Law Accommodating Nonmotorized Road Users and Pedestrian Fatalities in Florida, 1975 to 2013

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Objectives. To examine the effect of Florida's adoption of Statute 335.065—a law requiring the routine accommodation of nonmotorized road users (i.e., a "Complete Streets" policy)—on pedestrian fatalities and to identify factors influencing its implementation.

Methods. We used a multimethod design (interrupted time-series quasi-experiment and interviews) to calculate Florida's pedestrian fatality rates from 1975 to 2013—39 quarters before and 117 quarters after adoption of the law. Using statistical models, we compared Florida with regional and national comparison groups. Semistructured interviews were conducted with 10 current and former Florida transportation professionals in 2015.

Results. Florida's pedestrian fatality rates decreased significantly—by at least 0.500% more each quarter—after Statute 335.065 was adopted, resulting in more than 3500 lives saved across 29 years. Interviewees described supports and challenges associated with implementing the law.

Conclusions. Florida Statute 335.065 is associated with a 3-decade decrease in pedestrian fatalities. The study also reveals factors that influenced the implementation and effectiveness of the law.

Public Health Implications. Transportation policies—particularly Complete Streets policies—can have significant, quantifiable impacts on population health. Multimethod designs are valuable approaches to policy evaluations. (*Am J Public Health.* 2018;108:525–531. doi:10.2105/AJPH.2017.304259)

See also Schneider, p. 431; and Galea and Vaughan, p. 445.

Pedestrian fatalities have become an increasingly larger proportion of all traffic fatalities in the United States, increasing from 11% to 15% of all traffic deaths over the past decade.[1] The Sun Belt—the southern tier of the United States that spans the South and West census regions—has been noted for having some of the nation's most perilous communities for pedestrians.[2] In 2015, 19 states had a pedestrian fatality rate higher than the national average; of those 19 states, 13 (68.4%) were located in the Sun Belt region.[1a]

Routine accommodation policies—commonly known as "Complete Streets" policies[1b]—are mandates that require the accommodation of nonmotorized road users (i.e., pedestrians and bicyclists) as a routine part of roadway planning, design, construction, operation, and maintenance.[3,4] State and local governments have adopted Complete Streets policies to direct transportation planners and engineers to "routinely design and operate the entire right of way to enable safe access for all users, regardless of age, ability, or mode of transportation."[5] "Right of way" is defined as "land (usually a strip) acquired for or devoted to highway transportation purposes."[6] Complete Streets policies have been adopted in a variety of forms, including comprehensive plans, design manuals, organizational policies, executive orders, and laws. However, legislation (e.g., ordinances and statutes) is considered to have the force of law necessary to ensure that specific policy actions are implemented. According to the AARP et al., adopting a Complete Streets policy at the state level is essential to create transportation networks that provide users with choices and access, particularly given that "states control many community roadways and often set the standard for streets in cities and counties."[7a(p3)]

In 1984, Florida became the second US state to adopt a Complete Streets legislative statute (Statute 335.065), after Oregon in 1971.[7b] Statute 335.065 states that "bicycle and pedestrian ways shall be given full consideration in the planning and development of transportation facilities" and that "bicycle and pedestrian ways shall be established in conjunction with the construction, reconstruction, or other change of any state transportation facility."[8] After the adoption of Statute 335.065, Florida's pedestrian fatality rates decreased substantially over the subsequent 3 decades. However, whether a relationship exists between the decline in pedestrian fatalities and the adoption of Statute 335.065 has not previously been investigated. Previous claims that Complete Streets policies improve pedestrian safety have been based on evaluations of specific traffic engineering countermeasures.[9–12] Traffic engineering countermeasures are modifications to the built environment that can reduce the risk and severity of vehicle–pedestrian crashes. Examples include sidewalks, roundabouts, roadway lighting, pedestrian refuge islands, and speed

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control devices.[13] No study to date has examined whether the adoption of a Complete Streets law can be linked to a specific public health outcome, such as pedestrian fatalities.

The purpose of this study was to (1) determine whether the adoption of Florida's Complete Streets state law, Statute 335.065, is associated with statewide declines in pedestrian fatalities and (2) identify key factors that have supported or hindered the implementation of the statute.

METHODS

We used a multimethod study design that included an interrupted time-series quasi-experiment and a series of semistructured key informant interviews.

Interrupted Time-Series Quasi-Experiment

We obtained Florida's pedestrian fatality counts from January 1975 through December 2013 (a total of 156 quarters—39 quarters before and 117 quarters after the adoption of Statute 335.065) from the National Highway Traffic Safety Administration Fatality Analysis Reporting System.[14] The Fatality Analysis Reporting System is a census of motor vehicle traffic crashes that result in a fatality to a vehicle occupant or nonmotorist within 30 days of the crash. It has been collected since January 1975 by the National Highway Traffic Safety Administration. The Fatality Analysis Reporting System contains data on all fatal crashes in the 50 states, the District of Columbia, and Puerto Rico. As of this study, only data inclusive of December 2013 were available. US Census data were used to calculate quarterly pedestrian fatality rates per 100 000 population.[15] To detect stationarity and seasonality, we used Box–Jenkins seasonally adjusted autoregressive moving average (ARMA) models to analyze and forecast the time-series data.[16] We compared Florida with 2 groups: (1) an aggregated group of 13 states from the South census region that did not have a Complete Streets state law as of December 2013 and (2) an aggregated group of all US states and Washington, DC. The 13 states that lacked a Complete Streets state law in the South census region as of December 2013 were Alabama, Arkansas, Delaware, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia. The 13-state South census region comparison group includes states that—when compared with Florida—have a variety of comparable measures, including (but not limited to) miles of public roads, fatalities per vehicle mile traveled, vehicles per person, percentage of occupied housing units with no vehicle available, age distribution, sex ratios, median household income, and percentage of people whose income is below the poverty level. We initially considered 3 outcomes: raw frequencies, quarterly rates per 100 000 population, and logarithms (base 10) of quarterly rates per 100 000 population. We ultimately used the logarithmic transformation of the data for all ARMA models to stabilize the variance of the data resulting from heteroscedasticity.

Letting time t denote the number of quarters that have elapsed since the fourth quarter of 1974, the mean log pedestrian fatality rate μ_t at time t and in the jth quarter of the year is described using the change-point model

$$(1)\quad \mu_t = \alpha_j + \gamma_1 x_t + \gamma_2 t + \gamma_3 (t - t^*)_+,$$

where α_j denotes the seasonal effect of the jth quarter of the year, γ_1 describes the impact of the log pedestrian mortality rate in the comparison states, γ_2 is the rate at which the log pedestrian mortality rate changes over time before adoption of Statute 335.065, and $\gamma_2 + \gamma_3$ denotes the rate at which the log pedestrian mortality rate changes over time after adoption of the statute. The term $(t - t^*)_+$ denotes the amount of time that has elapsed since the adoption of Statute 335.065 at t^* in the 39th quarter, taking the value zero for $t < t^*$. Thus, γ_3 represents the impact of Statute 335.065 on the rate at which log pedestrian mortality changes over time. The percentage of reduction in pedestrian fatalities each quarter was calculated using $(e^{\gamma_3} - 1)\times 100\%$. Autocorrelation and partial autocorrelation plots from the residuals suggested that a third-order autoregressive model fit the data well. Two fitted ARMA (3,0) models comparing Florida's pedestrian fatalities with those of the 2 comparison groups took the form

$$\begin{aligned}(2)\quad Y_t = {} & \mu_t + \beta_1 (Y_{t-1} - \mu_{t-1}) \\ & + \beta_2 (Y_{t-2} - \mu_{t-2}) \\ & + \beta_3 (Y_{t-3} - \mu_{t-3}) + \varepsilon_t.\end{aligned}$$

Under this model, the log pedestrian mortality rate Y_t at time t is a function of data as much as 3 units of time in the past. The autoregressive coefficient β_k denotes the impact of data k units of time in the past, and ε_t is white noise. Plots of the autocorrelation and partial autocorrelation functions of the residuals from the model in Equation 2 show no statistically significant departure from zero as confirmed by the Ljung–Box–Pierce test, indicating that the third-order autoregressive models fit the data well. Finally, the ARMA models were fitted to 8 demographic subgroups, delineated by sex and age.

The number of lives saved as a result of the adoption of Statute 335.065 may be estimated using

$$(3)\ \hat{L} = \frac{1}{100{,}000} \sum_{t=t^*}^{T} P_t 10^{\hat{Y}_t} \left(1 - 10^{\hat{\gamma}_3 (t - t^*)_+}\right),$$

where the sum is over all quarters from adoption at time t^* of the adoption of the statute in the 39th quarter until the end of the data in the 156th quarter, P_t is the population of Florida, and $\hat{Y}_t$ is the forecast log pedestrian mortality rate in quarter t. Powers of 10 were required to back-transform log-transformed mortality rates, and mortality rates were expressed as the number of pedestrian deaths per 100 000 residents of Florida. All analyses were completed using SAS version 9.4 (SAS Institute, Cary, NC).

Semistructured Key Informant Interviews

On receiving institutional review board approval, we recruited interviewees by means of a snowball sampling technique.[17] Two professional contacts known to the primary author (J. M. P.) were asked whether they had any colleagues who currently work or previously worked in the Florida transportation system. Referrals from these professional contacts resulted in additional contacts, who were asked to identify other colleagues. This recruitment process was repeated twice, resulting in a total of 24 contacts. Only 10 contacts ultimately met the eligibility criteria for inclusion in the study: currently or previously working in the Florida transportation system, familiarity with Statute 335.065, and having had direct or indirect responsibility for implementing activities associated with Statute 335.065. All 10 contacts had 15 or more years of experience working in Florida's

transportation system as urban planners, roadway design engineers, traffic managers, program coordinators, and policy analysts at state, regional, or local levels.

We conducted phone interviews using a semistructured interview protocol that included 20 open-ended questions between October and December 2015. Constructs in the interview protocol addressed interviewees' knowledge and perceptions of Statute 335.065, connections between the statute and their agency's daily operations, and their perceptions of factors that may have influenced the implementation and impact of the law. Interviews ranged from 38 to 90 minutes and were recorded and transcribed with consent from interviewees.

Three coders conducted a multipart analysis of the transcripts using an open-coding approach (coding phrases in the text that reflected specific ideas or themes).[18] Each transcript was initially coded twice, once each by 2 coders. Through a collaborative and iterative process, coders developed, refined, and finalized a codebook—a set of consensus codes and definitions used to systematically analyze the interview data. Using the codebook, each transcript was coded a third and final time. Coders summarized key themes that emerged from the data, including quotes from interviewees. Qualitative analyses were supported using NVivo data analysis software (version 10; QSR International, Cambridge, MA).

TABLE 1—Autoregressive Moving Average (ARMA) Analyses and Estimated Lives Saved: South US Census Region States and All US States and Washington, DC; 1975–2013

Parameter	South US Census Region States, Estimate (95% CI)	All US States and Washington, DC, Estimate (95% CI)
Quarter[a]		
First	1.70 (1.47, 1.96)	1.79 (1.58, 2.03)
Second	1.42 (1.23, 1.64)	1.56 (1.37, 1.78)
Third	1.41 (1.22, 1.63)	1.48 (1.30, 1.67)
Fourth	1.74 (1.50, 2.03)	1.71 (1.50, 1.96)
Time[b]		
Before adoption	0.010 (−0.453, 0.475)	0.150 (−0.273, 0.574)
After adoption	−0.577 (−1.098, −0.053)	−0.500 (−0.954, −0.043)
Comparison group[c]	2.40 (1.56, 3.70)	4.43 (2.51, 7.82)
Autoregressive[d]		
First	0.195 (0.038, 0.352)	0.189 (0.032, 0.346)
Second	0.213 (0.057, 0.370)	0.181 (0.022, 0.340)
Third	0.255 (0.097, 0.413)	0.247 (0.088, 0.405)
Estimated lives saved[e]	3942	3506

Note. CI = confidence interval.

[a]Adjusted baseline quarterly fatality rates describing seasonality in Florida pedestrian fatalities, where rates are in number of pedestrian fatalities per 100 000 people at risk. The estimates are adjusted for log fatality rates in the comparison states.

[b]Percentage of change in log fatality rate per quarter before the adoption of Statute 335.065 and percentage of change in log fatality rate per quarter after adoption of the statute relative to the rate of change before adoption. For example, when adjusted for log fatality rates in the South US census region, pedestrian fatality rates in Florida increased by 0.010% per quarter before adoption of Statute 335.065 and decreased by a net total of 0.010%–0.577% = 0.567% more per quarter after adoption of the law.

[c]Risk ratio for the impact of pedestrian fatality rate in comparison states on the pedestrian fatality rate in Florida. The pedestrian fatality rate in Florida is expected to increase 2.4-fold for every 10-fold increase in the South US census region, and the pedestrian fatality rate in Florida is expected to increase 4.43-fold for every 10-fold increase in all US states and Washington, DC. Given that the risk ratio for all US states and DC is higher, it suggests that this comparison group was a better predictor for the temporal pattern of pedestrian fatalities than was the South US census region.

[d]The best-fitting ARMA model for the data required the use of at least 3 past values, which are the autoregressive parameters. The estimates indicate which measurements from preceding quarters are stronger predictors of the current value of each model. As the largest value, the third autoregressive coefficient is the strongest predictor for the current value of the time series for both models. As such, the log fatality rate 3 quarters in the past is the strongest predictor of the current log fatality rate.

[e]Estimated total number of lives saved between adoption of Statute 335.065 in 1984 and 2013.

RESULTS

Table 1 summarizes the results of fitting the 2 ARMA models. Controlling for the state population, the ARMA models indicated that the adoption of Statute 335.065 was significantly associated with a statewide reduction in Florida's pedestrian fatalities. Adjusting for log mortality rates in the South census region comparison group, Florida's pedestrian fatalities decreased by 0.577% (95% confidence interval [CI] = −1.098, −0.053) more each quarter after Statute 335.065 was adopted. Similarly, adjusting for log mortality rates in the comparison group of all US states and Washington, DC, Florida's pedestrian fatalities decreased by 0.500% (95% CI = −0.954, −0.043) more each quarter after Statute 335.065 was adopted. The ARMA forecast plots confirmed that Florida's pedestrian fatalities decreased after the adoption of Statute 335.065, and observed fatalities were lower than those forecast by the models. However, the higher risk ratio for the comparison group of all US states and Washington, DC, indicated that this group was a better predictor for the temporal pattern of pedestrian fatalities compared with the South census region (Figure 1). As a result of the adoption of Statute 335.065, the estimated number of lives saved ranged from 3506 to 3942 across nearly 3 decades. Subgroup analyses revealed that, after adoption of the law, Florida's pedestrian fatalities decreased most significantly among men and pedestrians ages 20 to 49 when juxtaposed with both comparison groups (Table 2).

Interview Findings

Interviewees discussed a variety of factors that positively or adversely influenced the implementation of Statute 335.065 (Table 3), as well as their perspectives on the overall value of the law.

Supports for implementing Statute 335.065. Supports that positively influenced the implementation of Statute 335.065 included the following:

- Complementary state transportation policies: Interviewees described how other

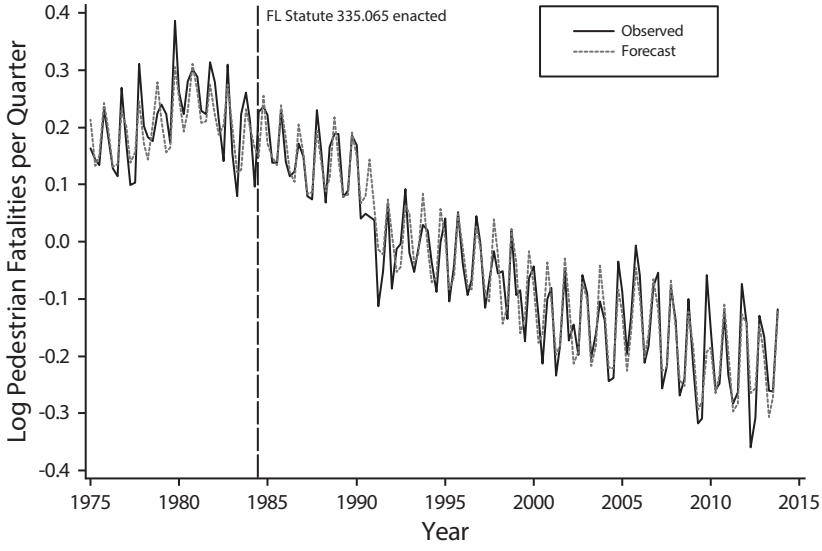

FIGURE 1—Forecast Plot of Autoregressive Moving Average Comparing Florida With All US States and Washington, DC: Log-Transformed Pedestrian Fatalities per Quarter, 1975–2013

state policies bolstered the impact of Statute 335.065. For instance, the 1975 Local Government Comprehensive Planning and Land Development Regulation Act required local governments to adopt comprehensive plans to "promote, protect, and improve the public health, safety . . . and general welfare" and facilitate "adequate and efficient provision of transportation."[19] In 1998, the Florida Department of Transportation (FDOT) adopted the Transportation Design for Livable Communities policy, which allowed planners and engineers to create features (e.g., speed limits, sidewalks, crosswalks) based on a consideration of the "safety of pedestrians, bicyclists, motorists and public transit users."[20(p21-1)]

- Funding: Nearly all interviewees felt there was adequate funding to support the implementation of Statute 335.065. According to one interviewee, Florida is "in much better shape than most states" and only obtains a fraction of its transportation funding from the federal government. However, interviewees noted that most state transportation funding is allocated to projects that accommodate motorized road users rather than pedestrians and bicyclists.
- Leadership within transportation agencies: Having competent, collaborative, and energized leaders within state, regional, and local transportation agencies was cited as critical to advancing pedestrian safety efforts aligned with Statute 335.065. Also, having officials who ensured that the statute's requirements were routinely incorporated into road design guidelines for state and local transportation projects was key to the successful implementation of the statute.
- Trained state and local transportation staff: According to most interviewees, successful transportation projects aligned with Statute 335.065 were the result of efforts spearheaded by trained transportation staff at district, county, and city levels, including planners, engineers, and bicycle and pedestrian coordinators. Interviewees also noted the value of transportation staff who actively sought out additional education about routine accommodation and Complete Streets and conveyed new knowledge to their colleagues.

Barriers to implementing Statute 335.065. Interviewees discussed a variety of barriers that hampered efforts to implement Statute 335.065. Key barriers included the following:

- Inconsistent state oversight and local accountability: Several interviewees noted that inconsistent state oversight has allowed some district, county, and city governments to design roads that poorly accommodate pedestrians and bicyclists. Without state oversight, these local governments have been able to avoid being held accountable for ineffectually accommodating nonmotorized users in their transportation projects.

TABLE 2—Estimated Change in Rate of Decline in Pedestrian Fatality Rate Following Law Adoption as a Function of Demographic Group: South Census Region States and All US States and Washington, DC; 1975–2013

Demographic Group	South US Census Region States Estimate[a] (95% CI)	All US States and Washington, DC, Estimate[a] (95% CI)
Sex		
Male	−0.689 (−1.279, −0.096)	−0.630 (−1.133, −0.124)
Female	−0.247 (−0.670, 0.178)	−0.180 (−0.579, 0.221)
Age, y		
0–14	−0.312 (−1.152, 0.535)	−0.270 (−1.162, 0.630)
15–19	−0.641 (−1.695, 0.425)	−0.698 (−1.617, 0.230)
20–34	−0.987 (−1.683, −0.285)	−0.716 (−1.346, −0.082)
35–49	−0.987 (−1.546, −0.425)	−0.921 (−1.414, −0.425)
50–64	−0.217 (−0.980, 0.553)	−0.332 (−0.963, 0.304)
≥ 65	−0.276 (−0.786, 0.236)	−0.262 (−0.770, 0.249)

Note. CI = confidence interval.

[a]Estimated impact of the adoption of Statute 335.065. Adoption of the law resulted in decreased pedestrian fatality rates among both sexes and all age groups. However, decreases in fatalities were most significant among males and people ages 20–49 y in Florida when juxtaposed with both comparison groups. For example, adjusting for log fatality rates in the South census region, the percentage of change in log fatality rate per quarter after adoption of the statute was 0.689% lower among males and 0.987% lower among those aged 20–49 y after adoption of the statute than it was before adoption.

TABLE 3—Supports and Barriers Related to Implementing Florida Statute 335.065: Quotations From Interviewees, 2015

Supports and Barriers	Quotations from Interviewees
Supports	
Complementary state transportation policies	"[Statute 335.065] cannot be looked at in isolation from other requirements in state law. . . . When you look at the state statutes, you also have to look at the overall planning framework in Florida to better understand how these requirements work together and support each other in achieving the overall state policies."
Funding	"I'd say on the infrastructure side, funding is not an issue. I mean, the types of things that need to be done to improve pedestrian safety don't really increase costs by any significant amount. And some of those things, like for instance, if we were talking about adding street lighting to a road—that benefits all users. And so, no, I don't think the costs on the infrastructure side are really a problem or a hindrance."
Leadership within transportation agencies	"I think what made [Statute 335.065] implementable was truly having the right governance, the right structure in place, having the [Department of Transportation] that over time was in that process of turning itself around. Maybe not doing it as fast as I certainly would've liked . . . but still exhibiting good leadership and being willing to do things in a different way."
Trained state and local transportation staff	"We needed people below the district bicycle and pedestrian coordinators who would be able to get projects on the ground and truly make sure that they were overseen with the right designs and things like that. . . . Nobody could just pass a law like [Statute 335.065] and have any change; that's just not how governments work. You have to have key people who get trained, who are very proud of what they've learned how to do, and have the competency and the courage to go against their own fears to build something different than what they had been building in the past."
Barriers	
Lack of state oversight and local accountability	"If there is not accountability, it [makes] no difference what performance measurements or policies or statutes [say]. If there is no one holding people's feet to the fire, it doesn't get done."
Inflexible land use and zoning policies	"Local governments and their land development regulations are a major contributor to this problem. But we can't fix the problem without them. . . . You're not addressing the comfort or efficiency needs of pedestrians when everything is set way back from the sidewalk. That's why they're critical to the whole Complete Streets effort."
Uninformed decision-making by transportation agency staff and elected officials	"Honestly, if the legislature really believed in it and the traffic engineers who have all the power and call all of the shots really believed in it, then they would say a lot more of the money needs to be spent on the things that make a difference for the pedestrians' and cyclists' experience. Instead, what they do is they fight against those common sense things at every turn."
Performance metrics that prioritize motor vehicles	"We did well what we thought we knew to do well. We provided a 5-foot sidewalk . . . that was it. Or we provided a bit of bike lane. But what was happening on the concurrency side is the state was consumed with the requirements—that we have adequate capacity for cars on roadways—and part of that was based on the ability of a car to get from location A to B in a timely manner and fast. And so we didn't connect the dots very well between what was happening for the vehicle design and what was happening for the pedestrians and the bicyclists."

- Inflexible land use and zoning policies: Land use and zoning codes, regulations, and ordinances mandate how land can be developed to address a variety of uses (e.g., residential, commercial, civic, and recreational). According to interviewees, suburban sprawl and disjointed land use in Florida have led to disconnected neighborhoods that lack pedestrian infrastructure and require the use of motor vehicles to reach nearby destinations. Interviewees stated that many Florida cities and counties continue to have inflexible land use and zoning policies that prohibit pedestrian-friendly environments.
- Uninformed decision-making by transportation agency staff and elected officials: Several interviewees noted that some transportation staff and local elected officials have been too eager to reap the financial benefits of proposed residential and retail developments without considering the consequences of these land use decisions. In approving these proposals too quickly, some officials have neglected to require developers to provide sufficient accommodations for nonmotorized road users.
- Performance metrics that prioritize motor vehicles: Nearly all interviewees described how transportation agencies' prioritization of motor vehicles has hindered efforts to implement Statute 335.065 and provide adequate accommodations for pedestrians and bicyclists. Roadway performance metrics—measures used to assess the quality of traffic service and road functionality—often exclude measures associated with pedestrian accommodation. One metric, level of service, evaluates the "speed, convenience, comfort and security"[21(p1)] of the transportation system. Given that level of service has historically been based on the movement of motor vehicles, it has often led to highway improvements that benefit automobiles rather than pedestrians and bicyclists.

Overall Value of Statute 335.065

Interviewees described Statute 335.065 as an invaluable blueprint and catalyst for advancing statewide pedestrian and bicycle safety efforts in Florida. As a foundational piece of legislation, the statute reflected a long-term commitment by the state to enhance the safety of nonmotorized road users:

> I think the law was an essential piece. We really needed a grounding piece—something that is truly a document that everyone can go back to and say, "This is the intent of the legislature. It

has not been changed. This is the direction we're going to go." I think that was fundamental.

By January 2000, FDOT began to explicitly quote or refer to Statute 335.065 in road design guidance documents used by transportation engineers and planners statewide. These documents included the *Plans Preparation Manual,* which provides design criteria for all state highways, and the *Florida Greenbook,* which provides minimum standards for all local roads in Florida. According to interviewees, after the adoption of Statute 335.065, many Florida communities developed more stringent subdivision regulations that required developers to provide sidewalks and other accommodations for pedestrians. The use of state road design guidance documents grounded in Statute 335.065, combined with local regulations, may have collectively contributed to infrastructural roadway improvements that enhanced the safety of Florida pedestrians over time.

DISCUSSION

This study builds on previous policy evaluation research designs[22,23] by using a multimethod approach: an interrupted time-series analysis and semistructured interviews. Results confirmed that Florida's 1984 adoption of a Complete Streets state law (Statute 335.065) is associated with a significant decrease in pedestrian fatalities over 3 decades, with more than 3500 lives saved. Interviews with current and former Florida transportation professionals revealed a variety of supports that contributed to the successful implementation of Statute 335.065 (e.g., complementary policies, funding, agency leadership, and trained staff) and challenges that have impeded the overall effectiveness of the statute (e.g., inadequate oversight and accountability, inflexible land use and zoning policies, uninformed decision-making, and performance metrics that prioritize motor vehicles).

Although the adoption of Statute 335.065 represented an important and effective step in reducing pedestrian fatalities in Florida, there continues to be room for substantial improvement. Between 1984 and 2013, Florida's annual pedestrian fatality rate decreased by nearly 60%—from 6.36 to 2.56 per 100 000 population.[14] Nevertheless, Florida's pedestrian fatality rate remains significantly high, consistently exceeding the average annual pedestrian fatality rate of most states and the United States since these data were first captured in 1975. A January 2017 report published by Smart Growth America examined more than 100 of the nation's largest metro areas to identify the most dangerous areas for pedestrians. The report ranked Florida as having the highest pedestrian danger index of any state, with 8 of the top 10 most dangerous metro areas located in Florida.[24] Smart Growth America defines the pedestrian danger index as a calculation of the share of local commuters who walk to work and the most recent data on pedestrian deaths. Pedestrian danger index calculations were made using US census data and National Highway Traffic Safety Administration Fatality Analysis Reporting System data from 2005 to 2014.

Interviewees expressed frustration with the state's persistently high pedestrian fatality rate:

> We should be farther by now. We shouldn't be in last place anymore. We shouldn't be killing and maiming pedestrians and cyclists at the rate we're doing it. And I'm sure many people would say, "Well, wait a minute. That's not because the statute failed; in fact it might a lot worse if not for the statute." But we have a long way to go.

In an effort to further reduce the state's pedestrian fatalities, FDOT adopted an organization-wide Complete Streets policy in September 2014. The policy reflects the agency's commitment to "coordinate with local governments, Metropolitan Planning Organizations, transportation agencies and the public" to "routinely plan, design, construct, reconstruct and operate a context-sensitive system of 'Complete Streets'" that will "serve the transportation needs of transportation system users of all ages and abilities."[25(p1)] To support the implementation of its organizational policy, FDOT collaborated with Smart Growth America in 2015 to develop and implement a 5-part *Complete Streets Implementation Plan* to institutionalize a Complete Streets approach within its organizational policies and practices.[26] Also, local governments in Florida have embraced Complete Streets by adopting more than 70 policies since 2005 in the form of ordinances, resolutions, comprehensive plans, and design guidelines.[7b] It is hoped that the continued implementation of state and local Complete Streets policies—with a keen focus on addressing the barriers identified through this study—will collectively contribute to further decreases in Florida's pedestrian injuries and fatalities over time.

Limitations

Given that the Fatality Analysis Reporting System only includes traffic fatality data, we could not build nonfatal pedestrian injuries into the ARMA models. Also, snowball sampling was used to identify, recruit, and interview a small sample of transportation professionals who currently work or formerly worked in Florida. Their insights—although valuable for contextualizing the quantitative findings of this study—cannot be generalized to the entire population of transportation professionals in Florida.

Opportunities for Further Study

Florida's pedestrian fatalities reached an all-time high in 1980 (7.54 per 100 000 population), during the period studied. Given the complexity associated with population health outcomes, other variables may also have contributed to the observed declines in pedestrian fatalities in addition to Statute 335.065, including fluctuations in economic conditions; changes in fuel prices; demographic shifts; varying expenditures on roadways and traffic engineering countermeasures; and the adoption or enforcement of other concurrent local, state, and federal policy efforts. These variables present additional opportunities for further study.

Building on similar studies conducted by Hanson et al.[27] and Radwan et al.,[28] researchers can use geocoded data on pedestrian fatalities, road infrastructure features, and traffic engineering countermeasures to examine potential connections between the presence or lack of specific countermeasures, the existence of local Complete Streets policies, and locations of pedestrian fatalities throughout Florida. Geographic Information System software can be used to map these data and support local area analyses to determine potential associations between counts and locations of pedestrian fatalities, quantities and types of traffic engineering countermeasures,

the existence of local Complete Streets policies, and other demographic and topological variables.

Finally, conducting multimethod evaluations of other state and local Complete Streets policies throughout the United States can provide a greater understanding of relationships that may exist among policy adoption, policy implementation, and public health outcomes.

Public Health Implications

This study provides 2 key implications for public health:

1. Confirmation that transportation policies—specifically Complete Streets policies—can have significant, quantifiable impacts on population health. This study revealed that Florida's adoption of a Complete Streets state law was associated with significant decreases in statewide pedestrian fatalities, ultimately saving more than 3500 lives across 3 decades.
2. Affirmation that a multimethod approach adds insight and value to a policy process and outcome evaluation. Multimethod evaluation approaches can successfully combine advanced statistical techniques with perspectives from policy implementers. This combined methodology can allow public health practitioners, researchers, and policymakers to determine not only whether policies are effective but also how and why they may or may not be effective. This knowledge can inform implementation efforts and ultimately enhance policy effectiveness. AJPH

CONTRIBUTORS

J. M. Porter conceptualized the study; led the collection, analysis, and interpretation of qualitative data; supported the procurement and analysis of quantitative data; and drafted the article. S. L. Rathbun led the quantitative data analyses and supported the drafting and critical review of the article. P. S. Corso, M. Davis, J. M. Lee, S. J. Bryan, K. Arseniadis, and L. P. Caldwell provided critical review of the article. S. L. Rathbun, P. S. Corso, M. Davis, J. M. Lee, and S. J. Bryan informed the study design. S. J. Bryan supported the procurement and analysis of quantitative data. K. Arseniadis and L. P. Caldwell supported the analysis and interpretation of qualitative data.

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HUMAN PARTICIPANT PROTECTION

This study was approved by The University of Georgia institutional review board.

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