

The Bicycle: Vehicle to Health and Social Equality

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Summary:

Multiple levels of synergy exist between bicycling, health, and social equality. Transportation infrastructure and policy in most countries elevates the social status of motorists over bicyclists and pedestrians. Through such policy, the status syndrome (inequality as a direct risk factor for ill health) is related to the world obesity epidemic and to low self esteem and social stigmatization of those who walk, ride mass transit, and use the bicycle for transportation. Programs which promote bicycling have the ability to help reverse these negative health and social trends. Such programs are more successful in boosting cycling, health, and social equality when one of the program goals is the elevation of the cyclist to equal status and privilege as the motorist. Because the effects of inequality on health have profound consequences for all humanity, transportation planners, policy makers and infrastructure developers must adopt as a priority, the goal of promoting status equality in every policy and project.

To date, efforts to study the health effects of inequality in transportation have focused on crash injuries, noise-related stress and social disruption, pollution exposure, social isolation in high traffic neighborhoods, and difficulty accessing medical care by those who are transport disadvantaged. A 1999 World Health Organization study of mobility concluded “Exercise levels, social contact, and access to services in children, the elderly, the ill, and the poor is inversely related to the societal level of motor vehicle usage in all countries.” In 2006, Transportation Alternatives (TA) in New York published a study showing that people who live on streets with heavy traffic go outdoors less often and have fewer friends than those living on quieter streets. The study, “Traffic’s Human Toll” reveals that high volume vehicular traffic has profoundly negative impacts on the lives and perceptions of residents who live near it. The study concluded that, “Compared to their neighborhood counterparts living on streets with low traffic volumes, residents living on higher volume streets:

- harbor more negative perceptions of their block;
 - possess fewer relationships with their neighbors;
 - are more frequently interrupted during sleep, meals, and conversations;
 - spend less time walking, shopping and playing with their children.”
- A 1995 study of social contact in San Francisco third graders showed that, on average, those living on streets with light traffic had three times as many friends and twice as many acquaintances as those living on streets with heavy traffic.

The recently identified Nature Deficit Disorder is a failure to develop a sense of connectedness with nature resulting from lack of meaningful experience of natural areas. This disorder develops in children who are constantly indoors or in motor vehicles. Children who are deprived of contact with nature begin to show deficits in motor and social skills as early as age five. The disorder was starkly demonstrated in a study by Marco Huttenmoser of Zurich in which 6 and 7 year-old children were asked to draw pictures of their daily trips to school. Those who walk or bicycle to school drew pictures rich with color and included a variety of plants, animals and people encountered in their

journeys. Their classmates who are driven to school tended to draw images with little color and devoid of details about anything but the vehicle, the road, and the buildings of origin and destination.

Although some studies have mentioned feelings of insecurity related to traffic volume and proximity, analyses of the adverse health effects of the status syndrome resulting from transportation inequality have been lacking. The status syndrome describes a direct link between social status and health, independent of other health risk factors. Higher social status is associated with lower risk of illness across a broad spectrum of health and disease indicators. The syndrome was first described by Sir Michael Marmot, professor of Epidemiology at the International Institute for Society and Health, University College, London. According to Marmot, "The higher the social position, the longer can people expect to live, and the less disease can they expect to suffer." Marmot first noticed the effect during analysis of data from the 1970's Whitehall Study which looked at coronary artery disease risk factors among British civil servants housed at Whitehall, U.K. Whitehall was studied because its high degree of stratified organization lent itself to ready collection of the data needed. When the data were analyzed, Marmot was surprised to discover that position in the bureaucratic hierarchy was directly related to the risk of coronary events. Thus, the number one official at Whitehall was less likely to have a myocardial infarction (M.I.) in any given period of time than was the number two official who was at less risk than the number three official. This effect continued undisturbed down the hierarchy and was independent of all other risk factors. Men in the lowest employment grade (office support) were four times more likely to experience M.I. than those in the highest grade (administrative). In fact, the data showed employment grade to be a more powerful predictor of M.I. than the classic risk factors of smoking, serum cholesterol, and blood pressure combined. This astounding finding led to a second (Whitehall II) study of 17,000 bureaucrats which confirmed and expanded upon the original findings.

Several studies have since confirmed the reproducible risk difference associated with even small salary differences. These studies have refuted the argument that the health risk disparity between different socioeconomic classes are solely the result of lifestyle differences or differing ability to afford health care, although those factors are real and operate independently of the status syndrome

Work stress and work hierarchy have been shown to be independent risk factors for the metabolic syndrome (a constellation of coronary risk factors, including central adiposity, hypertension, glucose intolerance, and hyperlipidemia). The more work stress that was reported, the greater the likelihood of having the metabolic syndrome. Ninety percent of the metabolic syndrome stratification by employment grade remained after smoking, sedentary lifestyle, and alcohol consumption were factored out. In addition, several studies have shown a direct link between increased risk of coronary disease and low control in the workplace and perceived imbalance between efforts and rewards. This lack of control is much more stressful and harmful to health than is the perceived heavy workload and long work hours typically associated with upper level administrative positions. The impact of the status syndrome seems to be more severe the greater is the degree of inequality in any given hierarchy. This is seen in the health status rankings of nations. Thus, the large disparity between social classes in the U.S. is thought to be a major reason this wealthy country, which spends the most per capita on health care,

consistently ranks far down the list in such parameters as infant mortality and life expectancy.

The status syndrome is demonstrable over a wide range of health variables including longevity, infant mortality, HIV/AIDS, and others. It is also demonstrable across a broad array of socioeconomic variables such as employment hierarchy, community social status, regional and national economic ranking, and even education level. A 1990's study in Sweden showed M.I. risk to be lower the higher level of educational degree obtained even to a difference depending on the number of PhD's an individual has earned

The status syndrome is thought to be mediated through the mechanisms by which our endocrine and nervous systems respond to stress. Acute stress causes an outpouring of hormonal and nervous system impulses to enable the organism to cope more effectively (the "fight or flight" response). Chronic stress produces constant elevations of these levels which negatively affects the health of the organism. Numerous studies have demonstrated that individuals' stress hormone (glucocorticoids and catecholamines) levels are inversely related to social status in humans and all other primate species with social hierarchies. In human societies, stress associated with the adverse effects of status is compounded by internalization of messages of inferiority resulting in poor self-esteem. Insecurity, chronic anxiety, low self-esteem, social isolation, and lack of control in work and social interactions undermine mental and physical health.

The effects of the status syndrome seem to begin well before birth. Maternal stress hormones and other chemical factors cross the placenta. Low birth weight and predisposition to a number of metabolic diseases are directly associated with lower social status. Blood cortisol levels in adults are inversely related to birth weight. Low birth weight is a direct risk factor for later development of diabetes type 2. Multiple studies have shown that mortality is related directly to low levels of social integration.

The status syndrome even has linear geographic correlates. The life expectancy of a male resident of Washington D.C is 57 years and increases 1.5 years per mile to Montgomery County, Maryland, where the male life expectancy is 76.7 years.

Following the collapse of the Soviet Union in 1990, the associated decline in social status and the rise of social inequality led to a rise in mortality which was somewhat mitigated by higher education level. In 1978, coronary disease mortality rates were nearly identical in Lithuania and Sweden. By 1994, coronary mortality was four times higher in Lithuania than in Sweden.

The World Health Organization's landmark 2005 report on the social determinants of health, "The Solid Facts," recognized transport as a major area where inequality negatively affects health. But even that report, co-edited by Sir Marmot, failed to consider the status syndrome as a direct health risk factor in its transportation section. We need to recognize that, as was true within Whitehall, our transportation systems are designed as hierarchies with motorists enjoying higher status than other users. Usually, the degree of disparity between motorists and others is extreme. Typically, pedestrians are at the bottom of this social stratification. As we spend longer hours using these systems, especially in areas where sprawl development is the norm, the adverse health effects of this designed inequality can be expected to reach greater prominence. Unfortunately, this effect has received little study.

Let us now consider some situations in which transportation disparity has been reduced. In 1991, Cuba was suddenly faced with a transportation crisis when the collapse of the Soviet Union interrupted its oil supply and immobilized its motor vehicle fleet. The government declared a “special period” emergency. All available means of alternative transportation were put into use. 1.5 million bicycles were imported from China, and tractor trailers were converted to “camel” buses which can carry up to 150 passengers. The crisis served to decrease transportation disparity. In general, social inequality is much less extreme in Cuba than in most developed countries. The Cuban population now consistently ranks much higher than the U.S. in measures of health.

Enrique Penalosa became mayor of Bogota, Colombia in 1995. He implemented a plan of social equalization which concentrated in promoting transportation equality. During his six years in office, Penalosa’s administration developed 52 new schools, refurbished 150 others, added 14,000 computers to the public school system, and increased student enrollment by 34 percent. He also built three large central libraries and 10 neighborhood libraries. He improved life in the slums by bringing water to 100 percent of Bogotá households, and buying undeveloped land on the outskirts of the city to prevent real estate speculation and ensure that it will be developed as affordable housing with electrical, sewage, and telephone service as well as space reserved for parks, schools, and greenways. Penalosa successfully reclaimed the sidewalks from motorists, who traditionally drove and parked on them with impunity. The year before he took office, over 200 pedestrians were killed by cars driving on the sidewalks or when they stepped into the street to go around cars parked on the sidewalks. "I was almost impeached by the car-owning upper classes," Peñalosa said, "but it was popular with everyone else."

Penalosa established over 300 kilometers of separated bikeways, announcing, “These bike paths are a declaration that a citizen riding a \$30 bicycle is equally as important as a citizen driving a \$30,000 car. We built symbols of respect, equality and human dignity, not just sidewalks and bike paths. Motor vehicles on sidewalks were a symbol of inequality – people with cars taking over public space. A premise of the new city is that we want a society to be as egalitarian as possible. For this purpose, quality-of-life distribution is more important than income distribution, and quality of life includes a living environment as free of motor vehicles as possible.”

Penalosa created the Trans-Milenio, a bus rapid transit system (BRT), which now carries a half-million passengers daily on special bus lanes that offer most of the advantages of a metro at a fraction of the cost. His programs reduced traffic by 40 percent with a system where motorists must leave cars at home during rush hour two days a week. He also raised parking fees and gas taxes, with half of the proceeds going to fund the new bus transit system. He implemented an annual carfree day during which everyone had to use alternative transportation. He created a 45 km. greenway along a blighted river in a space which had been slated for an 8-lane highway. He built the world’s longest (17 km.) pedestrian street. He established or refurbished 1200 parks and playgrounds throughout the city.

Penalosa recently declared, “The world's environmental sustainability and quality of life depends to a large extent on what is done during the next few years in the Third World's 22 mega-cities. There is still time to think different... there could be cities with as

much public space for children as for cars, with a backbone of pedestrian streets, sidewalks and parks, supported by public transport.”

During his term in office, the murder rate in Bogota fell by two thirds. Violent crime rates declined dramatically, and quality of life indices rose. Penalosa’s successor has continued his programs which have been so popular that election of a mayoral candidate who espouses reversal of the equalizing efforts is considered exceedingly unlikely.

There are many other examples of legislative, infrastructural and programmatic changes which help to equalize transport modal status. Notable among them are the “green wave” traffic light system developed in Odense, Denmark, and the Netherlands law assigning fault to motorists in collisions with cyclists unless the cyclist can be proven to have deliberately caused the accident. The danger motor vehicles pose to other road users and the ease with which motorists can physically intimidate and dominate cyclists and pedestrians clearly justify further changes to promote parity.

Just as the city of Odense has become the Danish national cycling laboratory, the transportation changes of the “special period” in Cuba and those initiated by Enrique Penalosa in Bogota provide laboratories for studying the benefits of transport equalization. To facilitate such study, methods to measure status syndrome effects in transport systems must be developed and refined.

In the USA in 2005, Hurricane Katrina highlighted the devastating result of decades of transportation policy which discriminates against those who do not own cars by dismantling public transportation systems while heavily subsidizing use of the private motor car. By the time the evacuation order for Hurricane Katrina was issued, the bus and train services out of New Orleans had already been shut down. Over 1/3 of New Orleans residents do not own cars. The last Amtrak train to leave New Orleans traveled to Tennessee not to evacuate people in the path of Katrina, but to avoid hurricane damage to Amtrak rolling stock. That train traveled to Tennessee empty of passengers.

Although more study is needed regarding the magnitude of the status syndrome effect in transportation systems, analysis to date supports the role this phenomenon plays in damaging the health of victims of transportation inequality. It is well proven that individuals seek to avoid the psychological and physical stress associated with low status. Our transportation systems are hierarchical by design and through properties intrinsic to each of the various modes. Without stringent effort to minimize status disparity between system users, those users will naturally tend to seek the perceived highest status level, the private motor car.

Through the status syndrome, motorists adversely affect the health of other modal users. This effect constitutes an externalization to society of the cost of motoring which has not been fully recognized or subjected to economic analysis. The costs of motoring not fully paid by motorists themselves have, therefore, been underestimated by economists. This externalization of cost must be accounted for in future economic analyses of transportation impacts

The perception of transportation mode status by individuals has largely become internalized and automatic. Transportation programs which elevate the status of pedestrians, bicyclists and transit users to equality or superiority with respect to motorists will help change this perception and should result in more rapid adoption of alternative transportation modes than programs which ignore status effects or which seek to change

status perception by education or marketing approaches not accompanied by real and demonstrative changes in the system hierarchy. By lowering motor vehicle usage, these programs will serve to decrease the health impacts of both the status syndrome and the other adverse effects of transportation inequality mentioned above (i.e. crash injury, noise stress, social isolation, pollution exposure and healthcare access limitation).

Transportation equality is clearly a vital matter of health and social justice. I offer these recommendations as beginning steps:

- Make equality promotion a goal of all transportation systems and a design feature of every transportation project.
- Include equality analysis as a criterion in all transportation studies.
- Develop transportation equality metrics to standardize these studies.
- Consider the status syndrome in all studies of transportation health effects.
- Recognize status syndrome health impact as an externalized cost in economic analyses of transportation projects

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