Once Bitten, Twice Shy: Repeat Victimization and its Prevention

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CHAPTER 20

ONCE BITTEN, TWICE SHY: REPEAT VICTIMIZATION AND ITS PREVENTION

LOUISE GROVE AND GRAHAM FARRELL

The subject of this essay is the prevention of repeat victimization. Repeat victimization is the repeated criminal victimization of a person, household, business, place, vehicle, or other target, however defined. Around 40 years of research show that crime is not randomly distributed and that this is largely because targets already victimized are at much greater risk than others. In fact, most crimes are repeats of some sort. One classic study found that 1 percent of people experience 59 percent of personal crime, including violence, and that 2 percent of households experience 41 percent of property crime (Pease 1998). The most chronically victimized people and places are known as supertargets (Farrell et al. 2005).

The same perpetrators often commit repeats. This is because they have learned how to successfully victimize a target and know it will be easier next time around. Crimes are often repeated quickly, minimizing the likelihood that anything has changed. For example, burglars return quickly if they know what they left behind and know the household layout - though some may wait a few weeks for insurance payments to replace stolen goods, as found by Clarke, Perkins and Smith (2001). Even relatively rare crimes such as street robbery are experienced disproportionately by the same victims, perhaps because they cannot change their travel route or because they know the offender—as with much school bullying robbery and assaults. And success breeds repeats: bank robbers return more often to the same branch when they escape with significant amounts of money (Matthews, Pease, and Pease 2001).

Different offenders may also victimize the same target. A store that is a lucrative target because it handles a lot of cash but has little security, or a row-end house that other houses do not overlook (so it has less guardianship), or a car frequently parked in the same risky spot, may attract different offenders who may also return.

Repeat victimization can involve different crime types. Some schools are frequent targets of vandalism as well as break-ins (Lindstrom 1997). Within any particular group of targets, some of them are more prone to repeats than others, so there are some risky professions, risky facilities, risky vehicles, risky places, and risky lifestyles. For example, nurses, firefighters, police officers, and other service or caring professions are more likely to experience crime, and within those groups, certain individuals are far more frequently victimized than others (Clare, Kingsley, and Morgan 2009). Lifestyle plays a role more generally (Hindelang, Gottfredson, and Garafalo 1978). A person who goes out often, say to bars and clubs, may experience assault and theft while out and also a break-in if his or her property is left unguarded. Offenders also become victims, as when drug dealers and customers rob each other because they have money and drugs and are unlikely to call the police.

Not only are the same targets prone to further crime but so, too, are similar targets. Following a successful burglary, a neighboring household may be targeted in anticipation of similar success (Townsley, Homel, and Chaseling 2003; Bowers and Johnson 2004; Bernasco 2008; Short et al. 2009). This is known as near repeat victimization or near repeats. In addition to the spatial nearness of neighbors, the concept of nearness can apply to other characteristics of a crime. The theft of frequently stolen hot products such as smartphones and laptops is a form of near repeat because of the repetition of the characteristics of the target. Repeat victimization often causes geographical concentrations of crime known as hot spots (Levy and Tarturo 2010). The result is that the study of repeats is beginning to merge with other areas of crime concentration. The key issue is that of the similarity of crimes. Very similar crimes afford greater potential for prediction and prevention than those that are dissimilar. We are, however, yet to develop practical indices of similarity to improve efforts to address concentrations of crime.

There are now dozens of studies of different crime types across a wide range of countries that find similar patterns of repeat victimization. An annotated online bibliography by the present authors (Grove and Farrell 2011) lists studies relating to Australia, Canada, Denmark, Germany, Hungary, the Netherlands, New Zealand, Poland, Spain, Sweden, the United Kingdom, and the United States, plus comparative analysis of repeat victimization in 17 industrialized countries.

The importance of repeat victimization for crime prevention is that it means we should know where and when to go, and what to do, to prevent crime. This is because crime occurs against the same people and at the same places, and because if we know how the crime occurred previously, then we are more informed about how to go about preventing its recurrence. Hence, the essence of this crime-prevention theory is that *targeting repeats and near repeats provides a means of allocating crime-prevention resources in an efficient and informed manner*.

This essay explains how the evidence strongly suggests that preventing repeat victimization can be an effective crime-prevention strategy. However, it also shows

that there has been variation in the successes, and that reducing crime it is not necessarily easy. Even if we know where and when crime will occur, it is not always clear what to do to prevent it. Crimes vary greatly by place, time, and type of crime, which means the same prevention tactics do not necessarily transfer. It is also not always easy to introduce crime-prevention tactics in the manner that we might want. Public funds for crime prevention are rarely available, and some victimized householders and business owners are unwilling or unable to spend money on prevention even though it could be cost-effective in the long run. Hence, the design of tactics and their implementation are important issues that we will also discuss.

The main points of this essay are that:

- Most crime occurs as a form of repeat victimization.
- The chronically victimized supertargets are typically 1 or 2 percent of potential targets but experience half or more of crime.
- A comprehensive review of the evidence suggests repeat victimization can be prevented and overall crime thereby reduced.
- The impact of prevention efforts varies, with reduced success due to failure to develop or implement appropriate crime prevention tactics.
- This significant potential suggests there is a dire need for further efforts to prevent different types of repeats.

Here is how this essay is structured. Section I summarizes key issues in research, policy, and practice that have emerged from repeat victimization research to date. Section II examines the effectiveness of previous efforts to prevent repeat victimization, and section III looks at how prevention efforts were developed and implemented. Section IV is a short conclusion with a discussion of future research.

I. Joined-Up Research, Policy, and Practice

A range of research has identified different characteristics of repeat and near repeat victimization. Many of them are summarized in table 20.1, which indicates the relevance to crime prevention of each research finding. The strong relationship among research, policy, and practice is a key characteristic of this area of crime prevention. Gloria Laycock, formerly head of the UK government unit that oversaw development of much of the research, has documented the story of how it evolved (Laycock 2001). Laycock notes that the Kirkholt burglary-prevention project was a landmark. It used a crime analysis problem-solving approach to identify multiple tactics focused on preventing repeat residential burglary, successfully implemented to dramatic effect. The Kirkholt project served as a catalyst for much of the research that followed. We will not describe table 20.1 in detail here because it should be self-explanatory, but it requires close scrutiny by the reader.

Table 20.1 Key research findings and their strategic implications

Research Finding	Implication
1. Most crime is repeat victimization of the same targets.	Preventing repeats would prevent most crime.
2. Repeat victimization occurs for all crime types except murder (which can be a repeat assault)	Preventing repeats can be a general crime prevention strategy.
3. Two+ percent of potential targets are usually the supertargets that experience half or so of all crime.	Focus more resources on supertargets.
4. High-crime areas have high levels of repeats.	Focusing on repeats naturally allocates resources to high-crime areas and hot spots.
5. Repeats and near repeats show as hot spots on maps.	Analysts should be aware that hot spots are repeat victimization locations.
6. Repeats occur after a previous crime, not all at once.	The gradual drip-feeding of crime prevention reduces strain on resources and personnel.
7. There is a broad spectrum of near repeats to targets with similar characteristics and situations.	Be aware of risk at nearby and similar targets and situations.
8. Spatially near repeats–e.g., of neighboring households–have increased risk.	Cocoon watch and similar local measures may be appropriate.
9. Frequent theft of hot products is a form of near repeat (often a tactical repeat).	Beware crimes against the same product types (esp. using same modus operandi).
10. Risky facilities identifies repeat victimization of schools, businesses, etc.	Focus on repeats to target risky facilities.
11. Repeats are committed disproportionately by same offenders returning.	Focus on repeats to detect repeat and prolific offenders.
12. Other offenders also repeat at attractive vulnerable targets.	Focus on repeats to detect repeat and prolific offenders.
13. Risk increases with each repeat—e.g., a 3rd more likely than 2nd, and so on.	Allocate more crime-prevention resources to risky targets.
14. Repeats more likely when crime is a success (e.g., successful bank robbers return).	Prioritize crimes where offender succeeded.
15. Repeats occur quickly—risk is highest soon after crime.	Put crime-prevention resources in place quickly (temporarily if necessary).
16. Risk of displacement is less when repeats prevented.	Lower displacement risk means prevention is more efficient.
17. Repeats often use the same tactics or modus operandi.	Prevent repeats by that modus operandi; tactics should be locally and individually appropriate.
18. Known tactics can be focused on repeats.	New crime-prevention tactics are not necessarily needed.

Research Finding	Implication
19. The focus on repeats can generate new tactical insight.	New crime-prevention tactics may be suggested by the nature of repeats.
20. Strong preventive mechanism work best to prevent crime.	Appropriate situational measures often effective where appropriate.
21. Victims may fail to implement prevention (due to lack of money or motivation).	Practical assistance (e.g., free security and installation), follow-ups, and other nudges are better than advice alone.
22. Victim support services may assist.	Victim services adopt a prevention focus to empower victims.
23. Police are empowered to assist victims.	Victim-oriented policing and good police-community relations can result.

II. The Success of Prevention Efforts

The majority of evaluated prevention efforts to date relate to burglary. The types of prevention tactics varied by crime type and place. Interventions for residential burglary and commercial burglary often included an initial security survey followed by securitization of properties. This usually involved improving locks on vulnerable doors and windows, but also other techniques such as reinforcing doors. Alarms were occasionally given or loaned to victims, including repeat victims of domestic violence. Property marking for burglary victims was often facilitated by the provision of either SmartWater (a microdot solution that can be uniquely identified) or access to a property register, usually with decals (stickers) to promote deterrence. Neighborhood Watch, or the smaller Cocoon Watch among nearby neighbors, programs were established within some repeat burglary or domestic violence projects. Less common measures included offender-focused interventions, blocking off access to rear alleys used by burglars, and media publicity to promote deterrence.

The impact on crime varied a lot across projects and is only summarized here, drawing on the review by Grove et al. forthcoming; see also Grove 2010; Farrell and Pease 2006). A summary of key indicators is shown in table 20.2. The table lists studies chronologically by crime type. Residential burglary is first because it accounts for 22 of the 31 studies that have been evaluated, then domestic violence, commercial burglary, and sexual victimization. Study identifiers (often the location name), date of the evaluation's publication, and the crime type to be prevented are shown in the first three columns. The two main outcome indicators are the change in repeats and the change in the overall level of crime. There had been evaluations conducted where preventing repeats was part of a broader crime-prevention effort, but these are not included if the repeat victimization component could not be distinguished.[1]

Table 20.2 Summary of outcomes for repeat victimization prevention studies

Evaluation	Author and Year	Crime type	Change in repeats	Change in overall crime count (incidence)	Summary as +ve or -ve (u= uncertain)[1]
Kirkholt	Forrester et al. 1988, 1990	Residential burglary	-100%	-62.8%	+
St. Anns	Gregson 1992	Residential burglary	NA	-9.2%	+
The Meadows	Gregson and Hocking, 1993	Residential burglary	-40.4%	-57.5%	+
Eyres Monsell	Matthews and Trickey, 1994a	Residential burglary	Yes	-6%	+
New Parks	Matthews and Trickey, 1994b	Residential burglary	-50%	+17.5%	u[A]
Huddersfield	Anderson et al. 1995	Residential burglary	Equivocal	-30%	+
Blackburn	Webb 1996	Residential burglary	-68.8%	-62%	+
Burnley	Webb 1996	Residential burglary	-33.3%	-27.2%	+
Lambeth	Webb 1996	Residential burglary	NA	-80%	+
Merthyr Tydfil	Webb 1996	Residential burglary	-92%	-26%	+
Cambridge	Bennett and Durie 1999	Residential burglary	No	+13.8%	-
Baltimore	Weisel et al. 1999	Residential burglary	No	-23.7%	u[B]
Dallas	Weisel et al. 1999	Residential burglary	No	+16%	-
San Diego	Weisel et al. 1999	Residential burglary	No	-24.7%	u[B]
Beenleigh	Budz et al. 2001	Residential burglary	>-15%	+9.9%	u[A]
Ashfield	Taplin and Falherty 2001	Residential burglary	Equivocal	+1.8%	-
Tea Tree Gully	Morgan and Walter 2002	Residential burglary	Equivocal	+7.5%	-
Liverpool	Bowers et al., 2003	Residential burglary	-70.5%	-39.2%	+

Evaluation	Author and Year	Crime type	Change in repeats	Change in overall crime count (incidence)	Summary as +ve or -ve (u= uncertain)[1]
Hartlepool	Sturgeon-Adams et al. 2005	Residential burglary	Yes	-18.3%	+
Bentley	Cummings 2005	Residential burglary	Yes	-26.2%	+
Morley	Cummings 2005	Residential burglary	Yes	+2%	u[A]
NDV[2]	Morgan 2004	Domestic violence	Yes	-8.2%	+
Multnomah	Pearson 1980	Commercial	Yes	-14.9%	+
Leicester	Taylor 1999; Tilley and Hopkins 1998	Commercial	Yes	-19.7%	+
Merseyside	Bowers 2001	Commercial	Yes	-39.2%	+
		Note that the five sexual victimization projects below refer to crime prevalence not incidence.			
Sexual Assault Prevention	Hanson and Gidycz 1993	Sexual	NA	-17.8%	+
Reduce multiple sexual victimization	Breitenbecher and Gidycz 1998	Sexual	NA	-2%[3]	+
Sexual Victimization Prevention	Marx et al. 2001	Sexual	NA	-36%	+
Acquaintance rape prevention	Gidycz et al. 2001	Sexual	NA	12.1%	-
New York and Seattle Field Test	Davis et al. 2006	Sexual	NA	-10.3%	+

[1] u = uncertain where the superscript A denotes three sites where repeats fell but incidence increased, and superscript B denotes two sites where repeats did not decrease but incidence did. See text for further details.
[2] Outcomes measured as domestic violence calls to the police.
[3] Note that the five sexual victimization projects show change in crime prevalence not incidence in the fifth column.

Whether a reduction in repeat victimization was found among those receiving the crime-prevention effort (the intervention group) is shown in the fourth column of table 20.2. By this indicator, repeats fell in over 80 percent—that is, in 17 out of 21 studies. In the other 10 studies, the extent of change in repeats was unknown. On average, repeats were reduced by more than half (mean = 56 percent, median = 54

percent) across the 14 studies where it was measured. However, there was wide variation, from one project where repeats were eliminated to one where the best estimate was that repeats fell 10 percent. Readers interested in evaluation method should note that repeat victimization was typically not measured in comparison groups.

For each study, overall crime—not just repeats—in the intervention group was compared to a similar group. The aim of such comparison is to try to rule out the possibility that any change in crime was due to factors other than the intervention. This process of counterfactual inference is possible when both groups have all factors in common other than the intervention. For example, a national fall in crime would be experienced in both an intervention and the comparison area, and so it could be distinguished from the effect of the intervention: only the remainder of any fall in crime can be reasonably attributed to the intervention in such an instance. There was some variation in the extent to which comparison groups were comparable to their intervention groups.

The fifth column of table 20.2 shows the percentage change in the overall crime count in the intervention group relative to the comparison group. The sixth column shows whether the project had a positive outcome of reduced overall crime, denoted by + (plus), or a negative outcome of increased crime, denoted by – (minus). Five studies are categorized as uncertain, or *u*, due to apparently conflicting indicators. With those five excluded, 73 percent, or 19 of 26 studies, reduced both repeats and crime incidence. Crime was reduced on average across the studies by a fifth (mean = 21.4 percent, median = 19.7 percent).[2]

Another way to examine this data is represented in figure 20.1, which shows impact as an effect size (the point) with confidence intervals around it (the lines) for each study. Many but not all of the studies listed in table 20.2 could be included in this analysis. This more conservative analysis suggests 13 of 21 studies (62 percent) reduced crime, but only five studies showed that with greater statistical certainty (where the confidence interval does not cross the value of 1, which would indicate no effect). The overall key indicator here is the weighted mean effect size of 1.22 (CIs: 1.06–1.40), shown at the base of the chart. This indicator supports the previous ones and strongly suggests that crime can be prevented.[3]

The conclusion of this fairly conservative assessment is that it is possible to prevent repeat victimization and that this can reduce crime overall. However, there can be quite some variation in impact across time and place. Consequently, the next section looks at why some efforts succeed more than others.

III. Development and Implementation of Prevention Tactics

A key problem is that it is often difficult to get prevention measures put in place, or implemented, for various reasons. It was possible to gauge the extent of implementation and figure 20.2 shows the relationship between implementation rate and

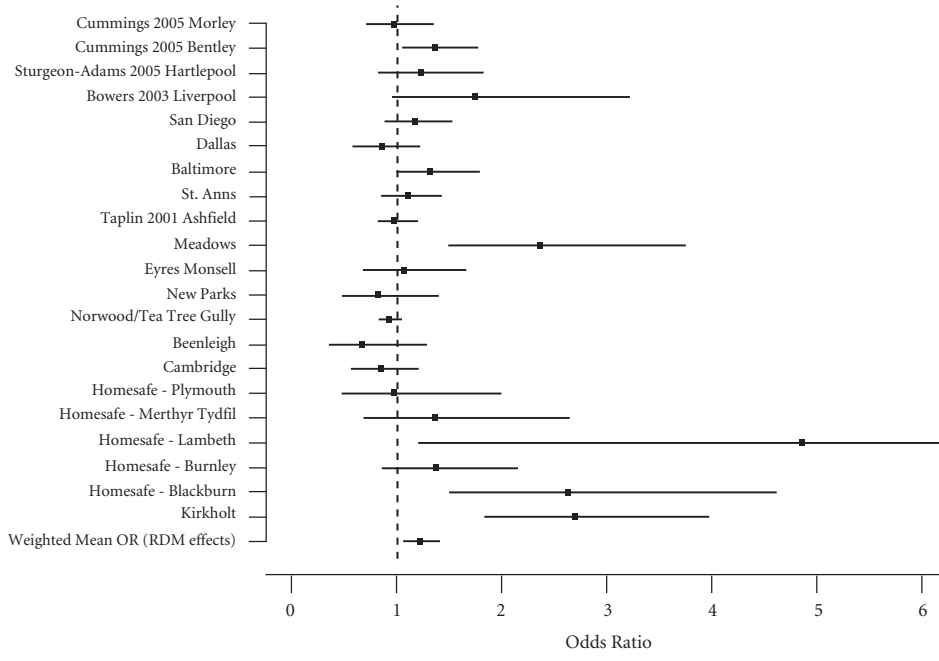

Figure 20.1 Outcomes of repeat victimization programmes upon crime incidence (odds ratios with confidence intervals)

impact on crime for the 19 studies where both measures were available. The implementation rate is the percentage of those eligible who received the prevention measure. The impact on crime is the percentage change in crime relative to the comparison group. Where the intervention was given to victims as "advice," the implementation rate was measured as the percent of those eligible who followed the advice by implementing the prevention tactics.[4]

Figure 20.2 shows a generally positive relationship between implementation and impact. Were the data of better quality, or implementation easier to gauge, then perhaps the relationship would be stronger. The linear best fit line does not fit the data well ($R^2 = 0.413$), but if taken literally it suggests that a project must implement measures at a minimum of more than a fifth of targets (22.5 percent) before any impact is achieved, that every 0.6 percent additional increase in the implementation rate brings a further 1 percent reduction in crime, and that crime is eliminated when implementation exceeds 80 percent (81.5 percent). Clearly, the best fit line cannot be interpreted so literally, but it may be indicative of the overall nature of the relationship between implementation and impact.

The three overarching determinants of success in efforts to prevent repeat victimization were:

1. Successful conception and development of a functioning project.
2. Identification of locally appropriate and effective preventive tactics.
3. Thorough implementation of those tactics.

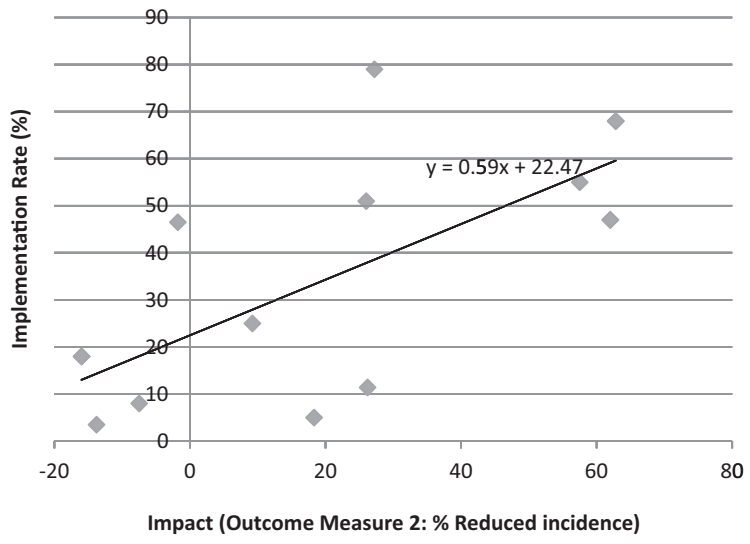

Figure 20.2 Relationship between implementation rate and impact on crime

In some instances the crime-prevention tactic was inappropriate as it was not tailored to the crime problem. For some of the burglary projects in particular, it seemed that 'the usual' target-hardening security measures were introduced without checking whether or not they were appropriate to the type of burglary problem or whether other tactics were also needed. The type of measures needed varies by time and place. For example, prevention measures appropriate to prevent burglary of inner-city apartments are not necessarily the same as those for suburban burglary.

Sexual victimization prevention schemes emphasized the education of repeat victims, with the provision of general advice on how to avoid or manage risky situations. The specific nature of this advice was not necessarily clear in all of the evaluation reports. However, a key problem with education is that it may change attitudes without necessarily changing behavior or situations, or if behavior and situations are changed, it is not necessarily in a way that prevents crime. Such problems with the identification of effective prevention measures are categorized in table 20.3 as "lack of tailoring."

Some burglary prevention projects compromised their focus. In some instances they were required to provide security to other sections of the population deemed vulnerable by local agencies, such as elderly people and single mothers. This meant that it was not only the prevention of repeat victimization being evaluated. For present purposes, this is categorized as "unclear eligibility criteria."

Four types of implementation problems appeared to arise. "Staff problems" relate to the staff employed to implement the project: it is often difficult to recruit staff, to train staff, to retain staff, and to ensure that staff are undertaking work in the desired manner. "Communications breakdown" could be detrimental and are quite common in multi-agency projects where different agencies and parties are involved with different goals and different means of achieving them. Projects with "inflexibility"

Table 20.3 Main types of problems during project development and implementation

	Development and General Issues				Implementation Issues		
Evaluation study	Lack of tailoring	Unclear eligibility criteria	Data problems	Staff probs	Comms break down	Inflexibility	Resistance to measures
Kirkholt							
Blackburn	X	X					
Meadows		X	X				X
Liverpool		X					X
Burnley					X		
Merthyr Tydfil		X					
Bentley				X			X
Baltimore			X	X	X	X	
Hartlepool			X	X	X		X
San Diego	X		X	X	X	X	X
St Anns				X			
Eyres Monsell	X				X	X	X
Ashfield	X		X	X			X
Morley				X			X
Norwood/ TTG	X			X	X		
Dallas			X			X	X
Cambridge							X
New Parks	X			X	X	X	
Beenleigh	X		X	X			X
Never Again						X	
Lambeth		X	X	X	X		
Huddersfield			X				
NDV		X	X				X
Leicester			X		X		
Merseyside							X

Notes to *table

[1] Implementation data not available for the five sexual victimization studies.

[2] *X* indicates this type of problem was identified in the study's report.

did not tend to learn from their mistakes and failed to accommodate changing demands within the project. In some projects, there was "resistance to tactics" that were to be implemented, either from potential recipients who did not want them or from those tasked with implementation.

"Data problems" were a more general issue. Particularly with respect to the collation or analysis of police data sets, data problems led to difficulties identifying how many households or persons had been victimized, and in determining whether crime had been prevented.

An example will emphasize the importance of implementation. One project evaluation report was sufficiently dispirited at the failure of police officers to conduct security surveys at victimized households that it noted "If we take the results at face value, those officers who declined to carry out the survey thereby facilitated the revictimisation of many of those they were charged to help." (Thompson, Townsley, and Pease 2008, p. 132). The types of problems encountered, as identified in the main reports of each project included in the previous section, are summarized in table 20.3.[5]

Those projects that were most effective were those with both high implementation rates and strong preventive mechanisms. Typically, a range of situational security measures targeted at preventing repeats by the same modus operandi were most effective. Thus, stronger doors and window locks plus other measures can prevent crime when appropriately targeted. In contrast, education and advice do not necessarily trigger a strong preventive mechanism either if nothing substantive is implemented or if the measures conceived are weak and unlikely to have much effect. However, it is important to note that, where there was no reduction in repeats, this does not represent falsification of the theory of preventing repeat victimization. Even where a project does not reduce crime, this does not invalidate the theory if the project had poor tactics or implementation.

IV. Discussion and Conclusions

There has been significant success to date in preventing repeat victimization. Generally, the most successful efforts used appropriate situational crime-prevention measures that were comprehensively implemented. When little or no crime was prevented, this was for two reasons. First, some prevention tactics were weak or inappropriate. Well-meaning advice and education will not prevent crime—unless it results in implementation of a strong prevention tactic—any more than sticky tape around a damaged door will prevent repeat burglary. Second, a failure to adequately implement preventive tactics means nothing is in place to prevent further crime.

In light of the evidence, it is most unfortunate that there appears to have been a steep decline in the number of evaluated efforts to prevent repeat victimization, as

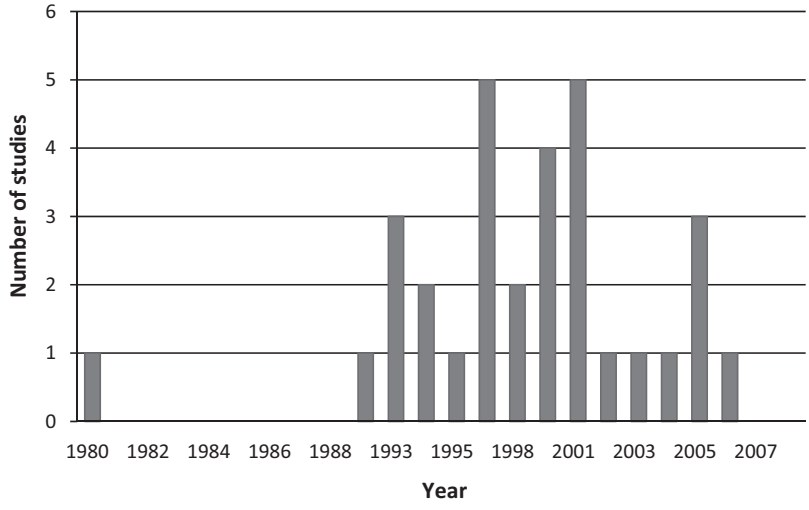

Figure 20.3 Number of Repeat Victimization Prevention Studies by Year (n=31)

shown in figure 20.3. While repeat victimization can be prevented, for the full potential of this crime-prevention strategy to be achieved, there needs to be significant additional investment in research and development. Problem-solving and action-research approaches that develop strong prevention tactics based on analysis of the crime problem should be developed. These should cover a broader range of crime types than have been addressed to date. Figure 20.3 suggests that policymakers and crime-prevention research in general may be missing significant opportunities, at a cost to victims of crime. It could be argued that policy is causing crime by failing to develop this area of crime-prevention strategy.

Research on preventing repeat victimization should include greater efforts to prevent near repeats of various sorts. This is because there is an increasingly clear conceptual overlap around the repetitive nature of crime and its tendency to cluster along whatever dimension it is measured. The similarity of further crimes is the common factor among these repeat crime clusters, and the more similar the crimes, the greater the potential to develop an informed and efficient response. Hence, we conclude that further development of research and policy in this area would be to the significant benefit of society.

NOTES

We thank Shane Johnson, Ken Pease, Nick Tilley, Melanie Wellsmith, and the editors for comments on earlier drafts.

1. In addition, Wellsmith and Birks (2008) is the only study, to our knowledge, evaluating the prevention of near-repeat burglary, and they tentatively indicated some success. Related areas of crime concentration from hot products to hot spots are not included, though we suspect the time will come when such areas are more integrated.

2. The inter-quartile range is 33.2 percent. When the "ambiguous" projects were included, the mean fall in crime incidence is 17.8 percent and the median 19.0 percent with an inter-quartile range of 31.3 percent.

3. Using a random effects model (Q = 284.2861), the weighted mean effect size (WMES) is 1.22 with confidence intervals (CIs) of 1.06 and 1.40. The WMES gives greater weight to studies with a smaller standard error (s.e.). The CIs shown for each study in figure 20.1 were computed using 1.96 standard errors, but as the s.e. is likely to be underestimated using the standard formula, they were multiplied by 2. Without doubling each s.e., the WMES would be 1.25 with CIs: 1.10–1.44.

Additional studies evaluating advice to victims of family violence and elder abuse have been conducted by Robert Davis and colleagues (e.g., Davis and Medina-Ariza, 2001; Davis et al. 2006). There is much in common with work reviewed here, but the studies were not part of the Grove et al. (forthcoming) review on which this section is based. And while more work is needed to integrate that body of work, if its results seem less promising, we suspect this may be a result of what is assessed here as low implementation rates and weak crime-prevention mechanisms, particularly when prevention relies on education and advice rather than tactics with stronger situational mechanisms.

4. The chart excludes the five studies of sexual victimization.

5. We recognize the need for further work and inter-rater reliability tests to confirm this preliminary typology of problems.

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