Differences in Robbery Prevention Strategies Across Retail Business Types

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Objective: To compare implementation of robbery prevention strategies between gas station/convenience stores with liquor stores/grocery stores/pharmacies, restaurants/bars, and other retail businesses. **Methods:** One hundred forty-nine retail businesses were evaluated by police personnel across four police departments for adherence to robbery prevention strategies. Assessment of these strategies occurred between November 2012 and October 2014. Implementation of these strategies were compared across business types using logistic regression. **Results:** Liquor/grocery stores/pharmacies and restaurants/bars were less likely to have a high site assessment score for robbery prevention elements when compared with gas station/convenience stores. **Conclusions:** Non-gas station/convenience stores require stronger consideration when developing robbery prevention programs and policies to assure appropriate implementation of robbery prevention strategies.

Keywords: design, environmental modification, workplace

Work related homicides are a leading cause of fatal workplace injuries for retail workers.[1] Many of these homicides are robbery related, suggesting that efforts to reduce robbery can reduce violence to retail workers.[2]

Crime prevention through environmental design (CPTED) is a theory used in robbery prevention in which modifications to the business environment make the business an unappealing target for robbery.[3] These CPTED-based programs include balancing good interior and exterior lighting with visibility into and within the business, controlling access into the business, controlling the amount of available cash in the registers, and maintaining clean and uncluttered premises to enhance territorial reinforcement of ownership. Studies examining these comprehensive CPTED-based programs show they are effective in reducing robbery and improving the safety of both employees and customers.[4–8]

When individual elements of CPTED-based programs are examined, there are conflicting results regarding their individual impact on robbery prevention.[9–12] One such component is the effectiveness of video surveillance systems (VSS). Early investigations of VSS and robbery rates suggested that VSS systems were associated with lower robbery rates.[13,14] However, these early studies did not fully address confounding from environmental factors that may have explained the observed association between a reduced robbery rate and VSS. In later studies that included methods to address confounding from environmental factors, VSS were not found to be significant in reducing the risk of robbery.[9,11] Despite the mixed evidence, video surveillance systems are considered an integral part of robbery prevention for many retail establishments, and many businesses will install these systems before implementing the less expensive CPTED-based components that are better studied and effective.[15] In a study of convenience store adherence to a robbery prevention ordinance in Dallas and Houston, VSS requirements were more frequently adhered to when compared with lower cost interventions such as controlling the amount of available cash through the use of drop safes, improving visibility, and posting signs displaying that the business operates with a minimal amount of cash.[16]

The majority of studies examining the effectiveness of CPTED-based programs focus on convenience store robbery, but CPTED-based programs have also been shown to be effective in other types of retail establishments including liquor stores and grocery stores, as well as service establishments such as restaurants.[4] Little is known about how businesses implement CPTED-based program components, specifically whether they follow the same patterns as convenience stores and prioritize implementation of video surveillance systems over low-cost CPTED measures.[17]

This investigation examined the implementation of CPTED-based robbery prevention measures across various retail and service businesses. Additionally, implementation was compared across businesses in high and low crime areas, providing insight into how businesses in areas most affected by crime choose to address robbery prevention.

METHODS

Business Sample

Businesses in four police department jurisdictions in the United States were recruited to participate in a robbery and violence prevention program between November 2012 and October 2014. Police department personnel recruited businesses based on their risk for robbery, defined as having a history of robberies or being located in a high crime area. Businesses received an individualized program based on an assessment of robbery prevention strategies already in place. Strategies assessed included employee training in robbery prevention and cash control procedures, and an inventory of environmental strategies including bright lighting, good visibility through front windows, cash control, access control procedures, use of signage, and use of video surveillance systems. Businesses were grouped into the following categories for analysis: gas station/convenience stores, liquor stores/grocery stores/pharmacies, restaurants/bars, and other retail and service businesses. Other types of businesses included: barber/beauty shops, hotel/motels, casinos, professional offices, adult businesses, self-storage, and rental centers.

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Clinical Significance: Despite evidence that environmental design reduces robbery and robbery related injury, non-gas station and convenience store businesses underutilize these low cost preventative measures. Identifying areas of improvement and gaps in programs used by these retail businesses will inform policy and guidance to better address robbery prevention in these businesses.

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Background crime was linked to each business using census block level crime information from the Environmental Systems Research Institute (ESRI) Crime Index data. Indexes were based on Applied Geographic Solutions' CrimeRisk database which is a compilation of Federal Bureau of Investigation Uniform Crime Report data to develop a crime index.[18] An index is created for each census block, where a score of 100 represents the national crime average. Background crime was defined as scores that were higher than the national average or lower than the national average.

Video Surveillance System and Site Assessment Scores

Information about video surveillance systems and other CPTED-based robbery prevention components were collected by sworn officers and civilian crime prevention specialists from the four police departments. The sworn officers and crime prevention specialists were given a field guide to assessing the robbery prevention components and trained on completing the assessment by a Certified Protection Professional. The comprehensiveness of video surveillance systems (VSS) was evaluated using a total score, where a business was given one point for each of the following components: camera(s) directed at all customer entrances, camera(s) directed at all cash counters, at least one dome camera, at least one camera positioned at eye level, a monitor positioned at all customer entrances, a monitor positioned at all cash counter areas, and signage on or near the customer entrance(s), camera(s), or monitor(s) indicating surveillance. Points for monitors were only given if the monitor was high quality, defined as: (1) an image sharp enough to identify an individual, and (2) an image where an individual's upper body covered at least half of the screen (measured vertically). This resulted in a total possible VSS score of 7. The median VSS score was used to separate businesses into high or low VSS comprehensiveness.

The site assessment score for the other robbery prevention measures covered 22 items based on components of a comprehensive CPTED robbery prevention program.[3,17] The site assessment included an inventory of cash management policies, visibility into and out of the business, proper lighting, controlling access into the business, employee training, and signage. Businesses were assigned one point for each component, with a total of 22 possible points. If the officer or crime prevention specialist recommended change for a specific item, the business did not receive a point for that item. The overall score was summed, and businesses were placed into high and low categories based on the median score for all businesses.

Statistical Analysis

Descriptive statistics are presented for business characteristics and VSS and site assessment scores. Logistic regression was used to examine the odds of being in the high robbery prevention component score category, comparing the various business types (liquor/grocery/pharmacy, restaurant/bar, and other businesses) to gas station/convenience stores. Implementation of robbery prevention components was measured using overall VSS and site assessment scores, as well as the individual components that make up the site assessment score. The likelihood of implementation was also compared for businesses in low crime, compared with high crime, areas. The analysis was performed using SAS9.4 (SAS Institute, Cary, NC).

RESULTS

A total of 149 businesses enrolled in the study and are described in Table 1 by type of business. Businesses enrolled included gas station/convenience stores ($n = 40$, 26.8%), restaurants/bars ($N = 38$, 25.5%), liquor stores/grocery stores/pharmacies ($n = 29$, 19.5%), and businesses classified as other ($n = 42$, 28.2%). Nearly half of the businesses were independently owned ($n = 70$, 49.0%). The highest percentage of corporate-owned businesses were represented by gas station/convenience stores (58.3%). Most business types had at least five or more employees.

The median VSS score was 2, with a range from 0 to 7. Gas station/convenience stores had the greatest proportion of businesses in the high VSS score category (3 to 7), representing 40.0% of all businesses. The median site assessment score was 19, with a range from 0 to 22. Gas station/convenience stores also had the highest percentage of businesses in the high site assessment score category (77.5%), followed by restaurants/bars (50.0%). Liquor stores/grocery stores/pharmacies had the lowest percentage of businesses with a high site assessment score (27.6%).

Restaurants/bars were less likely (odds ratio [OR] = 0.54, 95% confidence interval [CI]: 0.21 to 1.40) to have a high VSS score compared with gas stations/convenience stores (Table 2). While many of the restaurants/bars had cameras ($n = 31$, 81.6%), restaurant/bars had a smaller percentage of entrances with monitors ($n = 27$, 71.1%) and very few had monitors at cash counters ($n = 2$, 5.3%) (data not shown).

TABLE 1. Business Characteristics, Overall, and by Business Type

	Total		Gas/Convenience		Liquor/Grocery/Pharmacy		Restaurant/Bar		Other*	
	N	%	*N*	%	*N*	%	*N*	%	*N*	%
Total	149	100	40	26.8	29	19.5	38	25.5	42	28.2
Business type										
Corporate-owned	42	29.4	21	58.3	10	35.7	7	18.9	4	9.5
Franchise	31	21.7	10	27.8	3	10.7	15	40.5	3	7.1
Independently-owned	70	49.0	5	13.9	15	53.6	15	40.5	35	83.3
Employees										
5 or more	107	73.3	36	90.0	19	65.5	30	83.3	22	53.7
Less than 5	39	26.7	4	10.0	10	34.5	6	16.7	19	46.3
Video surveillance system (VSS) score										
0–2	104	69.8	24	60.0	18	62.1	28	73.7	34	81.0
3–7	45	30.2	16	40.0	11	37.9	10	26.3	8	19.0
Site assessment score										
0–18	72	48.3	9	22.5	21	72.4	19	50.0	23	54.8
19–22	77	51.7	31	77.5	8	27.6	19	50.0	19	45.2

*Other includes: barber/beauty shops, hotel/motels, casinos, professional offices, adult businesses, self-storage, and rental centers.

TABLE 2. Odds Ratios (and 95% CI) Comparing Implementation of CPTED-Based Robbery Prevention Components by Various Business Types With Gas/Convenience Stores

		Liquor/Grocery/Pharmacy	Restaurant/Bar	Other*
CPTED-Based Robbery Prevention Component	**Gas/Convenience**	**OR (95% CI)**	**OR (95% CI)**	**OR (95% CI)**
Video surveillance system (VSS) score, score 3–7	Reference	0.92 (0.34–2.45)	0.54 (0.21–1.40)	0.35 (0.13–0.96)
Site assessment score, score 19–22	Reference	0.11 (0.04–0.33)	0.29 (0.11–0.77)	0.24 (0.09–0.63)
Employee training in robbery prevention	Reference	0.36 (0.13–1.05)	0.69 (0.25–1.91)	0.70 (0.26–1.91)
Cash control procedures	Reference	0.28 (0.10–0.79)	0.38 (0.15–0.97)	0.25 (0.10–0.62)
Interior lighting and visibility into the business	Reference	0.21 (0.07–0.64)	0.63 (0.21–1.89)	0.83 (0.27–2.49)
Access control	Reference	0.21 (0.02–2.17)	0.21 (0.02–1.93)	0.51 (0.04–5.89)
Clean and uncluttered premise	Reference	1.53 (0.35–6.70)	6.53 (0.75–57.0)	2.29 (0.53–9.88)
Signage indicating low cash availability	Reference	0.54 (0.17–1.65)	0.42 (0.15–1.19)	0.36 (0.13–1.01)

CI, confidence interval; OR, odds ratio.
*Other includes: barber/beauty shops, hotel/motels, casinos, professional offices, adult businesses, self-storage, and rental centers.

Liquor stores/grocery stores/pharmacies had similar odds of having a high VSS score when compared with gas station/convenience stores (OR = 0.92, 95% CI: 0.34–2.45); however, there was a much smaller odds of liquor stores/grocery stores/pharmacies with a high site assessment score (OR = 0.11, 95% CI: 0.04–0.33). Restaurants/bars also had lower odds of having a high site assessment score, compared with gas station/convenience stores (OR = 0.29, 95% CI: 0.11–0.77). With the exception of having ''Clean and uncluttered premises,'' Restaurants/bars and liquor stores/grocery stores/pharmacies had lower implementation of each of the CPTED elements, but few of these differences were statistically significant for the individual elements (Table 2). There was a statistically significant reduction in the odds of having cash control procedures for both liquor stores/grocery stores/pharmacies (OR = 0.28, 95% CI: 0.10–0.79) and restaurants/bars (OR = 0.38, 95% CI: 0.15–0.97) compared with gas station/convenience stores. Additionally, liquor stores/grocery stores/pharmacies were less likely to have adequate interior lighting and visibility (OR = 0.21, 95% CI: 0.07–0.64) when compared with gas station/convenience stores. Having adequate signage was the least commonly implemented CPTED element ($n = 34$, 23.6%) across all businesses (data not shown).

Implementation of the CPTED-based robbery prevention measures was also compared between businesses located in high crime areas (census block level crime index more than 100) and businesses located in low crime areas (census block level crime index less than or equal to 100, Table 3). Businesses with a higher background crime index had increased odds of having a high VSS score compared with a low VSS score (OR = 2.28, 95% CI 1.08–4.80). This suggests that businesses are more likely to have a comprehensive VSS if they are located in a high crime area. In contrast, those with a high background crime index did not have a significantly increased odds of having a high site assessment score (OR = 1.27, 95% CI: 0.65–2.45). For the individual robbery prevention measures, businesses in high crime areas were more likely to train their employees in robbery prevention and control, compared with businesses in low crime areas (OR = 3.04, 95% CI: 1.41–6.57). While not statistically significant, businesses in high crime areas were less likely to have adequate lighting and visibility when compared with business in low crime areas. The presence of other robbery prevention measures (cash handling procedures, clean and uncluttered premises, and signage) were similar between businesses in high and low crime areas.

TABLE 3. Odds Ratios (and 95% CI) Comparing Businesses in High Crime Areas With Businesses in Low Crime Areas

	OR (95% CI)
Video surveillance system (VSS) score	2.28 (1.08–4.80)
Site assessment score	1.27 (0.65–2.45)
Employee training in robbery prevention	3.04 (1.41–6.57)
Cash control procedures	0.94 (0.48–1.85)
Interior lighting and visibility into the business	0.56 (0.26–1.23)
Access control	NA
Clean and uncluttered premises	1.00 (0.29–3.44)
Signage indicating low cash availability	1.10 (0.50–2.42)

CI, confidence interval; NA, not analyzed due to insufficient sample size (less than 5 exposed cases); OR, odds ratio.

DISCUSSION

We found that businesses classified as gas station/convenience stores had the highest frequency of businesses with high video surveillance system and site assessment scores. Liquor stores/grocery stores/pharmacies also had similar implementation of VSS components, but had poorer adherence to non-VSS robbery prevention measures (eg, employee training, cash handling policies), compared with gas station/convenience stores. This suggests an over reliance on VSS prevention measures compared with other low cost robbery prevention measures. All other business types had lower implementation of VSS components and other robbery prevention measures compared with gas station/convenience stores.

Overall, the non-gas station/convenience store retail businesses had lower implementation of the non-VSS robbery prevention strategies. This is similar to results from a study examining compliance to a crime prevention ordinance in Houston and Dallas convenience stores where compliance to camera requirements was the second highest robbery prevention measure implemented (73%) with only cash limit policies being more frequently implemented (79%). Policies concerning visibility, signage, and having a drop safe were less frequently implemented.[16] A matched case-control study of robbery risk factors in convenience stores provides similar evidence. Hendricks et al[9] evaluated robbery prevention measures implemented in convenience stores. A measure of comprehensiveness of security systems included the presence of cameras, visible monitors, alarms, mirrors, height markers, and window barriers. Similar to our study, the majority of convenience stores had fair or good security systems and cash handling procedures, while good visibility was less common. This illustrates that gas station/convenience stores will choose video surveillance systems over lower cost and lower maintenance robbery prevention measures, despite these

measures being more effective in reducing robberies than video surveillance systems.[5]

Most studies evaluating the effectiveness of CPTED-based robbery prevention programs have been conducted in convenience stores.[5,6,9–11] However, these programs have also been successful in reducing robberies in other small retail settings, such as liquor stores and grocery stores.[4] Additionally, higher levels of implementation of CPTED elements has shown evidence of decreasing violent crimes and robberies after adopting these program elements in small retail businesses.[17] Despite the effectiveness of these programs in other settings, we found that gas station/convenience stores had implemented more robbery prevention measures than other business types. Specifically, all non-gas station/convenience stores were less likely to have an employee training program, cash control procedures, good interior lighting and visibility, controlled access into the business, and signs indicating low cash availability. Grocery stores and restaurants are among the leading industries with the highest rates of workplace homicide, the majority of which are due to a robbery.[1] Our findings suggest that better dissemination of evidence-based robbery prevention programs for translation into other high-risk retail settings would be important.

Non-gas station/convenience stores also had lower odds of having a comprehensive video surveillance system, although this effect was not as strong as the effect seen for the overall site assessment. This was most apparent with liquor stores/grocery stores/pharmacies, where the odds of having a high VSS score was similar to that estimated in gas station/convenience stores. This suggests a possible higher reliance of the non-gas station/convenience stores on video surveillance systems for robbery prevention, compared with the more effective CPTED-based robbery prevention measures. Support to implement a more comprehensive approach including several of the CPTED measures presents an opportunity to reduce robbery at these retail businesses. A better understanding of how business owners make decisions about how to protect their businesses from crime and resulting employee injury is also needed, so messaging about the importance of evidence-based robbery prevention strategies can be developed.

We found that businesses in high crime areas were more likely to have a high VSS score, compared with businesses in low crime areas. Furthermore, businesses in high crime areas were more likely to have a higher site assessment score, but the magnitude was lower than that found for the VSS score and not statistically significant. These findings enforce our previous conclusions about how businesses seem to choose video surveillance systems over more effective, and less costly, strategies.

While this study described how different types of businesses implement robbery prevention measures, the generalizability of the results may be limited by combining several business types together. Depending on the specific business type, it may not be feasible or appropriate to implement the various CPTED-based robbery prevention measures frequently used in gas stations/convenience stores. However, in high-cash businesses where there is a risk for robbery, existing robbery prevention strategies could be adapted to meet the needs and design of the non-gas station/convenience store.

This study provides new evidence about how various types of businesses and businesses in high crime areas choose to reduce the risk of robbery and robbery-related employee and customer injury. While video surveillance systems were frequently present in businesses and the preferred robbery prevention strategy, opportunities to implement evidence-based CPTED strategies that are low cost and low maintenance still exist. Specifically, law enforcement and injury prevention professionals should consider non-gas station/convenience stores when developing tailored robbery prevention programs and policies, with the goal of identifying effective ways to reach these businesses with messaging that will increase the adoption of these practices.

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