

RONALD D. FIGUEROA

BEHAVIOR DETECTION
ACTIVITIES TO
IDENTIFY AVIATION
SECURITY THREATS
ASSESSMENTS

Defense, Security
and Strategies

NOVA

DEFENSE, SECURITY AND STRATEGIES

**BEHAVIOR DETECTION
ACTIVITIES TO IDENTIFY
AVIATION SECURITY THREATS
ASSESSMENTS**

**RONALD D. FIGUEROA
EDITOR**

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PREFACE

Available evidence does not support whether behavioral indicators, which are used in the Transportation Security Administration's (TSA) Screening of Passengers by Observation Techniques (SPOT) program, can be used to identify persons who may pose a risk to aviation security. This book addresses the extent to which available evidence supports the use of behavioral indicators to identify aviation security threats, and TSA has the data necessary to assess the SPOT program's effectiveness.

Chapter 1 – TSA began deploying the SPOT program in fiscal year 2007—and has since spent about \$900 million—to identify persons who may pose a risk to aviation security through the observation of behavioral indicators. In May 2010, GAO concluded, among other things, that TSA deployed SPOT without validating its scientific basis and SPOT lacked performance measures. GAO was asked to update its assessment. This chapter addresses the extent to which (1) available evidence supports the use of behavioral indicators to identify aviation security threats and (2) TSA has the data necessary to assess the SPOT program's effectiveness. GAO analyzed fiscal year 2011 and 2012 SPOT program data. GAO visited four SPOT airports, chosen on the basis of size, among other things, and interviewed TSA officials and a nonprobability sample of 25 randomly selected BDOs. These results are not generalizable, but provided insights.

Chapter 2 – The authors audited the Transportation Security Administration's (TSA) Screening of Passengers by Observation Techniques program. The program's intent is to screen passengers by observing their behavior in order to detect potential high-risk travelers. This program uses Behavior Detection Officers to detect passenger behaviors that may be indicative of stress, fear, or deception. Congressman Bennie Thompson

requested an audit of TSA's Screening of Passengers by Observation Techniques program to determine its effectiveness, efficiency, and economy as a security screening protocol at airports. The audit objective was to determine whether TSA's Screening of Passengers by Observation Techniques program is structured to ensure that passengers at U.S. airports are screened in an objective and cost-effective manner to identify potential terrorists.

Since the Screening of Passengers by Observation Techniques program began in fiscal year 2007, data provided by TSA indicate that the program has expended an estimated \$878 million and has more than 2,800 full-time equivalent positions, as of September 30, 2012. However, TSA has not implemented a strategic plan to ensure the program's success. For example, TSA did not (1) assess the effectiveness of the Screening of Passengers by Observation Techniques program, (2) have a comprehensive training program, (3) ensure outreach to its partners, or (4) have a financial plan. As a result, TSA cannot ensure that passengers at United States airports are screened objectively, show that the program is cost-effective, or reasonably justify the program's expansion. In fiscal year 2012, TSA's Behavior Detection and Analysis Division developed a draft strategic plan that includes a statement of mission, goals, and objectives. However, the plan had not been approved and implemented at the time of the authors' review.

The authors made six recommendations to improve the effectiveness of the Screening of Passengers by Observation Techniques program. TSA concurred with all recommendations.

Chapter 3 – Statement of John S. Pistole, Administrator, Transportation Security Administration.

Chapter 4 – Statement of Charles K. Edwards, Deputy Inspector General, U.S. Department of Homeland Security.

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Chapter 1

**AVIATION SECURITY: TSA SHOULD LIMIT
FUTURE FUNDING FOR BEHAVIOR
DETECTION ACTIVITIES***

United States Government Accountability Office

WHY GAO DID THIS STUDY

TSA began deploying the SPOT program in fiscal year 2007—and has since spent about \$900 million—to identify persons who may pose a risk to aviation security through the observation of behavioral indicators. In May 2010, GAO concluded, among other things, that TSA deployed SPOT without validating its scientific basis and SPOT lacked performance measures. GAO was asked to update its assessment. This chapter addresses the extent to which (1) available evidence supports the use of behavioral indicators to identify aviation security threats and (2) TSA has the data necessary to assess the SPOT program’s effectiveness. GAO analyzed fiscal year 2011 and 2012 SPOT program data. GAO visited four SPOT airports, chosen on the basis of size, among other things, and interviewed TSA officials and a nonprobability sample of 25 randomly selected BDOs. These results are not generalizable, but provided insights.

* This is an edited, reformatted and augmented version of United States Government Accountability Office Publication No. GAO-14-159, dated November 2013.

WHAT GAO RECOMMENDS

Congress should consider the absence of scientifically validated evidence for using behavioral indicators to identify threats to aviation security when assessing the potential benefits and cost in making future funding decisions for aviation security. GAO included this matter because DHS did not concur with GAO's recommendation that TSA limit future funding for these activities until it can provide such evidence, in part because DHS disagreed with GAO's analysis of indicators. GAO continues to believe the chapter findings and recommendation are valid.

WHAT GAO FOUND

Available evidence does not support whether behavioral indicators, which are used in the Transportation Security Administration's (TSA) Screening of Passengers by Observation Techniques (SPOT) program, can be used to identify persons who may pose a risk to aviation security. GAO reviewed four meta-analyses (reviews that analyze other studies and synthesize their findings) that included over 400 studies from the past 60 years and found that the human ability to accurately identify deceptive behavior based on behavioral indicators is the same as or slightly better than chance. Further, the Department of Homeland Security's (DHS) April 2011 study conducted to validate SPOT's behavioral indicators did not demonstrate their effectiveness because of study limitations, including the use of unreliable data. Twenty-one of the 25 behavior detection officers (BDO) GAO interviewed at four airports said that some behavioral indicators are subjective. TSA officials agree, and said they are working to better define them. GAO analyzed data from fiscal years 2011 and 2012 on the rates at which BDOs referred passengers for additional screening based on behavioral indicators and found that BDOs' referral rates varied significantly across airports, raising questions about the use of behavioral indicators by BDOs. To help ensure consistency, TSA officials said they deployed teams nationally to verify compliance with SPOT procedures in August 2013. However, these teams are not designed to help ensure BDOs consistently interpret SPOT indicators.

TSA has limited information to evaluate SPOT's effectiveness, but plans to collect additional performance data. The April 2011 study found that SPOT was more likely to correctly identify outcomes representing a high-risk

passenger— such as possession of a fraudulent document—than through a random selection process. However, the study results are inconclusive because of limitations in the design and data collection and cannot be used to demonstrate the effectiveness of SPOT. For example, TSA collected the study data unevenly. In December 2009, TSA began collecting data from 24 airports, added 1 airport after 3 months, and an additional 18 airports more than 7 months later when it determined that the airports were not collecting enough data to reach the study’s required sample size. Since aviation activity and passenger demographics are not constant throughout the year, this uneven data collection may have conflated the effect of random versus SPOT selection methods. Further, BDOs knew if passengers they screened were selected using the random selection protocol or SPOT procedures, a fact that may have introduced bias into the study. TSA completed a performance metrics plan in November 2012 that details the performance measures required for TSA to determine whether its behavior detection activities are effective, as GAO recommended in May 2010. However, the plan notes that it will be 3 years before TSA can begin to report on the effectiveness of its behavior detection activities. Until TSA can provide scientifically validated evidence demonstrating that behavioral indicators can be used to identify passengers who may pose a threat to aviation security, the agency risks funding activities that have not been determined to be effective. This is a public version of a sensitive report that GAO issued in November 2013. Information that TSA deemed sensitive has been redacted.

ABBREVIATIONS

ASAP	Aviation Security Assessment Program
BAC	behavior analysis capability
BDA	Behavior Detection and Analysis program
BDAD	Behavior Detection and Analysis Division
BDO	behavior detection officer
BEAM	BDO Efficiency and Accountability Metrics
DHS	Department of Homeland Security
DOJ	Department of Justice
EEO	Equal Employment Opportunity
FAMS	Federal Air Marshal Service
FBI	Federal Bureau of Investigation
FTE	full-time equivalent

JKT	Job Knowledge Test
LEO	law enforcement officer
OIG	DHS Office of Inspector General
OMB	Office of Management and Budget
OOI	Office of Inspection
PASS	Performance Accountability and Standards System
PCA	Performance Compliance Assessment
PC&B	Personnel Compensation and Benefits
PPA	program, project, activity
S&T	Science and Technology Directorate
SPOT	Screening of Passengers by Observation Techniques
TAC	Technical Advisory Committee
TISS	Transportation Information Sharing System
TSA	Transportation Security Administration
TSO	transportation security officer
TSSRA	Transportation Security System Risk Assessment

November 8, 2013

Congressional Requesters

The Department of Homeland Security's (DHS) Transportation Security Administration (TSA) fiscal year 2014 budget request amounts to approximately \$7.4 billion for programs and activities to secure the nation's transportation systems. This amount includes nearly \$5 billion for TSA's Aviation Security account, a portion of which is requested to support Screening of Passengers by Observation Techniques (SPOT) within the Behavior Detection and Analysis (BDA) program, which seeks to identify persons who may pose a risk to aviation security.¹ Through the SPOT program, TSA's behavior detection officers (BDO) are to identify passenger behaviors indicative of stress, fear, or deception and refer passengers meeting certain criteria for additional screening of their persons and carry-on baggage.² During this SPOT referral screening, if passengers exhibit additional behaviors, or if other events occur, such as the discovery of a suspected fraudulent document, BDOs are to refer these passengers to a law enforcement officer (LEO) for further investigation, which could result in an arrest, among other outcomes.

In October 2003, TSA began testing its primary behavior detection activity, the SPOT program, and during fiscal year 2007, TSA deployed the

program to 42 TSA-regulated airports.³ By fiscal year 2012, about 3,000 BDOs were deployed to 176 of the more than 450 TSA-regulated airports in the United States. From fiscal years 2011 through 2012, an estimated 1.3 billion people passed through checkpoints at the 176 SPOT airports. TSA has expended approximately \$200 million annually for the SPOT program since fiscal year 2010, and a total of approximately \$900 million since 2007. BDOs represent one of TSA's layers of security. In addition to BDOs, other layers of security include travel document checkers, who examine tickets, passports, and other forms of identification; transportation security officers (TSO), who are responsible for screening passengers and their carry-on baggage at passenger checkpoints using X-ray equipment, magnetometers, advanced imaging technology, and other devices; as well as for screening checked baggage; and random employee screening, among others.⁴

In May 2010, we concluded on the basis of our work, among other things, that TSA deployed SPOT nationwide without first validating the scientific basis for identifying passengers who may pose a threat in an airport environment.⁵ TSA piloted the SPOT program in 2003 and 2004 at several New England airports. However, the pilot was not designed to determine the effectiveness of using behavior detection techniques to enhance aviation security; rather, the pilot was focused on the operational feasibility of implementing the SPOT program at airports. In recognition of the need to conduct additional research, DHS's Science and Technology Directorate (S&T) hired a contractor in 2007 to design and execute a validation study to determine whether the primary screening instrument used in the program—the SPOT referral report and its associated indicators based on behavior or appearance factors—could be used to correctly identify high-risk passengers. The validation study, published in April 2011, found that the SPOT program identified substantially more “high-risk” passengers—defined by the study as those passengers who, for example, possessed fraudulent documents—as compared with passengers who had been selected by BDOs according to a random selection protocol.⁶ However, the validation study cited certain methodological limitations, such as the potential for selection bias as a result of BDOs participating in the study not following the random selection protocols, among others. S&T concluded that the limitations were minimal and that the results were reasonable and reliable. In May 2010, we recommended that S&T convene an independent panel of experts to comment on and evaluate the methodology of the ongoing validation study. In response, S&T established a Technical Advisory Committee (TAC) of 12 researchers and issued a separate report in June 2011 summarizing TAC members'

recommendations and opinions on the study results.⁷ The results of the validation study and TAC's comments and concerns are discussed later in this chapter.

We also concluded in May 2010 that TSA was experiencing challenges in implementing the SPOT program at airports, such as not systematically collecting and analyzing potentially useful passenger information obtained by BDOs, and that the program lacked outcome-based performance measures useful for assessing the program's effectiveness.⁸ As a result, we recommended that TSA take several actions to help assess SPOT's contribution to improving aviation security.⁹ Overall, TSA has taken action on all of the 11 recommendations we made, and, as of October 2013, has implemented 10 of the recommendations. For example, among other things, TSA revised SPOT standard operating procedures to more clearly instruct BDOs and other TSA personnel regarding how and when to enter SPOT referral data into the Transportation Information Sharing System (TISS).¹⁰ This would help enable the referral data to be shared with federal, state, or local law enforcement entities. Further, in November 2012, TSA issued a plan to develop outcome-based performance measures, such as the ability of BDOs to consistently identify SPOT behavioral indicators, within 3 years to assess the effectiveness of the SPOT program. This plan is discussed in more detail later in this chapter.

You requested an updated assessment of the SPOT program's effectiveness. Specifically, this chapter addresses the following questions:

- 1) To what extent does available evidence support the use of behavioral indicators to identify aviation security threats?
- 2) To what extent does TSA have data necessary to assess the effectiveness of the SPOT program in identifying threats to aviation security?

In addition, we also reviewed information related to recent allegations of profiling in the SPOT program. This information can be found in appendix I.

To address the first question, we reviewed academic and government research on behavior-based deception detection, which we identified through a structured literature search and recommendations from experts in the field. We assessed the reliability of this research against established practices for study design, and through interviews with nine experts we selected based on their published peer-reviewed research in this area.¹¹ While the results of these interviews cannot be used to generalize about all research on behavior

detection, they represent a mix of views and subject matter expertise. We determined that the research was sufficiently reliable for describing the evidence that existed regarding the use of behavioral indicators to identify security threats. We also analyzed documentation related to the April 2011 SPOT validation study, including study protocols and the final reports, and assessed the study against established practices for evaluation design and generally accepted statistical principles.¹² We interviewed headquarters TSA and S&T officials responsible for the validation study and contractor officials. We obtained the data that were used by these officials to reach the conclusions in the validation study. To assess the soundness of the methodology and conclusions in the validation study, we replicated some of the analyses that were conducted by the contractor, based on the methodology described in the final report. Generally, we replicated the study's results, and as an extra step, we extended the analyses using the full sample of SPOT referrals to increase the power to detect significant associations, as described in appendix II. We also analyzed data on BDOs' SPOT referrals, hours worked, and characteristics, such as race and gender, from the SPOT program database, TISS, TSA's Office of Human Capital, and the National Finance Center for fiscal years 2011 and 2012 to determine the extent to which SPOT referrals varied across airports and across BDOs with different characteristics. To assess the reliability of these data, we reviewed relevant documentation, including DHS privacy impact assessments and a 2012 data audit of the SPOT database, and interviewed TSA officials about the controls in place to maintain the integrity of the data.¹³ We determined that the data were sufficiently reliable for us to use to standardize the referral data across airports based on the number of hours each BDO spent performing operational SPOT activities.¹⁴ In addition, we interviewed BDA program managers at headquarters, and visited four airports where the SPOT program was implemented in fiscal years 2011 and 2012, and where the validation study was carried out. We selected the airports based on their size, risk ranking, and participation in behavior detection programs.¹⁵ As part of our visits, we interviewed 25 randomly selected BDOs, as well as BDO managers and officials from the responsible local law enforcement agency for each airport.¹⁶ While the results of these visits and interviews are not generalizable to all SPOT airports or BDOs, they provided additional BDO perspectives and helped corroborate the research and statistical information we gathered through other means.

To address the second question, we analyzed documentation related to the April 2011 validation study, including study protocols and the final reports,

and evaluated these efforts against established practices for designing evaluations and generally accepted statistical principles.¹⁷ We also reviewed financial data from fiscal years 2007 through 2012 to determine the expenditures associated with the SPOT program, and interviewed officials in DHS's Office of the Inspector General (OIG) who were working on a related audit of the SPOT program.¹⁸ We also reviewed documentation associated with program oversight, including a November 2012 performance metrics plan and evaluated TSA's efforts to collect and analyze data to provide oversight of BDA activities against criteria outlined in Office of Management and Budget guidance, federal government efficiency initiatives, and *Standards for Internal Control in the Federal Government*.¹⁹ Finally, to demonstrate effectiveness of the BDA program, including SPOT, we analyzed documentation such as a return-on-investment analysis and a risk-based allocation analysis, both from December 2012. We interviewed headquarters TSA and S&T officials responsible for the validation study and TSA field officials responsible for collecting study data at the four airports we visited, as well as contractor officials, and 8 of the 12 TAC members.²⁰ We interviewed BDA officials in the Offices of Security Capabilities and Security Operations, and TSA officials in the Office of Human Capital on the extent to which they collect and analyze data. In addition, to identify additional information about recent allegations of passenger profiling in the SPOT program, we reviewed documentation and data, and interviewed a nongeneralizable sample of 25 randomly selected BDOs and an additional 7 BDOs who contacted us directly. We also interviewed TSA headquarters and field officials, such as federal security directors and BDO managers. Appendix III provides additional details on our objectives, scope, and methodology.

This chapter is a public version of the prior sensitive report that we provided to you. DHS and TSA deemed some of the information in the chapter as sensitive security information, which must be protected from public disclosure. Therefore, this chapter omits sensitive information about specific SPOT behavioral indicators, the validation study findings, and the results of our analysis on the extent to which SPOT referrals varied across airports and across BDOs with different characteristics. Although the information provided in this chapter is more limited in scope, it addresses the same questions as the sensitive report. Also, the overall methodology used for both reports is the same.

We conducted this performance audit from April 2012 to November 2013 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient,

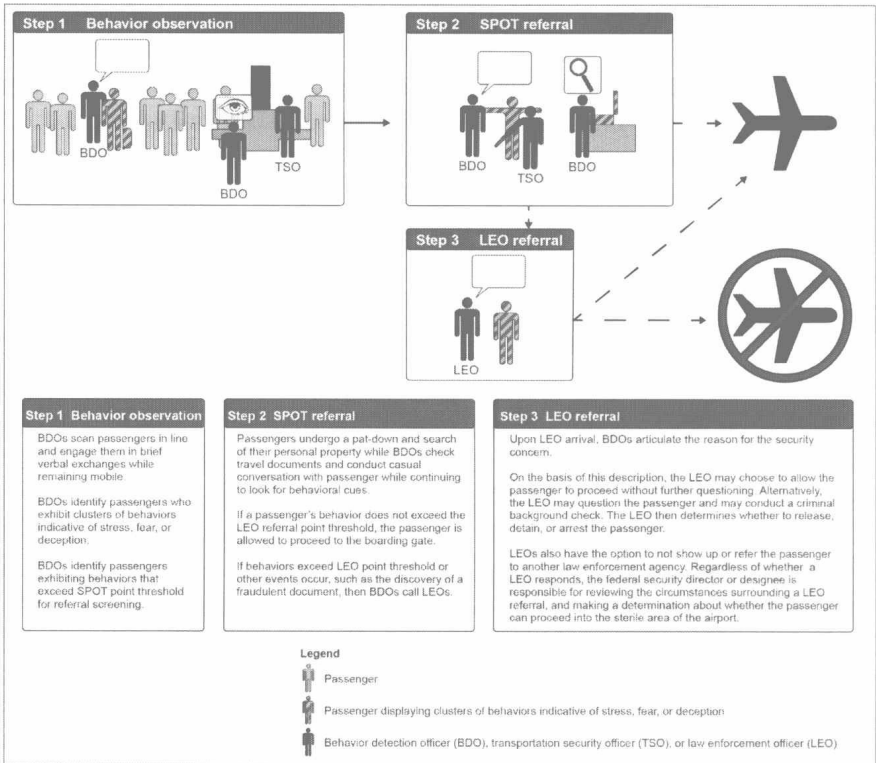
appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

BACKGROUND

BDA and the SPOT Program

The Aviation and Transportation Security Act established TSA as the federal agency with primary responsibility for securing the nation's civil aviation system, which includes the screening of all passengers and property transported by commercial passenger aircraft.²¹ At the more than 450 TSA-regulated airports in the United States, all passengers, their accessible property, and their checked baggage are screened prior to boarding an aircraft or entering the sterile area of an airport pursuant to statutory and regulatory requirements and TSA-established standard operating procedures.²² BDA, and more specifically, the SPOT program, constitutes one of multiple layers of security implemented within TSA-regulated airports.²³ According to TSA's strategic plan and other program guidance for the BDA program released in December 2012, the goal of the agency's behavior detection activities, including the SPOT program, is to identify high-risk passengers based on behavioral indicators that indicate "mal-intent." For example, the strategic plan notes that in concert with other security measures, behavior detection activities "must be dedicated to finding individuals with the intent to do harm, as well as individuals with connections to terrorist networks that may be involved in criminal activity supporting terrorism."

TSA developed its primary behavior detection activity, the SPOT program, in 2003 as an added layer of security to identify potentially high-risk passengers through behavior observation and analysis techniques.²⁴ The SPOT program's standard operating procedures state that BDOs are to observe and visually assess passengers, primarily at passenger screening checkpoints, and identify those who display clusters of behaviors indicative of stress, fear, or deception. The SPOT procedures list a point system BDOs are to use to identify potentially high-risk passengers on the basis of behavioral and appearance indicators, as compared with baseline conditions where SPOT is being conducted.²⁵ A team of two BDOs is to observe passengers as they proceed through the screening process.²⁶ This process is depicted in figure 1.



Source: GAO, Art Explosion (clip art).

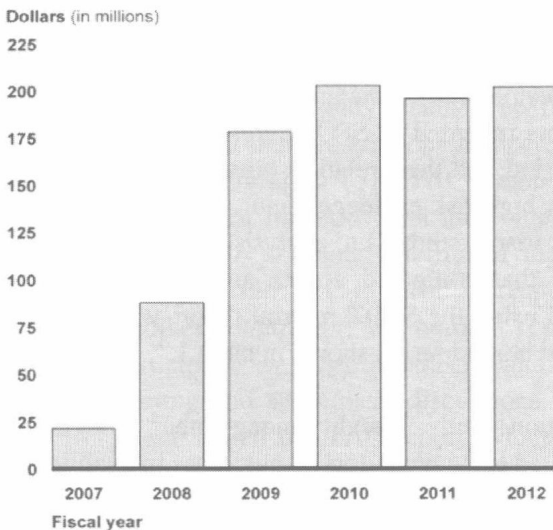
Figure 1. The Screening of Passengers by Observation Techniques (SPOT) Process.

According to TSA, it takes a BDO less than 30 seconds to meaningfully observe an average passenger.²⁷ If one or both BDOs observe that a passenger reaches a predetermined point threshold, the BDOs are to direct the passenger and any traveling companions to the second step of the SPOT process—SPOT referral screening. During SPOT referral screening, BDOs are to engage the passenger in casual conversation—a voluntary informal interview—in the checkpoint area or a predetermined operational area in an attempt to determine the reason for the passenger's behaviors and either confirm or dispel the observed behaviors.²⁸ SPOT referral screening also involves a physical search of the passenger and his or her belongings. According to TSA, an average SPOT referral takes 13 minutes to complete.²⁹ If the BDOs concur that a passenger's behavior escalates further during the referral screening or if other events occur, such as the discovery of fraudulent identification documents or suspected serious prohibited or illegal items, they are to call a LEO to conduct

additional screening—known as a LEO referral—who then may allow the passenger to proceed on the flight, or may question, detain, or arrest the passenger.³⁰ The federal security director or designee, regardless of whether a LEO responds, is responsible for reviewing the circumstances surrounding a LEO referral and making the determination about whether the passenger can proceed into the sterile area of the airport.

Overview of SPOT Program Funding

The costs of the SPOT program are not broken out as a single line item in the budget. Rather, SPOT program costs are funded through three separate program, project, activity (PPA)-level accounts: (1) BDO payroll costs are funded through the Screener Personnel Compensation and Benefits (PC&B) PPA, (2) the operating expenses of the BDOs and the program are funded through the Screener Training and Other PPA, and (3) the program management payroll costs are funded through the Airport Management and Support PPA. From fiscal year 2007—when the SPOT program began deployment nationwide—through fiscal year 2012, about \$900 million has been expended on the program, as shown in figure 2.



Source: TSA.

Figure 2. TSA Expenditures on the Screening of Passengers by Observation Techniques (SPOT) Program, Fiscal Years 2007 through 2012.