

# A Brief Primer on Experimental and Quasi-Experimental Methods in the Study of Terrorism

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For years, terrorism researchers and security professionals have lamented a lack of primary data to inform our understanding of issues surrounding the use of terrorism and how that understanding might influence policy decisions. Despite these ongoing complaints, most research within terrorism studies has not featured primary data, employed rigorous social scientific methods, or benefited from statistical analyses. Without these fundamentals of empirical scientific investigation, valid inferential claims about terrorism and related phenomena have been rare. Fortunately, terrorism researchers come from a variety of fields that have used rigorous empirical methods for decades, many of which can be used to help answer questions within terrorism studies. One method that has long been the foundation for social scientific knowledge but has yet to gain traction in the study of terrorism is experimentation. This paper proposes that terrorism researchers, security professionals, and policymakers should embrace experimentation to address salient research questions. More specifically, this paper describes various forms of experimentation that could be used in the study of terrorism and offers examples of how these different experimental approaches might be put into practice.

## Introduction

Despite ongoing calls for greater empiricism and the application of quantitative social scientific methods in terrorism studies, researchers of terrorism and political violence have been relatively resistant to change. Rigorous study designs and inferential statistical analyses remain underrepresented in the terrorism literature. To illustrate, consider the papers published in nine key peer-reviewed terrorism journals<sup>1</sup> between 2007 and 2016.<sup>2</sup> Though the proportion of research studies that featured primary data grew from 48.1% to 59.5% over this time period, less than *one-quarter* (21.8%) of these studies had any statistical analyses to speak of. Of the studies that did use statistics, less than *one-third* (32.5%) included inferential analyses—analyses that allow the researcher to draw conclusions about whether their findings would apply to larger populations beyond the individuals they analysed. Of all research articles published in the nine leading terrorism journals between 2007 and 2016, only about 7% included inferential analyses that provided evidence linking variables of interest to terrorism-related outcomes.

This lack of inferential analyses is unfortunate, particularly since many terrorism researchers come from disciplines that have used long-validated methods for quantitative data collection and data analytic methods that allow them to draw conclusions about the populations from which their research subjects were drawn. This is not to discredit the value of descriptive statistics in the study of terrorism. As the name suggests, they can effectively describe the nature of different terrorism-related phenomena. That said, descriptive studies cannot identify cause-effect relationships or definitively isolate factors that can lead to different outcomes. As such, descriptive analyses are limited in their capacity to inform security professionals about what sorts of strategies they should implement under different conditions. This kind of guidance requires more sophisticated methods that illustrate how things *affect* processes related to violent radicalisation and terrorism. One method for collecting the kinds of data that would allow researchers to draw useful conclusions that inform counter-terror practice is *experimentation*.

No single paper can provide a comprehensive account of experimental and quasi-experimental methods. Instead, this policy brief intends to introduce security professionals, homeland security practitioners, and terrorism researchers to experimental methods that they may be unfamiliar with. This brief also outlines how experimental methods can be tailored to test critical hypotheses related to political violence. In turn, these hypothesis tests can produce findings that can provide security professionals and policymakers with the information they need to make well-founded strategic decisions for contending with terrorism. Moreover, a fundamental understanding of experimental methods can help non-academics to recognise the merits and faults of the research they use to guide their decisions.

Because there remains significant resistance to inferential analyses, this paper begins with a short discussion of perceived barriers to experimentation within terrorism studies and how these barriers can be overcome. The brief then describes various experimental and quasi-experimental designs that can be employed in the study of terrorism and offers illustrative examples of how those designs might be used to investigate terrorism

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<sup>1</sup> These journals include *Terrorism and Political Violence*, *Studies in Conflict & Terrorism*, *Perspectives on Terrorism*, *The CTC Sentinel*, *Critical Studies on Terrorism*, *Dynamics of Asymmetric Conflict*, *Behavioral Sciences of Terrorism and Political Aggression*, *Journal of Terrorism Research*, and *Journal for Deradicalization*.

<sup>2</sup> Bart Schuurman, "Research on Terrorism, 2007-2016: A Review of Data, Methods, and Authorship," *Terrorism and Political Violence* (2018).

and related phenomena. The paper will close with short discussions of notable avenues of research within terrorism studies that might benefit from the application of experimental or quasi-experimental methods.

## Perceived Barriers to Experimental Investigation of Terrorism: Access to Participants and a Low Base Rate

For several years, many researchers believed that accessing individuals with first-hand experience in terrorism was difficult.<sup>3</sup> This contention was based, in part, on the fact that the number of individuals who engage in political violence is relatively small compared to those that engage in risky behaviours that are perceived as more amenable to rigorous analysis (e.g., smoking, drinking, promiscuous sex).<sup>4</sup> After all, there are literally thousands of studies on these topics that use primary, inferential data, but so few in terrorism studies. Despite these initial doubts, recent work has shown that it is possible to not only access individuals who have engaged in or supported terrorism, but also collect data from them.<sup>5</sup> Although most research using current and former terrorists as research subjects is almost exclusively qualitative in kind, that these individuals are indeed accessible suggests that quantitative data are also available for collection and analysis if we use the right methods and instruments.

Of course, while gathering first-hand data from current and former terrorists is feasible, it certainly remains difficult. Fortunately, experimental research designs do not always need to draw on this small group of individuals for their participant pools. Consider that terrorism researchers have largely settled that there is no terrorist “profile” (or that we have yet to identify one).<sup>6</sup> That is, there is no recognisable set of sociological, demographic, or personality traits that predict whether someone will be drawn towards terrorism. Indeed, many have argued that although terrorists are special because they engage in behaviours that are statistically abnormal, they are motivated by the same social and psychological processes that drive all behaviour.<sup>7</sup> Because (a) we have yet to identify a terrorist “profile,” and (b) those who support or engage in terrorism are no different in quality than others in the populations from which they come, it makes sense to perform terrorism-focused experimental research on participants from the general population to shed light on factors that contribute to (or impede) the development of terrorists.

<sup>3</sup> John Horgan, “Interviewing the Terrorists: Reflections on Fieldwork and Implications for Psychological Research,” *Behavioral Sciences of Terrorism and Political Aggression* 4, no. 3 (2012): 195-211.

<sup>4</sup> *Ibid.*, 199.

<sup>5</sup> See for example John Horgan, *Walking Away from Terrorism: Accounts of Disengagement from Radical and Extremist Movements* (London: Routledge, 2009); Adam Dolnik, “Conducting Field Research on Terrorism: A Brief Primer,” (2011), <https://ro.uow.edu.au/cgi/viewcontent.cgi?referer=https://scholar.google.com/&httpsredir=1&article=1755&context=lawpapers>; Anne Speckhard and Ahmet S. Yayla, *ISIS Defectors: Inside Stories of the Terrorist Caliphate* (McLean, VA: Advanced Press, 2016).

<sup>6</sup> Jeff Victoroff, “The Mind of the Terrorist: A Review and Critique of Psychological Approaches,” *Conflict Resolution* 49, no. 1 (2005), 3-42; John Horgan, “From Profiles to Pathways and Roots to Routes: Perspectives from Psychology on Radicalization into Terrorism,” *The ANNALS of the American Academy of Political and Social Science* 618, no. 1 (2008): 83; Centre for Research and Evidence on Security Threats, “Introductory Guide: Countering Violent Extremism,” [http://eprints.lancs.ac.uk/88097/1/17\\_008\\_01.pdf](http://eprints.lancs.ac.uk/88097/1/17_008_01.pdf).

<sup>7</sup> John Horgan, *The Psychology of Terrorism* (New York: Routledge, 2014); see also Kurt Braddock and John Horgan, “Towards a Guide for Constructing and Disseminating Counternarratives to Reduce Support for Terrorism,” *Studies in Conflict and Terrorism* 39, no. 5 (2016), 385.

Regarding the perceived lack of access to valid participants, some researchers may argue that evaluating issues related to terrorism via experimentation is impossible because it is a low base-rate phenomenon. Experimentation, after all, requires enough observations to perform valid statistical analyses. These researchers would be right to argue that terrorist activity represents only a small portion of overall activity performed by supporters of an extremist ideology, who will more frequently engage in protests, political participation and perhaps especially (online) hate speech rather than actual terrorist violence.<sup>8</sup> As such, some may argue that it is impossible to test how different factors (more formally known as independent variables) may affect someone's likelihood to engage in terrorism (the so-called dependent variable being investigated), given how infrequently people actually engage in terrorist violence.

That said, violent behaviour is only one of many dependent variables associated with the overall phenomenon of terrorism. There are a great many other variables of interest that can be evaluated via experimentation. For example, consider that terrorist behaviour is often underpinned by beliefs and attitudes consistent with terrorist ideologies. Compared to the number of individuals who engage in terrorist behaviour, the number of individuals susceptible to adopting beliefs and attitudes consistent with terrorist ideologies is vastly larger. In an analysis of how terrorist groups get popular support, Bhattacharya showed that several areas around the world are characterised by conditions that lead to civilian support for terrorist violence.<sup>9</sup> Given that (a) terrorist groups are largely dependent on the ideological support of their constituents and (b) individuals with beliefs and attitudes consistent with terrorist ideologies are—in some cases—at greater risk for going on to actually engage in terrorism, it makes sense to study these individuals. As such, researchers can (and should) use experimentation to test changes in their beliefs and attitudes in response to different stimuli.

This is not to suggest that there are no challenges associated with studying terrorism using experimental methods. There certainly are. Still, these assumed challenges should not prevent terrorism experts from using experimental and quasi-experimental methods to shed light on different phenomena surrounding the use of terrorism. In the following section, I describe some of these methods. In doing so, I hope to introduce unfamiliar researchers and security professionals to experimentation and motivate the collection of data that might help move terrorism studies beyond descriptive analyses.

For researchers, knowledge of experimental and quasi-experimental methods will allow them to explore new and exciting questions related to terrorism that they may have thought too difficult to tackle. An understanding of experimentation strongly benefits security professionals as well. By developing knowledge related to experimentation, security professionals and practitioners can challenge researchers to answer new questions related to terrorism and political violence that would address some of their most pressing needs. In addition, by recognising the empirical quality (or lack thereof) of terrorism research, practitioners will be better equipped to identify findings that provide sound guidance for their policy decisions.

In short, by understanding experimentation, terrorism researchers can address more complex research questions and security practitioners can better interpret information to achieve their strategic objectives.

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<sup>8</sup> See Clark McCauley and Sophia Moskalenko, "Understanding Political Radicalization: The Two-Pyramids Model," *American Psychologist* 72, no. 3 (2017): 205-216.

<sup>9</sup> Srobana Bhattacharya, "Comparing Civilian Support for Terrorism," *Journal of Strategic Security* 10, no. 2 (2017): 1-32.

## Experimental and Quasi-Experimental Methods

Like the “hard sciences” (e.g., physics, chemistry, astronomy), where conclusions about natural occurrences are based on direct observation and measurement, the social sciences are also often involved in studying phenomena that can be directly experienced. To be clear, many researchers have analysed directly observable phenomena related to terrorism. Research on the characteristics of terrorists,<sup>10</sup> incidence rates of certain kinds of terrorist activity,<sup>11</sup> situational factors that facilitate the use of terrorism,<sup>12</sup> and other manifest variables has been critical for describing the nature of terrorism and the factors surrounding its strategic use. However, analysis of latent issues—including how people may psychologically react to different factors—requires indirect observations that measures people’s responses to change. For example, what if we wanted to see how audience members’ attitudes about the death penalty are affected by watching hours of televised violence? We would be unable to pull attitudes out of the audience members’ heads, put them under a microscope and see how strong they are. We can only measure attitudes through methods that incorporate manipulation (i.e., showing some people the violent content while not showing others) and appropriate measurement instruments (e.g., surveys). Experimentation represents one approach that can be used to this effect, and it has yet to gain serious traction within terrorism studies.

Experimental designs can be broadly categorised based on the control a researcher has in randomly assigning participants to different experimental conditions. If the researcher has the capacity to randomly assign participants to conditions, then the design is considered true experimental. For instance, suppose a researcher wants to test how people react to video propaganda produced by ISIS. Also imagine that the researcher has access to 200 research participants to conduct an experiment under controlled conditions. The researcher would randomly select 100 individuals to view the ISIS video; the other 100 individuals would not view the video. Afterward, the researcher would ask all participants the same questions to test how the first group reacted to the video relative to the group that did not see it. By structuring the study in this way, the researcher can ensure both groups are (roughly) equivalent in terms of their intrinsic characteristics. This would be considered a true experiment.

In contrast, if the researcher is unable to ensure that participants are randomly assigned to the conditions in the study, the design is considered quasi-experimental. For example, what if a researcher wants to determine how ISIS video propaganda affected people in Syria who had already seen it? In this case, the researcher would have no control to randomly assign Syrians to the “seen the video” and “have not seen the video” conditions. Instead, the researcher would ask people whether they had seen the video or not, subsequently asking both groups questions related to the research objectives at hand. Because participants cannot be assigned to conditions at random under these

<sup>10</sup> Edwin Bakker, “Characteristics of Jihadi Terrorists in Europe (2001-2009).” In *Jihadi Terrorism and the Radicalization Challenge: European and American Experiences*, ed., Rik Coolsaet (Aldershot: Ashgate, 2011), 141-144; Clark McCauley, Sophia Moskalenko, and Benjamin Van Son, “Characteristics of Lone-Wolf Violent Offenders: A Comparison of Assassins and School Attackers,” *Perspectives on Terrorism* 7, no. 1 (2013), 4-24; Leonard Weinberg, Ami Pedahzur, and Daphna Canetti-Nisim, “The Social and Religious Characteristics of Suicide Bombers and their Victims,” *Terrorism and Political Violence* 15, no. 3 (2003), 139-153.

<sup>11</sup> Gary LaFree and Laura Dugan, “Evolution of Global terrorism: The Growing Lethality of Attacks.” In *Peace and Conflict 2017*, eds., David Becker, Ravinder Bhavnani, and Paul Huth (New York: CRC Press, 2018); National Consortium for the Study of Terrorism and Responses to Terrorism, “Terrorist Attacks against Religious Targets in the United States, 1970-2017.” [https://www.start.umd.edu/pubs/START\\_ReligiousTargets\\_FactSheet\\_Oct2018.pdf](https://www.start.umd.edu/pubs/START_ReligiousTargets_FactSheet_Oct2018.pdf).

<sup>12</sup> Jeff Gruenewald, Brent R. Klein, William S. Parkin, Joshua D. Freilich, and Steven Chermak, “A Situated Comparison of Suicide and Non-Suicide Terrorist Plots and Homicides in the United States, 1990-2014.” *Crime & Delinquency* (2018); Marissa Mandala and Joshua D. Frielich, “Disrupting Terrorist Assassinations through Situational Crime Prevention,” *Crime & Delinquency* 64, no. 12 (2017), 1515-1537.

circumstances, one cannot guarantee that the groups are equivalent. For example, one group may have been more inclined to watch the video because of some unidentified characteristic that affects the study's results. This would be considered a quasi-experiment.

Both true experiments and quasi-experiments subsume more refined kinds of research designs, based on the nature of the experimental manipulation and the point in the experimental process at which the researcher makes their observation(s). This section discusses these different kinds of experimental designs and how they can be implemented within terrorism studies. Each section will contain a scenario that could use the design in question, highlighting the design's relative strengths and weaknesses. Each section will also include visual representations of the research designs; in these representations, the following symbols will be used:

**R<sub>n</sub>**: Randomly-assigned participants in Group *n* – indicates that participants included in the study have an equal chance of being assigned to the stimulus or control condition

**N<sub>n</sub>**: Non-randomly-assigned participants in Group *n* – indicates that participants included in the study do not have an equal chance of being assigned to the stimulus or control condition

**M<sub>n</sub>**: Measurement – the point *n* at which the researcher measures/observes salient variables

**Stim**: Stimulus intervention – indicates the point at which the researcher exposes participants in the stimulus group to something that is thought to affect the outcome variable of interest

## True Experimental Designs

'True experiments' are characterised by random selection and distribution of participants into different conditions and are generally considered superior to quasi-experiments for ensuring that the groups being compared are equivalent. There are several ways that true experiments can be designed, but for the sake of parsimony, this brief will cover the four most prevalent: 'pre-test/post-test', 'pre-test/post-test with control', 'post-test only', and the 'Solomon Four-Group' design. For further reading on these (and other) methods, see Trochim's Web Center for Social Research Methods.<sup>13</sup>

### Pre-test/Post-test Design (No Control Group)

In the 'pre-test/post-test' design, the researcher randomly samples participants from a target population. The researcher measures target outcomes before exposing the sample to a stimulus of some type. Following participants' exposure to the stimulus, target outcomes are measured again—often using the same measurement instrument (e.g., survey). In the 'pre-test/post-test' design, the entire sample serves as both the control group (as measured before being exposed to the stimulus) and the experimental group (as measured after being exposed to the stimulus). By structuring an experiment in this way, a researcher can evaluate change in targeted outcomes as a function of being exposed to the stimulus.

<sup>13</sup> William M. K. Trochim, "Design." <https://socialresearchmethods.net/kb/design.php>.

Although this research design is simple and easy to implement, it has two key shortcomings. First, it runs the risk of sensitising participants to the purpose of the study. If research participants read questions before they are exposed to any stimulus, they may think they are “supposed to” react to the stimulus in some way, thereby affecting how they respond to questions after being exposed to the stimulus (i.e., there will be a pre-test effect on participant responses; see the Solomon Four-Group Design section below on how to identify a pre-test effect). Second, without the use of a control group, it is impossible to know if any changes observed in participants’ answers is due to the stimulus or some other, unidentified factor.

Including a control group in a study design means that the researcher will need twice as many participants than they would need with this design. Therefore, despite the risks to validity associated with a simple ‘pre-test/post-test’ design, it can be useful when there are only a limited number of research subjects that can be evaluated.

### Example

A researcher wishes to test the effect of an extremist group’s propaganda on a given population. The researcher randomly selects 200 individuals from this population as a representative sample ( $R_1$ ). The researcher administers a questionnaire asking participants about their beliefs and attitudes with respect to elements of the group’s ideology ( $M_1$ ). The researcher then exposes all 200 individuals to an excerpt of the group’s propaganda. After showing participants the group’s propaganda, the researcher uses the same instrument as in the pre-test to again measure participants’ beliefs and attitudes about elements of the group’s ideology ( $M_2$ ). Following data collection, the researcher compares participants’ responses on the post-test to their responses on the pre-test to determine the effect of the propaganda on their beliefs and attitudes ( $M_2$  vs.  $M_1$ ). This process can be represented as follows:

$R_1$ :	$M_1$	Stim	$M_2$
Strengths		Weaknesses	
<ul style="list-style-type: none"> <li>▪ Simplicity</li> <li>▪ Requires relatively few research subjects</li> </ul>		<ul style="list-style-type: none"> <li>▪ Potential for sensitisation to purpose of study</li> <li>▪ No pure control group</li> </ul>	

### Pre-test/Post-test Design (with Control Group)

As in the standard ‘pre-test/post-test’ research design, this research design involves the measurement of salient outcomes both before and after the stimulus. However, this design also incorporates a control condition. Specifically, the researcher randomly selects and assigns participants to either an experimental condition or a control condition. Participants in both conditions provide data related to salient outcomes before respectively being exposed to the experimental stimulus or the control. Following exposure to the stimulus or control, participants again provide data related to salient outcomes (often using the same instrument featured in the pre-test). This study design allows the researcher to evaluate the effect of the stimulus in two ways—against the pre-test values in the stimulus condition, or against the post-test values in the control condition. Having both comparisons is useful when the researcher is concerned that



participants may have deduced the purpose of the study from the pre-test (in which case the researcher would compare post-test scores) or that there was an oversight that led to the two groups being non-equivalent (in which case the researcher could compare post-test scores to pre-test scores).

### Example

A researcher wishes to test the effect of witnessing a terrorist attack in the media on individuals’ beliefs about the possibility of a future terrorist attack. The researcher randomly selects 400 individuals from the population of interest and randomly assigns them to the stimulus condition or the control condition. The researcher administers a questionnaire to both groups of participants, asking about their beliefs regarding the probability of a future terrorist attack ( $M_1$ ). After administering the pre-test, the researcher exposes participants in the stimulus group ( $R_1$ ) to a series of news clips depicting suicide bombings. Participants in the control group ( $R_2$ ) are exposed to unrelated news clips that describe local activities for the upcoming weekend. After being exposed to the stimulus and control messages, respectively, participants respond to the same questions they answered in the pre-test ( $M_2$ ). Following data collection, the researcher can make two comparisons to determine the effect of the stimulus message: the stimulus group’s post-test scores to the stimulus group’s pre-test scores ( $R_1: M_2$  vs.  $M_1$ ) or the stimulus group’s post-test scores to the control group’s post-test scores ( $R_1: M_2$  vs.  $R_2: M_2$ ).

$R_1:$	$M_1$	Stim	$M_2$
$R_2:$	$M_1$		$M_2$

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>▪ Simplicity</li> <li>▪ Allows for comparing post-test scores to two baselines (pre-test scores, control group post-test score)</li> <li>▪ Random assignment to conditions</li> </ul>	<ul style="list-style-type: none"> <li>▪ Potential for sensitisation to purpose of study</li> </ul>

### Post-test Only Design (with Control Group)

The ‘post-test only’ experimental design circumvents the shortcomings associated with a pure ‘pre-test/post-test’ design by incorporating two groups of participants, neither of which will be sensitised to the study’s purpose by answering questions before being exposed to the stimulus. In this design, participants are randomly selected and assigned to one of two conditions: an experimental condition and a control condition. Participants in the experimental condition are exposed to the stimulus, after which they provide data concerning target outcomes. Participants in the control condition are not exposed to the experimental stimulus, but nonetheless respond to the same measurement scales that participants in the experimental condition did. This allows the researcher to compare the two groups of participants in terms of target outcomes to evaluate the effect of the stimulus relative to a baseline control.



## Example

A researcher wants to determine whether exposure to former terrorists’ stories about their engagement in terrorism affects individuals’ beliefs about supporting terrorism. The researcher randomly selects 300 individuals from the population of interest and randomly assigns them to one of two conditions—the stimulus condition or the control condition. Participants in the stimulus group ( $R_1$ ) are exposed to a video-taped messages of former terrorists describing how their joining the terrorist group did not meet their expectations for glory, and how they quickly became disillusioned with the group and its activities. Participants in the other group ( $R_2$ ) are not exposed to any message. The researcher then administers a questionnaire to all participants asking about their perceptions of the terrorist group, their beliefs about engaging in terrorism on its behalf, and related issues. Following data collection, the researcher compares responses provided by the stimulus group ( $R_1: M_1$ ) to those of the control group ( $R_2: M_1$ ).

$R_1:$	Stim	$M_1$
$R_2:$		$M_1$

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>▪ Simplicity</li> <li>▪ Allows for comparing post-test scores to control group post-test scores</li> <li>▪ Random assignment to conditions</li> </ul>	<ul style="list-style-type: none"> <li>▪ Potential for sensitisation to purpose of study</li> </ul>

## Solomon Four-Group Design

Although ‘pre-test/post-test’ designs are used extensively in the social sciences, they suffer from a key threat to validity. In some cases, participants’ responses on post-test measures may be affected by their responses on pre-test measures. This may occur because participants become sensitised to the purpose of the ‘pre-test/post-test’ comparison, make assumptions about how they are “supposed” to answer in the post-test based on their responses to the pre-test, or otherwise reply to post-test measures because of factors other than their true responses to those measures.

The Solomon Four Group Design combines a traditional ‘pre-test/post-test’ design (with control group included) with the ‘post-test only’ (with control group included) design. By using this design, researchers can compare post-test scores in the two stimulus conditions ( $R_1$  and  $R_3$  below) to determine if there is a pre-test effect on salient outcomes. If the researcher finds a significant difference between post-test scores in these conditions, this effect can be controlled by comparing the post-test scores of the stimulus and control conditions that did not receive the pre-test ( $R_3$  and  $R_4$  below). On the other hand, if no pre-test effect emerges, researchers can make multiple comparisons across stimulus and control conditions ( $R_1$  vs.  $R_2$ ,  $R_1$  vs.  $R_4$ ,  $R_3$  vs.  $R_4$ ). It should be noted that because there are a larger number of conditions in the Solomon Four-Group Design relative to other designs, researchers should use it when they have access to a large number of participants that can sufficiently populate each condition.

## Example

A researcher is interested in studying whether exposure to news about political violence will affect viewers’ intentions to support terrorist organisations. To test this possibility, the researcher develops a survey instrument that directly asks whether respondents would support a terrorist organisation under different circumstances. Given the overt nature of these questions, the researcher is concerned that a traditional ‘pre-test/post-test’ design will fail, given that participants may become sensitised to the purpose of the study. In short, the researcher is concerned that there will be a pre-test effect on post-test responses. Nevertheless, she randomly selects 600 participants from a population of interest.

Upon obtaining the overall sample, the researcher randomly assigns participants to one of four conditions. In two of the conditions (R<sub>1</sub> and R<sub>2</sub>), participants will complete the survey before being exposed to the stimulus (i.e., news clips reporting on political violence; administered to R<sub>1</sub>) or control (no message; administered to R<sub>2</sub>). Participants in the other two conditions are similarly exposed to either the stimulus (R<sub>3</sub>) or control (R<sub>4</sub>), but do not respond to the questionnaire before doing so. After R<sub>1</sub> and R<sub>3</sub> are exposed to the stimulus message, the researcher again administers the survey to all four groups, to (a) determine whether the survey sensitised participants to the purpose of the study (by comparing R<sub>1</sub>: M<sub>2</sub> and R<sub>3</sub>: M<sub>2</sub>) and (b) gauge the effect of the stimulus relative to the control (by comparing R<sub>1</sub>: M<sub>2</sub> to R<sub>4</sub>: M<sub>2</sub>).

R <sub>1</sub> :	M <sub>1</sub>	Stim	M <sub>2</sub>
R <sub>2</sub> :	M <sub>1</sub>		M <sub>2</sub>
R <sub>3</sub> :		Stim	M <sub>2</sub>
R <sub>4</sub> :			M <sub>2</sub>

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>▪ Allows for comparing post-test scores to three baselines (pre-test scores, two control group post-test scores)</li> <li>▪ Allows for identification of pre-test effect on outcomes</li> <li>▪ Random assignment to conditions</li> </ul>	<ul style="list-style-type: none"> <li>▪ Potential for sensitisation to purpose of study for some groups</li> <li>▪ Requires relatively large number of research subjects</li> </ul>

## Quasi-Experimental Designs

Quasi-experiments are experiments in which participants are not randomly assigned into conditions. These studies typically utilise participant groups that are already established prior to the researcher’s decision to study how those groups react to stimuli (e.g., neighbourhoods, schools). Researchers using these methods should do their best to use similar samples for the stimulus and control conditions to best evaluate the effect of the stimulus against the control.

Even with the researcher’s best effort to construct stimulus and control groups that are similar, the groups cannot be considered as equivalent as they would be if participants had been assigned to conditions randomly. As such, *a priori* differences between the

stimulus and control groups may affect the outcome of the study. This is all to say that terrorism researchers who utilise non-equivalent groups should be aware of this threat to internal validity and account for it when they describe their findings. Though quasi-experiments suffer from threats to internal validity to a greater extent than true experiments, they can nonetheless be useful tools for evaluating the effects of different stimuli. This is particularly true in the domain of terrorism, where controlled selection and assignment of research participants to specific conditions can be difficult.

As with the true experiments described above, there are multiple kinds of quasi-experiments. Again, for the sake of parsimony, I will describe the designs that are most applicable to research associated with terrorism and violent extremism: the ‘non-equivalent groups’ design, the ‘proxy pre-test’ design, the ‘switching replications’ design, and the ‘regression point displacement’ design.

### Non-equivalent Groups Design

‘Non-equivalent group’ designs are similar in structure to the aforementioned ‘pre-test/post-test’ and ‘post-test-only’ true experimental designs. However, non-equivalent group designs do not have the benefit of randomisation in how participants are assigned to conditions. Studies that utilise the non-equivalent groups ‘pre-test/post-test’ or ‘post-test only’ designs are common in social scientific investigations using participants evaluated in their natural environments rather than under laboratory-controlled conditions. As such, terrorism researchers that wish to use real-world participants (e.g., individuals at risk for radicalisation via terrorist messaging) in real-world settings (e.g., neighbourhoods that are targeted by terrorist groups for recruitment) are likely to use these study designs.

#### Example (pre-test/post-test with control)

A researcher wishes to determine the effectiveness of messages intended to prevent the adoption of attitudes consistent with white nationalism among high school students. The researcher travels to a region where white nationalist groups are active and identifies a high school from which white nationalists have been known to recruit. The researcher then chooses two classes in the school (that are as similar as possible) to serve as the respective stimulus and control groups ( $N_1$  and  $N_2$ ) and administers the same questionnaire to students in both classes ( $M_1$ ). Following the pre-test, one class is exposed to counter-radicalisation messages intended to dissuade the adoption of values consistent with white nationalism; the other class is not exposed to these messages. One month later, students in both conditions are administered the same questionnaire they completed in the pre-test ( $M_2$ ). After data collection, the researcher can compare post-test responses provided by the stimulus group ( $N_1: M_2$ ) to the same group’s pre-test scores ( $N_1: M_1$ ) or the post-test responses provided by the control group ( $N_2: M_2$ ).

$N_1:$	$M_1$	Stim	$M_2$
$N_2:$	$M_1$		$M_2$
$N_1:$		Stim	$M_1$
$N_2:$			$M_1$

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>▪ Simplicity</li> <li>▪ Allows for comparing post-test scores to two baselines (pre-test scores, control group post-test score)</li> <li>▪ No risk of sensitisation to study’s purpose (for post-test only design)</li> <li>▪ Useful for real-world contexts in which the researcher can test an intervention</li> </ul>	<ul style="list-style-type: none"> <li>▪ Risk of sensitisation to study’s purpose (for pre-test designs)</li> <li>▪ Participants not randomly assigned to conditions – no guarantee groups are equivalent</li> <li>▪ Because of non-random assignment, researcher must expend significant effort to best select groups that are equivalent</li> </ul>

## Proxy Pre-test Design

This design is structurally similar to traditional ‘pre-test/post-test’ designs. However, whereas baseline data is collected in the pre-test stage in traditional ‘pre-test/post-test’ experiments, in ‘proxy pre-test’ designs, baseline data is collected *after* the administration of the stimulus (or exposure to the control). In one form of ‘proxy pre-test’ experiment, participants are exposed to a stimulus or control and provide responses to research instruments that measure salient outcomes. They are then asked to determine how they *would* have measured on those same instruments at some time in the past. Another kind of ‘proxy pre-test’ experiment uses archived data to serve as the pre-test measure against which post-treatment data is compared. Because of threats to validity associated with the pre-test scores in either kind of ‘proxy pre-test’ design (e.g., participants wrongfully estimate their past scores, archived data is not directly comparable to post-test scores), researchers should seek to avoid using a ‘proxy pre-test’ design. That said, when researchers must measure the impact of an intervention after the intervention has already been implemented, the ‘proxy pre-test’ design may be their only option.<sup>14</sup>

### Example (archived data)

A researcher is tasked by the Lebanese government to determine if a political campaign that criticises Hezbollah diminishes support for the group in Beirut. The political campaign has already been implemented in several Beirut neighbourhoods in the form of televised and radio-based messages. The researcher identifies the neighbourhoods in which the political campaign has been implemented (N<sub>1</sub>), as well as several other neighborhoods that are similar, but have not been exposed to the Lebanese government’s campaign (N<sub>2</sub>). After identifying the stimulus and control groups, the researcher develops an instrument that asks individuals in both sets of neighbourhoods about their beliefs and attitudes with respect to Hezbollah, its policies, and its actions (N<sub>1</sub>: M<sub>1</sub> and N<sub>2</sub>: M<sub>1</sub>). Although the researcher can compare the post-test scores of the treatment and control neighbourhoods, she also wishes to account for differences between the neighborhoods by collecting “pre-test” data against which the post-test data can be compared. To do so, the researcher collects extant polling data concerning

<sup>14</sup> One area where this research design may be particularly useful is in the evaluation of so-called “de-radicalisation” programs. Researchers are often requested to evaluate the effectiveness of these programs after they have already begun and must therefore gather data retroactively.

support for Hezbollah from the treatment and control neighbourhoods as a proxy measure to serve as the pre-test ( $M_2$ ). These data and the post-test data are then standardised to allow for statistical comparison.

$N_1$ :	$M_2$	Stim	$M_1$
$N_2$ :	$M_2$		$M_1$

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>▪ Simplicity</li> <li>▪ Allows for comparing post-test scores to two baselines (pre-test scores, control group post-test score)</li> <li>▪ No risk of sensitisation to study's purpose since "post-test" groups are proxied by alternative data</li> <li>▪ Useful for real-world contexts in which the researcher has no control over when an intervention was implemented (e.g., asked to evaluate the effectiveness of de-radicalisation efforts after they have already been implemented)</li> </ul>	<ul style="list-style-type: none"> <li>▪ No guarantee that post-test respondents are equivalent to those that were first evaluated</li> <li>▪ Because of non-random assignment, researcher must expend significant effort to select a non-stimulus pre-test group (<math>N_2M_1</math>) and proxy post-test groups that are at least somewhat similar to the stimulus pre-test group (<math>N_1M_1</math>)</li> <li>▪ Requires collection of data from multiple sources (e.g., surveys developed by researcher and polling data)</li> </ul>

## Switching Replications Design

In this quasi-experimental design, two non-random groups are exposed to a treatment over three waves of data collection. In the first wave, both groups are measured on pre-test measures. One group is then exposed to the stimulus and the other is not. Pre-test measures are then replicated in the second wave of data collection, completing one complete 'pre-test/post-test' comparison against a control group. Following the second wave of data collection, the group that had previously *not* been given the stimulus is now exposed to the treatment stimulus. The group that had earlier been exposed to the stimulus does not receive the stimulus in this stage. Finally, a third wave of data collection occurs. Because the switching replications design measures the effect of the stimulus twice, it has two key advantages over traditional 'pre-test/post-test' designs. First, because it measures the effect of the stimulus over two groups instead of one, the switching replications design is more generalizable to the population from which the samples were drawn. Second, the switching replications design ultimately administers a stimulus treatment to *all* participants in a study. If that treatment is thought to be beneficial to participants in some way (e.g., reduces their likelihood of seeking terrorist propaganda), administration to all participants may be perceived more ethically defensible than administering the treatment to only half of one's overall sample (i.e., a single treatment group).

## Example

Researchers have developed a new form of person-centred counselling to be implemented in de-radicalisation programs around the world. To determine the effectiveness of person-centred counselling in the de-radicalisation process, the researchers decide to test the treatment on participants in the Saudi and Indonesian de-radicalisation initiatives (N<sub>1</sub> and N<sub>2</sub>, respectively). Prior to implementing the treatment, the researchers administer an instrument to participants in both programs that asks several questions concerning the respondents’ adherence to jihadi ideologies (N<sub>1</sub>: M<sub>1</sub> and N<sub>2</sub>: M<sub>1</sub>). Saudi program personnel then implement person-centred counselling as part of their initiative. Following this, the researchers again administer the questionnaire to participants in the Saudi and Indonesian programs (N<sub>1</sub>: M<sub>2</sub> and N<sub>2</sub>: M<sub>2</sub>).

Upon analysing the data collected from the first round of data collection, the researchers find that the person-centred counselling had a positive impact on the Saudi participants relative to the control group (i.e., the Indonesian participants). To ensure that all participants can benefit from the treatment, Indonesian participants then partake in person-centred counselling. After this final treatment, the questionnaire is administered to both groups a last time (N<sub>1</sub>: M<sub>3</sub> and N<sub>2</sub>: M<sub>3</sub>), thereby allowing the researchers to gauge the effectiveness of person-centred counselling in both contexts against different kinds of controls.

N <sub>1</sub> :	M <sub>1</sub>	Stim	M <sub>2</sub>		M <sub>3</sub>
N <sub>2</sub> :	M <sub>1</sub>		M <sub>2</sub>	Stim	M <sub>3</sub>

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>▪ Allows both groups of participants to benefit from the intervention</li> <li>▪ Allows for comparing post-test scores to several different pre-test baselines across both conditions</li> <li>▪ Useful for real-world contexts in which the researcher can test an intervention from which multiple groups can benefit</li> </ul>	<ul style="list-style-type: none"> <li>▪ Risk of sensitisation to study’s purpose (for pre-test designs)</li> <li>▪ Participants not randomly assigned to conditions – no guarantee groups are equivalent</li> <li>▪ Because of non-random assignment, researcher must expend significant effort to best select groups that are equivalent</li> <li>▪ Time-intensive</li> </ul>

## Regression Point-displacement Design

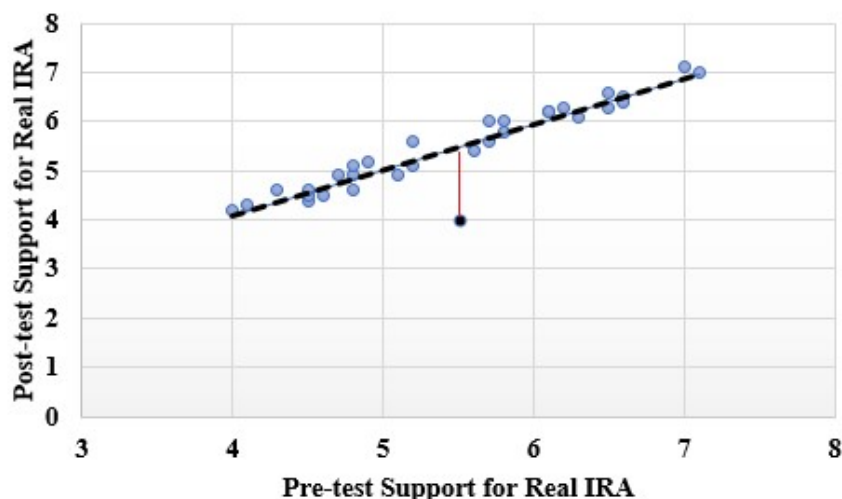
The ‘regression point-displacement’ quasi-experimental design is useful for researchers that wish to compare the effect of some intervention on a single unit (e.g., a school, a community, a family, a country). To effectively utilise this approach, the researcher must identify a large number of comparison units against which the experimental unit can be measured. The researcher should select comparison units that are similar in quality to the experimental unit. For instance, if the researcher wishes to test the effect of an educational program in a school in a Middle Eastern urban community, it is necessary to identify several other schools in similar Middle Eastern urban communities that will *not* be exposed to the educational program.

Once the set of comparison units is identified, the researcher measures all units (i.e., the treatment unit and comparison units) on variables of interest. Then, the researcher administers the treatment to the experimental unit. Following this, the researcher collects post-test data from all units. These steps will provide the researcher with pre-test and post-test data for one experimental unit and many control units who did not receive the experimental stimulus. Pre-test and post-test scores for the control units should be plotted on an X-axis (pre-test scores) and Y-axis (post-test scores), thereby allowing for the estimation of a regression line. Once this line is estimated, the researcher plots the scores of the single experimental unit. The deviation of the single unit from the experimental condition from the regression line—which represents an estimate of where a comparable control condition would fall on the plot—indicates the effect of the treatment on the single experimental unit.

## Example

The Irish Garda receive word that the Real IRA, a dissident republican group operating in Ireland and Northern Ireland, has begun a recruiting drive across the 32 counties of Ireland and Northern Ireland. Eager to limit the effectiveness of this drive, the British and Irish governments hire a researcher to develop messages to diminish the effectiveness of the Real IRA recruitment efforts. The researcher develops a series of commercials and radio ads and wishes to determine their efficacy by piloting a program whereby the messages are distributed only in County Monaghan.

Before delivering the counter-Real IRA messages in County Monaghan, the researcher develops an instrument that measures support for the Real IRA on a series of scales ranging from 1 to 10. This instrument is then administered to individuals in County Monaghan ( $N_1: M_1$ ) and the other 31 counties of Ireland and Northern Ireland ( $N_2: M_1$ ). After this first round of data collection, the researcher delivers the counter-Real IRA messages in County Monaghan. A few weeks after the campaign is launched, the researcher administers the questionnaire again in County Monaghan ( $N_1: M_2$ ) and the other counties ( $N_2: M_2$ ). To compare the effect of the campaign in County Monaghan, the researcher plots participants pre-test scores and post-test scores to determine whether County Monaghan deviated from the average change in scores across all counties. The resulting plot would look like Figure 1 below.



*Figure 1.* Imagined scatterplot and regression line estimate of the pre-test and post-test scores among the 32 counties of Ireland and Northern Ireland. County Monaghan is indicated by the black dot.



This scatterplot indicates to the researcher that his campaign was a success. Average post-test support for the Real IRA is lower than the norm would be for an average county. Deviation from the norm is indicated by a vertical line from the regression line to the black dot indicating County Monaghan’s data point.

$N_{1 (n=1)}$ :	$M_1$	Stim	$M_2$
$N_2$ :	$M_1$		$M_2$

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>▪ Useful when comparing large-scale groups of individuals (e.g., counties, countries, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Risk of sensitisation to study’s purpose if participants in tested regions are selected for both pre-test and post-test</li> <li>▪ Participants not randomly assigned to conditions – no guarantee groups are equivalent</li> <li>▪ May be difficult to implement for those without knowledge of statistical analysis (particularly regression analysis)</li> <li>▪ May be difficult to identify similar units against which to compare the test unit</li> </ul>

## Concluding Remarks

As indicated earlier, this paper is only a brief synopsis of experimental and quasi-experimental methods that can be utilised in terrorism studies. Indeed, there are other, more complex experimental designs (e.g., factorial designs) that could also be used. However, this policy brief is meant to introduce unfamiliar researchers and security professionals to experimentation and call upon terrorism experts give such methodologies greater consideration.

At present, there are several areas of lively research that might benefit from the use of experimental and quasi-experimental investigation. The possibilities are endless. As suggested by the examples given above, it is possible to evaluate the psychological impact of terrorist propaganda as well as the effects of messages intended to dissuade support for terrorist groups. Related to this, interested researchers and practitioners can investigate social and psychological outcomes associated with exposure to events that are thought to contribute to the development of terrorists (e.g., viewing the victimisation of one’s in-group). Of utmost importance is the need to evaluate intervention programs intended to turn individuals away from violent extremism; quasi-experimentation is uniquely suited to assist in these kinds of evaluations. A recent example of the utility for quasi-experimental methods in the evaluation of radicalisation intervention is a study performed by David Webber and his colleagues.<sup>15</sup>

<sup>15</sup> David Webber, Marina Chernikova, Arie W. Kruglanski, Michele J. Gelfand, Malkanthi Hettiarachchi, Rohan Gunaratna, Marc-Andre Lafreniere, and Jocelyn J. Belanger, “Deradicalizing Detained Terrorists,” *Political Psychology* 39, no. 3 (2018), 539-556.

First, however, it is necessary for those who seek to understand terrorism to know *how* to design an experimental study that provides data related to issues surrounding it. It is my hope that this modest introduction into experimentation primes terrorism experts of all types to join the empirical fray. By using some of the methods described here, it becomes possible to address questions that have long gone unanswered and develop better-informed policy intended to stem the threat of terrorism.

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## About the Author

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Kurt Braddock is an instructor in the Department of Communication Arts and Sciences and the Homeland Security Studies program at Penn State University. He studies the strategic communicative techniques that influence social behavior, particularly in illicit political groups. Although he is interested in how communication affects all kinds of behavior, his research specifically focuses on how communication used by terrorist groups contribute to radicalization, recruitment, and political violence. Dr. Braddock's work also informs practical approaches to counter-radicalization and counter-terrorism. He has authored articles in communication and security journals, and he has performed research for the U.S. Department of Homeland Security, the U.S. National Institute of Justice, and the U.S. Office of Naval Research. He also consults multiple government entities, including the U.S. Department of State, the U.S. Agency for International Development, and Congressional committees on homeland security.

# A Brief Primer on Experimental and Quasi-Experimental Methods in the Study of Terrorism

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