



## Cyclist safety on bicycle boulevards and parallel arterial routes in Berkeley, California

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### ABSTRACT

This study compares the safety of bicyclists riding on bicycle boulevards to those riding on parallel arterial routes in Berkeley, California. Literature on the impact of motor vehicle traffic characteristics on cyclist safety shows that high motor vehicle speeds and volumes and the presence of heavy vehicles are all detrimental to cyclist safety. This suggests that cyclists may be safer on side streets than on busy arterials. Bicycle boulevards—traffic-calmed side streets signed and improved for cyclist use—purport to offer cyclists a safer alternative to riding on arterials. Police-reported bicycle collision data and manually collected cyclist count data from bicycle boulevards and parallel arterial routes in Berkeley, California from 2003 to 2010 are used to test the hypothesis that Berkeley's bicycle boulevards have lower cyclist collision rates and a lower proportion of bicycle collisions resulting in severe injury. While no significant difference is found in the proportion of collisions that are severe, results show that collision rates on Berkeley's bicycle boulevards are two to eight times lower than those on parallel, adjacent arterial routes. The difference in collision rate is highly statistically significant, unlikely to be caused by any bias in the collision and count data, and cannot be easily explained away by self-selection or safety in numbers. Though the used dataset is limited and the study design is correlational, this study provides some evidence that Berkeley's bicycle boulevards are safer for cyclists than its parallel arterial routes. The results may be suggestive that, more generally, properly implemented bicycle boulevards can provide cyclists with a safer alternative to riding on arterials.

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### 1. Introduction

Research on bicyclist safety and the built environment is relatively limited. Reynolds et al. (2009) surveyed English-language publications investigating “a relationship between transportation infrastructure... and a clearly defined metric of bicyclist safety” in an Organisation for Economic Co-operation and Development (OECD) country and were able to identify only 23 such papers. Data are often limited—only 7 of those 23 studies based their conclusions on more than 1000 collision or injury events.

Most of the studies cited by Reynolds et al. focus on the safety impact of purpose-built bicycle facilities such as bike lanes and cycle tracks. Less effort has gone into determining which types of streets are safer for cyclists. Yet there are good reasons to believe that quiet side streets with low motor vehicle volumes, low speeds, and a relative absence of heavy vehicles, ought to be safer for cyclists than arterial streets, which tend to have high motor

vehicle volumes, high speeds and function as truck routes and public transit bus routes.

Turner et al. (2006) find, intuitively enough, that where there are more motor vehicles, there are more collisions per cyclist. Allen-Munley et al. (2004) find that truck involvement and several factors associated with high motor vehicle speeds are correlated with more severe collisions. Kim et al. (2006) also find that truck involvement and high speeds are correlated with severe injuries. Though Klop and Khattak (1999) and Allen-Munley et al. (2004) both find that high traffic volume is correlated with a smaller proportion of collisions being severe, this does not mean that cyclists would be safer overall on busier streets, since Turner's model would predict that, compared to quiet streets, busy streets would have far more collisions to begin with. Further, those studies compared roads across an entire state (North Carolina) and city (Jersey City, NJ), meaning that unobserved street design and street network variables can creep in—the high-volume streets may also be more urban in character. One of the earliest studies of cyclist safety (Kaplan, 1975) found a lower collision rate for minor roads than major roads, comparing roads across the United States.

Though the literature is sparse, there is some evidence that cyclist risk is correlated with high motor vehicle volumes and speeds and with the presence of heavy vehicles. This suggests that

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