Crosswalk Confusion

More Evidence Why Pedestrian and Driver Knowledge of the Vehicle Code Should Not Be Assumed

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Traffic safety researchers have long argued that driver behavior outweighs physical elements (such as road design) as a causal factor in motor vehicle collisions. A fundamental causal component of pedestrian–vehicle collisions is also behavior: that of the driver and that of the pedestrian. One determinant of this behavior may be whether the driver, the pedestrian, or both understand the motor vehicle code, which demarcates the right-of-way in pedestrian–vehicle interactions. That is, inappropriate or unlawful behavior may occur because the law is not understood or is misunderstood. Previous studies have shown that drivers and pedestrians have a limited knowledge of pedestrian right-of-way laws. This research expands on these studies by specifically considering knowledge of right-of-way laws related to marked and unmarked crosswalks. Driver and pedestrian knowledge was assessed by the use of intercept surveys and focus groups conducted in the San Francisco Bay Area in California. The results confirm that a substantial level of confusion about pedestrian right-of-way laws exists. This confusion was exacerbated by intersections that had unstriped, or unmarked, crosswalks. The implications for engineering, education, and enforcement countermeasures in light of these findings are discussed; and areas for further research are proposed.

Traffic safety researchers have long argued that driver behavior outweighs physical elements (such as road design) as a causal factor in motor vehicle collisions (*1, 2*). A fundamental causal component of pedestrian–vehicle collisions is also behavior: that of the driver and that of the pedestrian (*3, 4*). One determinant of this behavior may be whether the driver, the pedestrian, or both understand the motor vehicle code, which demarcates the right-of-way in pedestrian–vehicle interactions. That is, inappropriate or unlawful behavior may occur because the law is not understood or is misunderstood. Although knowledge of the law does not guarantee compliance, a lack of knowledge could point to a significant pedestrian safety concern and opportunities for improvement.

Previous studies have shown that drivers and pedestrians have limited knowledge of pedestrian right-of-way laws (*5–8*). The research presented in this paper expands on these studies by considering driver and pedestrian knowledge of laws specifically related to marked and unstriped, or unmarked, crosswalks. The focus on crosswalk markings is warranted by the long history of debate regarding whether and why the crash risk for pedestrians is higher in marked crosswalks than in unmarked crosswalks (*9*). By considering knowledge of right-of-way laws related to crosswalk markings, the behavioral aspects of this phenomenon may be more fully understood.

This paper presents the results of driver and pedestrian intercept surveys and focus groups conducted in the San Francisco Bay Area in California as a component of a larger study considering driver and pedestrian behavior at marked and unmarked crosswalks. The implications for engineering, education, and enforcement countermeasures are discussed; and areas for further research are recommended.

THE VEHICLE CODE

In the United States, the legal priority of movement in pedestrian–vehicle interactions is dictated by the traffic code or the motor vehicle code of each state. The National Committee on Uniform Traffic Laws and Ordinances, a private, nonprofit advocacy group, has proposed a Uniform Vehicle Code as a set of national traffic laws. Although many states have modeled their traffic regulations on the basis of this standard, the letter and spirit of pedestrian right-of-way laws can vary widely (*10*). In California, where the original data collection was conducted for this study, the vehicle code regarding pedestrian and driver responsibility states (*11*):

> (a) The driver of a vehicle shall yield the right-of-way to a pedestrian crossing the roadway within any marked crosswalk or within any unmarked crosswalk at an intersection, except as otherwise provided. . . .
>
> (b) This . . . does not relieve a pedestrian from the duty of using due care for his or her safety. No pedestrian may suddenly leave a curb or other place of safety and walk or run into the path of a vehicle that is so close as to constitute an immediate hazard. No pedestrian may unnecessarily stop or delay traffic while in a marked or unmarked crosswalk.
>
> (c) The driver of a vehicle approaching a pedestrian within any marked or unmarked crosswalk shall exercise all due care and shall reduce the speed of the vehicle or take any other action relating to the operation of the vehicle as necessary to safeguard the safety of the pedestrian.
>
> (d) Subdivision (b) does not relieve a driver of a vehicle from the duty of exercising due care for the safety of any pedestrian within any marked crosswalk or within any unmarked crosswalk at an intersection.

The law makes it clear that pedestrians and drivers have a shared responsibility; but it also uses vague or ambiguous language, such as "unnecessarily stop," "due care," and "immediate hazard."

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PREVIOUS STUDIES

Previous studies have shown that drivers and pedestrians have a limited understanding of right-of-way laws. Tidwell and Doyle found that most people understood that pedestrians must cross at signals or crosswalks and that turning drivers must yield to pedestrians in the crosswalk at intersections (*5*). However, there was confusion about the extent of pedestrians' right-of-way at crosswalks. Although the Uniform Vehicle Code requires motorists to stop or slow down only for pedestrians already in a crosswalk, almost 70% of the respondents thought that motorists were required to stop or slow for pedestrians waiting on the curb at a marked crosswalk. The respondents also did not understand pedestrian crossing signals. Tidwell and Doyle concluded that there is a need for pedestrian safety education programs, explanatory signs on pedestrian signals, and enforcement of pedestrian right-of-way laws (*5*).

A second study asked pedestrians, "In your opinion, when should vehicles yield to pedestrians?" (*6*). More than 60% stated that motorists should yield to pedestrians only at designated crosswalks, while 31% said that pedestrians should always have the right-of-way and 7% said that motorists should always have the right-of-way. Because this question asked about the respondents' opinions, it is unclear if it reveals pedestrians' understanding of right-of-way law or simply their preferences. Additionally, the authors did not ask pedestrians to define "designated crosswalks" (*6*).

A survey of drivers in Virginia found that a large majority (75% to 92%) were aware of laws that require them to yield in midblock crosswalks and to stop before crosswalks at signals (*7*). However, more than half incorrectly thought that pedestrians have the right-of-way at all times, including when they are crossing outside of intersections or crosswalks (*7*).

Finally, in a 2004 study by Sarkar and Andreas in San Diego, California, 1,587 adult and teenage traffic violators were surveyed at a traffic school (*8*). The survey results showed that "many respondents were unaware of California laws related to the pedestrian's rights and duties," based on their assessment of six photograph scenarios (*8*). The researchers also found that the drivers surveyed were insensitive to pedestrian–driver conflict situations, suggesting that "aggressive acts toward pedestrians need to be included in the definition of aggressive driving so that drivers are made aware of the rights of pedestrians" (*8*).

A key component missing from the previous studies is the examination of pedestrian and driver understanding of the right-of-way specifically at marked crosswalks compared with that at unmarked crosswalks. There is a long and influential history of research on the safety impacts of marked and unmarked crosswalks. The most recent and comprehensive study of this subject found that on high-volume (average daily traffic of more than 12,000), multilane roads, uncontrolled intersections with a marked crosswalk (and no other treatments) had higher crash rates than unmarked crosswalks (*9*).

Current research being conducted by the Traffic Safety Center (TSC) at the University of California, Berkeley (on behalf of the California Department of Transportation), is examining for the first time whether drivers and pedestrians exhibit behaviors at marked crosswalks different from those that they exhibit at unmarked crosswalks on multilane roads. Understanding of the extent of driver and pedestrian knowledge of the law in these situations may account for the observed differences in behavior and may partially explain the marked crosswalk–unmarked crosswalk crash risk phenomenon.

ORIGINAL RESEARCH

As a component of the TSC crosswalk behavior study, pedestrian and driver intercept surveys and focus groups were conducted between September 2005 and June 2006. These original data collection efforts addressed (*a*) understanding of right-of-way laws, (*b*) self-reported behavior, and (*c*) perceptions of effectiveness of education, enforcement, and engineering countermeasures. Responses from the right-of-way questions (Objective a) are presented and discussed in this paper.

The study sample is not representative of the general population in several important ways. First, the pedestrian population was oversampled because of a particular interest in understanding pedestrian behavior. Second, seniors (people age 65 years or older) were also oversampled. A focus on seniors was chosen because of their vulnerability as road users and the unique challenges that they encounter when they cross streets. Furthermore, a focus on improving conditions for seniors will result in improved conditions for all pedestrians. Third, the study was not conducted randomly; rather, participants were approached on a convenience basis. Last, not everyone who was approached for the study chose to participate, and those who did choose to participate may hold opinions different from those who did not.

Despite the potential atypical characteristics of the survey and focus group participants, their answers were informative and may truly portray the beliefs of a large segment of the California population.

INTERCEPT SURVEYS

A survey research company conducted the intercept surveys, under contract with TSC. The surveys were self-administered, were designed to take approximately 10 min, and were completed by the participants under close supervision by the field staff. Pedestrian participants were intercepted immediately after they crossed an unsignalized intersections in one of four urban pedestrian areas. Two of the areas were highly frequented by elderly residents, and the other two areas were associated with high alternative mode shares. The census tracts targeted were as follows: (*a*) Census Tract 4030 (Alameda County) and Census Tract 114 (San Francisco) for the elderly urban population and (*b*) Census Tracts 115 and 176 (San Francisco) for the urban high alternative (nonautomobile) mode share.

Drivers were surveyed while they were purchasing fuel at gas stations or while they were accessing their vehicles in parking lots in Census Tract 4088 (Alameda County). The surveyors screened for local drivers (people who regularly drive locally) before administering the survey.

The survey was completed by 192 people, comprising 133 pedestrians and 59 drivers. Seventy-five percent of the drivers surveyed estimated that they spend a majority (50% or more) of their local travel time driving as opposed to using other modes. In contrast, only 61% of the pedestrians surveyed drive a majority of the time. The median driver and pedestrian age range was 30 to 39 years. Driver respondents were 64% male, and pedestrian respondents were 54% male.

The scenarios related to the right-of-way at marked and unmarked crosswalks were presented as shown in Figure 1.

On the basis of the California Vehicle Code, in Scenarios 1, 2, and 4 of Figure 1, the pedestrian has the right-of-way, as stated. In Scenario 5, the pedestrian does not have the right-of-way. For the case of the marked and unmarked crossings (Scenario 3), the pedestrian

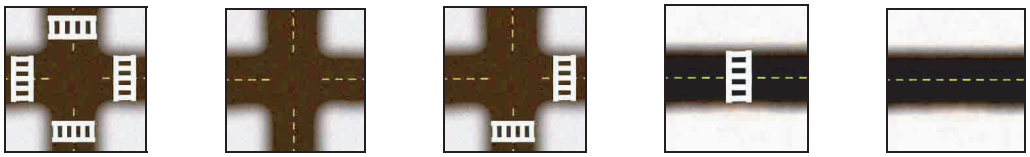

FIGURE 1 Right-of-way laws crosswalk survey scenarios: When do pedestrians trying to cross the street have the right-of-way? (*a*) Scenario 1, at marked crosswalks at intersections; (*b*) Scenario 2, at intersections without a marked crosswalk; (*c*) Scenario 3, at an intersection with a marked crosswalk on one side of the street, only in the marked crosswalk; (*d*) Scenario 4, at marked crosswalks midblock; and (*e*) Scenario 5, at midblock without a marked crosswalk.

has the right-of-way at all four crossings (making the statement here false).

INTERCEPT SURVEY RESULTS

The survey responses were designated correct or incorrect on the basis of whether the response agreed or disagreed with the California Vehicle Code. Figure 2 presents a comparison of the percentage of correct responses for each scenario for the driver and pedestrian surveys. The results suggest that most drivers and pedestrians understand the law when the message is clear and simple. That is, when all crossings are marked (Scenario 1), the pedestrian's right-of-way is mostly understood. Likewise, for unmarked midblock crossings, most respondents knew that jaywalking is illegal, and thus, the pedestrian does not have the right-of-way at these locations (Scenario 5). Nonetheless, it is noteworthy that more than 35% of the driver respondents did not believe that pedestrians have the right-of-way even at marked crosswalks (Scenario 1).

For scenarios of increasing complexity, both pedestrians and drivers exhibited a lower level of understanding of the vehicle code, as illustrated by the clear gradient in Figure 2. Marked differences between driver and pedestrian responses to individual scenarios can be seen. For the two cases in which the 95% confidence intervals do not overlap (Scenarios 1 and 4), pedestrians demonstrate better knowledge than drivers. Overall, pedestrians provided correct responses 63.0% of the time and drivers provided correct responses 55.6% of the time.

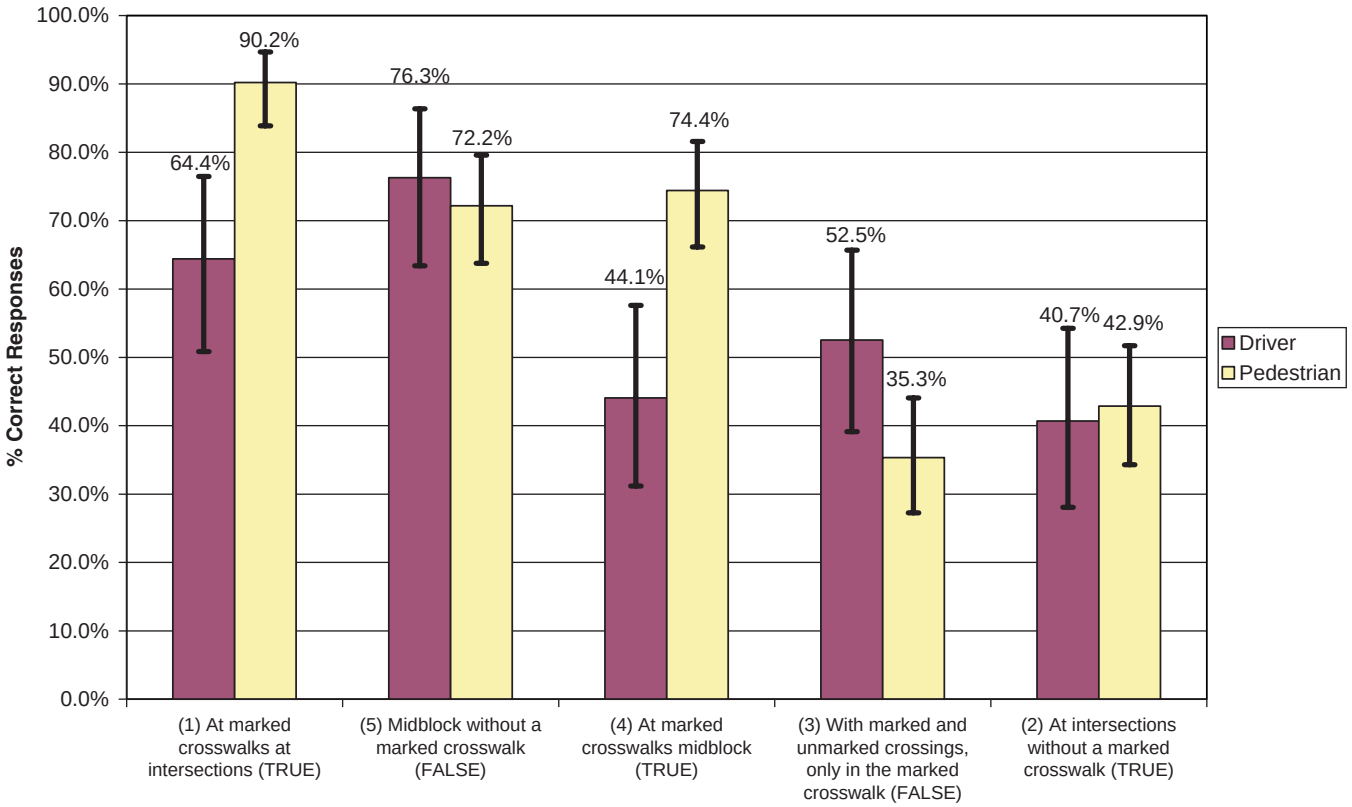

FIGURE 2 Survey answers to the question "When do pedestrians have the right-of-way?" in order of scenarios of increasing complexity.

FOCUS GROUPS

The TSC study also used focus groups to provide a more interactive discussion of driver and pedestrian knowledge and behavior. Six focus groups, each comprising 10 to 12 participants, were conducted in the San Francisco Bay Area in four different locations and among two different age groups. The six groups were as follows:

- Senior pedestrians (with walking as their primary mode of transport) in the suburban community of Walnut Creek,
- Senior drivers (with driving as their primary mode of transport) in Walnut Creek,
- Nonseniors in urban Oakland (mixed drivers and pedestrians),
- Seniors in urban Berkeley (mixed drivers and pedestrians),
- Nonseniors in Berkeley (mixed drivers and pedestrians), and
- Seniors in suburban Albany (mixed drivers and pedestrians).

In total, 65 people participated in the six groups. Sixty-four percent of the participants were seniors (over age 65 years). Forty-three of the participants were women and 22 were men. Seventy-eight percent of participants had a college education (associate's degree or higher). The median household income of the participants was between $20,000 and $49,999. Finally, 33% of the participants were married, 36% were single, 14% were widowed, and 17% were divorced.

Right-of-Way Questions

At the beginning of each focus group session, the participants were asked to complete a background and demographics survey, which included the right-of-way question from the intercept survey (as presented in Figure 1). A subsample of three of the survey scenarios, as illustrated in Figure 3, was then presented to focus group participants for an interactive discussion. In the following section, the survey results have been combined with the discussion session comments to provide quantitative and qualitative responses for the three scenarios.

Focus Group Results

Given the small sample size and anecdotal nature of many of the data, statistics were not computed for the focus group responses. Instead, the range of responses to the discussion scenarios is presented along with the percentage of the participants providing the correct response for the equivalent survey question. Because of time constraints during the session, only the survey portion of the right-of-way questions was included in the Oakland focus groups; thus, no discussion comments are provided from that session.

Four Marked Crosswalks (Scenario A)

On the basis of the survey results, all focus group participants correctly responded that the pedestrian has the right-of-way at all crossings in this scenario. Some of the comments during the discussion session, some of which qualify the survey responses, are provided below.

- Berkeley nonseniors: "The driver would have the right-of-way if completing a left turn."
- Albany seniors: (*a*) "Marked crosswalks give the indication that a driver has to stop." (*b*) "Pedestrians have the right-of-way, but they can't always trust drivers to stop."

(a)

(b)

(c)

FIGURE 3 Focus group slides for pedestrian right-of-way law discussion: (*a*) Scenario A, four marked crossings: the pedestrian has the right-of-way in all crossings (correct response: true); (*b*) Scenario B, four unmarked crossings: the pedestrian has the right-of-way in all crossings (correct response: true); and (*c*) Scenario C, mixed marked and unmarked crossings: the pedestrian has the right-of-way in the marked crossing only (correct response: false; the pedestrian has the right-of-way at all crossings).

Four Unmarked Crosswalks (Scenario B)

Figure 4 presents the surveys results for Scenario B. In a considerable change from Scenario A, on average only 50% of participants provided the correct response that the pedestrian has the right-of-way at all crossings. The number and range of discussion session comments are illustrative of the participants' relative lack of knowledge regarding the pedestrian right-of-way in this situation. Some of these comments are provided below.

- Walnut Creek pedestrians:
  - "Pedestrians have the right-of-way no matter what."
  - "Drivers should have the courtesy to stop."
  - "Pedestrians have to initiate the action."
  - "Pedestrians should make eye contact with the driver."
  - "A person is not considered a pedestrian unless he makes a move to cross."
- Berkeley seniors:
  - "If the pedestrian is in the street or within view of the vehicle, then the pedestrian has the right-of-way."
  - "If it is obvious the pedestrian wants to cross, then the driver must yield."
  - "The pedestrian has to make a signal that he wants to cross, such as stepping into the street or making eye contact with the driver."
- Berkeley nonseniors: although pedestrian right-of-way is not contingent on the presence of "Stop" signs, the participants in this group requested information regarding "Stop" signs at the intersection in this scenario. When the participants were told that there were "Stop" signs at all four approaches, all 11 participants said that the pedestrian would have the right-of-way in the unmarked crossings. However, only eight participants thought that the pedestrian would have the right-of-way if there were no "Stop" signs at this type of intersection.
- Albany seniors:
  - "Whether there is a crosswalk marking or not, the pedestrian should always have the right-of-way."
  - "Pedestrians should go to the next block or marked crosswalk for safety."
  - "It is illegal for drivers not to stop for pedestrians, even if there's no marking."

Marked and Unmarked Crosswalks (Scenario C)

Figure 5 illustrates the percentage of correct survey responses for Scenario C in each focus group. As with Scenario B, a lack of driver and pedestrian knowledge in both age groups is evident. Overall, only 45% of the focus group participants provided the correct response for Scenario C.

Again, the comments provide insight into the confusion associated with this complex situation.

- Walnut Creek pedestrians: "Pedestrians should not cross anywhere other than the marked section of the intersection."
- Walnut Creek senior drivers: if the pedestrian had already stepped into the intersection, all the participants believed that the pedestrian had the right-of-way. However, if the pedestrian had not yet stepped off the sidewalk, only three participants believed that the pedestrian had the right-of-way within this type of intersection.

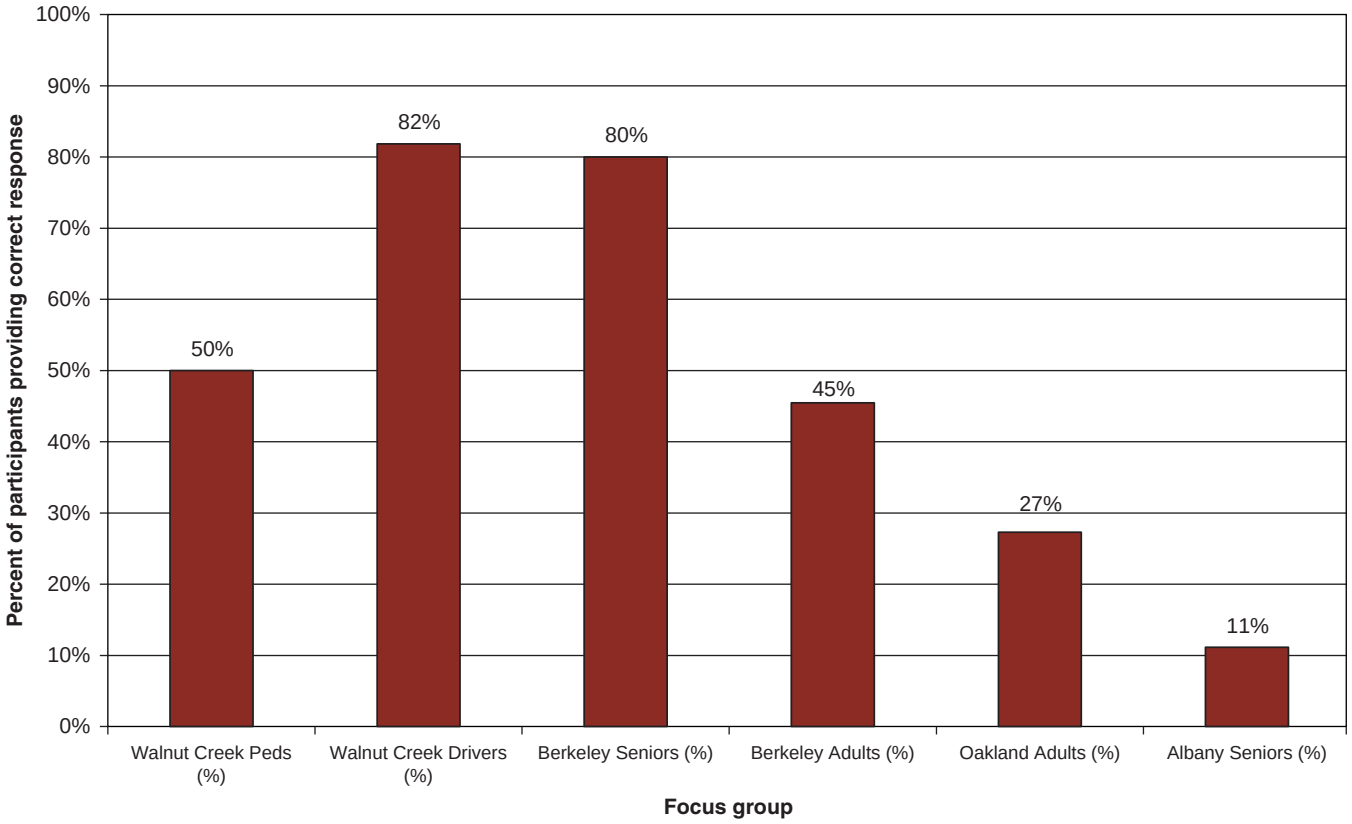

FIGURE 4 Scenario B: percentage of correct responses by focus group.

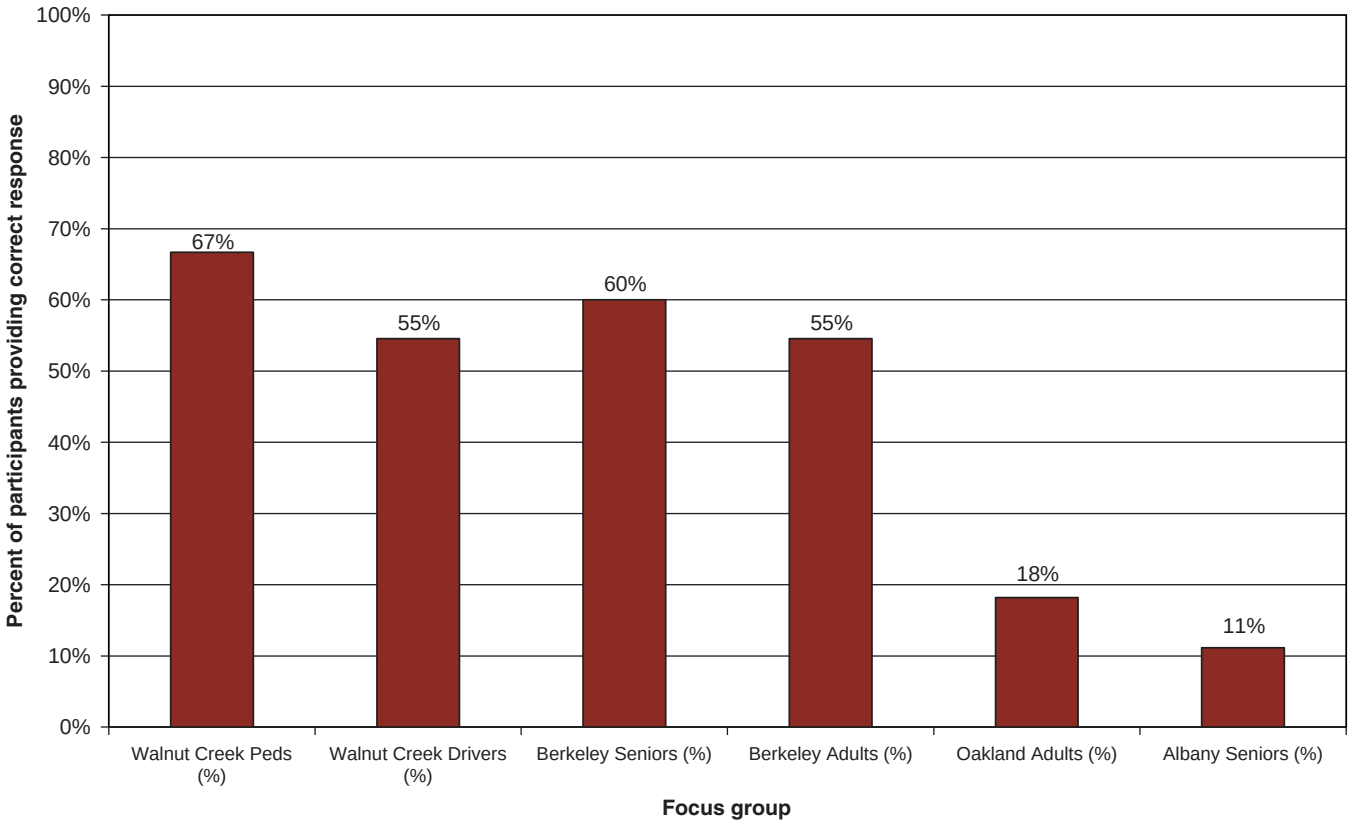

FIGURE 5 Scenario C: percentage of correct responses by focus group.

- Berkeley seniors:
  - "The unmarked crosswalk indicates that pedestrian crossings are not allowed."
  - "The DMV [Division of Motor Vehicles] booklet states that the motorist has to yield to a pedestrian whether there is or is not a crosswalk."
  - "The pedestrian must take responsibility in this situation."
  - "I would only cross in a marked crosswalk."

The participants in this focus group were also asked a follow-up question to explore their stated behavior in this type of situation. When the participants were given a hypothetical origin and destination that would have the unmarked crosswalk in the direct path, four people said that they would go out of their way to cross in the marked crosswalk and six said that they would cross in the unmarked crosswalk.

Berkeley nonseniors responded as follows: "The pedestrian only has the right of way if there is a 'Stop' sign." and "The pedestrian can't step out in front of a car but can cross in an unmarked area when it is safe."

Summary

The results of the focus group surveys and discussion sessions demonstrate that road users tend to understand the pedestrian right-of-way laws when the message is clear and simple (as in Scenario A). In the six focus groups, all participants believed that the pedestrian has the right-of-way in the intersection with four marked crosswalks (although some qualified this answer during the discussion session). However, for the other scenarios of increasing complexity, both pedestrians and drivers, young and old individuals, and urban and suburban individuals exhibited a lower level of understanding of the vehicle code.

Figure 6 presents a comparison of the correct focus group survey responses between seniors and nonseniors. For both Scenarios B and C, seniors displayed a greater knowledge of right-of-way laws.

Figure 7 presents a comparison of the correct focus group survey responses between senior pedestrians and senior drivers in Walnut Creek. Overall, senior drivers had a slightly better knowledge of the laws.

In a comparison of the correct focus group survey responses among the urban (Berkeley and Oakland) and the suburban (Walnut Creek and Albany) participants, the suburban residents (all of whom were seniors) had a slightly greater knowledge of the law in Scenario C only (and an equal level of knowledge as the urban residents in the other scenarios).

There are a number of possible reasons for these differences, including level of education or socioeconomic status, personal walking experience, generational or neighborhood walkability differences, how the law is advertised in each city, or—quite possibly—chance.

Overall, the focus group results corroborate data from the intercept surveys and previous research and again suggest that knowledge of the law cannot be assumed, especially in complex situations.

COUNTERMEASURE IMPLICATIONS

There may be a connection between knowledge of pedestrian right-of-way laws and crash risk. Although knowledge of the law does not necessarily result in compliance, a lack of knowledge is unlikely

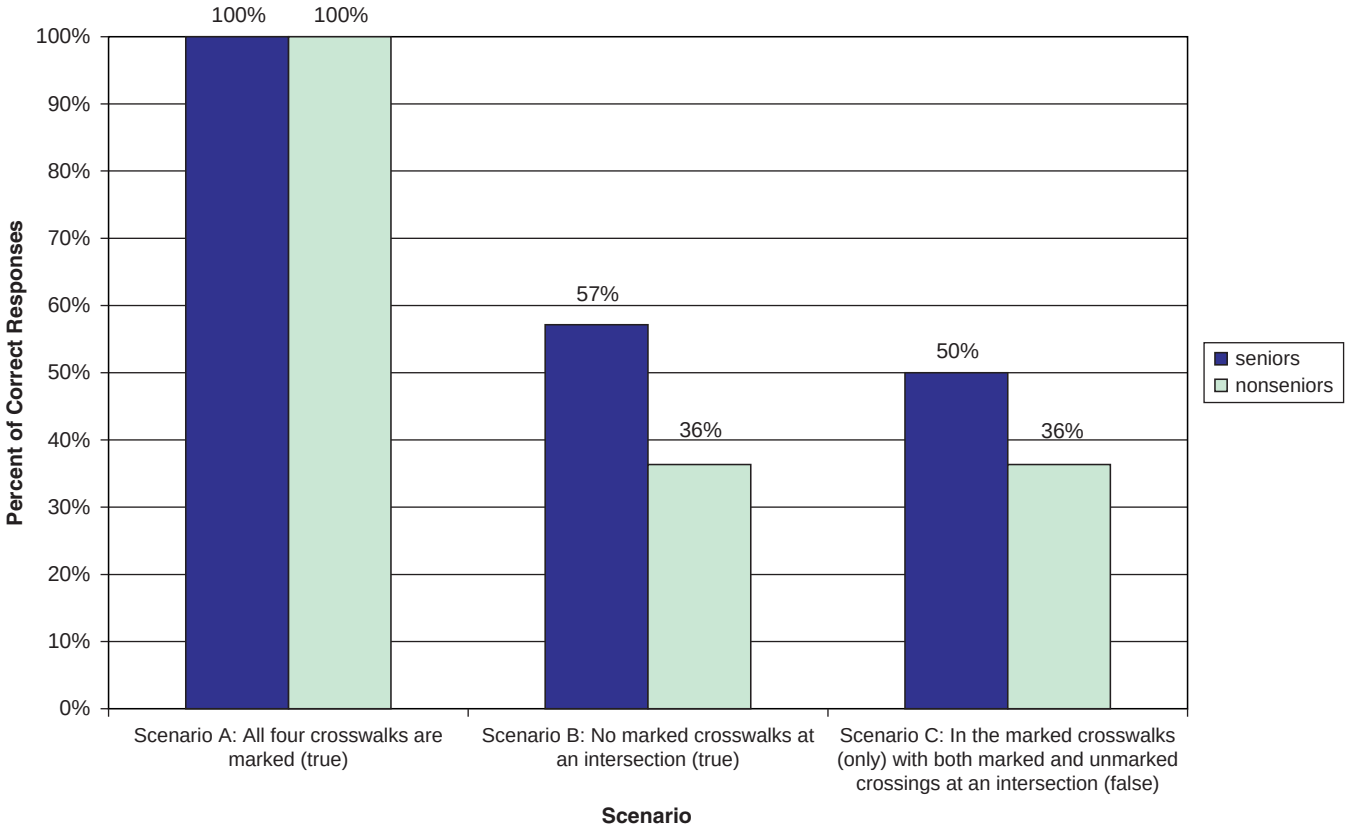

FIGURE 6 Comparison of senior and nonsenior knowledge of the law (percentage of correct responses).

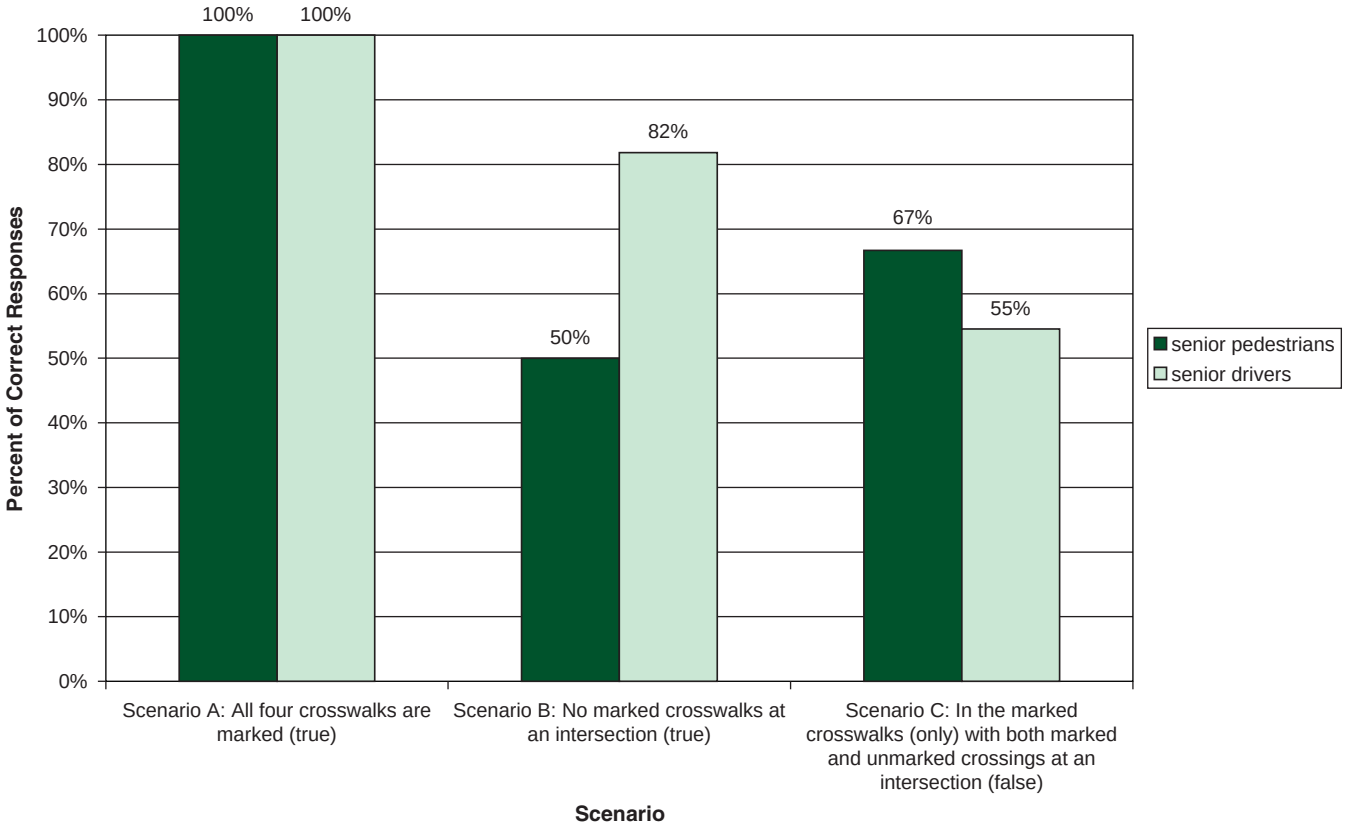

FIGURE 7 Comparison of Walnut Creek senior driver and senior pedestrian knowledge of the law (percentage of correct responses).

to result in improved yielding behavior, especially in the case of multilane roads. This connection is an appropriate subject for further study. If the widespread lack of accurate knowledge regarding right-of-way laws is indeed found to be a significant contributing factor in pedestrian–vehicle collisions, a reprioritization of pedestrian safety countermeasures may be required. Thus, in addition to the physical countermeasures for enhancing safety in marked crosswalks suggested by Zegeer et al. (*9*), behavioral countermeasures may be needed.

The appropriate combination of education, engineering, and enforcement countermeasures, often referred to as the 3-E's of safety, has been a subject of debate for many decades (*12, 13*). The following countermeasures are illustrative components of a rebalanced 3-E strategy that would address the demonstrated lack of knowledge of right-of-way laws.

Engineering

By using context-sensitive design (CSD) options, pedestrian facilities can actively communicate the right-of-way to drivers and pedestrians, whether or not they know their legal responsibilities. As defined by FHWA, CSD "is an approach that considers the total context within which a transportation improvement project will exist" (*14*). The CSD philosophy, in "thinking beyond the pavement," embraces the appropriate use of traffic-calming devices such as bulbouts, raised intersections, pedestrian refuge islands, and raised crosswalks, among others, that communicate expected behavior to road users.

In a before-and-after study of traffic-calming devices in several U.S. cities, Huang and Cynecki found that motorist and pedestrian compliance with the vehicle code increased, suggesting that these devices "have the potential for improving the pedestrian environment." The researchers also emphasize, however, that "these devices by themselves do not guarantee that motorists will slow down or yield to pedestrians" (*15*).

In cases in which traffic calming may be inappropriate or infeasible, Zegeer et al. note that traffic and pedestrian signals and other more substantive countermeasures, such as pedestrian overpasses, should be considered (*9*). Although these engineering measures are costly, they would also preclude the need for accurate knowledge of the law.

Education

The impact of education and mass media imaging changes on smoking cessation in the United States, for example, offers evidence that public health concerns can be significantly addressed through educational campaigns (*1*). However, pedestrian safety education efforts are currently less prevalent than engineering countermeasures.

Knowledge of the right-of-way laws in a state's vehicle code is typically transmitted as a component of driver education. Drivers are expected to demonstrate knowledge of the laws when they pass a driver's license examination. Notably, such examinations do not require perfect scores for licensure and are typically administered only when a driver first receives his or her license.

Sarkar and colleagues reviewed the drivers' manuals from 32 states on the basis of the premise that "along with enforcement and engineering, quality education can be very important in improving driver behavior and providing a better understanding of the vulnerability of pedestrians" (*16*). The researchers concluded that although state driver's licensing manuals can play a key role in education, the manuals need significant improvements. They note that better manuals with "well-written, well-illustrated information on pedestrian conflicts associated with different traffic regulations" are increasingly important, given the gradual phasing out of driver education in schools (*16*).

There is no analogous licensing examination or manual for nondriver pedestrians. Parents, teachers, and the media are expected to convey pedestrian right-of-way laws to nondrivers. Some efforts, such as Safe Routes to School programs, have demonstrated considerable success with pedestrian safety education of children. Holtz et al. evaluated the effectiveness of a Safe Routes to School program, the WalkSafe program, for elementary school children in Miami, Florida (*17*). The study concluded, "The WalkSafe program implemented in a single high-risk district was shown to improve the pedestrian safety knowledge of elementary school children. The observational data demonstrated improved crossing behaviors from pre-test to post-testing conditions" (*17*).

However, similar programs for seniors, immigrants, and other groups of nondriver pedestrians are not as prevalent. Additional opportunities to educate nondriver pedestrians should be explored, as should refresher programs or educational campaigns for licensed drivers.

Enforcement

Innovative enforcement strategies that focus on enhancing pedestrian and driver knowledge of and compliance with the laws include enforcement "stings," educational warnings in lieu of or in addition to fines, and community enforcement programs. In a study of an enforcement sting in Miami Beach, Florida, Van Houten and Malenfant found that "the percentage of drivers yielding to pedestrians increased following the introduction of the enforcement operation in each corridor" (*18*). They note, "these increases were sustained for a period of a year with minimal additional enforcement, and that the effects generalized to untreated crosswalks in both corridors as well as crosswalks with traffic signals" (*18*).

Sustained enforcement efforts targeted at both drivers and pedestrians can also serve as valuable educational campaigns by incorporating warnings, informational pamphlets, media coverage, and community involvement activities. In this way, road users may learn the right-of-way laws through enforcement of these laws.

CONCLUDING THOUGHTS

An important, possibly more fundamental, consideration in selecting and balancing pedestrian safety countermeasures is whether the vehicle code itself should first be amended. Perhaps drivers and pedestrians lack knowledge of the law because the law is inherently confusing or unfair. It may be that a significant number of right-of-way violations occur because laws are counterintuitive or because they are perceived to be inappropriate for the local driving culture. Furthermore, in some scenarios it is legally ambiguous or unclear who has the right-of-way.

Several authors have made concrete suggestions for how vehicle code amendments should be formulated. The suggestions vary widely in their visions of what would constitute a better driving or walking environment.

Evans suggests that laws should be strengthened such that the default responsibility for a pedestrian–vehicle collision would be placed only

on the driver because the driver has the potential to cause greater harm (*1*). In contrast, proponents of the shared space or "naked streets" philosophy (Hans Moderman and others) argue that "artificial" traffic regulations should be removed and replaced instead by "natural human interaction," which can be encouraged by traffic-calming street designs (*19*).

As suggested by the National Committee on Uniform Traffic Laws and Ordinances, any such revisions to the current law should also include efforts to create more uniform laws on the pedestrian right-of-way across agency and state boundaries so that the laws are not only intuitive but also consistent (*10*).

Another important concern that many pedestrian safety experts raise is that unless 100% compliance with the law is achieved, increasing driver-yielding behavior could actually be detrimental to pedestrian safety if it leads to a pedestrian expectation that all drivers will yield and, thus, a lower level of vigilance by pedestrians when they are crossing a street. In this event, the consequence of even one driver failing to yield may be much greater than the consequence of many drivers not yielding under current conditions. Again, this point further emphasizes the need to develop a three-pronged program of not only engineering but also education and enforcement to address the responsibilities of both the pedestrian and the driver as the users of the shared roadway.

The strategies presented here offer a proactive approach to pedestrian safety that does not first require the assumption of driver and pedestrian knowledge of the law. The use of these balanced countermeasures offers an opportunity to communicate both actively and passively the importance of these laws in maintaining safety for all road users.

Analogous to the successful Mothers Against Drunk Driving campaign to reduce the rates of driving under the influence, a change in societal norms may be required before meaningful and sustainable improvements in pedestrian safety can occur. Diagnosis of the extent to which drivers and pedestrians know and understand the vehicle code is an important step in this endeavor.

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