

Grippa Working Paper

Grippa Evaluation Research Design

Matching Action and Control Sites

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The Grippa research programme, mainly funded by AHRC, is a collaboration between the Design Against Crime Research Centre, Central Saint Martins College of Art & Design, University of the Arts London, and the UCL Jill Dando Institute of Security and Crime Science. Papers and other materials from the programme are at www.grippaclip.com and wider practical and research material on preventing bag theft at www.inthebag.org.uk

Grippa Evaluation Research Design

Matching Action and Control sites

The Grippa clips are designed to reduce opportunities for bag theft. Evaluating their impact needs to be measured at two levels:

- a) Differences in bag theft levels between action and control groups as a whole, i.e. pooled across pubs, and,
- b) Matched pairs of 1 action pub with 1 control pub (a total of 13 pairs – 26 pubs). This accounts for the ‘moving’ pre/post intervention period across action pubs (i.e. the time when the clips are to be fitted), this being inevitable due to the timely process of implementing the design-based intervention tested here.

The separation of which sites are to be action and which control has already been determined through discussion with the bar management team. Here we describe the various analyses required to suitably match pubs within those groups, specifically we show:

- i) The volume of bag theft across pubs, and the distribution within each group (action and control).
- ii) The trajectory of bag theft for action and control groups, and between the 2 pubs with the largest volume of bag theft within each group.
- iii) The number of seating opportunities per pubs.
- iv) The bag theft rate per year using number of seating opportunities per pub as the denominator.

A set of action and control bars are then matched. These couplets are then assessed for disparities in light of a series of pub management surveys on extant crime prevention measures in the pubs under analysis.

The volume and trajectory of bag theft

Table 1 shows the volume of bag theft incidents for the 27 pubs of the same chain, split by action and control groups. The data analysed is recorded crime statistics for 2005 to 2006 made available by the Metropolitan Police

Service. The table is arranged in descending order (of bag thefts) by group.

Total volume of bag theft is higher in the action sites than in the control sites (624 – 452). We need to assess if such differences are significantly different however in order to make any subsequent aggregate level (action vs. control) comparisons. First we check the distribution in each group to ascertain the appropriate tests to conduct (parametric or non-parametric). The number of bag thefts for the action sites and for the control sites are not normally distributed, although the distribution between each group is not significantly different (Kolmogorov-Smirnoff = .842, $p > 0.05$). We therefore use non-parametric tests to assess the mean difference in bag theft pre intervention. A Mann-Whitney U test indicates there is no significant difference between the groups in terms of the mean number of bag thefts ($U = 68.50$, $p > 0.05$).

Displaying the data slightly differently, figures 2 and 3 demonstrate the distribution of bag theft within each group. The skewed distribution in both groups is a recurrent finding throughout crime analysis, referred to as a J-curve distribution (Eck, Clarke and Guerette, 2007). This can be interpreted as a minority of bars are found to account for the majority of the bag theft problem across bars within the analyzed locale (central London).

Table 1

Total number of bag thefts per action and control pub for
2005 - 2006 (n=1,076)

	action	control	
Shakespeare's			
1 Head	221		221
Lord Moon of the			
2 Mall	73		73
3 Tyburn	59		59
4 Hamilton Hall	53		53
5 Liberty Bounds	45		45
6 Angel	45		45
7 White Swan	29		29
8 Crosse Keys	25		25
9 Glassworks	20		20
10 Knights Templar	16		16
White Lion of			
11 Mortimer	14		14
12 Sir John Oldcastle	9		9
13 Gatehouse	8		8
14 Half Moon	7		7
1 Montagu Pyke		157	157
2 Penderel's Oak		92	92
3 Willow Walk		48	48
4 Moon Under Water		45	45
5 Ice Wharf		33	33
6 Wetherspoons		31	31
7 Masque Haunt		13	13
8 Printworks		9	9
9 Coronet		8	8
10 Green Man		7	7
11 Ledger Building		4	4
12 Metropolitan		3	3
13 Goodmans Field		2	2
	624	452	1076

Figure 1
Distribution of Bag Theft across 14 action bars (n=624)

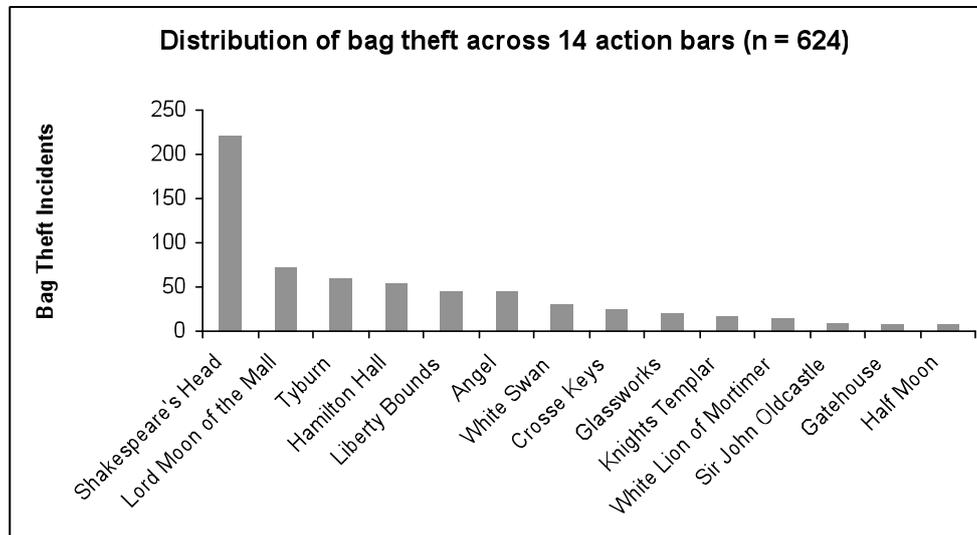
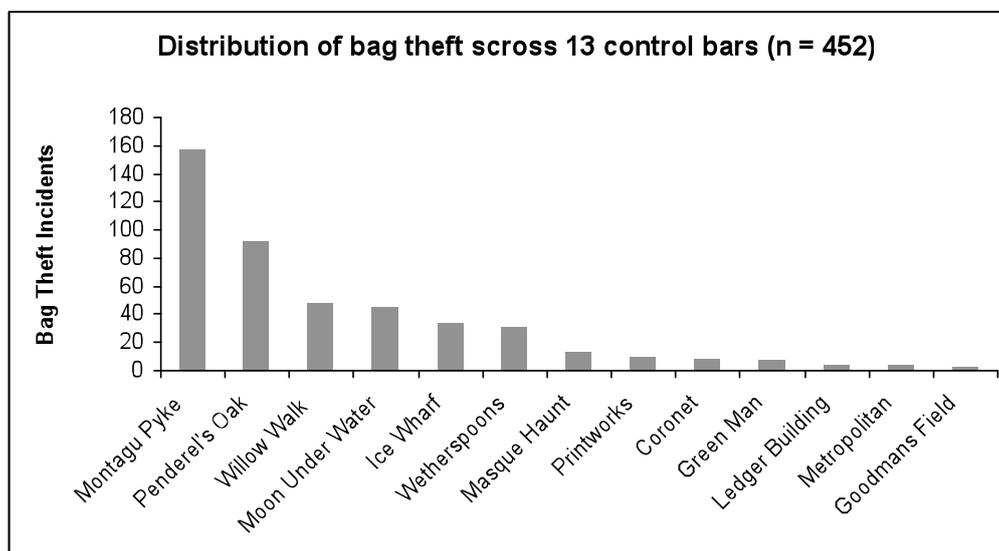


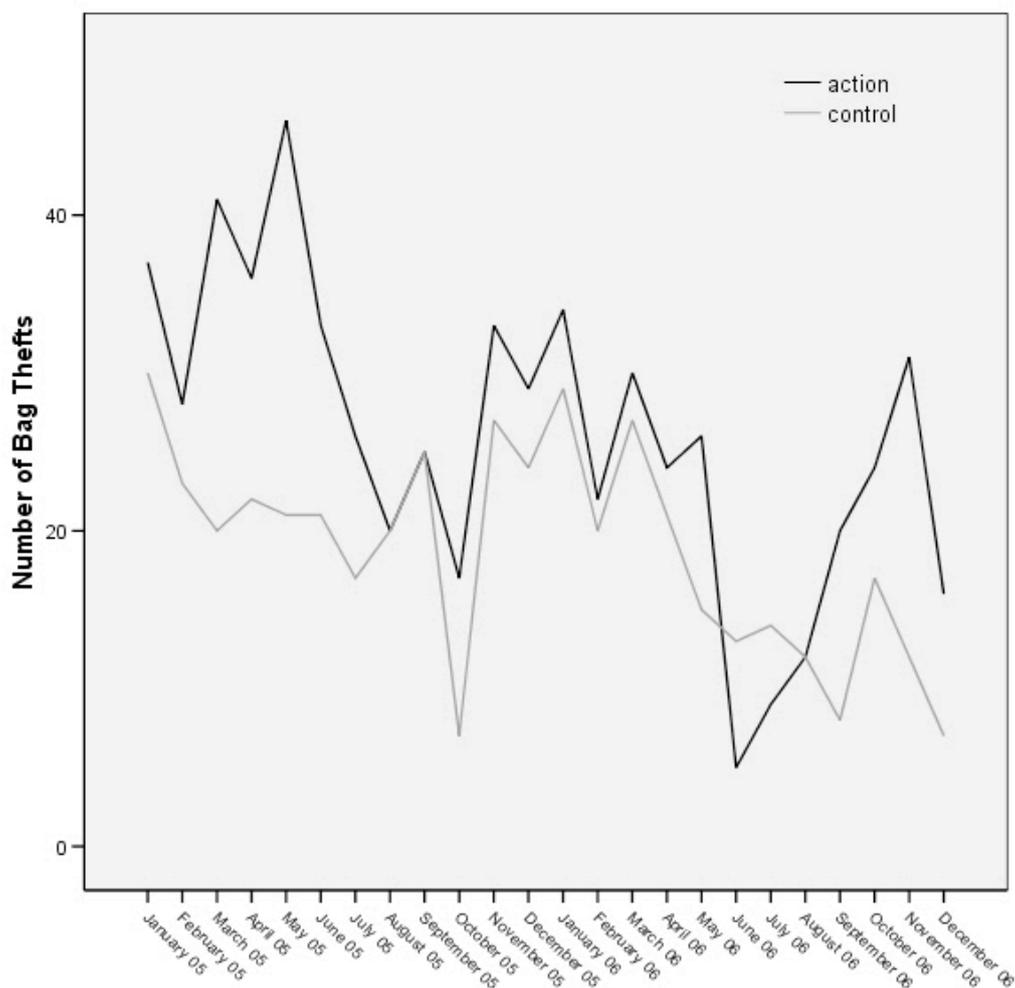
Figure 2
Distribution of Bag Theft across 13 control bars (n=452)



Variation can exist within distributions; crime changes over time. It is important when assessing comparability to ensure the action and control sites have similar 'crime trajectories' (one might be on the way up, the other on the way down, and just happen to cross at the time of designing the evaluation).

Figure 3 presents the bag theft history over the 2 year period.

Figure 3
Trajectory of Bag Theft at Action and Control (n = 1,076)

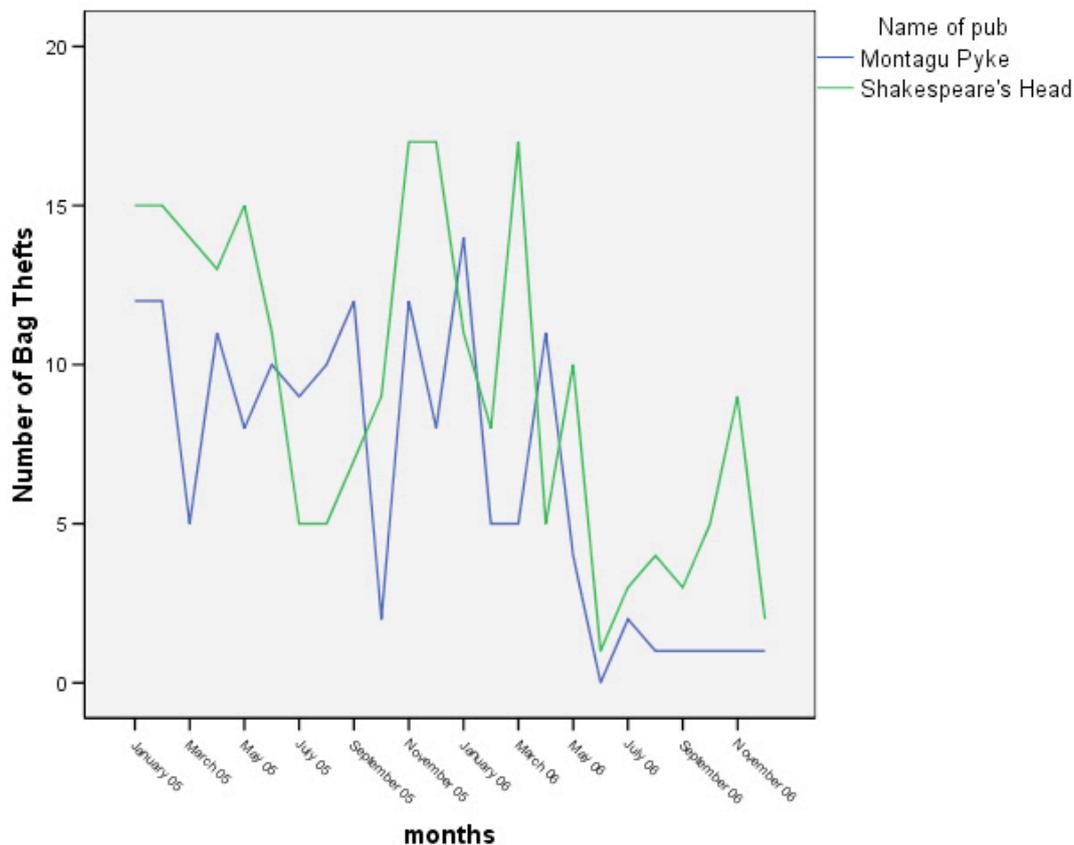


Bag theft trajectory indicates similar patterning across action and control sites, the former having regularly more bag thefts per month. There also appears to be an overall reduction in both groups over time.

Pearson’s correlation for thefts per month over the two years between action and control groups is positive and statistically significant ($r = .627, p < .001$).

Note that in each group, one pub accounted for a majority of the bag theft problem. In the action group the *Shakespeare’s Head* is attributable for 35 per cent of the total recorded bag thefts. In the control group, the *Montague Pyke* contributed 35 per cent of the total number of bag thefts between 2005-06. Considering such venues are the prime contributors within each group, statistical analyses may be particularly determined by (no) changes in these pubs. Assessing the trajectory within these two pubs is hence important, and presented below.

Figure 4
Trajectory of Bag Theft at Shakespeare’s Head and
Montagu Pyke (n = 378)



Because analyses is on just two pubs then the values on the Y axis are much lower. The crime trajectory is thus more sensitive than would be expected with larger datasets. That acknowledged, patterning between the two pubs is similar. Correlating the number of bag thefts per month over the selected time period using Spearman’s test is positive and statistically significant ($r = .580, p < .05$).

Bag Theft Changes over Time

We now examine changes in bag theft per pub between the two years for which data is available, 2005 and 2006. Table 2 displays all pubs ranked in descending order in terms of the largest increase in bag thefts from 2005 to 2006.

Table 2
Change in Bag Theft Levels between 2005 and 2006
per pub

Pub	2005	2006	Total	Site status	06 - 05	Change?
Wetherspoons	7	24	31	Control	17	increase
Sir John Oldcastle	1	8	9	Action	7	increase
Knights Templar	5	11	16	Action	6	increase
Printworks	2	7	9	Control	5	increase
Green Man	2	5	7	Control	3	increase
Coronet	3	5	8	Control	2	increase
Glassworks	9	11	20	Action	2	increase
White Lion of						
Mortimer	6	8	14	Action	2	increase
Gatehouse	3	5	8	Action	2	increase
Masque Haunt	6	7	13	Control	1	increase
Metropolitan	1	2	3	Control	1	increase
Ledger Building	2	2	4	Control	0	same
Angel	23	22	45	Action	-1	decrease
Goodmans Field	2	0	2	Control	-2	decrease
Half Moon	5	2	7	Action	-3	decrease
Willow Walk	26	22	48	Control	-4	decrease
Moon Under Water	25	20	45	Control	-5	decrease
Ice Wharf	19	14	33	Control	-5	decrease
Lord Moon of the						
Mall	40	33	73	Action	-7	decrease
Tyburn	33	26	59	Action	-7	decrease
Crosse Keys	17	8	25	Action	-9	decrease
Penderel's Oak	51	41	92	Control	-10	decrease
White Swan	20	9	29	Action	-11	decrease
Liberty Bounds	30	15	45	Action	-15	decrease
Hamilton Hall	36	17	53	Action	-19	decrease
Montagu Pyke	111	46	157	Control	-65	decrease
Shakespeare's						
Head	143	78	221	Action	-65	decrease
Total	628	448	1076			

Most notable from table 2 is that the biggest drop in bag thefts is experienced in the two 'critical' pubs mentioned previously. This could mean that the bag theft figures for 2005 were at an artificial high, and such reductions are the result of regression-to-the-mean effects. They could also be the product of some as-yet-unknown preventive action or police activity for which data is not currently available. The latter seems plausible given the sharp drop observed in both bars occurs at a similar time, around May 2006. Monitoring this in 2007 is important.

Pooling all bag thefts across the two groups between 2005 and 2006 shows:

Reduction in the control group of 62 bag thefts

Reduction in the action group of 118 bag thefts.

What to match on?

We have thus far presented the volume, trajectory and change of bag theft within and between action and control sites. Generally the patterns are similar and statistical significance is in the desired direction, allowing us to assume that the aggregate groups are comparable to one another. Now we move to the matching of individual pubs between groups, and the question of what to match on.

Here, we demonstrate the differences and discuss the appropriateness of matching action and control bars using:

1) overall bag theft events over 05/06, 2) seating capacity, 3) annual bag theft rate using number of seats per bar as the denominator.

1) overall bag theft incidences

Table 3 shows the ranking of bars by incidences of bag theft over the 2 years for the action and control groups, and matching them like with like - so the top ranked bar (highest incident of bag theft) in each group are pair 1, 2nd highest rank pair 2 and so on.

Table 3
Matched action and control bars using ranked bag theft levels

	Action bars	Bag theft total		Bag theft total	Control bars	action - control
1	Shakespeare's Head Lord Moon of the	221	with	157	Montagu Pyke	64
2	Mall	73	with	92	Penderel's Oak	-19
3	Tyburn	59	with	48	Willow Walk	11
4	Hamilton Hall	53	with	45	Moon Under Water	8
5	Liberty Bounds	45	with	33	Ice Wharf	12
6	Angel	45	with	31	Wetherspoons	14
7	White Swan	29	with	13	Masque Haunt	16
8	Crosse Keys	25	with	9	Printworks	16
9	Glassworks	20	with	8	Coronet	12
10	Knights Templar White Lion of	16	with	7	Green Man	9
11	Mortimer	14	with	4	Ledger Building	10
12	Sir John Oldcastle	9	with	3	Metropolitan	6
13	Gatehouse	8	with	2	Goodmans Field	6
14	Half Moon	7		XX	XX	XX

* The difference in number of bag thefts is calculated from subtracting the control bar total number of bag thefts from its corresponding action bar number of bag thefts. Positive numbers indicate a larger number of bag thefts in the action bar.

But the *volume of crime* fails to accurately represent *risk of victimization*, as it does not standardise crime by a suitable metric for available opportunities. For example, the bar with the highest volume of bag theft may simply be the bar with the highest volume of customers and highest volume of bags. A positive relationship is therefore expected.

2) Seating Capacity

Table 4 is a ranking of each bar per group in descending order by number of seats. Seating opportunity data were gathered by a visual audit of the furniture within each venue.

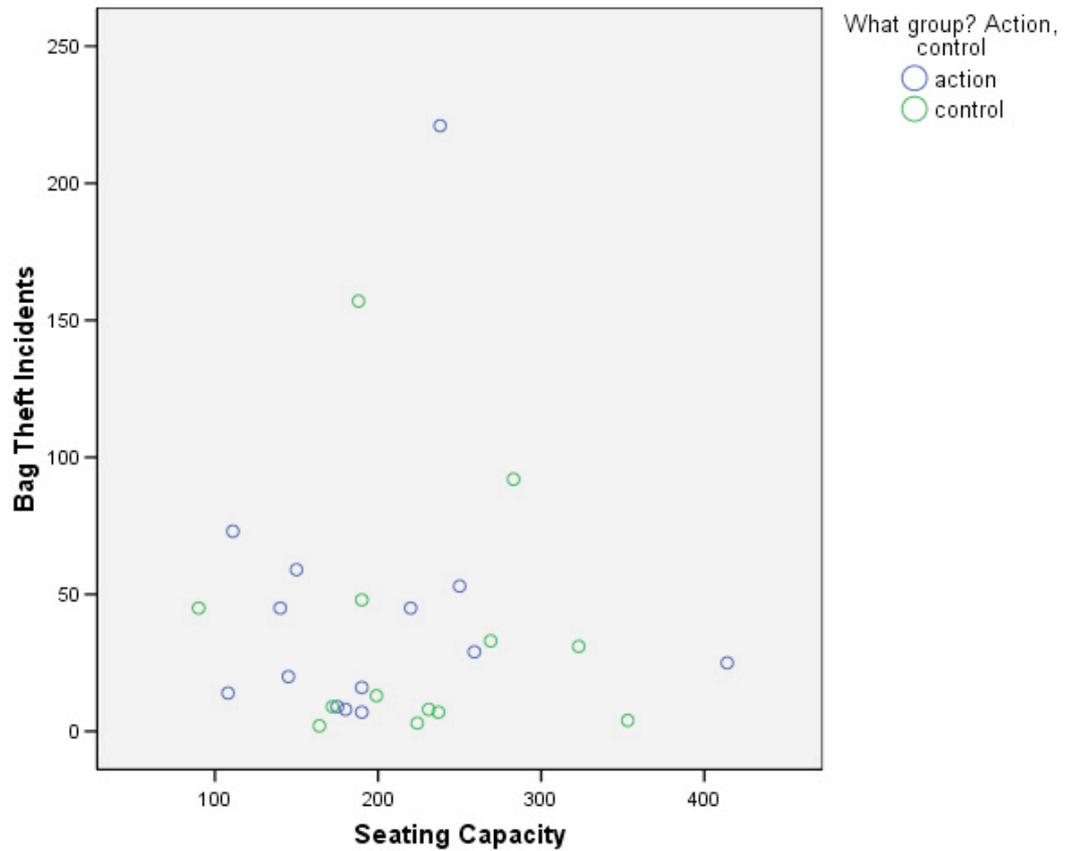
Table 3
Matched action and control bars
using ranked number of seats

	action	seats		seats	control	action - control
1	Crosse Keys	414	with	353	Ledger Building	61
2	White Swan	259	with	323	Wetherspoons	-64
3	Hamilton Hall	250	with	283	Penderel's Oak	-33
4	Shakespeare's Head	238	with	269	Ice Wharf	-31
5	Liberty Bounds	220	with	237	Green Man	-17
6	Knights Templar	190	with	231	Coronet	-41
7	Half Moon	190	with	224	Metropolitan	-34
8	Gatehouse	180	with	199	Masque Haunt	-19
9	Sir John Oldcastle	175	with	190	Willow Walk	-15
10	Tyburn	150	with	188	Montagu Pyke	-38
11	Glassworks	145	with	172	Printworks	-27
12	Angel	140	with	164	Goodmans Field	-24
13	Lord Moon of the Mall	111	with	90	Moon Under Water	21
14	White Lion of Mortimer	108		xx	xx	xx

* The difference in number of seats is calculated from subtracting the control bar number of seats from the action bar number of seats. Positive numbers indicate more seats in the action bar.

It is plausible that the number of bags stolen across bars increases as number of seats increases. To test this hypothesis a Pearsons correlation was run using data from the previous two tables. Results indicate that there is no statistically significant relationship between such variables ($r = -.006$, $p > .05$). A scatterplot for this, split by action and control group, is shown overleaf.

Figure 5
Scatterplot of Bag Theft Levels by Seating Capacity



Annual Bag theft rate per 100 seats

Matching on seating opportunities alone fails to incorporate any crime based data. Next, we therefore combine bag theft data with seating data to produce a rate, as shown in Table 4, ranked in descending order by annual bag theft rate per 100 seats.

A bag theft rate is calculated by:

$$[\text{total no. of bag thefts over 2 yrs} / \text{no. of seats} * 100] / 2.$$

The latter division of 2 is to produce a yearly rate, at present the total number of bag thefts pertains to 2 years (05/06).

Table 4
Matched action and control bars using annual bag theft rate per 100 seats

		annual bag theft rate per 100				
Action Pub		seats		Control Pub		difference
1	Shakespeare's Head	46	with	42	Montagu Pyke	5
2	Lord Moon of the Mall	33	with	25	Moon Under Water	8
3	Tyburn	20	with	16	Penderel's Oak	3
4	Angel	18	with	13	Willow Walk	5
5	Liberty Bounds	10	with	6	Ice Wharf	4
6	Hamilton Hall	10	with	5	Wetherspoons	5
	White Lion of					
7	Mortimer	10	with	3	Masque Haunt	6
8	Glassworks	8	with	3	Printworks	6
9	Knights Templar	5	with	2	Coronet	3
0	White Swan	4	with	1	Green Man	2
1	Crosse Keys	3	with	1	Metropolitan	2
2	Sir John Oldcastle	3	with	1	Goodmans Field	2
3	Gatehouse	2	with	1	Ledger Building	2
4	Half Moon	2		xx	xx	

* The difference in annual bag theft rate per 100 seats is calculated from subtracting the control bar bag theft rate from the action bar bag theft rate. Positive numbers indicate a higher rate in the action bar.

The above is the most accurate measure on which to suitably determine our matched pair sample. These account for total volume of bag theft but standardise such volume by estimates for the at-risk population of interest. There are caveats: furniture changes and interior revamps may force the researcher to adjust risk estimates accordingly. Furthermore, it is obviously unreasonable to assume that the bar will always be operating at full capacity. However we feel this offers the best compromise, and provides an acceptable estimate of the number of possible opportunities an offender could exploit.

With our matched pairs assembled, we now assess such couplets using additional information, namely:

- Pub management surveys and data pertaining to extant crime prevention measures in the pubs under analysis
- Pub furniture surveys which document the type and style of furniture in each pub.

Discussing each in turn.

Crime Management Surveys

Managers at the representative pubs completed crime management surveys designed to gain information on managerial policy, staff training and extant crime prevention measures. In addition to bag theft figures, this was designed to provide contextual information of the security procedures available/employed in each pub.

For action-control matching, most pertinent is data on existing crime prevention measures. 14 crime prevention measures were listed in the crime management surveys and respondents were asked to indicate which measures were present in their pubs.

The crime prevention measures were:

CCTV (internal)

CCTV (external)

Crime prevention literature on display

Burglar alarm

Window locks / door locks

Staff operated entry system

Bouncers/ door men

Staff panic button

Customer cloakroom for bags and coats

Regular toilet checks

Staff positioned to enable monitoring

Mirrors

Furniture/fittings positioned to enable monitoring

Bag hooks- Chelsea grips

A total crime prevention score was then computed. When a pub had one of the above measures, a score of 1 was awarded. These were then added together to produce a total crime prevention score per pub out of 14.

A caveat with this approach is that each security measure is given equal weighting. Moreover we accept that more security measures doesn't necessarily equate to a pub being more secure. More measures may also be a response to a higher crime rates.

Whilst aware of these potential shortcomings, the computed crime prevention score was then contrasted across the matched pairs cited above. Results are shown in Table 4.

The mean number of security measures was 9 across all bars with a standard deviation of 1.49. No pub had all the listed crime prevention measures, the maximum number being 11/14 (4 pubs), the minimum 5/14 (1 pub).

All pubs contained internal CCTV, staff panic buttons and conducted regular toilet checks. For the purposes of the present study, noteworthy is that 22 of the 27 pubs had some form of bag clip fitted (of course this does not mean they are used). The least most common measures were cloakrooms to store bags and coats or the positioning of furniture to increase natural surveillance within the bar. Pearson's correlation between number of recorded bag thefts (2005 – 2006) and number of security measures per pub holds a slight negative relationship and is not statistically significant ($r = -.036, p > .05$).

Table 5
Crime Prevention Measures and their frequency of usage
across 27 pubs

Crime Prevention Measure	Pubs with measure (n = 27)
INTERNAL CCTV	27
STAFF PANIC BUTTON	27
REGULAR TOILET CHECKS	27
BURLGAR ALARM	25
EXTERNAL CCTV	24
BAG HOOKS	22
WINDOW LOCKS / DOOR LOCKS	21
CRIME PREVENTION LITERATURE ON DISPLAY	18
STAFF OPERATED ENTRY SYSTEM	14
BOUNCERS / DOOR STAFF	14
MIRRORS	9
STAFF POSITIONED TO ENABLE MONITORING	6
FURNITURE POSITIONED TO ENABLE MONITORING	4
CUSTOMER CLOAKROOM FOR BAGS AND COATS	2

Table 6 shows the difference between the derived matched pairs in terms of extant crime prevention measures as indicated in the manager survey. Important for comparability between groups is the difference column, which is calculated by subtracting the control pub crime prevention score from its action pub pair. It can be seen that the largest difference across all pairs is just – 4. In total the action-control pair difference column is – 1. Across all matched pairs the difference is therefore marginal and not sufficient to warrant altering the current pairings.

Table 6
Matched action and control bars using Crime Prevention
Score from Management Survey

Action Pub	Manager Survey - Crime Prevention Score		Control Pub	difference
1 Shakespeare's Head	9	with	9 Montagu Pyke	0
2 Lord Moon of the Mall	10	with	9 Moon Under Water	1
3 Tyburn	6	with	10 Penderel's Oak	-4
4 Angel	9	with	8 Willow Walk	1
5 Liberty Bounds	8	with	10 Ice Wharf	-2
6 Hamilton Hall	8	with	5 Wetherspoons	3
White Lion of				
7 Mortimer	8	with	11 Masque Haunt	-3
8 Glassworks	9	with	8 Printworks	1
9 Knights Templar	10	with	8 Coronet	2
0 White Swan	8	with	11 Green Man	-3
1 Crosse Keys	8	with	10 Metropolitan	-2
2 Sir John Oldcastle	11	with	7 Goodmans Field	4
3 Gatehouse	11	with	8 Ledger Building	3
4 Half Moon	9		xx xx	xx

* The difference in is calculated from subtracting the control bar total crime prevention measure score from that of the paired action bar. Positive numbers indicate a higher score in the action bar.