

Compliance to two city convenience store ordinance requirements

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ABSTRACT

Background Robbery-related homicides and assaults are the leading cause of death in retail businesses. Robbery reduction approaches focus on compliance to Crime Prevention Through Environmental Design (CPTED) guidelines.

Purpose We evaluated the level of compliance to CPTED guidelines specified by convenience store safety ordinances effective in 2010 in Dallas and Houston, Texas, USA.

Methods Convenience stores were defined as businesses less than 10 000 square feet that sell grocery items. Store managers were interviewed for store ordinance requirements from August to November 2011, in a random sample of 594 (289 in Dallas, 305 in Houston) convenience stores that were open before and after the effective dates of their city's ordinance. Data were collected in 2011 and analysed in 2012–2014.

Results Overall, 9% of stores were in full compliance, although 79% reported being registered with the police departments as compliant. Compliance was consistently significantly higher in Dallas than in Houston for many requirements and by store type. Compliance was lower among single owner-operator stores compared with corporate/franchise stores. Compliance to individual requirements was lowest for signage and visibility.

Conclusions Full compliance to the required safety measures is consistent with industry 'best practices' and evidence-based workplace violence prevention research findings. In Houston and Dallas compliance was higher for some CPTED requirements but not the less costly approaches that are also the more straightforward to adopt.

INTRODUCTION

Homicide is a leading cause of work-related deaths in the USA, particularly among workers in gas stations and food and beverage stores,^{1–2} with the majority of homicides in this subsector of the retail industry being robbery-related (Bureau of Labor Statistics, Report 1997–2008. Homicides by type of assailant, industry and occupation, unpublished report provided to the National Institute for Occupational Safety and Health).^{3–7} Situational Crime Prevention⁸ programmes have been successful in reducing robbery and robbery-related injury to employees and customers in retail settings.^{9–13} These case-specific, applied programmes are consistent with Crime Prevention Through Environmental Design (CPTED), which theorises that environments can be modified to make robbers vulnerable to detection and less likely to obtain a large reward, thus increasing the robber's perception that a robbery is not worth the risk.¹⁴ The five principles of CPTED are access control,

surveillance, territoriality, maintenance, and activity support and are expanded upon in Situational Crime Prevention to 12 techniques that essentially represent CPTED principles.^{8–14}

Since the 1980s effective CPTED programmes have been identified by the National Association of Convenience Stores^{15–21} and ultimately recommended by the National Institute for Occupational Safety and Health²² and the Occupational Safety and Health Administration.²³ A comprehensive review identified retail establishments with multiple-component CPTED programmes experienced 30%–84% decreases in robberies and a 61% decrease in non-fatal injuries.¹³ Current research has focused on identifying approaches to increase knowledge and compliance to CPTED recommendations, particularly among small retail establishments.^{10–24–25}

Cities in Florida were among the first to adopt ordinances designed to reduce robberies in convenience stores using CPTED-based approaches.¹³ Over a 6-year period, cities in Florida promulgating ordinances mandated four to nine different CPTED components. The common components were visibility, training and cash handling policies. By 1992, signage, drop safes, alarms and cameras were additional requirements. Studies evaluating the effectiveness of the Florida ordinances focused on robberies and other outcomes rather than examining compliance.^{11–12} Store compliance is an important step in empirically reducing robbery rates and, consequently, homicide rates and other robbery-related injuries.

In 2007 the Mayor of Houston convened a task force under the leadership of a local convenience store owner and industry leader that led to the promulgation of a convenience store safety ordinance in Houston and Dallas, Texas. There had been a recent increase in convenience store robberies in Houston and Dallas, and the local Houston convenience store owner and industry leader wanted more action on the part of the city to prevent robberies. The task force was chaired by the convenience store owner, co-chaired by the police department and comprised of many local community and business leaders. We aim to examine store compliance to CPTED-based approaches to robbery prevention in each city after enactment of the convenience store safety ordinance.

METHODS

Ordinance requirements

Convenience store ordinances became effective 1 January 2010 in Houston and 10 May 2010 in Dallas. The ordinances incorporated CPTED safety requirements identically in both cities and



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included: (A) employee training in robbery/violence prevention; (B) signage depicting no loitering/trespassing, surveillance cameras, minimum cash available, security alarm and height strips posted on doors of public exits; (C) visibility 3–6 feet off ground through doors/windows; (D) cash limit policy and use of a bolted, timed-release drop safe; (E) alarm system; and (F) at least two surveillance cameras.¹⁴

The ordinance defines a convenience store as any business that is primarily engaged in the retail sale of convenience goods, or convenience goods and gasoline, and has less than 10 000 square feet of retail floor space. Each city mandates all convenience stores located in the city limits register with the police department upon receiving by mail a packet that contains a list

of the ordinance requirements, the trespass affidavit, the window decal denoting programme registration, the height strips (vertical tape measurers designed to estimate height), and the list of vendors with contact information and pricing for obtaining the remaining requirements. Stores were given 18 months from the time the ordinance was announced and advertised via local business associations to the effective date to purchase and install the required safety equipment. The packet also included a copy of the DVD and the web link to the 10–15 min police department training video available in six languages. The robbery prevention training was organised into recommended store procedures and policies before, during and after a robbery. The ‘before a robbery’ segment presented procedures on cash handling, store opening and closing, proper operation of security devices, the use of physical deterrents, and each employee’s role in robbery prevention. The ‘during a robbery’ segment included a vignette with a critique by a police officer on recommended employee behaviour, and the ‘after a robbery’ segment contained recommendations for store employees such as calling 911 and not chasing the robber.

The police departments in both cities went store to store to promote compliance with the ordinance during a month-long campaign and visited stores when possible to assess compliance for approximately 18 months leading up to the effective date of the ordinance.

Store sample

A sampling frame of 2046 businesses in Houston (population 2.1 million) and 761 in Dallas (population 1.2 million) meeting the convenience store definition was obtained from InfoUSA, a company that provides business lists to marketing firms. A business was included in the study if its location address listed the city as Dallas or Houston and its primary or secondary SIC code was 541101 (Food markets), 541103 (Convenience Stores), 541104 (Food products, retail), 541105 (Grocers, retail) or 554101 (Service stations, gasoline and oil). A random sample of 800 stores, 400 from each city, was selected. Each store address in the sample was reviewed using Google Street Maps, and 104 were found to not meet eligibility criteria—that is, there was no store at the location or it was determined to clearly be over 10 000 square feet. The remaining 696 stores were considered eligible for the survey.

Data collection

Study surveyors reflecting the racial/ethnic demographics of the convenience store managers and trained in the consent and survey process by the principal investigator approached convenience store managers of previously selected stores. Study surveyors obtained verbal assent, provided a copy of the consent form script to store managers and interviewed them during August to November 2011 regarding employee characteristics, ordinance compliance and store crime. Surveyors separately completed a store evaluation of observable compliance to ordinance requirements, such as registration sticker posted, signage posted, visibility or direct line of sight from register through doors and windows, and presence of cameras and alarms. The study protocol was approved by the institutional review board.

Study variables

The primary outcome measure—store compliance to the ordinance—was defined as being fully compliant or not compliant. Single requirements were considered as individual secondary outcome measures. All requirements were asked in response to the ordinance that was in effect in their city. Where possible the

Table 1 Selected store and manager characteristics, % (n)*

	Full sample† (N=594)	Houston (n=305)	Dallas (n=289)
Store ownership type			
Single owner-operator—1 store	44 (261)	45 (137)	44 (127)
Single owner-operator—>1 store	13 (77)	12 (37)	13 (38)
Franchise—1 store	12 (71)	13 (40)	11 (32)
Franchise—>1 store	10 (59)	8 (24)	13 (38)
Corporate chain store	21 (125)	22 (67)	20 (58)
Store type			
Convenience store	88 (523)	90 (275)	86 (249)
Small grocery store	11 (65)	9 (27)	13 (40)
Manager-owned store	43 (255)	47 (143)	38 (110)‡
Manager gender			
Male	82 (487)	81 (247)	83 (240)
Manager race/ethnicity			
Non-Hispanic white	14 (83)	12 (37)	16 (46)‡
Non-Hispanic black	15 (89)	5 (15)	27 (78)
Hispanic	6 (36)	7 (21)	4 (12)
Asian	65 (386)	76 (232)	53 (153)
Manager age (years)			
16–24	4 (24)	5 (15)	3 (9)‡
25–34	23 (136)	18 (55)	28 (81)
35–44	29 (172)	26 (79)	32 (92)
45–54	32 (191)	36 (110)	28 (81)
≥55	12 (72)	15 (46)	9 (26)
Manager nativity			
Born outside the USA	26 (154)	15 (46)	37 (107)‡
Risk factors			
Open 24 h	29 (172)	22 (67)	36 (104)‡
Strip mall location	31 (184)	27 (82)	35 (101)‡
Located within half a mile of an expressway	53 (315)	53 (162)	52 (150)
Gas pumps on premises	57 (339)	58 (177)	55 (159)
Parking lot on premises	97 (576)	98 (299)	96 (277)
Sidewalk in front	49 (291)	48 (146)	49 (142)
Within 100 ft of another commercial business	81 (481)	80 (244)	83 (240)
Located in residential area	61 (362)	60 (183)	62 (179)
Located in urban/downtown area	39 (230)	40 (122)	37 (107)

*Numbers in cells represent percentage.

†All χ^2 tests for equal proportions within each variable were statistically significant with the exception of store being located within half a mile of an expressway ($p=0.14$) and store having a sidewalk in front ($p=0.62$).

‡ χ^2 Tests for equal proportions within each variable were statistically significant ($p<0.05$) for city differences.

safety measure checklist completed as a validity check by surveyors based on safety measures observable without a manager's assistance was used. For each requirement, a question was asked about reasons for non-compliance with the following possible responses: too busy, too expensive, unnecessary, unaware of importance, and other or unknown.

Both outcomes were examined by city location, designated as Houston or Dallas, and store ownership type. Store ownership type was dichotomised into either a franchise or corporate chain or designated as a store with a single owner-operator.

Descriptive variables are store type, manager-related characteristics, and characteristics associated with known or suspected risk factors for robbery. Store type includes either convenience store or small grocery store. Manager-related characteristics include whether the manager owned the store and the manager's gender, race/ethnicity, age, and nativity. Known or suspected risk factors include stores open 24 h, located in a strip mall, located within half a mile of an expressway, gas pumps on the premises, a parking lot on the premises, a sidewalk in front, located within 100 ft of another commercial business, located in a residential area, and located in an urban or downtown area.^{11 12}

Statistical analysis

Where possible, variables from the checklist that were based on surveyor observation of the outside of the store were used rather than self-report measures. Descriptive statistics are presented for selected store and manager characteristics for the full study population and by city, with χ^2 testing proportion differences within each variable and by city. The prevalence of stores fully compliant and compliant to individual ordinance requirements after effective dates of the ordinance was examined. Mantel-Haenszel χ^2 tests evaluated differences between cities and store ownership type. Data analysis occurred in 2012–2014.

RESULTS

Store and manager characteristics

Upon visiting, a further 42 stores were ineligible and 60 managers refused to participate. A total of 594 stores with a manager's participation were surveyed: 305 in Houston and 289 in Dallas. Overall, a majority (57%) of the stores were single owner-operated, and these were nearly evenly distributed by city (table 1). Convenience stores overwhelmingly outnumbered small grocery stores (88% vs 11%). Almost half of the stores were manager-owned (43%), more so in Houston (47%) than Dallas (38%). Managers were predominantly men (82%), Asian (65%), with no predominant age group. A majority of managers were born in the USA (74%), less so for Dallas (63%) than Houston (85%).

Approximately a third of the stores were open 24 h (29%) or were located in a strip mall (31%). Just over half were located within half a mile from an expressway (53%) and had gas pumps on the premises (57%). Nearly all had a parking lot on the premises (97%) and nearly half had a sidewalk in front (49%). Four out of five stores (81%) were located within 100 feet of another commercial business, with 39% located in an urban or downtown area. Risk factors did not differ by city with the exception of more stores being open for 24 h and having a strip mall location occurring in Dallas.

Ordinance compliance

Full compliance

Overall, 9% of stores were in full compliance: 3% in Houston and 15% in Dallas ($p<0.0001$) (figure 1). When the signage

requirement was removed from analyses for full compliance, store compliance increased statistically significantly overall (9–24%), in Houston (3–21%) and in Dallas (15–27%) ($p<0.001$ for all comparisons). Without the signage requirement, Dallas reported greater compliance than Houston, though not significantly (27% vs 21%, $p=0.08$). When the signage and visibility of cash register requirements were removed from analyses for full compliance, compliance increased statistically significantly overall (24–42%), in Houston (21–36%) and in Dallas (27–49%) ($p<0.001$ for all comparisons). Without the signage and visibility requirement, Dallas reported significantly greater compliance than Houston (49% vs 36%, $p=0.001$).

When examining compliance by store ownership type, compliance was consistently significantly higher for corporate/franchise-owned stores compared with single-owner operated stores—overall and for each city (figure 2). Compliance levels were higher for Dallas compared with Houston. All comparisons by store ownership and/or city were statistically significant with the exception of differences between Houston and Dallas for non-compliance to signage only among single store owners ($p=0.15$) and non-compliance to signage only ($p=0.33$) and signage and visibility ($p=0.28$) for corporate/franchise-owned stores.

Individual requirements

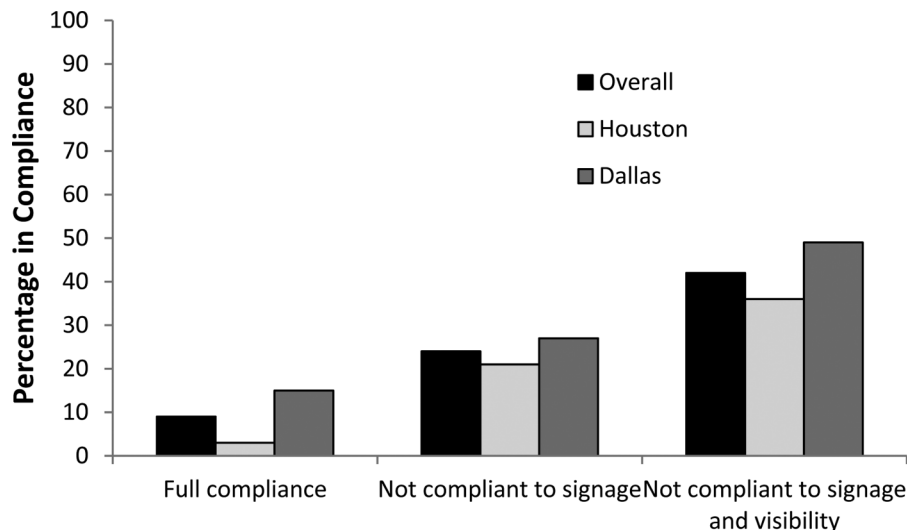
Dallas convenience stores had significantly higher percentages of manager-reported registration to the ordinance, posted registration, manager-reported training, posted trespass affidavits and other signage, manager-reported cash limit policy and surveillance camera installations (table 2). Conversely, Houston convenience stores had greater compliance to store visibility, alarm system and drop safe requirements. City-specific differences persisted regardless of store-ownership type, with the exception of visibility requirements for corporate/franchise convenience stores. Corporate or franchise convenience stores had significantly greater compliance to trespass affidavit and signage postings, visibility, cash limit policies and surveillance camera installations compared with single owner-operator stores. While these differences persisted for Dallas compared with their single owner-operator counterparts, Houston corporate/franchise stores had greater compliance to drop safes but did not experience significantly greater compliance to visibility and surveillance camera installation requirements.

Overall, the three requirements with the lowest compliance were signage postings (including registration sticker/affidavits), visibility and drop safes.

Reasons for non-compliance

The majority of responses for why each requirement was not compliant was 'other' rather than the responses provided (too busy, too expensive, unnecessary, unaware of importance) or simply unknown. 'Unaware of importance' was the second most prevalent response in providing training, posting signage and maintaining visibility. 'Unnecessary' was the second most prevalent response for not having a cash limit policy or no drop safe. However, for corporate/franchise stores the second most prevalent reason for non-compliance to having a drop safe was 'too expensive'. 'Too expensive' was the second most prevalent reason for non-compliance to installing alarm systems or surveillance cameras. For single owner-operator stores there was no prevalent reason for non-compliance to security alarm installation. A review of the 'other' responses for lack of a cash limit policy found a substantial number was due to check cashing needs for store patrons. The remaining 'other' responses were

Figure 1 Proportion of convenience stores fully compliant, compliant except for signage, and compliant except for signage and visibility.



disparate, unique to one store and did not fall into clear categories. Data are not shown due to too small cell sizes for a majority of categories.

DISCUSSION

The purpose of this study was to examine the compliance of a group of randomly selected convenience stores in two major cities to an ordinance designed to reduce robberies and, consequently, workplace violence injuries. In both cities, a majority (79%) of convenience stores were registered with the programme: 68% in Houston and 90% in Dallas. When examined by store ownership type, a majority of franchise/corporate stores (77%) were registered in the programme, with almost 50% more in Dallas (93%) than in Houston (63%). Interestingly, a large proportion of single owner-operator stores (80%) were also registered with the ordinance programme with 23% more in Dallas (88%) than in Houston (71%). There were more single owner-operator stores registered in the ordinance programme in Houston than franchise/corporate stores. Evidence of registration—posted registration stickers—occurred less frequently than manager-reported registration, but were

posted more frequently in Dallas compared with Houston, and in corporate/franchise stores compared with single owner operator stores.

Full compliance was lower than expected for a mandated city ordinance with an 18-month grace period for compliance. Challenges in compliance to the full set of comprehensive measures was anticipated, so police departments in both cities provided a list of vendors with costs to help store owners budget for compliance. The store managers were surveyed after the grace period in Houston, and towards the end of the grace period in Dallas. Sampling into the grace period was likely not a factor in low compliance as Dallas had a significantly greater level of compliance than Houston.

Interestingly, two of the three safety measures with the lowest compliance were signage and visibility. These are also two safety measures that generally do not incur costs. In previous research among small retail establishments, compliance to low-cost and low-maintenance recommendations was higher.⁹ The lack of compliance to signage and visibility was more often credited with 'lack of importance' and 'unnecessary'. Although the managers most often provided a reason for non-compliance as

Figure 2 Proportion of convenience stores in fully compliant, compliant except for signage, and compliant except for signage and visibility—by store ownership type.

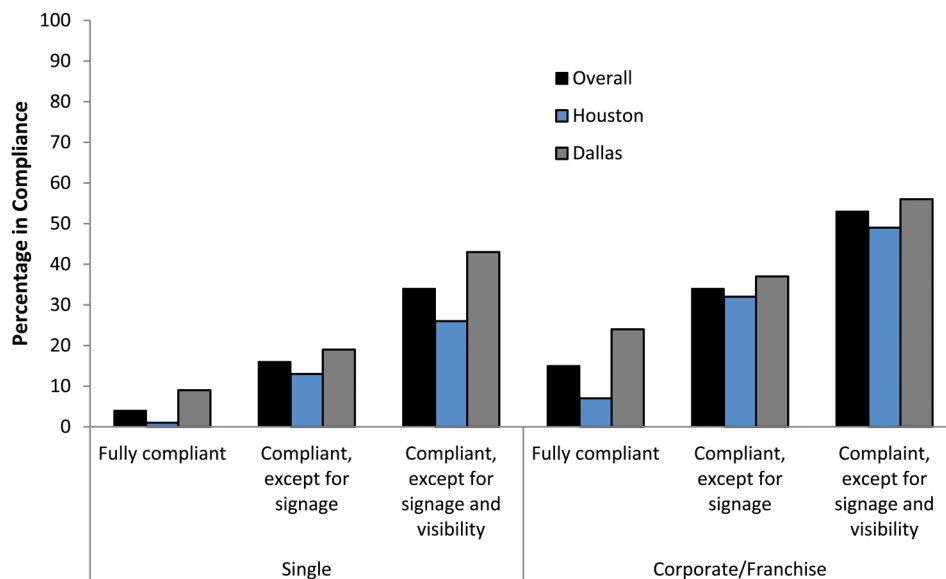


Table 2 Compliance to individual ordinance requirements after effective date, by city and store ownership type, %

	Full sample (N=594)	Houston (n=305)	Dallas (n=289)	Single owner-operator			Corporate/franchise		
				Overall (n=339)	Houston (n=175)	Dallas (n=164)	Overall (n=253)	Houston (n=130)	Dallas (n=123)
Registration*	79	68	90†	80	71	88‡	77	63	93§
Registration sticker posted	64	48	81†	61	45	78‡	68	52	85§
Training*	79	70	89†	77	67	88‡	82	74	91§
Trespass affidavit posted	69	54	84†	63	47	79‡	77¶	64**	91§,††
Signage posted	26	16	36†	18	10	27‡	36¶	25**	47§,††
Visibility	60	65	54†	55	65	46‡	66¶	65	66††
Alarm system	71	79	61†	70	81	59‡	71	78	64§
Drop safe	46	57	34†	47	62	32‡	43	50**	36§
Cash limit policy*	79	71	88†	73	60	86‡	88¶	85**	91§,††
Camera	73	58	88†	69	55	84‡	77¶	62	93§,††

*As reported by store manager.

†Mantel-Haenszel χ^2 tests statistically significant ($p < 0.05$) for differences between cities.

‡Mantel-Haenszel χ^2 tests statistically significant ($p < 0.05$) for differences between cities for single owner-operator stores.

§Mantel-Haenszel χ^2 tests statistically significant ($p < 0.05$) for differences between cities for corporate/franchise stores.

¶Mantel-Haenszel χ^2 tests statistically significant ($p < 0.05$) for differences by store ownership type.

**Mantel-Haenszel χ^2 tests statistically significant ($p < 0.05$) for differences by store ownership type in Houston.

††Mantel-Haenszel χ^2 tests statistically significant ($p < 0.05$) for differences by store ownership type in Dallas.

'other', upon examination the reasons were disparate and may not make a valid argument to a police officer enforcing the ordinance with a citation. Store managers/owners may have focused on the components they felt were the most important for compliance rather than ensuring compliance to all requirements. Additionally, small retail stores use window space to advertise available products and promotions for their store and space is usually limited. It is possible that managers/owners put a higher premium on advertisements than signage requirements if window space was limited. One of the underlying reasons for CPTED success is believed to be communicating to potential robbers the risks of getting caught through the signage component. In order to reduce robberies, it is important that stores are fully compliant to the ordinance and understand how each measure reduces the risk of a potential robbery. It is important that managers are trained in the required safety measures, and how they are intended to reduce robberies to increase ordinance buy-in by managers.

Although we found an increase in compliance among single owner-operator stores, the compliance was consistently less than corporate/franchise stores. Single owner-operator stores are considered at high risk for robbery because they are less likely to employ CPTED components than corporate/franchise stores.²⁴⁻²⁵ It is particularly crucial for single owner-operator stores to be aware of and compliant to ordinances designed to reduce robberies and associated injuries. The timing of the current ordinance provided 18 months for stores to become compliant with the ordinance, allowing for time to save for and purchase the more expensive ordinance requirements (alarm system, drop safe and cameras) that may be more of a financial hardship for single owner-operator stores. We interviewed the stores between 19–22 months (Houston) and 15–18 months (Dallas) after the effective date of the ordinances.

Compliance was lower than expected for each city given the legal obligation. The ordinance enforcement appears to be crucial for high compliance rates, and self-reported enforcement by managers appeared low. Only 3% ($n=16$) of all stores in the study reported being cited for non-compliance, and 75% were single owner-operators. There was no meaningful difference in

the number or proportion of stores being cited by city. Given the comprehensive requirements of the ordinance, ongoing education and enforcement of the ordinance in both cities would likely play an important role in obtaining higher rates of full compliance.

An important limitation was the quality of ordinance implementation was not assessed in detail due to the breadth of topics covered in the 30-min survey. For example, we did not ask how employee training was implemented but, rather, if and when it was implemented and reasons for not implementing the training. Additionally, this is a re-analysis of data collected post ordinance in order to minimise two key limitations in the original analysis: collecting preordinance and postordinance data at only one time point (postordinance) and using self-report survey data only. The current analysis removed the temporality of the safety measures as we could not establish with certainty they were implemented pre ordinance in addition to using implemented safety measurements observed by the surveyor rather than relying on the manager's response. Eliminating these two biases in the re-analysis significantly improves the contribution of this research to the field of robbery prevention.

To our knowledge this is the first study to evaluate compliance to an ordinance designed to reduce robberies and associated violence in small retail settings. We randomly interviewed managers in small retail establishments in two separate cities and determined self-reported and observed compliance levels after an ordinance became effective. Compliance to the ordinance was lower than hoped although compliance to most individual requirements was high, particularly among corporate/franchise stores. Enforcement measures and/or safety messages explaining the importance of each requirement are likely to improve overall compliance to the ordinance, especially among single owner-operator stores. Next steps are to evaluate the crime rate among the convenience stores with respect to ordinance timing.

CONCLUSIONS

Full compliance to the required safety measures is consistent with industry 'best practices' and evidence-based workplace

Original article

violence prevention research findings. In Houston and Dallas compliance was higher for some CPTED requirements but not the less costly approaches that are also the more straightforward to adopt.

What is already known about the topic

- ▶ Multiple safety measures to reduce convenience store robberies are more effective than a single measure.
- ▶ Ordinances mandating safety measures are associated with reduced robbery and assault rates.

What this study adds

- ▶ Safety measures that are considered the least expensive and least time-consuming were the least compliant with the safety ordinance.
- ▶ Differences in compliance levels were observed between single operators/owners of convenience stores and corporate/franchise owners.

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Competing interests None declared.

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