related injuries (Coffman, 2003). Bicycle crashes are also the most common cause of head injuries in children, and there is currently no federal law in the United States requiring cyclists to wear helmets (Coffman, 2003). In Germany, wearing helmets is not a main cause of bicycle-related injuries. In 2006 in Germany there were 11,843 bicycle related injuries involving children (ADAC 2007). There is no helmet law in Germany because the German cycling club (Allgemeiner Deutscher Fahrradclub e.V. ADFC) has argued that a helmet law would cause a decrease in the number of cyclists, and therefore more people will drive cars, resulting in more crashes between cyclists and car drivers (ADFC, 2008).

Based on the low number of child cyclists in Canada and the United States and the frequently cited safety concerns of caregivers, it would appear that a perceived fear around cycling safety is a major deterrent to increasing cycling. Whether the fears of caregivers are perceived or real, they need to be considered and balanced against the individual and community benefits of cycling (Centre for Health and Environmental Research, 2008). Studies suggest that the risk of cycling injuries decrease the more cycling there is (Eckman, 1996). Jacobson (2003) has found that motorists are less likely to collide with cyclists when there are more people riding bicycles. Accordingly, he suggests that increasing the number of cyclists in a community appears to be an effective means of improving the safety around cycling (Jacobson, 2003). As stated in *Barriers to Children Walking to or From School –United States, 2004*, the best method to address barriers which prevent children cycling to school is a comprehensive initiative that includes behavioral, environmental, and

policy strategies (Martin, 2005). The school setting can provide a location for such comprehensive programs by addressing the barriers and encouraging cycling as well as educating all school community members about safe cycling skills and practices.

The School Setting

The school setting is an optimal location for health education programs and practice because of the frequent and sustained interaction between individuals in the community, creating efficiencies in time and resources (Mullen et al., 1995). Racioppi et al. (2005) suggest that improving physical activity within communities requires new partnerships and policies that involve a number of different sectors such as urban planning, transport, education, etc. Schools represent an opportunity and a setting in which these partnerships and policies can be built. For example, the 'health promoting school' in Europe and 'coordinated school health programs' in the United States offer frameworks for school health in which the social and physical school environment and school-based health policies are linked with health services and the local community (St. Leger, 2001). In the United States, the CDC has endorsed coordinated school health programs (CSHP) as a means of building healthier school communities through classroom instruction, environmental policy, and community and family involvement (Young et al., 2007). Implementing CSHP in schools ensures comprehensiveness that is particularly useful for addressing issues such as inactivity among children. Lee, Burgeson, Fulton, and Spain (2007) argue that a substantial percentage of children's recommended daily activity can be achieved through a comprehensive school-based physical activity program. The addition of cycling safety education through the systematic implementation of a CSHP is an opportunity to provide the knowledge and skills around cycling safety to students in addition to improving physical activity through active transportation to and from school. Furthermore, and in consideration of the safety concerns mentioned earlier, the CSHP allows for parental and community participation which will help reduce such barriers by improving the health-related knowledge and skills of parents, teachers, and administrators.

Translation to Health Education Practice

Coordinated school health programs include eight interacting components that contribute to the health and wellbeing of students and staff in the school (Allensworth & Kolbe, 1987). These components include: 1) health education; 2) physical education; 3) health services; 4) nutrition services; 5) counseling and psychological services; 6) health

promotion for staff; 7) healthy school environment; and 8) family and community involvement (Allensworth & Kolbe, 1987). For the purposes of outlining recommendations in this paper, the relevant CSHP components will be synthesized into the following three groups; 1) the curriculum; 2) partnerships; and 3) the school environment. These categories will serve as a 3-component framework for the recommendations for school-based bicycle safety programs, which incorporates active transportation for students, staff, teachers, and parents to and from school. The categories of recommendations are inter-related and adaptable to those countries, communities and individual schools who endorse a whole-school approach.

Recommendations

The curriculum. The recommendations for bicycle safety curriculum are guided by the CSHP components of health education and physical education. According to Allensworth and Kolbe (1987), health education should allow students to develop increasingly sophisticated health-related knowledge, attitudes, skills, and practices while physical education should promote lifelong physical activities and sports that all students enjoy. Using these concepts as a guideline for bicycle safety curriculum ensures that attitudes and beliefs, as well as skills and practices, are covered in the curriculum. This is significant as research has shown that instruction-only programs are generally ineffective in improving safe cycling behavior among children (Macarthur, Parkin, Sidky, & Wallace, 1998). A recommendation to help guide effective bicycle safety curriculum is to ensure health literacy is an outcome of health and physical education. Health literacy refers to the personal, cognitive, and social skills which contribute to the ways in which individuals make health decisions (Nutbeam, 2000). Nutbeam (2000) identifies three levels of health literacy; functional, communicative/interactive, and critical health literacy. Most health education curricula addresses functional and interactive health literacy, but often the third, critical level is more difficult to achieve. With bicycle safety education, it is important to teach children the basic rules of the road such as how to read and understand road signs (functional literacy), how to interact with other cyclists and road traffic (interactive literacy), and the importance of helmet use (functional and interactive literacy). More importantly children also need to foster the advocacy skills of critical literacy in order to encourage community capacity to act on improving health (Nutbeam, 2000). A possible avenue for developing this third level in bicycle safety education is to have students develop a

proposal for building safer routes to school. The development of the proposal itself can include cross-curricular examinations of the local geography in terms of where routes might be planned, mathematical assessments of distances to school, and comprehension of the structures and processes of municipal governments and ways to influence the political agenda of the community. These skills would enable students to participate actively in the development of healthy school and community initiatives, while improving their cycling knowledge and attitude. This may also alleviate some of the safety concerns among children who will develop the confidence to practice safe cycling skills as a result of the health and physical education curriculum.

Partnerships. Comprehensive, skills-based curriculum relies on the partnerships and participation of the school's community members. Partnerships in a bicycle safety school program can include the CSHP components of health promotion for staff and family and community involvement. Allensworth and Kolbe (1987) suggest that health promotion for staff can result in greater commitment to the health of students and creates positive role modeling, while family and community involvement can ensure resources and services effectively respond to the health-related needs of students. A recent pilot project in Vancouver, British Columbia, involved 23 educators participating in a cycling skills workshop designed to encourage the educators to start cycling to school. The rationale behind the project was to capitalize on the visibility of school teachers as role models for students. The researchers argue, "When an educator cycles to school, their bicycle, helmet and gear can become visual prompts demonstrating their commitment to environmental stewardship, social responsibility and active living" (Transport Canada, 2008). The results of the project found that two-thirds of the participants felt much more confident in their cycling ability and were better prepared to promote cycling at their school (Transport Canada, 2008). As well, 93% of the participants reported incorporating at least one bike activity in their classroom one month after the cycling workshop (Transport Canada, 2008). The positive results of this program highlight an opportunity to capitalize on the influence of a school's community members, as well as address the real and perceived fears around cycling safety. A recommendation for building capacity for commuting to school by bike would be to offer a similar workshop for teachers, staff, administrators and parents alike. By educating caregivers and teachers about safe cycling skills, parental attitudes towards cycling can also be positively influenced.

Another suggestion would be to ask parents and teachers to coordinate a bike-pool for students in which one or more adults would meet individual students in a given neighborhood and collectively bike to school using safe bike routes. An example of such a project is the German "Fahrrad macht Schule," funded by the Federal Ministry of Traffic, Building, and Urban Development. The project establishes cycling teams for the purpose of encouraging children to cycle to school. Children in younger grades cycle to school with older children and adults who were taught bicycle safety skills by local police. The children are also taught cycling skills by police within the school curriculum. As a means of enabling bicycle use, the children can rent bikes at the school for their journeys to and from school, or to use during holidays. Involving various members of the school community has the potential to enhance the health of all stakeholders as well as address the barriers such as safety concerns around children commuting to school by bicycle.

School environment. The CSHP components of healthy school environment and health services can be addressed through cycling safety education programs. The built environment and infrastructure of the school and routes to and from school need to be considered in a bicycle safety program. An example of an infrastructure improvement project in the United States is the "Safe Routes to School" program, which can be found in states such as Michigan and California. Safe Routes to School educates students about bicycle safety and cycling and is promoted as an appealing mode of transportation, thereby encouraging children to think of the environment while developing healthy lifestyle choices (Martin, 2005). The Safe Routes to School aims to create an infrastructure that is safe and conducive to exercise for children whose physical education has been cut due to funding cuts and demands on teachers spending more time teaching math, science, reading, and language arts (Vogt et al., 2006). The program is more than simply encouraging children to walk to school, but to do so safely. The knowledge gained from attending classes and information sessions of safe ways to actively travel to school relieves barriers faced by children in regards to engaging in physical activity. There are five "E" strategies that have been incorporated into the program to make it successful and sustainable. The five "E" strategies, which were discovered through information gathered from students and parents, are: Engineering, Education, Encouragement, Enforcement, and Evaluation (Vogt et al., 2006).

Michigan's Safe Routes to School program has not only helped children realize that destinations are easy to reach by safely biking or walking to them, but

members of the community also have begun to take notice of the ease of getting places without automotive transportation. The success of the program, therefore, has not only benefitted the children whom are part of it, but also the community-at-large (Vogt et al., 2006). Because of the success of Michigan's program, a federal Safe Routes to School program was authorized in 2005, and every state in the United States has been allocated funds to help with infrastructure improvements and non-infrastructure activities to encourage and enable students to walk and bike to school (Martin, 2005).

The kinds of changes involved in a Safe Routes to School program require not only participation from community members, but also a shared school ethos around the importance of safe cycling. Building the necessary infrastructure is only economical and sustainable if bike paths and bike racks are being used. Therefore, the school must support and encourage cycling in spirit as well as in practice. This embrace of cycling may require some of the recommendations previously mentioned, as well as providing workshops for teacher and staff to encourage riding bikes to school, or providing shower facilities to staff who would like to commute by bicycle. A bike-to-school week could incorporate various skills and activities to promote cycling skills, helmet use, and environmental sustainability. Creating a culture of physical activity and safety awareness within the school is essential to the success of CSHP and initiatives to promote cycling to and from school.

Conclusion

Canada, Germany, and the United States are three countries with great potential to increase physical activity, reduce carbon fuel emissions, and build healthier, more sustainable communities. Integrating coordinated, comprehensive bicycle safety programs into school health education programs in any of these countries has the potential to increase cycling among children, youth and adults, as well as reduce overall bicycle injuries. The school can be an optimal setting to encourage, support, and promote active transportation such as cycling, as the school can target all the key stakeholders of a community. Often fears around cycling injuries and road safety deter families from choosing active methods of transportation to school. In all three countries cycling injuries are relatively low and the public health benefits of increased cycling need to be considered against the real and perceived concerns of families. The benefits to increasing cycling are such that addressing safety concerns through health education and coordinated school health programs is a worthwhile endeavor for school communities.

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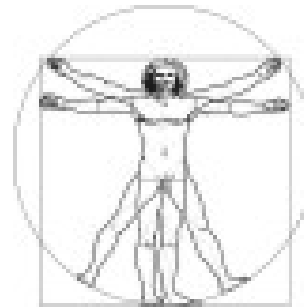
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ABOUT THE AUTHORS

Kelly White (kellyannewhite@gmail.com) is a graduate student at Simon Fraser University in Burnaby, British Columbia (Canada). Lauren Ratner (lratner@health.usf.edu) is a graduate student in the MPH program, Department of Community and Family Health, University of South Florida College of Public Health, Tampa, Florida (United States). Katrin Markeli (Lmarkeli@uni-koeln.de) is a student at the University of Cologne (Germany). An earlier version of this paper was presented in May 2008 at the 10th Health Education and Injury Prevention Course and Field Conference, Cologne, Germany. Copyright 2008 by *Umwelt und Gesundheit Online* and the Gesellschaft für Umwelt, Gesundheit und Kommunikation.