List of Exhibits

TSA 15-00014 - 011605

INTRODUCTION

The published literature on terrorism is extensive, yet full literature reviews on the topic are rare because the field is so broad. In their terrorism literature review, Lum, Kennedy, and Sherley (2003) used more than 17 library databases to identify 14,006 articles published between 1975 and 2002, less than half of which (6,041) were found in peer-reviewed journals. An examination of these by year revealed that a full 54% of the articles had been published in 2001 and 2002, illustrating the impact of 9/11 on this area of work. Moreover, the authors found that the vast majority of published work related to terrorism was not empirical. Ninety-six percent of this literature consisted of what are referred to as thought pieces: theoretical, philosophical, or opinion pieces that often focused on the political, socioeconomic, and psychological factors related to terrorism. The conclusions drawn in thought pieces may or may not include recommendations for decision makers. Of the remainder, 1% were case studies and 3% were classified as empirical works. Using a broad definition, these included any articles with any type of reporting or analysis of collected data. In fact, the dearth of empirical work in terrorism literature has also been noted by others (Brandon & Silke, 2007; Damphousse & Smith, 2004).

Despite the vast terrorism literature and variety of related topics covered, AIR's work focused on a specific goal: to identify, validate, and optimize indicators of suicide attack. For our purposes, we were interested in behavioral indicators of imminent suicide attack. We have termed these "pre-incident indicators," operationalizing them as "those observable behaviors or physical descriptions exhibited by an individual suicide attacker during the operational phase of an attack." This work was part of Project Hostile Intent (PHI; 2005-2011), funded by the Department of Homeland Security Science and Technology Directorate (DHS S&T) and the US Naval Research Laboratory (NRL).

As an initial step, AIR conducted a literature search on behavioral indicators of suicide attack in 2009. Then, in 2010, we analyzed these data and presented findings in the form of two reports. For the first report, AIR sorted the descriptions of attacker behavior (also referred to here as "the raw data") into conceptual categories that were purely behaviorally based and developed from the data themselves (Mullaney, Matheson, & Costigan, 2010). For the second, AIR sorted and analyzed these same raw data, mapping them to the suspicious indicators on the SPOT Referral Report (Mullaney, Matheson, & Costigan, 2009). The latter provided support for many of the SPOT items.

Following the 2009 and 2010 reports, the AIR team engaged in another effort to identify and operationalize indicators of suicide attack. We designed and conducted more than 50 interviews with subject matter experts (SMEs) and eyewitnesses to suicide attack in the United States and Israel. Results of these studies provided additional insights into the behavior of suicide attackers, such as the co-occurrence of particular behaviors and possible behavioral prototypes of suicide attackers. These findings, along with those from the original literature reviews, are relevant and greatly inform our current work.

1

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TSA 15-00014 - 011606

The current report is an update to the original literature reviews on indicators of suicide attack. This effort includes updated searches[1] as well as a reanalysis and recategorization of the raw data (that is, behavioral descriptions gathered during the 2009 search). The reanalysis reflects expertise that AIR staff have gained since early 2010, particularly from interviews with SMEs and eyewitnesses to suicide attacks. In addition, we consider recent efforts by the SPOT Program to document and refine indicator descriptions for inclusion in Behavior Detection Officer (BDO) training in our analysis and presentation of findings.

As such, the goals of the present effort are threefold:

1. Determine the current state of knowledge about observable indicators of suicide attackers just prior to detonation (pre-incident indicators).
2. Explore the extent to which indicators in the SPOT Referral Report[2] (Version 4.0; revised 23 February 2009) are associated with suicide attackers as reported in the existing literature.
3. Gather information to support concrete, operational definitions of identified pre-incident indicators and indicator-specific exemplars.

In this report, we describe the methods employed and the results, and discuss key findings.

METHODOLOGY

Although the general literature on suicide attackers is extensive, the goal of this review is to update information on pre-incident indicators of suicide attackers we presented in two earlier reports. Based on previous search efforts, we anticipated that it would be difficult to find material relevant to this topic, particularly in peer-reviewed academic journals. To ensure that our search yielded the full range of relevant and available open-source information, we followed the same search strategy used for the previous effort, including the same broad range of search terms, sources (e.g., academic, applied), and search engines. We restricted the time period to January 2010 through March 2013 to prevent any overlap with previous findings.

This section provides details of our search strategy along with decision rules used to guide the searches and ensure consistency. We also describe our data extraction and coding procedures.

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[1] Updated searches were conducted for material published from 2010 to 2013. As mentioned, the original versions of the literature review were submitted to the Government in 2010, and the raw data were gathered during 2009. [2] This document references the SPOT Referral Report (Version 4.0; revised 23 February 2009) unless otherwise noted. Prior to submission of this report, the SPOT Program began using a newer version of the instrument (Version 3.0; revised 09 April 2013). However, because operational data in this reanalysis span from 2010 through 2012, and therefore correspond to the previous version of the SPOT Referral Report, we reference the previous version (Version 4.0). Despite the recent revision, the content of the screening instrument (i.e., the suspicious indicators) for the (b)(sections of primary interest to this report remain largely unchanged.

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Last, we present the methodology used to conduct the reanalysis and recategorization of the data collected during the literature search.

Overview of Search Strategy

For the current literature review, we adopted the same search strategy and decision rules developed for the search conducted in 2009. These included an array of search terms, literature sources, and search engines to comprehensively cover the literature on pre-incident indicators of suicide attackers. To that end, we did the following:

- Conducted searches using broad terms related to pre-incident indicators and suicide attackers followed by searches with more specific terms, including those that focused on the indicators identified in the SPOT Referral Report.
- Accessed information from a variety of sources. Specifically, our search included both the academic literature and writings found in more applied settings, such as police training materials and public awareness campaigns, where familiarity with preincident indicators is essential to public safety, law enforcement, and personnel security.
- Conducted ancillary searches intended to target potentially relevant source material that may or may not have been identified through the other searches.

In addition to identifying new indicators published since the previous search, we have taken a second approach to this update. This approach follows on what we did for the first report (submitted in 2009), where we categorized the raw data without reference to SPOT. For this updated review, we conducted a reanalysis and recategorization of the previously identified data. The rationale for this approach is twofold. First, we apply knowledge gained from the previous literature reviews as well as the aforementioned interviews with SMEs and eyewitnesses to suicide attack in the United States and Israel. Results of these studies provided insights into the behavior of suicide attackers and informed our development of potential prototypes of attacker behavior. Applying these findings for the current work, we developed a framework to reanalyze the raw data using an a priori approach. Second, since the 2010 submission, subsequent changes in the BDO training model provide an opportunity for AIR to extract additional information from the raw data. This information can be a valuable addition to training content that will further SPOT Program standardization and inform BDO performance goals.

Search Engines and Sources

We used an array of online reference systems to conduct the updated literature review. As expected, relatively few articles and references to pre-incident indicators of suicide attackers were found in academic sources. The majority of hits were found through an open-source internet search using Google. Appendix A contains a complete list of the search engines and sources used for the literature review.

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Academic Sources

We used several well-established online reference systems to identify existing academic research on suicide attackers, including EBSCO, JSTOR, Lexis Nexis, and Google Scholar. These online reference systems were the same ones used for the previous literature review. The current literature review, however, restricted searches for these systems to the 2010 to March 2013 time period.

Applied Sources

The majority of relevant materials identified through the literature review came from internetbased Google searches. The following primary categories of material were identified through these searches:

- Articles (most from news sources)
- PowerPoint presentations (from government sources and other experts)
- Websites
- Blogs (often of news reporters or security experts)
- Brochures, manuals, handbooks, or training documents (from law enforcement, government, etc.)

Although internet searches provide access to incredible amounts of information, it is often not possible to evaluate the credibility of the sources due to a paucity of information about source owners (such as in the case of some blogs or websites) or authors (in the case of PowerPoint presentations and other training materials available on the internet). This inability to validate the authors' credentials and expertise is a limitation of the previous literature review. We attempted to address this limitation by reviewing each reference and making a general assessment of the author's credibility. Two researchers[2] independently analyzed each source and met, along with the Project Director, to reach a consensus on whether or not to retain each source. We determined a source to be credible if we were able to ascertain that the author had a background in terrorism research, security, law enforcement, journalism, or other credentials that appeared relevant to sharing information about suicide attackers. Another marker of credibility was if the information was contained in a published article or book; disseminated in a trade newsletter, guide, or training document; or published by a newspaper. Our goal was to retain as many references as possible and identify and eliminate those which were most likely to contain content of questionable quality (e.g., from some blogs, websites, and PowerPoint presentations). In the end, we eliminated 12 of 169 references, primarily from blogs and websites.

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[2] For this effort, a team of two researchers from AIR (one at the Ph.D. level and another at the B.A. level), both with expertise in conducting literature reviews and one with expertise in behavioral coding, reviewed the sources to assess credibility. They then met with the Project Director to reach consensus.

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This process was not repeated for the current literature review, as new (that is, unique) indicators were not identified in the literature.

Ancillary Search

In addition to the aforementioned searches, during our previous literature review we conducted a search for news stories pertaining to 32 actual suicide attack incidents using the news-based search engine, Nexis. Thirty-one of the incidents occurred in Israel and one occurred in China (see Appendix B for a list of suicide attack incidents included in the ancillary search). The goal of the search was to identify additional eyewitness or firsthand accounts of actual suicide attack incidents, because these types of accounts were not common in the academic and applied searches. However, this search was not intended to be comprehensive or representative. Such an effort would be outside the scope of this review.

We initially identified the incidents that formed the basis of this search by reviewing two suicide attack incident databases to which we had access as part of prior work for the US Department of Defense (DoD) and the Department of Homeland Security (DHS). The databases contained a brief description of suicide attack incidents, including date and location. We selected incidents for inclusion if the descriptions mentioned or implied the existence of a witness or witnesses. Please note that this ancillary search, which is outside the scope of the current review, was intended neither to comprehensively explore all, or even most, suicide attacks, nor to identify additional indicators beyond those found in lists, because such a claim would not be possible on the basis of one incident or a non-representative sample of them. Rather, it was conducted to determine whether indicators extracted from lists were similarly noted in incident accounts, and to identify possible candidates for new indicators that might be associated with innovation or other related shifts in attacker behavior. This incident search included the following steps:

- We searched the Nexis database for articles about the incident that were released up until a week after the event.
- The one-week search duration was extended for incidents when no relevant hits emerged. First, we extended the search to the end of the calendar year in which the incident occurred. If that still did not result in any hits, we searched for "all dates available."
- The incident search focused on three specific sources: *Jerusalem Post*, *BBC News*, and Associated Press. These sources were targeted because they are credible and tend to widely cover news related to suicide attacks.

We did not see any new data in these accounts that could be potentially associated with some innovation or shift in attacker behavior. However, we did identify a number of indicators in these incident reports that were also seen on lists and in other source materials.

5

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Search Terms

In 2009 as well as for the current effort, we began the search of academic, intelligence/military, and applied sources with broad search terms (e.g., suicide bomber). Although such broad searches tended to result in an unmanageable amount of literature (often thousands of hits), they allowed us to quickly access general literature on the topic. Typically, the first four or five pages of these searches included relevant information and, after that number of hits, the review of returns was terminated. Following the general searches, we employed slightly different search terms and strategies to review academic journals, intelligence and military journals, and applied sources (i.e., Google-based internet searches). This deviation in approach was in response to the amount and nature of information available in academic versus applied sources. For example, internet searches required more specific search terms because the results from the general searches were unmanageable. This section describes our approach to identifying and applying appropriate search terms for each of the searches. Appendix C contains a complete list of search terms used with the academic, intelligence/military, and applied sources.

Academic Journals

In an effort to uncover peer-reviewed literature pertaining to pre-incident indicators of suicide attackers, we began our current search with academic journals. The initial academic searches focused on a list of broad terms or phrases related to the topic. The following terms are representative of those used within the academic search engines: "suicide bomber," "bombers" and "suicide attack."

In 2010, we learned that many of these broad terms resulted in an excessive number of hits, and these hits tended to focus on overall analyses of terrorism or suicide attackers rather than on specific pre-incident indicators. Therefore, we narrowed the search by adding slightly more specific terms to help limit the search to the most pertinent information (e.g., changing the search terms from simply "suicide bomber" to "suicide bomber AND behavior"). These modified searches resulted in a searchable number of hits, although for the most part, they did not result in a substantial number of relevant finds. This proved to be the case in 2013 as well.

Intelligence and Military Journals

As with the academic journals, the search of intelligence and military journals that was done for the previous literature review began with broad search terms. These broad terms produced a manageable list of results; therefore, it was not necessary to narrow the search of these journals in any way. The three search terms used for these sources were "suicide bomber," "bombers," and "suicide attack."

Applied Sources

Owing to the sheer quantity of information available through Google, we recognized a need to conduct specific, targeted searches to manage the information load. Therefore, in addition to

TSA 15-00014 - 011611

using general search terms, we also searched with more specific search strings, such as "suicide bomber and facial characteristics," "suicide bomber and demeanor," "suicide bomber and mannerisms," and "suicide bomber and counterterrorism." Further, we conducted targeted searches for the indicators listed in the SPOT Referral Report, which are designed to assess stress, fear, and deception. We focused on Section 2 indicators because they represent indicators that are observable when an individual is approaching a checkpoint or screening area. The targeted searches were critical to support the goals of (1) documenting whether, and to what extent, the SPOT indicators are identified in the literature associated with suicide attackers and (2) gathering information to support operational definitions of these indicators.

Search Decision Rules

For the current searches, we applied a variety of decision rules to manage the search and ensure consistency with what was done previously. Specifically, we did the following:

- Terminated a search of a particular keyword and variations after 1/2 hour if we obtained no hits.
- Terminated a productive search (i.e., one that included relevant hits) after reviewing five pages of results that included nothing relevant. Search results are sorted by relevance and this cut off corresponded with a marked decrease in the usefulness of hits.
- Initiated searches with general search terms and added specificity to the searches when warranted (i.e., if the general search included an unmanageable number of hits).

Data Extraction

Data extracted from the literature consisted of any behavior or appearance indicators that would be observable during the operational phase of a suicide attack or in the period of time just prior to detonation. In the present analysis, as with AIR's previous work in this area, these have been termed "pre-incident indicators" and operationalized as "those observable behaviors or physical descriptions exhibited by an individual suicide attacker during the operational phase of an attack."

We also included a few sources that describe pre-incident indicators with a longer lead time, which could be considered part of the planning or surveillance phase. These were included whenever it was thought that one or more of these indicators could be useful to security personnel because such indicators are likely to be observable at or near security checkpoints and personnel.[3] Other related indicators that fall outside this observable window of time/location, and

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[3] With respect to SPOT categorization, there is also some overlap with Section 6, Possible Surveillance Activity, on the current SPOT Referral Report (Version 3.0; revised 09 April 2013). For a more in-depth discussion, see *Relevant Information Outside of the Scope of the Current Review* section below.

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therefore are not included in the present review, are indicators centered on recruitment, selection, training, operational planning, and other pre-operation activities such as religious or ritualistic actions undertaken by the terrorist him/herself. Excluded were those appearance descriptions that would be considered demographic attributes of an individual or group of individuals (e.g., ethnicity, gender, age).

The process involved extracting the indicator information from each source and placing it into a master spreadsheet for further examination and analysis. Each separate word or phrase reflecting an indicator was placed on a different line in the spreadsheet. These extractions are designated "raw data" or "line items." In addition to the verbatim text in each line item, the spreadsheet documented whether the information came from an actual suicide attack incident or from lists or other non-incident information about suicide attackers.

Data Coding

Raw data were coded in two ways for the purpose of this review: with reference to SPOT and independent of SPOT. For the former, the research team used the suspicious indicators from the SPOT Referral Report (again, Version 4.0; revised 23 February 2009) as coding categories, onto which line items were mapped. Second, we also sorted the same line items into conceptual groups, developing our own coding categories based on the descriptive information found in the raw data and our knowledge of the behavior of suicide attackers, gained since 2010. These two approaches are explained below.

SPOT Categorization[4]

The SPOT-specific categorization of the raw data was conducted in 2009. As mentioned above, this categorization was not redone in 2013 because the search did not yield new unique indicators. As part of the previous effort, two researchers worked in a spreadsheet that included the raw data and columns for assigning codes to each line item. Here, they assigned codes to each piece of raw data, marking it as either reflecting suspicious indicators on the SPOT Referral Report (including items on the Possible Suicide Bomber Indicator list) or other as not contained on the SPOT Referral Report. Eighty different coding categories were used to sort the data from the literature review. Each coding category was represented by a numerical identifier or "code." Coding was conducted jointly by two researchers who applied a set of decision rules to guide them and reached a consensus before assigning a code to each line item. Some line items received multiple codes, either because the extracted text contained two separate behaviors or because it reflected multiple coding categories. Therefore, the total number of codes assigned to the raw data exceeds the total number of line items of raw data extracted from the literature. The

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[4] As mentioned previously, this report references the SPOT Referral Report (Version 4.0; revised 23 February 2009) unless otherwise noted. Prior to submission of this report, the SPOT Program began using a revised instrument (Version 3.0; revised 09 April 2013). However, because operational data included in this reanalysis spans 20102012 and therefore corresponds to the previous version of the SPOT Referral Report, we reference Version 4.0.

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TSA 15-00014 - 011613

resulting spreadsheet was used to generate the results provided in the next section. See Appendix D for a detailed description of data coding procedures and decision rules for the SPOT categorization; Appendix E for a list of SPOT coding categories; and Appendix G for raw data with associated SPOT categories.

Updated Analyses and Recategorization of Data Independent of SPOT

As mentioned, part of the updated review was a recategorization of the raw data gathered for the previous literature review. For the current effort, a team of two researchers with expertise in suicide attacker behaviors (13 years and 5 years), both of whom were involved in the prior literature review, carried out this reanalysis. First, the researchers discussed and refined the conceptual framework to be used for categorizing the data. They conducted an initial review of the raw data, previously organized into 92 conceptual categories, or "indicators," and sorted those 92 indicators by framework component, classifying them as evidence of the presence of an explosive, the suicide attacker's operational tradecraft (that is, his/her plan or mission), or his/her reaction to conducting the attack. Once separated into the three components, they independently examined the raw data or "line items" as categorized during the previous review, taking notes on any categories that might be split or combined and/or any line items that should be moved. The team proceeded together and used a convergence approach for the following steps:

- **Splitting categories.** We determined whether or not all line items listed under a specific category label represented a single, unitary construct. In instances where this did occur, we left the line items as a single grouping (b)(3):49 U.S.C. § 114(r) Elsewhere, we split the category and reassigned its line items accordingly so that ultimately each grouping, regardless of the number of line items it comprised, represented a unitary construct.

- **Combining categories.** We combined the raw data under multiple category labels when, upon reexamination, we determined that the behavioral descriptions pertained to a single construct.

- **Rewording category labels.** In all instances, we also considered the wording of category labels. We changed the majority of label names, making these more concise. Extraneous words such as "appears" or "seems" were eliminated, as were examples or other elaboration on the core concept expressed.[5] The revised label names are not intended to be comprehensive but are instead meant to serve as memory cues for BDOs. (In the original effort that yielded 92 categories, descriptive information was included in the

(b)(3):49 U.S.C. § 114(r)

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TSA 15-00014 - 011614

labels. This approach was more consistent with the approach to the labeling of the suspicious indicators on the SPOT Referral Report, where the label necessarily had to convey more detailed information.)

- **Deleting duplicate items.** We deleted duplicate line items left in as part of the previous content analysis. This was done to preserve the original data because the research team was unsure as to the significance of the reoccurrence of such exact wording duplicates found across multiple sources (e.g., (b)(3):49 U.S.C. § 114(r) was captured several times). Because we came to believe that the repetition of particular behaviors did not reflect that it occurred more often among bombers and was more likely an artifact of the dissemination and re-dissemination of the same lists among members of law enforcement and other operational settings, such duplicates were not worth preserving. However, we deleted only exact wording duplicates, not semantic duplicates, because it would require too much of a judgment call and would result in no value added for the time spent. As with exact duplicates, the apparent number of semantic duplicates is not seen as indicative of the importance of or frequency of a given indicator.

RESULTS

Our literature search resulted in the identification of 157 documents pertaining to the preincident indicators of suicide attackers. These documents contained a total of 1,218 line items, or separate pieces of data, extracted from the literature.[6] The vast majority of information was found through Google searches and included lists of similar (or identical) indicators. Further, many of the sources included training materials, trade media, and security consultation materials that appeared to be driven by the urgent need of security, law enforcement, and first responder personnel for methods to identify potential suicide attackers. The academic literature focused primarily on psychological, sociological and motivational factors relating to suicide attackers. Most tended to be broad, analytic reports of terrorism or suicide attackers or brief reports that a suicide attack has occurred, but no eyewitness accounts or descriptions of indicators.

These data have been organized and analyzed in two ways, both of which are presented here. First, under *Results: Examining Indicators with Reference to SPOT*, we present results as they relate to the suspicious indicators from the SPOT Referral Report. Second, under *Results: Examining Indicators Independent of SPOT*, we present results from the analysis and recategorization of raw data, with label names developed from the behavioral descriptions in the data and independent of SPOT.
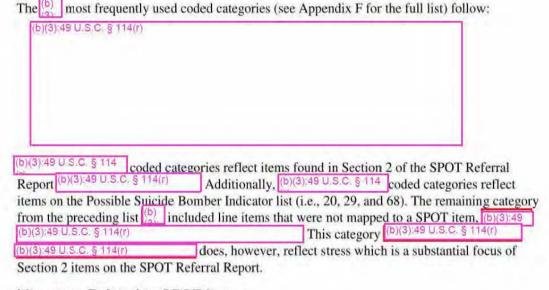
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[6] Our search of the literature in 2013 did not yield any new or unique suicide bomber indicators. We therefore did not make any changes (i.e., additions or deletions) to the raw data gathered and analyzed for the 2009 and 2010 reports.

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TSA 15-00014 - 011615

Results: Examining Indicators with Reference to SPOT

The literature search yielded a total of 1,218 line items. These line items were mapped to the suspicious indicators on the SPOT Referral Report (29 of these were uncodable and therefore not used in subsequent analyses). A total of 1,491 codes were assigned to these line items, and they were assigned to 80 categories. Throughout this report and its appendices, suspicious indicators from the SPOT Referral Report are listed with a corresponding numerical code. These codes were used as unique identifiers for these indicators throughout the analysis. We have included them in the report to help the reader move between text and exhibits in the body of the report and in the appendices.

The (b)(3) most frequently used coded categories (see Appendix F for the full list) follow:

(b)(3):49 U.S.C. § 114(r)

(b)(3):49 U.S.C. § 114 coded categories reflect items found in Section 2 of the SPOT Referral Report (b)(3):49 U.S.C. § 114(r) Additionally, (b)(3):49 U.S.C. § 114 coded categories reflect items on the Possible Suicide Bomber Indicator list (i.e., 20, 29, and 68). The remaining category from the preceding list (b)(3) included line items that were not mapped to a SPOT item, (b)(3):49 (b)(3):49 U.S.C. § 114(r) This category (b)(3):49 U.S.C. § 114(r) (b)(3):49 U.S.C. § 114(r) does, however, reflect stress which is a substantial focus of Section 2 items on the SPOT Referral Report.

Literature Related to SPOT Items

An explicit goal of the updated literature review was to ascertain the extent to which the items listed in Section 2 of the SPOT Referral Report, which are designed to assess stress, fear, and deception, are associated with indicators of suicide attackers as reported in the existing literature. The SPOT Referral Report was designed specifically to assist in the identification of suspicious persons within an airport setting. In contrast, our literature review focused on suicide attacker pre-incident indicators across the full range of possible targets and venues. Therefore, finding evidence of the SPOT items in the broader-focused literature not only would provide additional verification of these indicators but may also suggest that specific SPOT indicators may be generalizable across a variety of suicide attack situations versus those situations specific to airport security.

TSA 15-00014 - 011616

We supported this analysis by conducting targeted searches for each item listed in Section 2 of the SPOT Referral Report. The focus on Section 2 items (which are observed as an individual approaches a checkpoint or screening area) reflects the goal of identifying pre-incident indicators of suicide attackers. Appendix G presents all of the raw data organized under their associated items from the SPOT Referral Report.

Findings for the SPOT Analysis: Section 2

The existing literature on pre-incident indicators includes indicators associated with each of the overarching SPOT factors located in Section 2 of the SPOT Referral Report—Stress, Fear, and Deception. Specifically, we extracted 747 line items from the literature that were associated with Section 2 items. A total of 831 codes were assigned to these line items.

Exhibit 1 contains information regarding the line items identified in the literature that were mapped to SPOT Section 2 items, namely, the SPOT Section 2 coding categories and the number and percentage of coded items associated with each category.

Exhibit 1: Frequency and Percentage of Coded Line Items Associated with SPOT Section 2 Category Codes

Code	SPOT Section 2 Coding Categories	Coded Line Item Count	Percent of Coded Line Items within Section 2 (n=831)	Percent of total (n=1491)
(b)(3):49 U.S.C. § 114(r)				

1

TSA 15-00014 - 011617
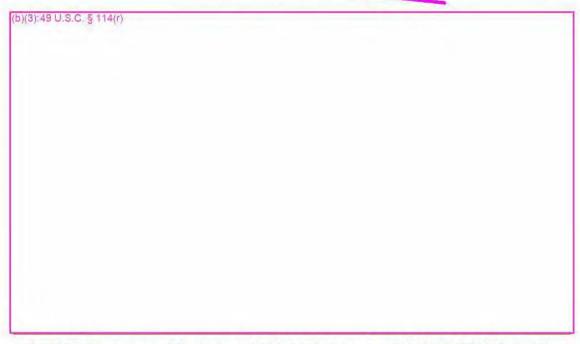
(b)(3):49 U.S.C. § 114(r)

Exhibit 1: Frequency and Percentage of Coded Line Items Associated with SPOT Section 2 Category Codes (Continued)

Code	SPOT Section 2 Coding Categories	Coded Line Item Count	Percent of Coded Line Items within Section 2 (n=831)	Percent of total (n=1491)

(b)(3):49 U.S.C. § 114(r)

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TSA 15-00014 - 011618

(b)(3):49 U.S.C. § 114(r)

In the course of the literature review, we identified (b)(3):49 line item that mapped to each SPOT Section 2 item, with the exception of (b)(3) SPOT items:

(b)(3):49 U.S.C. § 114(r)

(b)(3):49 U.S.C. § 1 percent of all codes assigned to line items extracted from the literature were associated with Section 2 items. Of the 831 coded line items associated with Section 2 items, (b) or more related to the following (b)(3):4 items, making them the most frequently mapped Section 2 items:

(b)(3):49 U.S.C. § 114(r)

Additional Section 2 items with which a substantial number of coded line items were associated (ranging from (b)(3):49 U.S.C. § 114(r) of coded line items associated with Section 2 items) follow:

(b)(3):49 U.S.C. § 114(r)

Special Note about Literature on (b)(3):49 U.S.C. § 114(r)

The search for literature on (b)(3):49 U.S.C. § 114(r) (category 29; located in Section 2 of the SPOT Referral Report and on the Possible Suicide Bomber Indicator list [henceforth referred to

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TSA 15-00014 - 011619

as the SB indicative behaviors]) continued to present a special challenge both during the original literature review and during the update. This was mainly due to the overwhelming number of relevant hits. During the original review, we modified our search strategy when conducting this search. Specifically, we completed the first 10 pages (i.e., 100 hits) of the results (which were ordered by relevance so the most recent and relevant, terms of number of times the keyword appears, were displayed toward the beginning). This strategy gave us an idea of recent trends in (b)(3):49 U.S.C. § 114(r) , although the results are not comprehensive. A similar approach was taken for the update, which provided some examples of (b)(3):49 U.S.C. § 1 being referenced in the literature.

The most frequently cited (b)(3):49 U.S.C. § 114(r)
(b)(3):49 U.S.C. § 114(r)   The articles pulled for this (b)(3):49 U.S.C. § 114(r
(b)(3):49 U.S.C. § 114(r)
(b)(3):49 U.S.C. § 114(r)   Reports were found regarding female suicide attackers (b)(3):49
(b)(3):49 U.S.C. § 114(r)
(b)(3):49 U.S.C. § 114(r)   . Finally, there
are references to (b)(3):49 U.S.C. § 114(r)
(b)(3):49 U.S.C. § 114(r)

(b)(3):49 U.S.C § 114(r) The majority of the hits received for the search were accounts of incidents that had taken place or, occasionally, incidents that were thwarted.

Comparison of Literature Referencing SPOT Indicators Mapped to Section 2 Items and the SPOT Incident Database (2006-2012)

To more fully explore the literature review findings, we compared of the indicators extracted during the literature search with the 2012 Operational SPOT Referrals database. The data set used for this comparison was provided by the SPOT Program and contained 333,270 cases (each incident report counted as a case). Data through 2010 have been previously analyzed and reported on by AIR (Costigan, Makonnen, Taylor, Sawyer, Myers, & Toplitz, 2011).

As described previously, the SPOT Program is intended to identify "high risk" passengers, or persons knowingly and intentionally trying to defeat the security process. BDOs aim to identify such passengers through use of the SPOT Referral Report. The SPOT Referral Report contains a set of indicators—non-verbal, verbal, and physiological—that is thought to be associated with fear of discovery and therefore exhibited with greater frequency among high-risk travelers. Such passengers may include individuals who were planning, intending, or carrying out a suicide attack; however, many other classes of high-risk passengers are identified and closely screened. These include persons who are carrying prohibited items, have false documentations, or are under investigation or involved in criminal activity. Regardless, these data provide an interesting point of comparison. The findings of this exploration revealed the following:
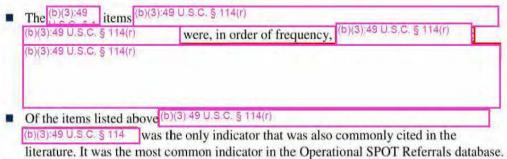
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- The [(b)(3):49 U.S.C. § 1...] items [(b)(3):49 U.S.C. § 114(r)] [(b)(3):49 U.S.C. § 114(r)] were, in order of frequency, [(b)(3):49 U.S.C. § 114(r)]
  [(b)(3):49 U.S.C. § 114(r)]

- Of the items listed above [(b)(3):49 U.S.C. § 114(r)] [(b)(3):49 U.S.C. § 114] was the only indicator that was also commonly cited in the literature. It was the most common indicator in the Operational SPOT Referrals database.
- Several of the most uncommonly used items from the Operational SPOT Referrals database were also uncommon in the literature review results. [(b)] ... that stand out[7]:
  [(b)(3):49 U.S.C. § 114(r)]
  [(b)(3):49 U.S.C. § 114(r)] This finding does not suggest that these items are not important; however, the consistency between literature review findings and the use of SPOT items in operational incidents is noteworthy.

There may be numerous reasons for the differences between the literature findings and the 2012 Operational SPOT Referrals database, the most obvious of which is the fact that the database represents a very specific, narrowly defined population (i.e., US air-traveling pubic) and the literature findings represent writing and information about the broader population of suicide attackers world-wide.

Findings for the SPOT Analysis: Section 4

Although we did not conduct a targeted search for the items in Section 4 of the SPOT Referral Report, relevant indicators emerged through the more general searches conducted for this review. Specifically, we extracted 212 line items from the literature that were associated with Section 4 items. A total of 240 codes were assigned to these line items.

Exhibit 2 contains information regarding the line items identified in the literature that were mapped to SPOT Section 4 items, namely, the SPOT Section 4 coding categories and the number and percentage of coded items associated with each category.

Exhibit 2: Frequency and Percentage of Coded Line Items Associated with SPOT Section 4 Coding Categories

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[7] We selected these SPOT items because they were uncommon in both the 2012 Operational SPOT Referrals database and the literature review. More specifically, each equated to [(b)(3):49] of the entries in the operational database, and none of these were found in the literature more than twice.

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Code	SPOT Section 4 Coding Categories	Coded Line Item Count	Percent of Indicators within Section 4 (n=240)	Percent of total (n=1491)
(b)(3):49 U.S.C. § 114(r)				

The literature contained at least one line item associated with (b)(3):49 U.S.C. § 114(r) items.
No line items were found for (b) .

(b)(3):49 U.S.C. § 114(r)

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(b)(3):49 U.S.C. § 114(r)

(b)(3):49 U.S.C. § 114(r) of all codes assigned to line items extracted from the literature were associated with Section 4 items. Of the 240 coded line items associated with Section 2 items, approximately (b) or more related to the following four Section 4 items (making them the most frequently mapped Section 4 items):

(b)(3):49 U.S.C. § 114(r)

Findings for the SPOT Analysis: Possible Suicide Bomber Indicators

BDOs apply indicators from the SPOT Referral Report to identify individuals for additional screening. There is also a class of indicators that results in an automatic LEO notification; one type is the SB indicative behaviors).[8] This section provides information on the indicators identified in the literature that were mapped to the (b) SB indicative behaviors.

We extracted 596 line items from the literature that were associated with the SB indicative behaviors. A total of 653 codes were assigned to these line items.

Exhibit 3 contains information regarding the line items identified in the literature that were mapped to the SB indicative behaviors, namely, coding categories and the number and percentage of coded items associated with each category.

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[8] For the original literature reviews, we obtained the list of SB indicative behaviors from the SPOT Standard Operating Procedure (SOP), 23 February 2009, (b)(3):49 U.S.C. § 114(r) that were mentioned in BDO training, 04-06 February 2009. As noted, this document generally references Version 4.0 of the SPOT Referral Report (revised 23 February 2009) because AIR's reanalysis of operational data (through 2012) corresponds to this version. However, prior to submission of this report, the SPOT Program began using a newer version of the instrument (Version 3.0; revised 09 April 2013) in which the SB indicative behaviors are listed out in their own section: Section 5 (Possible Suicide Bomber Indicators). Most of the SB indicative behaviors remain the same, although the few changes should be considered: (b)(3):49 U.S.C. § 114(r)

(b)(3):49 U.S.C. § 114(r)

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Exhibit 3: Frequency and Percentage of Coded Line Items Associated with Coding Categories for Suicide Bomber Indicators

Code	Coding Categories for Suicide Bomber Indicative Cluster Behaviors	Coded Line Item Count	Percent of Coded Line Items within SB (n=653)	Percent of total (n=1491)
(b)(3);49 U.S.C. § 114(r)				

The literature contained indicators associated with all Possible Suicide Bomber Indicators. The least common SB indicative behavior was (b)(3);49 U.S.C. § 114(r) (25). Of the 1491 coded references to an indicator, only 4 were mapped to this category.

(b)(3);49 U.S.C. § 114(r) of all codes assigned to line items extracted from the literature were associated with SB indicative behaviors. Of the 653 coded line items associated with the SB indicative behaviors, (b)(3);49 related to the following (b)(3);49 tems, making them the most frequently mapped SB indicative behaviors in this section:

(b)(3);49 U.S.C. § 114(r)

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(b)(3):49 U.S.C. § 114(r)

Findings for Additional Indicators (Not Mapped to SPOT Referral Report)

Many of the indicators identified in the literature mapped directly to a SPOT item (i.e., in Section 2 or Section 4 of the SPOT Referral Report or the list of SB indicative behaviors). However, we extracted 223 line items (of the 1,218 total) from the literature that were not directly mapped to a SPOT item but, rather, were mapped to 15 non-SPOT coding categories. As a result of coding some of the line items to several non-SPOT coding categories, a total of 251 codes were associated with the non-SPOT coding categories. (b)(3):49 U.S.C. § 114(r)

(b)(3):49 U.S.C. § 114(r)

(b) may in fact relate to SPOT categories, although their associated line items were not coded as such because the wording was too vague or ill-defined or was not a close enough match to the SPOT wording.

Exhibit 4 contains information regarding the line items identified in the literature that were mapped only to non-SPOT coding categories, namely, the coding categories and the number and percentage of coded items associated with each category.

Exhibit 4: Frequency and Percentage of Coded Line Items Associated Only with NonSPOT Coding Categories

Code	Non-SPOT Coding Categories	Coded Line Item Count	Percent of Coded Line Items for Non-SPOT Categories (n=251)	Percent of total (n=1491)
(b)(3):49 U.S.C. § 114(r)				

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(b)(3):49 U.S.C. § 114(r)

Of the 251 coded line items associated with non-SPOT categories, (b)(3):49 U.S.C. § 114(r) were coded into each of the following (b)(3):4 categories (making them the most frequently mapped categories in this section):

(b)(3):49 U.S.C. § 114(r)

Relevant Information Outside of the Scope of the Current Review

In the course of data collection, some indicators were identified that were not included because the discovery of such indicators often occurs outside the time frame or setting of the attack (i.e., during post-incident forensic investigations or searches of suspected militants' person or living quarters). In transportation settings, particularly airport settings, some of these could be discovered outside the immediate screening area (i.e., other parts of the airport), while others include unusual items that would be found upon further passenger screening (SPOT Referral Report, Section 3). Below we list indicators additionally found during this review because they offer further validation of the SPOT Standard Operating Procedures (SOP).

(b)(3):49 U.S.C. § 114(r)

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(b)(3):49 U.S.C. § 114(r)

Results: Examining Indicators Independent of SPOT

The previous reports were the first tasks in AIR's comprehensive multi-study effort to validate and optimize observable indicators of impending suicide attack. The first version of the literature review involved used the raw data to develop category labels, independent of SPOT. This functioned as a baseline data set in which content analytic procedures were employed in a purely data-driven manner. The resulting identification of 92 indicators revealed a number of behaviors also found on the SPOT Referral Report. In addition, SMEs and eyewitnesses to suicide attacks also mentioned many of these behaviors during AIR's subsequent interview studies, designed and conducted in the United States and Israel. In this section, we explain how findings from these efforts inform our approach to reanalysis of the literature review data as well as how the recategorization may be useful to SPOT Program standardization and inform BDO performance goals.

As we discovered during the 2009 literature search, indicators found in operational training materials are often presented as lists, of varying lengths, and with varying degrees of overlap, across multiple sources. Such lists of indicators were, at some point, obtained from post-blast eyewitness interviews. Unfortunately, the origins of the indicators and attacks from which they were identified, are often not cited and are difficult to trace. The result is that it cannot be determined whether indicators found in a given list actually co-occurred in the same incident, making the lists themselves unreliable sources of indicator co-occurrences and therefore unreliable sources from which to extract behavioral profile information. (b)(3):49 U.S.C. § 114(r)

(b)(3):49 U.S.C. § 114(r)

It was only in follow-on data collections, after the submission of the previous reports, that such contradictions could begin to be resolved. Following the initial literature reviews, the AIR team designed and conducted more than 50 interviews with SMEs and eyewitnesses to suicide attack in the United States and Israel. Results of those studies provided additional insights into the cooccurrence of behaviors, revealing the possibility of two primary behavioral profiles:

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(b)(3):49 U.S.C. § 114(r)

(b)(3):49 U.S.C. § 114(r)

What distinguishes the criminal from the suicide bomber? It is certainly the possession of a bomb and the knowledge of certain death given a successful operation. (b)(3):49 U.S.C. § 114(r)

(b)(3):49 U.S.C. § 114(r)

Based on this reasoning, we developed a conceptual framework of suicide attacker indicators (Exhibit 5) to guide our reanalysis of the raw data. This framework allowed the sorting of the line items, as well as, the final indicators, (b)(3):49 U.S.C. § 114(r)

(b)(3):49 U.S.C. § 114(r)

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(b)(3):49 U.S.C. § 114(r)

Exhibit 5: Framework Components

Framework Components

(b)(3):49 U.S.C. § 114(r)

This reanalysis of the data resulted in a reduction of indicators from 92 to 80. (See Appendix H for a list of the old and new category labels [reduced from 92 to 80], its respective line items, and their corresponding framework component and subcomponent.) Each indicator was given a short label and where this reflects a revision of its previous label, that previous label is included in the column to the right. Similarly, where two previous categories were combined, both of their previous labels appear in the column to the right of the new label. These prior label wordings offer good detail that can be used in a coding manual or other training materials (see Appendix I for the list of 80 new category labels and additional details for training). Similarly, regardless of whether or not an indicator was renamed with a shorter label, any time the line items in a grouping provided any additional information or data, that information was extracted and provided in the next column to the right. For example, (b)(3):49 U.S.C. § 114(r)

(b)(3):49 U.S.C. § 114(r)

Using our conceptual framework shown in Exhibit 6, (b)(3):49 U.S.C. § 114(r)

(b)(3):49 U.S.C. § 114(r)

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(b)(3):49 U.S.C. § 114(r)

Exhibit 6: Indicators Fit to Conceptual Framework

(b)(3):49 U.S.C. § 114(r)

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(b)(3):49 U.S.C. § 114(r)

DISCUSSION

This section further explores some of the key literature review findings as well as challenges associated with the currently available, open-source literature on pre-incident indicators of suicide attack. Specifically, this section discusses selected findings related to examining the indicators with reference to SPOT, indicators independent of SPOT, and potential limitations of the current literature on pre-incident indicators.

Selected Findings Related to the SPOT Items

Most of the SPOT items were associated with at least one pre-incident suicide attack indicator identified in the literature. In fact, (b)(3) of the coded line items extracted from the literature were associated with Section 2 items, (b) were associated with Section 4 items, and (b) were associated with suicide bombing indicative behaviors. Further, (b)(3):49 U.S.C. § 114 SPOT Section 2 items were supported by line items that mapped to them. This overlap between the SPOT items and the data identified in the literature (i.e., line items) lends strong support to the content validity of the SPOT Program and highlights the value of many of the SPOT items as potential identifiers of suicide attackers. Moreover, these findings provide support for grounding the SPOT items in research and best practices at the time of their development circa 2004 (C. Maccario, personal communication, 08 May 2013).

To more fully explore the literature review findings, we compared these results with the 2012 Operational SPOT Referral database. The most frequently cited indicator identified in the Operational SPOT Referral database (i.e., (b)(3):49 U.S.C. § 114(r)) was relatively common in the literature as well. However, none of the most common indicators identified in the literature (e.g., (b)(3):49 U.S.C. § 114(r)) was among the most frequently cited items in the database. One explanation for this lack of convergence is the very specific setting of

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a US-based TSA checkpoint. Indicators described in the literature reflect behaviors and descriptions associated with suicide attackers in a variety of locations, situations and settings worldwide. Several of the most uncommon indicators from the SPOT incident database were also uncommon in the literature. The (b) that stand out in this regard are (b)(3):49 U.S.C. § (b)(3):49 U.S.C. § 114(r) (b)(3):49 U.S.C. § 114(r) A possible reason that (b)(3):49 U.S.C. § 114(r) are rarely documented in either venue is that they are not easily observed.

Although many of the SPOT Referral Report items were evident in the suicide attacker literature, (b) of the items were not identified in this literature review. There are many possible explanations for this lack of coverage. It is possible that these indicators were not identified because they do not reflect current thinking with regard to pre-incident indicators or that these items are indicators that are important but very rarely observed. Another possible explanation is that becau these indicators are specific to airport or transportation screening situations and very few incidents have occurred in this arena, there have not been opportunities to observe and document these indicators. Similarly, because the wording of some of the SPOT items is so specific to airport settings (b)(3):49 U.S.C. § 114(r) it is possible that as interested parties (e.g., law enforcement, first responders) adapted lists of indicators for use in manuals and trainings, these items were not frequently included in these products. Still another explanation is that the information associated with these indicators is highly sensitive and, therefore, is not available through an unclassified literature search. Although is not possible to draw a definitive conclusion about these negative findings, continued research in this topic area is warranted. For example, it is possible that indicators that did not map to any of the SPOT items could indeed be important. Conversely, indicators that did map to SPOT items may not be relevant with respect to identifying high-risk passengers or, more specifically, suicide attackers, after all. During AIR's continued indicator optimization work, we will present these findings to experts and examine such possibilities.

Approximately (b)(3):4 of the codes associated with line items extracted from the literature were related to non-SPOT categories (i.e., they did not map to a particular item on the SPOT Referral Report). A closer examination of these data reveals some potentially important overlap between the line items coded into non-SPOT categories and the SPOT Referral Report items. The data in question fall into three categories: (1) line items that were not written in behavioral terms, but as more abstract concepts that nevertheless relate to constructs underlying one or more SPOT items; (2) line items that were written more generally and that have a SPOT counterpart that is more narrowly defined for airport settings, thus making a confident mapping difficult; and (3) line items that collectively could fall under a single SPOT item but would require a less strict decision rule than we used.

In the first of these cases, many sources commented that suicide attackers exhibit signs of nervousness or fear, or in some unspecified way, behave suspiciously. Such line items were

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coded into two categories corresponding to (b)(3):49 U.S.C. § 114(r) (b)(3):49 U.S.C. § 114(r) Had authors described these line items in behavioral terms, it is expected that many of them would have readily mapped to specific items within the Stress, Fear, or Deception Factors of the SPOT Referral Report (Section 2), items that collectively describe the common behavioral manifestations of these constructs.

Other non-SPOT coding categories were created because the line items as written, while observable, were not specific enough to warrant a SPOT coding category rating. If the authors of the source documents had provided more complete, observable descriptions in these line items, it is likely they would have readily mapped to one or more SPOT Referral Report items. (b)(3)

(b)(3):49 U.S.C. § 114(r)

The third set of line items that did not map to SPOT called for specific categories to be created.

(b)(3):49 U.S.C. § 114(r)

As noted, the overlap between the raw data from the literature review and the items on the SPOT Referral Report lends strong support to the content validity of the SPOT Program and demonstrates the value of many SPOT items as potential identifiers of suicide attackers. These findings also provide support for the best practices and research-base from which the suspicious indicators were initially developed. With its ongoing indicator optimization work, AIR will continue to examine all relevant data and elicit input from experts to inform recommendations on refinement of the indicator set.

Selected Findings Independent of SPOT

As reported in the *Results* section, the updated analysis grouped the raw data with respect to

(b)(3):49 U.S.C. § 114(r)

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(b)(3):49 U.S.C. §	. Here, we discuss how expertise gained during work conducted after the 2010 literature review informed our approach to the reanalysis of these raw data.

The additional experience gained by AIR staff from the indicators study, particularly the interviews of SMEs and eyewitnesses, enabled us not only to make decisions about splitting or combining indicators, but also to place indicators within the framework. For example, (b)(3):49 U

(b)(3):49 U.S.C. § 114(r)

(b)(3):49 U.S.C. § 114(r) . All related specifics were extracted and preserved in both the previous labels and details provided. The decision to combine these two came from our interviews with SMEs who described and demonstrated this set of behaviors. For example, (b)(3):49 U.S.C. § 114(r)

(b)(3):49 U.S.C. § 114(r)

Subject matter experts in terrorism and suicide attack (b)(3):49 U.S.C. § 114(r)

(b)(3):49 U.S.C. § 114(r)

Additional information provided by SMEs allowed us to better understand the range of reactions attackers have. (b)(3):49 U.S.C. § 114(r)

(b)(3):49 U.S.C. § 114(r)

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(b)(3):49 U.S.C. § 114(r)

Limitations

The following limitations were discussed in the previous literature review. However, they warrant inclusion, and in some cases, expansion, as part of the current review.

Reliance on Lists

Many of the pre-incident indicators identified in our searches were found in articles from applied settings rather than from publications in peer-reviewed journals. Further, many of the applied publications contained similar lists of pre-incident indicators. On the one hand, it is encouraging to note the apparent convergence across lists of the specific indicators identified. On the other hand, although convergence of expert opinion is an accepted method for determining the validity of a measure, the similarity across these sources should be viewed with caution because it is difficult to determine the extent to which these lists were independently derived. Without this information, it is not possible to gather corroborating information about the credibility of the listed indicators as markers of suicide attackers.

In the current literature review, very few of the articles mentioned the source underlying the indicator lists. However, those that did mention a source typically referenced one of the following two influential works in this area:

- *Training Keys, #581: Suicide (Homicide Bombers)* (training materials published by the International Association of Chiefs of Police for use by law enforcement agencies)
- *Only Together Will We Stop the Terror* (a brochure created for the Israeli public to assist them in identifying potential terrorists)

Both of these source materials provide guidance about the potential behaviors and physical characteristics of suicide attackers. It is possible that many of the references that do not provide an underlying source for the listed indicators derived their information from the same master sources (perhaps those listed above, although it is not possible to determine). It is also possible that one or more lists were developed by SMEs, whose documentation of these indicators was, at some previous time, classified information but has since been de-classified. This raises the question of what additional information, or validating information, may be found in classified sources.

Regardless of this potential limitation, the fact that the same list or subset of indicators emerged across multiple sources is an important indication of the value placed on this information and its potential for influence. The indicators were cited in a range of publications designed to guide or

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influence others (e.g., law enforcement personnel, the public, other audiences) in the identification of suicide attackers.

Lack of Information on Methods for Obtaining Indicators

In addition to this need to determine the original sources of information, it is important to verify the method used to obtain the indicators on each list. It would be surprising if such data were not collected in a scientifically rigorous manner given the relative scarcity of publications on the topic that rely on any data at all, including data collected from experimental laboratory or applied settings. If in fact they came from interviews of witnesses to suicide attacks or from security camera video tapes of attackers, like any data, they should be collected in a standardized, systematic way to minimize bias that could threaten the validity of the resulting list.

Subject matter experts in suicide terrorism who do not also have training in scientifically rigorous data collection methods may unwittingly miss indicators of interest or misidentify noncritical indicators as indicators of interest. This can lead to classification errors in operational settings when every second counts and where errors can have costly consequences. For example, several indicators on the lists also are exhibited by individuals with mental illness (e.g., (b)(3):49 U.S.C. § 114(r) Assessing the construct and discriminant validity of a list of pre-attack indicators would enable security personnel to more accurately distinguish between subsets of indicators that discriminate a non-violent individual who is mentally unstable from a suicide attacker about to strike. One only needs to reflect on the mistaken shooting of the Brazilian national in London by police in July 2005 to see what a contribution the validation of these lists of indicators would be to military, law enforcement, and security decision-makers in their ongoing efforts to correctly classify suicide attackers and react appropriately. Although the SPOT Program drew on SME knowledge, best practices, and scientific research in the development of the indicator list, additional work to further refine the list is warranted. It is this task that AIR will undertake in our attempt to bring scientific rigor to the suspicious indicators through the indicator optimization task.

CONCLUSION

While the updated literature review AIR conducted in 2013 did not yield any new or unique suicide bomber indicators, it is possible that the reanalysis of the literature review data could potentially add support to the advances being made in TSA's training model as well as current goals of TSA and Behavior Detection and Analysis (BDA) Program to optimize suspicious indicators and develop related documentation. As of 2009, the SPOT Referral Report was used as a stand-alone document on the job, with each indicator named in such a way that the label itself contained the most pertinent information thought to be critical for scoring accuracy. However, combining the elements of a scoring sheet and a scoring manual can present challenges. The goal of making the labels short enough to be user friendly on a scoring sheet,

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conflicts with the goal of providing a full set of coding instructions to enhance and reinforce user mastery and inter-rater reliability.

In 2010, AIR collaborated with TSA to document operational definitions and exemplars for indicators on the SPOT Referral Report. This draft scoring manual was further developed by TSA to become SPOT's Behavioral Indicator Reference Guide, used in BDO training and as a reference tool for program personnel. Central to this documentation was the inclusion of indicator names, or "labels," along with associated definitions, explanations, and examples of behaviors that meet the scoring criteria for the indicator and examples of behaviors that do not. Such advances in TSA's training materials and approach were considered in the present recategorization of the data. Further reanalysis of the previous suicide bombing literature data includes not only groupings of indicator statements with concise labels, but also additional supporting information to be drawn from the individual indicator statements making up each group. In this way, findings from this reanalysis can be used to further refine SPOT Program training to provide a logical, user-friendly framework for the indicators that will enhance standardization of usage across BDOs.

While specific to suicide attacks, these findings are an initial step in AIR's efforts to optimize the suspicious indicator list. The overlap between the raw data from the literature review and the items on the SPOT Referral Report support the scientific foundation of the SPOT Referral Report items. These findings also reflect the inclusion of best practices and scientific research from which the suspicious indicators were initially developed. Moreover, these search were conducted in 2009 and again in 2013, several years after the development of the indicator list circa 2004. Despite the passage of time, it appears that the SPOT Program remains on target with the indicators it uses, because neither of these searches uncovered many more behaviors than those included on the SPOT Referral Report.

Last, these findings lend strong support to the content validity of the SPOT Program and demonstrate the value of many SPOT items as potential identifiers of suicide attackers. As AIR's work in support of BDA continues, we will further examine these and other relevant data as well as elicit input from experts. Findings will ultimately inform recommendations on the refinement of the indicator set and training content, and will also further SPOT Program standardization and strengthen BDO performance goals.

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[9] This reference list includes sources cited in the body of the report as well as those from which we extracted behavioral indicators (i.e., raw data or line items) for the original literature review. Regarding the latter, the citations are numbered to correspond with *Appendix G. Raw Data and Associated SPOT Categories* and provide the reader with the source from which the line item was extracted. Other citations from the body of the report are included in this list and, instead of being numbered, are marked with an asterisk (*).

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