February 2020

READY AIRCREW PROGRAM

Air Force Actions to Address Congressionally Mandated Study on Combat Aircrew Proficiency

Accessible Version

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Why GAO Did This Study

In September 2016, GAO reported that annual combat aircrew training requirements delineated in the Air Force's Ready Aircrew Program might not address pilot training needs, and that the Air Force did not systematically evaluate the effectiveness of its training. As a result, Congress included a provision in Section 351 of the NDAA for Fiscal Year 2017 for the Air Force to commission an independent review of its Ready Aircrew Program, report on actions it planned to take in response to any recommendations, and provide an estimate of any resources required.

Section 351 also included a provision for GAO to assess the Air Force report. This report examines whether (1) the independent review conducted by the RAND Corporation addressed statutory requirements to review and assess the Ready Aircrew Program, and (2) the Air Force has reported on completed or planned actions to implement the RAND report recommendations.

To address these objectives, GAO reviewed the RAND and Air Force reports on the Ready Aircrew Program, assessed the study against generally accepted research standards, and interviewed officials at RAND, Air Force Headquarters, and the Air Combat Command.

What GAO Recommends

GAO is not making any new recommendations in this report but restates the need to fully implement GAO's two 2016 recommendations. In comments on a draft of this report, DOD did not concur with the two 2016 recommendations. GAO maintains that the Air Force should implement both recommendations.

View GAO-20-91. For more information, contact Cary Russell at (202) 512-5431 or russellc@gao.gov.

What GAO Found

A July 2018 RAND report—commissioned by the Air Force—addressed the statutory requirements of the National Defense Authorization Act (NDAA) for Fiscal Year 2017 to review and assess the Air Force's Ready Aircrew Program and make recommendations for ways to improve it. The Ready Aircrew Program establishes minimum annual training requirements for combat aircrew. RAND's report, entitled *Independent Review and Assessment of the Air Force Ready Aircrew Program*, made nine recommendations to improve its management:

1. Leverage internal expertise to implement measures for proficiency.
2. Invest resources to design data collection and storage solutions that facilitate analysis and readiness reporting.
3. Document the Ready Aircrew Program Tasking Memorandum development process in Air Force instruction supplements and ensure that the process incorporates squadron-level input and feedback.
4. Establish a more explicit and formal link between proficiency and Ready Aircrew Program requirements.
5. Document training quality to support requests for training resources.
6. Identify the conditions under which Ready Aircrew Program requirements, including mission types, can be accomplished.
7. Consider changing how Ready Aircrew Program requirements affect the Flying Hour Program.
8. Invest in data systems to correct data collection and assess deficiencies.
9. Leverage the Air Force Research Laboratory's performance data work and invest in added analysis to produce enterprise-wide proficiency metrics.

The nine RAND recommendations aligned with two GAO recommendations made in 2016 to comprehensively assess the assumptions underlying the annual aircrew training requirements and develop a process to collect data to assess the effectiveness of the training.

The Air Force's August 2018 one-page report to Congress included three broad actions in response to RAND's recommendations. The Air Force planned to

- build training matrices to help commanders assess their units' effectiveness,
- establish common data architecture through the Air Force's Chief Data Officer–led effort, and
- evaluate aspects of the Ready Aircrew Program to increase lethality and improve readiness as the Air Force shifts to executing the mandates of the 2018 National Defense Strategy.

The Air Force, however, did not explain how these three efforts would specifically address the nine recommendations. Air Force officials said that, though they generally agreed with RAND's recommendations, the Air Force lacked the resources to fully implement them beyond actions that were underway prior to the RAND report, and considers all recommendations as "closed." In part due to its not fully implementing RAND's recommendations, the Air Force has not fully addressed GAO's two recommendations. Fully implementing GAO's recommendations would better position the Air Force to ensure its aircrews receive effective training to achieve a range of missions.

_____ **United States Government Accountability Office**

Contents

Abbreviations

DOD	Department of Defense.
NDAA	National Defense Authorization Act.
Rand report	A July 2018 RAND Corporation report to the Air Force entitled, *Independent Review and Assessment of the Air Force Ready Aircrew Program*

February 28, 2020

Congressional Committees

The Air Force, through its Ready Aircrew Program, requires its combat pilots to complete a defined number of live training events, or "sorties," and virtual simulator training events, or "simulator missions," each year to maintain mission readiness. As part of this training, the Ready Aircrew Program establishes the minimum numbers and types of sorties and simulator missions that aircrews of a particular combat aircraft must complete during the annual training cycle to sustain different levels of mission readiness.[1] For example, in fiscal year 2016, experienced aircrews for the F-15E were required to complete a minimum of 96 annual live sorties (eight per month) to be considered combat mission ready, of which 49 were to be flown to fulfill primary mission requirements. Experienced aircrews for the F-15E were also required to complete 36 annual simulator missions (three simulator missions per month) to be considered combat mission ready.[2]

In addition to quantifying the minimum number of annual flying hours required to train combat aircraft squadrons, the Ready Aircrew Program is an important input for establishing the resources necessary to make the required training available to pilots and units. For example, the Air Force uses the Ready Aircrew Program sortie requirements for its combat aircraft, along with other inputs, to calculate the Air Force's annual flying hour program and includes this cost in the Air Force's annual budget submission to Congress. In fiscal year 2018, for example, the Air Force executed 826,606 flying hours at a cost of about $5.3 billion.

Section 351 of the National Defense Authorization Act (NDAA) for Fiscal Year 2017 included a provision for the Air Force to commission an independent study to (1) review and assess the assumptions underlying

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[1]Combat aircraft comprise fighters, bombers, attackers, and special electronic support aircraft.

[2]These requirements differed for inexperienced aircrews for the F-15E. Specifically, in fiscal year 2016, inexperienced aircrews for the F-15E were to complete 108 annual sorties (nine per month), of which 54 were to be flown to fulfill primary mission requirements. Also, inexperienced aircrews of the F-15E were required to complete 36 annual simulator missions (three simulator missions per month) to be considered combat mission ready. The experience level of aircrews is generally determined by the number of sorties or flying hours they have flown.

its annual continuation training requirements, (2) review and assess the effectiveness of the Ready Aircrew Program in managing aircrew training requirements, and (3) make recommendations for the improved management of these training requirements. Section 351 also required the Air Force to report on actions it plans to take in response to the independent study's recommendations and to estimate the resources required to implement the recommendations.[3] In accordance with Section 351, the Air Force contracted with the RAND Corporation in 2017 to independently study the Air Force's Ready Aircrew Program at a cost of slightly over $1 million. The RAND Corporation provided the results of its study in a July 2018 report to the Air Force entitled *Independent Review and Assessment of the Air Force Ready Aircrew Program*. Hereafter, we refer to this report as the RAND report.[4] In August 2018, the Air Force released its report, which consisted of a one-page transmittal letter with the RAND report attached as an enclosure.[5] Hereafter, we refer to this report as the Air Force report.

Section 351 also included a provision that we review the Air Force report. Based on our review, this report (1) assesses whether the RAND report addressed the three statutory requirements identified in Section 351 and whether RAND followed generally accepted research standards in performing its review and (2) describes the Air Force's response and planned actions to the RAND recommendations, as required by Section 351.

For objective one, we reviewed the RAND report to determine whether it addressed the elements specified in Section 351 of the NDAA for Fiscal Year 2017. As part of this review, we compared the RAND report findings, recommendations, and the work described in the report to the NDAA-specified elements. Additionally, we discussed RAND's work with RAND

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[3]Pub. L. No. 114-328, § 351 (2016).

[4]The RAND report addressed elements required by section 351(b)(2) to be considered by the Air Force in producing its report. According to Air Force officials, they directed RAND to include these elements as part of its independent assessment of the Ready Aircrew Program.

[5]While RAND provided its report to the Air Force in July 2018, the report print date is October 2018 to coincide with its authorized distribution release. John A. Ausink et al., *Independent Review and Assessment of the Air Force Ready Aircrew Program: A Report Prepared for the Secretary of the Air Force in Compliance with Section 351 of the FY 2017 National Defense Authorization Act* (Santa Monica, Calif.: RAND Corporation, October 2018).

officials, Air Force Headquarters Training and Readiness officials, and Air Combat Command training officials. To understand the extent to which the RAND report complied with generally accepted research standards, we reviewed research literature and Department of Defense (DOD) guidance and identified frequently occurring, generally accepted research standards that are relevant for defense studies. We selected standards related to the design, execution, and presentation of the study from among the standards we identified as generally accepted for research. We assessed the RAND study against these three major elements for generally accepted research standards, as based on prior GAO work.[6] To make our assessments, we considered the individual components of those elements, as appropriate for the RAND study. We discussed these standards with RAND officials, who agreed that they were generally consistent with their own quality standards for research and were applicable to this study. See appendix I for a more detailed description of the generally accepted research standards we focused on in this review.

For objective two, we reviewed and compared the Air Force report and briefing to us with the findings and recommendations in the RAND report to determine whether the Air Force concurred with the RAND findings and recommendations. We then discussed the Air Force report with officials from the Air Force Headquarters Training and Readiness Directorate and the Office of the Under Secretary of Defense for Personnel and Readiness to determine completeness of the report vis-à-vis Section 351 requirements. On the basis of these discussions of RAND findings and recommendations with Air Force officials, we reviewed any efforts that the Air Force officials reported being considered during the course of our review in response to the RAND recommendations. We discussed the planned actions identified in the Air Force report in interviews with officials from Air Force Headquarters, Air Combat Command, and the Office of the Under Secretary of Defense for Personnel and Readiness. For both objectives, we met with officials from the Office of the Under Secretary of Defense for Personnel and Readiness, Air Force Headquarters, Air Combat Command, and RAND to discuss the methodologies and results of the RAND report. We did not assess actions that the Air Force briefed

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[6]GAO, *DOD Manufacturing Arsenals: Actions Needed to Identify and Sustain Critical Capabilities*, GAO-16-86 (Washington, D.C.: Nov. 17, 2015); *Motor Carrier Safety: Additional Research Standards and Truck Drivers' Schedule Data Could Allow More Accurate Assessments of the Hours of Service Rule*, GAO-15-641 (Washington, D.C.: July 29, 2015); *Defense Transportation: Study Limitations Raise Questions about the Adequacy and Completeness of the Mobility Capabilities Study and Report*, GAO-06-938 (Washington, D.C.: Sept. 20, 2006).

to us after the completion of our field work to determine whether these actions were sufficient to fully address RAND findings and recommendations. However, Air Force officials told us that any actions the Air Force had taken had begun before RAND made its recommendations.

We conducted this performance audit from September 2018 through February 2020 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 that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

Air Force pilots are required to complete various phases of training before they are considered to be mission ready. To assess pilot candidates' flying aptitude for both traditional (i.e., manned) and remotely-piloted aircraft, the Air Force first requires these candidates to attend initial flight training. Successful candidates for traditional aircraft then attend one of two schools:

- Euro-NATO Joint Jet Pilot Training, the graduates of which become fighter pilots; or

- Specialized Undergraduate Pilot Training, the graduates of which become fighter, bomber, airlift, or tanker aircraft pilots, depending on pilot strengths and Air Force needs.[7]

During or following this training, a pilot is assigned to a specific aircraft, and the flight training program proceeds through three stages:

- Initial Qualification Training. This stage of training qualifies a pilot for basic flying duties associated with the type of aircraft (e.g., an F-16). The pilot accomplishes this stage at a formal training unit before

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[7]Specialized Undergraduate Pilot Training, or "SUPT," has a primary and an advanced phase. On the basis of a candidate's performance in the primary phase and the needs of the Air Force, the Air Force selects most student pilots for a fighter/bomber training track or an airlift/tanker training track in the advanced phase and assigns them to the corresponding type of aircraft upon graduation.

moving to an assigned squadron. Graduates of initial qualification training courses have basic aircraft qualification status.

- Mission Qualification Training. This stage of training occurs once the basic aircraft qualified pilot is at the assigned unit. The pilot undergoes mission qualification training in the type of aircraft assigned to qualify for the specific missions the unit is required to perform.

- Continuation Training. This stage of pilot training has two components. Pilots participate in continuation training to (1) in some instances upgrade their qualifications to fill certain positions, such as flight lead, instructor, or forward air controller through specialized continuation training;[8] and (2) in all instances maintain proficiency and improve their capabilities to perform their units' assigned missions.

The Ready Aircrew Program establishes the minimum number of live training events, or "sorties," and virtual simulator training events, or "simulator missions," that aircrews of a particular combat aircraft must complete during the annual training cycle to maintain mission readiness.[9] These sorties and simulator missions are aligned with the units' primary missions, for which the units must maintain "proficiency," and secondary missions, for which they must maintain "familiarity." The Air Combat Command, as lead command for the Ready Aircrew Program, with the assistance of other major commands (including the Air Force Global Strike Command, Pacific Air Forces, and U.S. Air Forces in Europe) and associated subordinate organizations (i.e., air wings and squadron commanders), develops tasking memorandums for the Ready Aircrew Program that delineate and specify the annual continuation training requirements for personnel assigned to each of the subordinate combat units.

The RAND Report Addressed Statutory Requirements, Followed Generally Accepted

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[8]Flying units also have specialized training, a category that includes upgrade training to be a flight lead, instructor pilot, or mission commander.

[9]According to Air Combat Command officials, the majority of aircraft in the combat air forces fall under the Ready Aircrew Program and receive annual Ready Aircrew Program training tasking for the associated aircrew. Two exceptions noted by the officials are the U-2 and RQ-170 aircraft.

Research Standards, and Identified Deficiencies

The RAND Report on the Ready Aircrew Program Addressed Section 351 Requirements by Assessing Training Requirements and Making Recommendations

On the basis of our analysis, we found that the RAND report addressed each of the three statutory elements required by Congress in Section 351. First, the RAND report addressed two statutory elements by reviewing and assessing

- the assumptions underlying annual continuation training requirements for the Ready Aircrew Program and

- the overall effectiveness of the Ready Aircrew Program in managing aircrew training requirements.

These two statutory elements focus on issues raised in our prior report recommendations, which we discuss in more detail later in this report. Table 1 provides detailed information about these statutory elements, our assessment of RAND's findings, and RAND's findings associated with each element.

Table 1: GAO Assessment of the Extent to Which the RAND Report on the Air Force Ready Aircrew Program Addressed Statutory Elements in Section 351 of the National Defense Authorization Act for Fiscal Year 2017

Required statutory elements	Element addressed / not addressed by the RAND Report	RAND findings related to the required statutory elements
1. Review and assess the following five assumptions underlying the annual training requirements for the Air Force Ready Aircrew Program:	Addressed	Overall, RAND reviewed and assessed each of the five topics that were specifically required as a part of this statutory element, as described below.
(a) number of sorties by mission type for minimum and optimum combat aircraft pilot proficiency,	Addressed	RAND concluded that the Air Force does not currently have the objective measures of proficiency needed to determine minimum and optimum number of sorties. Specifically, the combat air forces aviation community lacks consensus on how to define and measure an aircrew member's proficiency, and professional literature supports the conclusion that measuring performance is difficult. However, according to RAND, research both within the Air Force and in the broader scientific community provides a foundation for adapting or developing metrics that would be valid and useful.

Required statutory elements	Element addressed / not addressed by the RAND Report	RAND findings related to the required statutory elements
(b) optimal mix of live versus virtual training combat aircraft sorties,	Addressed	RAND found that there is limited research in this area. According to the RAND report, the "optimal" mix will depend on such factors as aircraft type, the skill being trained, the pilot's expertise, and the quality of the simulator. The RAND report stated that no research has been conducted on the appropriate live-to-simulator mix ratio during continuation training in a squadron. Furthermore, determining the right "mix" requires robust measures of proficiency, which are currently lacking.
(c) optimal mix of experienced and inexperienced combat aircraft crews,	Addressed	RAND stated that changing the mix of experienced and inexperienced pilots affects the ability of a fighter squadron to function and, although RAND did not model this, likely impacts bombers and remotely piloted aircraft as well. New RAND modeling supports the conclusions of past research indicating that, as long as flying requirements for inexperienced and experienced pilots differ, if the percentage of experienced pilots falls below 55 percent, unit training is degraded.
(d) availability of assets and infrastructure to support the achievement of aircrew proficiency levels, and	Addressed	Shortfalls in training infrastructure include lack of access to ranges, limitations in simulator and network capabilities and capacity, and lack of aircraft maintenance. According to an Air Combat Command official, lack of maintenance can result in assets (e.g., aircraft) not being available for training. However, because the Air Force is unable to objectively assess pilot proficiency levels, it is difficult to quantify improvements that may be needed for assets and infrastructure used for continuation training.
(e) accumulated flying hours or other measurements used to determine whether a combat aircraft aircrew qualifies as experienced and whether different measurements should be used.	Addressed	Studies regarding definitions of "experience" conducted in 2016 for the F-22 and in 2017 for fourth-generation aircraft led the Air Force to modify its definitions of experience for fighter aircraft to emphasize the number of sorties rather than hours flown and to add additional requirements, such as qualification for flight lead. RAND's interviews with subject-matter experts at eight Air Force flying locations led RAND to endorse these changes.
2. Review and assess the overall effectiveness of the Ready Aircrew Program in managing aircrew training requirements.	Addressed	While the Ready Aircrew Program provides a structure for communicating the skills expected of combat pilots and the mission types that should be emphasized in training, RAND determined that the program is not effective for four reasons: (1) the quality of Ready Aircrew Program sorties, while observed by squadron commanders or flight instructors, is not captured by the squadrons; (2) the squadron training schedule is driven by non–Ready Aircrew Program training (i.e., mission qualification training, sortie requirements for upgrades to positions, and preparation for deployment); (3) some units feel compelled to fly low-quality sorties—sorties that do not involve required elements (e.g., air combat training sorties require visual maneuvering against an airborne adversary; however, an aircraft acting in the adversary role may not be available during an actual sortie) simply to complete flying hours; and (4) Ready Aircrew Program accomplishment is not always clearly connected to readiness (e.g., sortie requirements for some readiness ratings in the Defense Readiness Rating System can exceed the number of sorties required by the Ready Aircrew Program).

Source: GAO analysis of RAND data.. | GAO-20-91

Note: The RAND data are from *Independent Review and Assessment of the Air Force Ready Aircrew Program* (Santa Monica, Calif.: RAND Corporation, October 2018).

For the authorization act, see Pub. L. No. 114-328, § 351 (2016).

The RAND report addressed the third statutory element by making recommendations for the improved management of training requirements. Specifically, the RAND report made nine recommendations, listed in table 2.

Table 2: RAND Report Recommendations on the Air Force Ready Aircrew Program

Recommendations for Improving the Use of Proficiency Metrics

1. Leverage internal expertise to formally implement comprehensive measures for proficiency.
2. Invest resources to design data collection and storage solutions that facilitate analysis and readiness reporting.

Recommendations for Improving Combat Aircraft Continuation Training

3. Document the Ready Aircrew Program Tasking Memorandum development process in Major Command Air Force instruction supplements and ensure that the process incorporates squadron-level input and feedback.
4. Establish a more explicit and formal link between proficiency and Ready Aircrew Program requirements.
5. Document training quality to support requests for training resources.
6. Identify the conditions under which Ready Aircrew Program requirements, including mission types, can be accomplished.
7. Consider changing how Ready Aircrew Program requirements affect the Flying Hour Program.
8. Invest in a new data system or modify the existing data systems to correct data collection and assess deficiencies.
9. Take advantage of Air Force Research Laboratory's work on performance data collection and invest in additional analysis to produce enterprise-wide metrics to evaluate proficiency.

Source: RAND Corporation. | GAO-20-91

Note: The RAND data are from *Independent Review and Assessment of the Air Force Ready Aircrew Program* (Santa Monica, Calif.: RAND Corporation, October 2018).

The RAND Report on the Ready Aircrew Program Was Consistent with Generally Accepted Research Standards

The RAND report and its underlying analysis is consistent with generally accepted research standards for design, execution, and presentation. Table 3 summarizes our assessment of the extent to which the RAND report conformed with these standards.

Table 3: GAO Assessment of the Extent to Which the RAND Report on the Air Force Ready Aircrew Program Conformed with Generally Accepted Research Standards

Generally accepted research standard	Met / Not met	Comments
Design—Study is well designed.	Met	RAND's assessment design of the Air Force Ready Aircrew Program used multiple data-collection methods and was consistent with generally accepted research standards. For example, in its research design, RAND reports that it included the following: • Review of available literature on Air Force readiness. • Site visits to regular and National Guard Air Force locations. • Discussion groups with a range of Air Force personnel and subject-matter experts to obtain in-depth personnel views concerning metrics to measure pilot proficiency. • Examination of Air Force personnel flight data to determine the extent to which Air Force Ready Aircrew Program requirements had been met to assess the "effectiveness" of the Ready Aircrew Program. • Comparison of mishap data against data on hours flown per pilot to determine whether there were links between errors and experience.
Execution—Study is well executed.	Met	RAND's description of how it collected the data and conducted the analyses needed to answer its researchable questions was consistent with generally acceptable research standards. For example, in its collection and analysis, RAND did the following: • Visited eight Air Force locations. • Conducted workshops with key Air Force personnel chosen to represent different military ranks, flight ratings, qualifications, and planes flown. • Obtained needed data on the degree to which requirements were met directly from Air Force bases after determining that its analysis was impeded by the lack of a centralized database on completed training. • Obtained Air Force data on flying hours and mishaps for a variety of aircraft to allow for graphical and statistical comparisons between experience and errors.
Presentation—Results are well presented.	Met	RAND's report followed generally accepted standards in its presentation, organization, and discussions of the data and methods used. For example, the RAND report did the following: • Presented findings and conclusions that were supported by the evidence collected and the analyses performed. • Sourced the data presented in the report (e.g., data on the extent to which Ready Aircrew Program requirements were met) to the Air Force bases that had provided the data. • Included the lack of centralized data as a finding. • Included detailed information in the appendixes on the workshops' methodology and findings and additional data on the comparisons between flying hours and errors.

Source: GAO analysis of RAND Corporation data. | GAO-20-91

Note: RAND data are from *Independent Review and Assessment of the Air Force Ready Aircrew Program* (Santa Monica, Calif.: RAND Corporation, October 2018).

The RAND Report on the Ready Aircrew Program Identified Similar Deficiencies as Reported by Us in 2016

The RAND study and our previous audit work identified similar deficiencies in the management and operation of the Ready Aircrew Program. Specifically, in September 2016, we reported that the Air Force had used the same underlying assumptions to establish its annual training requirements in the Ready Aircrew Program from 2012 through 2016, which may not reflect current and emerging training needs.[10] We concluded that without fully reassessing the assumptions underlying its training requirements, the Air Force could not be certain that its annual training plans are aligned with its stated goals to ensure a full-spectrum-capable force that can successfully achieve missions across a broad range of current and emerging threats. We recommended that the Air Force comprehensively reassess the assumptions underlying its annual training requirements—and make any appropriate adjustments in future aircrew training plans to ensure that its forces can accomplish a full range of missions.

Additionally, in our September 2016 report, we also reported that the Air Force did not systematically evaluate the effectiveness of training performed as part of the Ready Aircrew Program. We recommended that the Air Force establish desired learning objectives and training support elements needed to accomplish the training expectations identified by the Ready Aircrew Program and develop a process to collect data to assess the effectiveness of annual training against these features. We discuss these recommendations and their status in more detail later in this report.

The Air Force Reported Some General Actions to Link Readiness to Training but Plans No Further Actions in Response to RAND Recommendations

Section 351 of the NDAA for Fiscal Year 2017 required the Air Force to report on any actions it plans to take in response to RAND's recommendations and to estimate the resources required to implement

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[10]GAO, *Air Force Training: Further Analysis and Planning Needed to Improve Effectiveness*, GAO-16-864 (Washington, D.C.: Sept. 19, 2016).

the recommendations. On August 30, 2018, the Air Force provided its report—a one-page transmittal letter from the Secretary of the Air Force with the RAND report incorporated as an enclosure—to congressional committees in fulfillment of the Section 351 requirements. In its report, the Air Force agreed with RAND that more investment is needed in data collection because its current system does not lend itself to analysis that could be used to gain efficiencies. The Air Force also stated that it is addressing the RAND recommendations by working to link readiness to Ready Aircrew Program training requirements. Specifically, the Air Force stated that it was taking the following three actions:

- building training matrices to help commanders assess their units' effectiveness,
- establishing common data architecture through the Air Force's Chief Data Officer–led effort, and
- evaluating aspects of the Ready Aircrew Program to increase lethality and improve readiness as the Air Force shifts to executing the mandates of the 2018 National Defense Strategy.

However, in its August 2018 report, the Air Force did not provide any additional details to further describe or link these broad actions to the RAND findings and recommendations. Therefore, the extent to which these three actions are responsive to the RAND recommendations is unclear.

In October 2019, upon completion of our audit work, Air Force officials provided us with a briefing they described as a corrective action plan that further elaborated on the Air Force's position with respect to each of RAND's nine recommendations. Air Force officials conceded that the actions described in that briefing and plan were already underway at the time of the study and were not initiated in response to the study's recommendations. They stated that, though they generally agreed with the recommendations, the Air Force lacked the manpower, resources, and means to implement them. As such, the Air Force considers each of the recommendations closed and plans no further actions. Further, the Air Force has no plans for future follow-up on implementation of the RAND recommendations. Accordingly, we did not further assess the actions described by the Air Force in relation to the RAND study. Table 4 summarizes the Air Force's position as provided in its corrective action plan briefing.

Table 4: Air Force Status of Actions Taken or Planned in Response to RAND Recommendations According to an October 8, 2019, Briefing to GAO

RAND recommendation in *Independent Review and Assessment of the Air Force Ready Aircrew Program*, July 2018.	Air Force position: concur / partially concur / nonconcur	Air Force's position and explanatory comments on status of recommendations
1. Leverage internal expertise to formally implement comprehensive measures of proficiency.	Partially concur	The Air Force Ready Aircrew Program development process defined in Air Force Instruction (AFI) 11-202, volume 1, "Aircrew Training," and in AFIs for each aircraft type (e.g., AFI 11-2F-16, vol. 1, "F-16 Aircrew Training") establish the minimum standards for proficiency.
2. Invest in resources to design data collection and storage solutions that facilitate analysis and readiness reporting.	Concur	The Aircrew Readiness Training Management Module is currently under development as an upgrade to the Air Force's Aviation Resource Management System. The module will centralize management of the Air Force Ready Aircrew Program Tasking Memorandum at the command level, transfer aircrew training data when a member moves to a new station, and improve capability to track the types of flight simulators used for training.
3. Document the Air Force Ready Aircrew Program Tasking Memorandum development process in Major Command Air Force Instruction supplements, and ensure that the process incorporates squadron-level input and feedback.	Partially concur	The Air Force Ready Aircrew Program development process is defined in AFI 11-202, volume 1, "Aircrew Training," and in AFIs for each aircraft type (e.g., AFI 11-2F-16, vol. 1, "F-16 Aircrew Training," ch. 1 contains detailed information about Air Force Ready Aircrew Program policy and management). The process for developing the annual Air Force Ready Aircrew Program Tasking Memorandum incorporates group and squadron-level input and feedback.
4. Establish a more explicit and formal link between readiness and Air Force Ready Aircrew Program requirements.	Partially concur	The relationship between the Air Force Ready Aircrew Program and readiness measures is established in AFI 10-201, "Force Readiness Reporting." Squadron commanders routinely add comments regarding completion of Air Force Ready Aircrew Program requirements to their monthly readiness assessment reports to indicate the proficiency of assigned aircrew.
5. Document training quality to support requests for training resources.	Concur	The quality of training prescribed in the annual Air Force Ready Aircrew Program Tasking Memorandum is documented at the squadron level. Unit training requirements, their accomplishment, and readiness inputs are aggregated, analyzed, and then factored into the Air Force Ready Aircrew Program Tasking Memorandum and overall flying hour program.
6. Identify the conditions under which Air Force Ready Aircrew Program requirements, including mission types, can be successfully accomplished.	Partially concur	AFI 11-202, volume 1, "Aircrew Training," AFIs for each aircraft type (e.g., AFI 11-2F-16, vol. 1, "F-16 Aircrew Training"), as well as the annual Air Force Ready Aircrew Program Tasking Memorandum establish the minimum requirements for mission accomplishment. Further, the RAND report states that squadron commanders indicated confidence in having sufficient information on which to judge the readiness and proficiency of aircrew in their unit.

RAND recommendation in *Independent Review and Assessment of the Air Force Ready Aircrew Program*, July 2018.	Air Force position: concur / partially concur / nonconcur	Air Force's position and explanatory comments on status of recommendations
7. Consider changing how Air Force Ready Aircrew Program requirements affect the flying hour program.	Nonconcur	The Air Force Flying Hour Program, as defined in AFI 11-102, "Flying Hour Program Management," is a requirements-based program consisting of the flying hours necessary to train aircrews to safely operate aircraft. The Air Force Single Flying Hour Model (AFSFHM) provides the methodology and processes that Major Commands use to build flying hour programs. This model determines the number of flying hours needed to attain and maintain combat readiness for all aircrew requirements. The Joint Mission Essential Task List, the Air Force task lists, and Mission Design Series-specific volumes of the AFI 11-2 series are the foundational requirements that link aircrew training to tasks required to support Combatant Commanders. The centrality of the flying hour program to readiness and combat capability cannot be overemphasized and must be standard across the Air Force, connected to readiness indicators, easily understood, and based upon the requirements to train an aircrew to perform required Air Force missions.
8. Invest in a new data system (or modifications to existing data systems) that corrects deficiencies in current systems for both data collection and access.	Concur	The Aircrew Readiness Training Management Module is currently under development as an upgrade to the Air Force's Aviation Resource Management System. The upgraded system will allow centralized management of Air Force Ready Aircrew Program Tasking Memorandums at the Lead Command level by (1) transferring aircrew training data in the Air Force's Aviation Resource Management System whenever the member moves to a new station and (2) improving capability to track the types of flight simulators used for training.
9. Take advantage of the Air Force Research Laboratory work on performance data collection and invest in additional analysis to produce enterprise-wide metrics to evaluate proficiency.	Partially concur	The Air Force Flying Hour Program development process defined in AFI 11-202, volume 1, "Aircrew Training," and in AFIs for each aircraft type (e.g., AFI 11-2F-16, vol. 1, "F-16 Aircrew Training") already establish the minimum standards for proficiency.

Source: United States Air Force, Headquarters, Combat Air Forces Division. | GAO-20-91

As described in table 4, the Air Force concurred with three recommendations, partially concurred with five, and did not concur with one. The following summarizes the Air Force position by concurrence category:

Concur: In concurring with RAND Recommendations 2 and 8—to invest in data systems for the collection, access, and storage of data to correct deficiencies in current systems and improve analysis and readiness reporting—the Air Force stated that, before the recommendations were made, it had made available $5.15 million in fiscal year 2020 funding to develop an Aircrew Readiness Training Management Module as an upgrade to the Air Force's Aviation Resource Management System. The Air Force expects that this

module will centralize management of the Air Force Ready Aircrew Program Tasking Memorandum at the command level, transfer aircrew training data whenever a member moves to a new station, and improve capability to track the types of flight simulators used for training. Further, because the Air Force does not plan to take additional actions, it estimated no resources are required, beyond the $5.15 million already funded, prior to RAND making these recommendations.

In concurring with RAND Recommendation 5—to document training quality to support requests for training resources—the Air Force explained that it is documenting the quality of training prescribed in its annual Air Force Ready Aircrew Program Tasking Memorandum at the squadron level. However, this is not a change based on the RAND recommendation and was being done prior to RAND making this recommendation. The Air Force factors unit training, accomplishments, and readiness inputs into the Air Force Ready Aircrew Program Tasking Memorandum and overall flying hour program. As the flying hour program is the basis for resource training requests and the Air Force factors unit training and accomplishments into its flying hour program, the Air Force explained that it plans to take no additional actions based on this recommendation. Further, because the Air Force does not plan to take additional actions, it estimated no resources were required to implement this recommendation.

Partially Concur: In partially concurring with RAND recommendations 1, 3, 4, 6, and 9, Air Force officials explained that the mechanisms reflected in its comments are sufficient to address the intent of the RAND recommendations even though these mechanisms predated RAND's recommendations. Consequently, according to the Air Force officials who briefed us, the Air Force plans no additional actions based on the recommendations, obviating the need to estimate resources in the case of these five recommendations.

Nonconcur: In not concurring with RAND Recommendation 7—to consider changing how Air Force Flying Hour Program requirements affect the flying hour program—the Air Force explained that the flying hour program determination is standard across the Total Air Force, affecting more than combat aircrews alone, and that the centrality of the flying hour program to readiness and combat capability cannot be overemphasized and must be defendable and auditable. Further, based on its not concurring with this recommendation, the Air Force did not estimate resources for this recommendation.

Notwithstanding the RAND study, the actions taken by the Air Force may not fully implement our prior recommendations as described previously. Specifically, we recommended that the Air Force comprehensively reassess the assumptions underlying its annual training requirements—including for example the total annual training requirements by aircraft, the criteria for designating aircrews as experienced or inexperienced, and the mix between live and simulator training—and make any appropriate adjustments in future aircrew training plans to ensure that its forces can accomplish a full range of missions. While RAND accomplished such an analysis as part of its review (see table 1, items 1(a) through 1(e) above), RAND concluded in its analysis that the Air Force did not have the objective measures of proficiency needed to determine the minimum and optimum number of sorties and that the combat air forces aviation community lacks consensus on how to define and measure an aircrew member's proficiency. While the Air Force has defined proficiency in an Air Force manual issued in September 2019, the Air Force has not reassessed its assumptions underlying training requirements and made appropriate adjustments to future training plans per our recommendation.

Further, we recommended that the Air Force establish desired learning objectives and training support elements needed to accomplish the training expectations in its annual Ready Aircrew Program tasking memorandums, and develop a process to collect data to assess the effectiveness of annual training. In commenting on RAND's recommendations 2 and 8, the Air Force stated that, before the recommendations were made, it had made available $5.15 million in fiscal year 2020 funding to develop an Aircrew Readiness Training Management Module as an upgrade to the Air Force's Aviation Resource Management System. The Air Force's effort to upgrade this system, while not a result of the RAND recommendations, may meet the intent of our recommendation. For example, the Air Force's development of the Aviation Resource Management System is expected to centralize management of the Air Force's Ready Aircrew Program training requirements data at the command level, transfer aircrew training data whenever a member moves to a new station, and improve capability to track the types of flight simulators used for training. When fully implemented, these improvements may ultimately allow the Air Force to assess the effectiveness of annual training, as we recommended. However, it is too early to tell as the actions were under development or had just begun at the end of September 2019, and sufficient data to evaluate the results have not been collected.

Fully implementing both of our recommendations would better position the Air Force to ensure that its aircrews receive effective training to achieve a range of missions for current and emerging threats.

Agency Comments and Our Evaluation

We provided a draft of this report to DOD for review and comment. In its written comments (reprinted in appendix II), DOD stated that it saw great value in our discussion. DOD added that its position on the two recommendations we made in our 2016 report—with which DOD did not concur—is fundamentally unchanged. However, we continue to believe the recommendations should be implemented by the Air Force, as previously discussed in this report.

In its comments, DOD also stated that it is addressing training infrastructure and aircrew proficiency through two initiatives. First, in response to the 2018 National Defense Strategy, the department's Joint Operational Infrastructure Plan is framing the modernization effort of DOD-wide Operational Infrastructure. The Joint Operational Infrastructure Plan specifically addresses areas such as Live Virtual Constructive and aircrew training. Second, the department is pursuing efforts to align training events with the range of current and evolving threats. According to DOD, both efforts will address the underlying assumptions for aircrew training and proficiency with reportable readiness metrics.

However, the Joint Operational Infrastructure Plan is a draft and not yet officially issued, according to an official at the Office of the Under Secretary of Defense for Personnel and Readiness. Therefore, details needed to assess this plan are not yet available for us to consider in determining whether the change will help to address the recommendations we made in 2016. Regarding efforts the department is pursuing to better align training events, the DOD comments did not include sufficient details to allow us to state whether the change could be helpful in addressing our recommendations. Nonetheless, to the extent that DOD is successful in completing, issuing, and implementing its new Joint Operational Infrastructure Plan, or takes further actions related to our prior recommendations, we will consider them as we continue to analyze DOD efforts to address our recommendations.

We are sending copies of this report to the appropriate congressional committees, the Secretary of Defense, the Under Secretary of Defense for Personnel and Readiness, and the Secretary of the Air Force. In

addition, the report is available at no charge on the GAO website at http://www.gao.gov.

If you or your staff have any questions about this report, please contact me at (202) 512-5431 or russellc@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made major contributions to this report are listed in appendix III.

Cary B. Russell
Director, Defense Capabilities and Management

List of Committees

The Honorable James M. Inhofe
Chairman
The Honorable Jack Reed
Ranking Member
Committee on Armed Services
United States Senate

The Honorable Richard C. Shelby
Chairman
The Honorable Dick Durbin
Ranking Member
Subcommittee on Defense
Committee on Appropriations
United States Senate

The Honorable Adam Smith
Chairman
The Honorable Mac Thornberry
Ranking Member
Committee on Armed Services
House of Representatives

The Honorable Pete Visclosky
Chairman
The Honorable Ken Calvert
Ranking Member
Subcommittee on Defense
Committee on Appropriations
House of Representatives

Appendix I: GAO's Criteria for Generally Accepted Research Standards

To determine whether the RAND report followed generally accepted research standards, we chose the following criteria, which are based on a review of research literature and Department of Defense (DOD) guidance, from which we identified frequently occurring, generally accepted research standards that are relevant for defense studies, including those related to the presentation of results. These standards have been used in a number of our prior reports, modified as appropriate for each situation.

For the purposes of this engagement, we assessed the RAND study against three major elements, listed below, that fall under generally acceptable research standards, as based on our prior work.[1] These generally accepted research standards are consistent with Office of Management and Budget (OMB) Guidelines [2] and DOD guidance[3] on ensuring and maximizing the quality of information disseminated by federal agencies to the public.

We discussed these standards with RAND officials, who agreed that they were generally consistent with their own quality standards for research and were applicable to this study. We determined that these standards are still current and relevant for the purposes of this report, based on their

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[1]GAO, *DOD Manufacturing Arsenals: Actions Needed to Identify and Sustain Critical Capabilities*, GAO-16-86 (Washington, D.C.: Nov. 17, 2015); *Motor Carrier Safety: Additional Research Standards and Truck Drivers' Schedule Data Could Allow More Accurate Assessments of the Hours of Service Rule*, GAO-15-641 (Washington, D.C.: July 29, 2015); and *Defense Transportation: Study Limitations Raise Questions about the Adequacy and Completeness of the Mobility Capabilities Study and Report*, GAO-06-938 (Washington, D.C.: Sept. 20, 2006).

[2]Office of Management and Budget, *Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information Disseminated by Federal Agencies*, 67 Fed. Reg. 8452 (Feb. 22, 2002). These guidelines are still in effect.

[3]Deputy Secretary of Defense Memorandum, *Ensuring the Quality of Information Disseminated to the Public by the Department of Defense* (Feb. 10, 2003), 68 Fed. Reg. 55944 (Sept. 29, 2003). This memorandum is still in effect.

consistency with OMB and DOD guidance, discussions with RAND officials, and consideration of prior GAO work applying generally accepted research standards with the assistance of GAO's Applied Research and Methods Team. The standards include the following:

Design—Study is well designed. For the RAND study, we focused on the following elements for design:

- The study plan, scope, and objectives follow existing guidance.
- Assumptions and constraints are reasonable and consistent.

Execution—Study is well executed. For the RAND study, we focused on the following elements for execution:

- The methodology is successfully executed.
- Data used to support study and analyses are validated.

Presentation—Results are well presented. For the RAND study, we focused on the following elements for presentation:

- Timely, complete, accurate, concise, and relevant to stakeholders.
- Presentation of results supports findings.

Appendix II: Comments from the Department of Defense

OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE
4000 DEFENSE PENTAGON
WASHINGTON, D.C. 20301-4000

READINESS

FEB 0 6 2020

Cary B. Russell
Director, Defense Capabilities and Management
U.S. Government Accountability Office
441 G Street, NW
Washington, DC 20548

Dear Mr. Russell,

This is the Department of Defense (DoD) response to the GAO Draft Report, GAO-20-91SU, "READY AIRCREW PROGRAM Air Force Actions to Address Congressionally Mandated Study on Combat Aircrew Proficiency" dated December 20, 2019 (GAO Code 103024).

The Department appreciates the opportunity to comment on this draft. We see great value in the discussion. In response to the two specific GAO recommendations in this draft, the Department's position is fundamentally unchanged from the response provided in the May 25, 2016 GAO-16-635 report. However, we offer additional information on current Department readiness efforts. There are two Department initiatives that address training infrastructure and aircrew proficiency. First, in response to the 2018 National Defense Strategy, the Department's Joint Operational Infrastructure Plan frames the modernization effort of DoD-wide Operational Infrastructure. The Joint Operational Infrastructure plan specifically addresses areas such as Live Virtual Constructive and aircrew training. Second, the Department is pursuing efforts to align training events with the range of current and evolving threats. Both efforts will address the underlying assumptions for aircrew training and proficiency with reportable readiness metrics.

If questions should arise, please have your action officers contact Col Steven Erickson at (703) 692-5782.

Sincerely,

Matthew B. Shipley
Deputy Assistant Secretary of Defense (Force Readiness)

Text of Appendix II: Comments from the Department of Defense

Cary B. Russell

Director, Defense Capabilities and Management

U.S. Government Accountability Office 441 G Street, NW

Washington, DC 20548

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Sincerely,

Matthew B. Shipley

Deputy Assistant Secretary of Defense (Force Readiness)

Appendix III: GAO Contact and Staff Acknowledgments

GAO Contact

Cary Russell, (202) 512-5431 or russellc@gao.gov

Staff Acknowledgments

In addition to the contact named above, Beverly Schladt (Assistant Director), John Strong (Analyst in Charge), John Beauchamp, Vincent Buquicchio, Martin De Alteriis, and Lillian Moyano Yob made key contributions to this report.

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