The Mālaekahana Path: An Ecological Model-Based Intervention for Increasing Walking and Biking in Rural Hawai‘i

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Obesity is one of the largest public health challenges facing Hawai‘i today. Mau et al.’s systematic assessment of the existing literature demonstrated that Native Hawaiians and other Pacific Islanders have increased prevalence of diabetes, obesity, and other cardiovascular risk factors compared with other race/ethnicity categories. Although interventions to increase physical activity through individual/social approaches have shown modest success, further progress can be made. Consistent with the increased focus on walking brought about by the Surgeon General’s Call to Action to Promote Walking and Walkable Communities, increased availability of active transportation could further improve health and reduce overall health care costs.

Active Transportation

The current obesity epidemic can be attributed—at least in part—to reduced nonleisure-time physical activity. Safe sidewalks that provide access to everyday destinations both encourage active transportation and can decrease obesity and metabolic disease. As the adverse health effects of life in sprawling suburban neighborhoods have become more evident, affluent individuals vacate these areas in favor of urban centers or mixed-use developments. This creates lower cost housing in suburban areas that promotes an influx of individuals of lower socioeconomic status. This tends to exacerbate the health disparities experienced by minorities and immigrants.

The myriad of well-documented health benefits of physical activity, such as walking and biking for transportation over short distances, presents a major opportunity to improve the health of people of all demographic backgrounds. However, a common barrier to activity for persons in low-income neighborhoods is perceived danger. In fact, parental concern about children’s safety is a major factor in deciding whether or not their children will be allowed to walk or bike to school. Historically, unsafe neighborhoods have low rates of active transportation. It is frequently the physical environment—and not a gap in knowledge—which poses a major barrier to activity in these locations. Therefore, interventions based on traditional health education must be coupled with changes in the built environment to be most efficacious. Our current vehicle-friendly infrastructure needs to be modified to support increased active transportation and living.

Ecological Model Interventions

The ecological model describes the cause of human behavior as a combination of interpersonal, social, community, built environment, and policy factors (Figure 1). The built environment refers to the totality of places built or designed by humans, including buildings, grounds, community layout, transportation infrastructure, parks, and trails. Although ecological model–based interventions are most effective when they intervene simultaneously at the individual, social, built environment, and policy levels, interventions at one level can affect changes on another in a process called cascading contingencies. For example, changes in the physical environment can incite changes in social norms, which in turn yield changes in individual behavior. Indeed, ecological models provide the major conceptual basis for health interventions that emphasize changes in the built environment and public policy. A major strength of interventions based on the ecological model framework is that they tend to be more scalable and sustainable than those based on other behavioral theories. Changes in built environments have a long-term impact on most, if not all, of the people living in a particular place.

Built environment interventions offer a potential remedy to the problem of sedentary living. A previously mentioned barrier to active transportation is concern about safety. Studies show that the presence of bike and walking paths are important for active transportation among youth. and that bicycle paths separated from traffic are associated with increased bicycle use. A systematic review also showed that modifying community-scale land-use regulations to accommodate such changes can effectively increase biking and walking. These increases in biking and walking, though modest, are important in terms of their impact on community health and social norms.

In addition to providing a safe place to walk or bike, these interventions can increase physical activity more broadly through the normalization of exercise behavior. The impact is difficult to quantify but can be seen and felt within the community. As community members see their peers using active transportation to get to work, walking and biking during their leisure time, and living happier, healthier lives, they become internally motivated to comply with the perceived norm.

The Mālaekahana Bike Path

One such intervention in Hawai‘i is the Mālaekahana Bike Path (Figure 2). The Mālaekahana Bike Path, constructed in 2011, is a 2.43-m-wide, 1.4-mile-long paved bicycle and pedestrian path that connects the towns of Lā‘ie and Kahuku on O‘ahu’s north shore. As the first project green lighted by a rural private–public partnership, the path’s intent was to promote better health, provide a safe

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still higher among Lā‘ie and Kahuku residents than for the overall population of Hawai‘i—37.3% reported being highly active (>300 min/wk of moderate physical activity or >150 min/wk of vigorous activity) and 25.7% reported being active (150–300 min/wk of moderate physical activity or 75–150 min/wk of vigorous activity) compared with 37.0% and 19.5%, respectively.16

The majority of the Mālaekahana path runs alongside the rustic Gunstock Ranch, which provides ample scenery and green space to runners and bikers. However, one of its most important contributions is providing a safe means of active transportation for students and teachers at Kahuku High & Intermediate School. Students previously had to walk or bike on the shoulder of the busy Kamehameha Highway. The wide buffer zone of grass between the path and the road has made commuters feel safer. Prior to the construction of the path, only a few commuters could be seen on the shoulder of the highway. Nowadays, dozens of walkers and bikers can be seen commuting along the path throughout the day.

In tight-knit communities, such as Lā‘ie and Kahuku, community engagement is another important driver of behavior. The Mālaekahana Bike Path offers a strong source of bonding social capital. Bikers and walkers revel in the opportunity to connect and interact with their friends and neighbors, even just a smile and a passing wave. Frequent social interaction strengthens individuals’ ties to one another, and the opportunity for such interactions incentivizes path use. Moreover, as community members observe their peers using the path for active transport and leisure-time physical activity, the social norms for physical activity are being modified.

**Conclusion**

Ecological model–based interventions like the construction of the Mālaekahana Bike Path are an excellent way to increase physical activity and normalize exercise in an especially at-risk population. Although most of the research surrounding sedentary behavior is based on urban populations, rural residents are at equal or greater risk for poor health outcomes associated with being sedentary. For rural residents, traffic safety, recreation facilities, and trails were most consistently associated with increased physical activity.17 The path is also important because many previous analyses focused on expensive walkable neighborhoods,5 but this intervention affected change in a primarily low-income population. Efforts in Hawai‘i to mitigate the obesity problem through changes in the built environment are becoming more and more commonplace,5,8 but long-term evaluation of their health benefits and cost-effectiveness will be required to encourage further development. Efforts to promote walking and walkability are ideal solutions for increasing physical activity in both the urban and rural areas of Hawai‘i and beyond.

**Acknowledgments**

The authors would like to thank Daniel James for his photographic contributions. The authors have no financial conflicts to disclose. The opinions expressed by the authors contributing to this journal do not necessarily reflect the opinions of the US Government, US Department of Defense, US Department of Health and Human Services, the US Public Health Service, the Indian Health Service, or the authors’ affiliated institution.

**References**