



April 2023

AIRLINE PASSENGER PROTECTIONS

Observations on Flight Delays and Cancellations, and DOT's Efforts to Address Them

Accessible Version

GAO Highlights

Highlights of [GAO-23-105524](#), a report to congressional requesters

Why GAO Did This Study

As air travel in the U.S. began to recover from the pandemic in mid-2021, U.S. passenger airlines experienced frequent flight disruptions. These flight disruptions, including delays and cancellations, continued into 2022 and affected millions of passengers. Industry observers raised questions about airline-scheduling practices, as well as the role of DOT in enforcing consumer protections.

GAO was asked to determine key changes in the U.S. passenger airline industry resulting from the pandemic. This report examines (1) trends in and causes of flight disruptions before and after the pandemic; (2) challenges airlines faced managing and responding to flight disruptions; and (3) FAA and DOT actions to help address them.

GAO analyzed DOT data on U.S. airline operations from January 2018 through April 2022. GAO reviewed relevant federal statutes and regulations. GAO interviewed DOT and FAA officials, as well as representatives from U.S. passenger airlines, unions, and consumer organizations selected based on background research and prior GAO work, among other things.

GAO's draft report recommended that DOT use network-level (i.e., system-wide) data to identify instances of potential unrealistic scheduling. In response, DOT provided additional information about its recent analysis of airlines' scheduling practices. As a result, GAO removed the recommendation and modified the report accordingly.

View [GAO-23-105524](#). For more information, contact Heather Krause at (202) 512-2834 or KrauseH@gao.gov.

April 2023

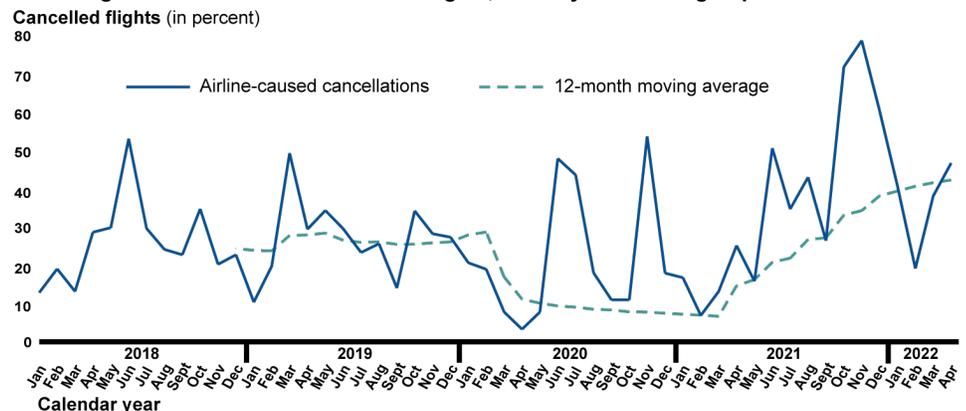
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What GAO Found

Flight cancellation rates in the last 6 months of 2021 outpaced 2018 and 2019 rates despite 14 percent fewer scheduled flights, according to GAO's analysis of data from the Department of Transportation (DOT). Increased cancellation rates continued through April 2022, the most recent data at the time of GAO's analysis. In contrast, flight delays in the last 6 months of 2021 remained at similar rates compared to 2018 and 2019. According to DOT data, factors within the airlines' control (e.g., aircraft maintenance or lack of crew) were the leading cause of cancellations from October through December 2021 as well as in April 2022 and airline-caused delays increased for nearly all airlines in the last half of 2021.

Percentage of Airline-Caused Cancelled Flights, January 2018 through April 2022



Source: GAO analysis of Bureau of Transportation Statistics data. | GAO-23-105524

Stakeholders said that operational challenges, including a need for additional pilots and crew, have made it harder for airlines to manage flight disruptions. In response, airlines added new staff, opened new training facilities, and reduced the number of scheduled flights, among other things. Airline representatives GAO interviewed said they attempt to accommodate affected passengers, offering meal and hotel vouchers. However, consumer advocate representatives were generally not satisfied with airlines' responses, noting the significant inconvenience passengers experienced, such as missing important events.

DOT and the Federal Aviation Administration (FAA) are taking several actions to address flight disruptions. For example, DOT and FAA met with airlines to discuss disruptions and airlines' customer service obligations. In early September 2022, DOT released its Airline Customer Service Dashboard, which shows the services and amenities U.S. airlines provide if the airline causes a delayed or cancelled flight. Additionally, DOT monitors chronically delayed flights—a long standing practice. Over the course of GAO's review, DOT enhanced its oversight of airline-scheduling practices. Specifically, DOT began analyzing system-wide cancellation and on-time performance data and routinely meeting with airlines to review their scheduling and operational performance. DOT plans to continue these actions.

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Abbreviations

ASQP	Airline Service Quality Performance System
BTS	Bureau of Transportation Statistics
CDC	Centers for Disease Control and Prevention
DOT	Department of Transportation
FAA	Federal Aviation Administration
NPRM	notice of proposed rulemaking
PSP	Payroll Support Program
TSA	Transportation Security Administration

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April 13, 2023

The Honorable Sam Graves
Chairman
Committee on Transportation and Infrastructure
House of Representatives

The Honorable Garret Graves
Chairman
Subcommittee on Aviation
Committee on Transportation and Infrastructure
House of Representatives

The COVID-19 pandemic had a severe and profound effect on the U.S. aviation industry. Domestic passenger airlines experienced an unprecedented drop in passenger traffic in 2020, and since then their recovery has been uneven. Congress provided about \$54 billion to passenger airlines through the Payroll Support Program (PSP).¹ Despite this support, which barred recipient airlines from conducting involuntarily furloughs or terminations during certain time periods, many airlines reduced their workforce, including pilots and flight attendants, through early retirements or other incentives to help manage costs.²

Due to these workforce reductions, airlines faced challenges resuming operations when travel demand began to rapidly recover in the spring and summer of 2021. Several severe, high-profile flight disruptions—involving flight cancellations and delays—affected thousands of passengers in the summer and fall of 2021. For example, Spirit Airlines cancelled more than 2,000 flights in late July and August 2021, according to media outlets and the airline’s financial filings. As flight disruptions have persisted

¹Pub. L. No. 116-136, § 4112, 134 Stat. 281, 498 (2020) (codified at 15 U.S.C. § 9072); Pub. L. No. 116-260, div. N, tit. IV, § 402, 134 Stat. 1182, 2053 (2020) (codified at 15 U.S.C. § 9092); Pub. L. No. 117-2, § 7301, 135 Stat. 4, 104-107. Including these funds, COVID-19 relief laws have provided more than \$100 billion in assistance for aviation businesses and airports since March 2020, in response to the public health and economic crises.

²For information about the effects of the pandemic on the aviation industry, among other things, see GAO, *COVID-19 Pandemic: Observations on the Ongoing Recovery of the Aviation Industry*, [GAO-22-104429](#) (Washington, D.C.: Oct. 21, 2021).

throughout 2022, affecting millions of passengers, industry observers have raised questions about the extent to which the pandemic has permanently affected the passenger airline industry—and whether the Department of Transportation (DOT) is fulfilling its mission to protect passengers, especially those who have been affected by the ongoing flight disruptions.³

You asked us to review key changes in the U.S. passenger airline industry resulting from the COVID-19 pandemic. This report addresses three objectives:

1. how flight disruptions in 2021 and 2022 and their underlying causes compare to the 2 years preceding the COVID-19 pandemic;
2. the operational challenges airlines faced in managing flight disruptions, and actions airlines have taken to address them; and
3. the actions taken by DOT and the Federal Aviation Administration (FAA) in 2021 and 2022 to help address flight disruptions.

To address these objectives, we analyzed data collected by DOT's Bureau of Transportation Statistics (BTS) from January 2018 through April 2022, the most recently available data at the time of our analysis, on U.S. domestic flight delays and cancellations and airline operations.⁴ Because there is a several month lag before BTS publishes each month's airline performance data, our data analysis is limited to the first 4 months of 2022. We determined the data were sufficiently reliable for our purposes by reviewing documentation and electronic testing of data. Further, we conducted semi-structured interviews with representatives from a non-generalizable sample of 15 stakeholders, including four airlines; three unions representing pilots and flight attendants; three industry associations; two consumer organizations; one trade association; and two academics. We also interviewed DOT and FAA officials. For additional information on our scope and methodology, see appendix I.

We conducted this performance audit from November 2021 to April 2023 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain

³More recently, during the 2022-2023 holiday season, Southwest Airlines delayed and cancelled thousands of flights over multiple days.

⁴For the purposes of our analysis, we excluded 2020 data in certain instances. Given the effects of the pandemic on the industry, 2020 airline operational data are not comparable to other years.

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

Airline Operations and Flight Disruptions

The U.S. passenger airline industry, composed primarily of network, regional, and low-cost airlines, is a vital contributor to the domestic economy. In 2019, the U.S. aviation industry supported \$852.3 billion in direct economic activity, and contributed 2 percent of U.S. gross domestic product, according to a report issued by FAA.⁵ The aviation industry also plays a critical role in supporting tourism and other travel-related industries. Network airlines operate complex hub-and-spoke operations with thousands of employees and hundreds of aircraft. Regional airlines operate smaller aircraft, typically under contract to network airlines, and generally provide service to smaller communities. Low-cost airlines tend to operate more affordable point-to-point service mostly within the U.S.

Airline operations are complex, and many factors may affect airlines' operational and on-time performance. Tens of thousands of flights on average operate in the National Airspace System each day. As part of these operations, airlines have always experienced some amount of flight disruptions, which can include prolonged flight cancellations and delays.⁶ Some of the factors that cause flight disruptions, such as mechanical

⁵FAA, *The Economic Impact of U.S. Civil Aviation: 2020*. These values represent the direct aviation sector, which includes airline and airport operations, and aircraft manufacturing, among other things. This report also includes information about the economic impact of civil aviation in 2020.

⁶For the purposes of reporting airline performance data to DOT, a cancellation is a flight operation that was not operated, but that was listed in a carrier's computer reservation system within 7 calendar days of the scheduled departure. 14 C.F.R. § 234.2. Delays can range in severity. For the purposes of reporting an arrival delayed flight to BTS, airlines must report a flight as delayed if it arrives at the gate 15 minutes or more after its published arrival time. "Diversions," defined as a flight that is operated from the origin to a point other than the scheduled destination point, are another type of flight disruption. We excluded diversions for the purposes of this report. Although in law, U.S. airlines are generally referred to as "air carriers" we will refer to them as "airlines" for the purpose of this report.

issues or crew staffing, are within the airline's control, while other factors, such as weather, are not.

Federal regulations require that U.S. passenger airlines report monthly data to BTS on airline operations and on-time performance, including data on cancellations, delays, and their causal factors.⁷ BTS requires that airlines report the primary cause of cancellations in one of the following categories:⁸

- **Air carrier (Airline):** This category includes factors that are within the airline's control, such as aircraft maintenance or a lack of crew.
- **Extreme weather:** This category includes actual or forecasted weather conditions that prevent the operation of the flight or subsequent flights due to the aircraft being out of position because of weather conditions.
- **National Aviation System:** This category includes factors that are within the National Aviation System, including, for example, non-extreme weather, heavy traffic volume, and air traffic control issues.
- **Security:** This category includes factors resulting from the malfunctioning screening or security equipment, or certain breaches of security.⁹

These same four categories apply when airlines report arrival delays. For arrival delays, however, airlines can attribute a delay to a fifth category: late arriving aircraft, which are delays that are the result of a late incoming aircraft from a previous flight. Unlike for cancellations, airlines must report each cause of delay that contributes 5 minutes or more to the delay.

⁷Airlines whose domestic scheduled-service passenger revenues exceeds 0.5 percent are required to report on-time performance to DOT. 14 C.F.R. § 234.2. Reporting airlines include network airlines, regional airlines, low-cost airlines, and ultra-low cost airlines. In 2022, 17 airlines were required to report data to BTS. These airlines represent approximately 96 percent of passenger traffic in the U.S., according to DOT officials.

⁸Although airlines typically track specific reasons for flight delays and cancellations internally, they only report a single cause for a cancelled flight to BTS.

⁹Pursuant to DOT guidance, this category also includes compliance with federal directives and notices to mitigate the spread of COVID-19, closure of National Aviation System facilities to protect people from the spread of COVID-19, and airline management of system capacity because of actions to mitigate the spread of COVID-19. See *Reporting the Causes of Flight Delays and Cancellations Given the Unprecedented Impact of the COVID-19 Public Health Emergency on Air Travel*, United States Department of Transportation Office of the Secretary (April 17, 2020).

Airlines must also report the total minutes the cause contributed to the delay. Therefore, airlines may report multiple causes to BTS for a single flight delay.

When airline operations are disrupted, airlines attempt to minimize the effects of disruptions on their network and passengers. As we have previously reported, flight delays and cancellations that occur in one location of an airline's network can cause subsequent disruptions elsewhere in the airline's network.¹⁰ This ripple effect often occurs because key resources, such as aircraft and airline's staff, do not get to their next destination in time to operate the subsequent flight. As a result, flight disruptions can persist for days after the event that triggered the disruption if the airline does not have sufficient capacity to clear the backlog.

Passenger Airlines and the Pandemic

During the COVID-19 pandemic, which triggered an unprecedented reduction in demand for air travel in 2020, Congress established multiple federal relief programs for the aviation industry totaling more than \$100 billion.¹¹ One of these programs, PSP, provided up to \$54 billion in financial assistance for passenger airlines to use exclusively for employee wages, salaries, and benefits. This assistance contained provisions to keep employees on airlines' payroll.¹² According to an aviation industry association, maintaining a stable workforce helped airlines be better positioned to restart operations when demand for air travel recovered.

¹⁰GAO, *National Airspace System: DOT and FAA Actions Will Likely Have a Limited Effect on Reducing Delays during Summer 2008 Travel Season*, [GAO-08-934T](#) (Washington, D.C.: July 15, 2008).

¹¹For a summary of these programs, see [GAO-22-104429](#).

¹²In total, PSP provided up to \$63 billion for passenger airlines, cargo airlines, and aviation contractors. According to data available in March 2022, passenger airlines received about \$53.4 billion in payments, aviation contractors received about \$4.6 billion, and cargo airlines received about \$827.4 million. Most of the remaining funds were appropriated but not awarded to cargo airlines, because total demand by cargo airlines was far below available funds. For more information about the program, see GAO, *COVID-19: Current and Future Federal Preparedness Requires Fixes to Improve Health Data and Address Improper Payments*, [GAO-22-105397](#) (Washington, D.C.: April 27, 2022).

PSP was implemented through three COVID-19 relief laws.¹³ Each of the three rounds of PSP prohibited airlines from conducting involuntary furloughs and terminations and required airlines to maintain minimum service obligations, among other things. These requirements generally only applied during timeframes specified in each COVID-19 relief law. For the most recent round of PSP, prohibitions on involuntary furloughs and terminations expired the later of September 30, 2021, or when the recipient had expended all of its payroll support.

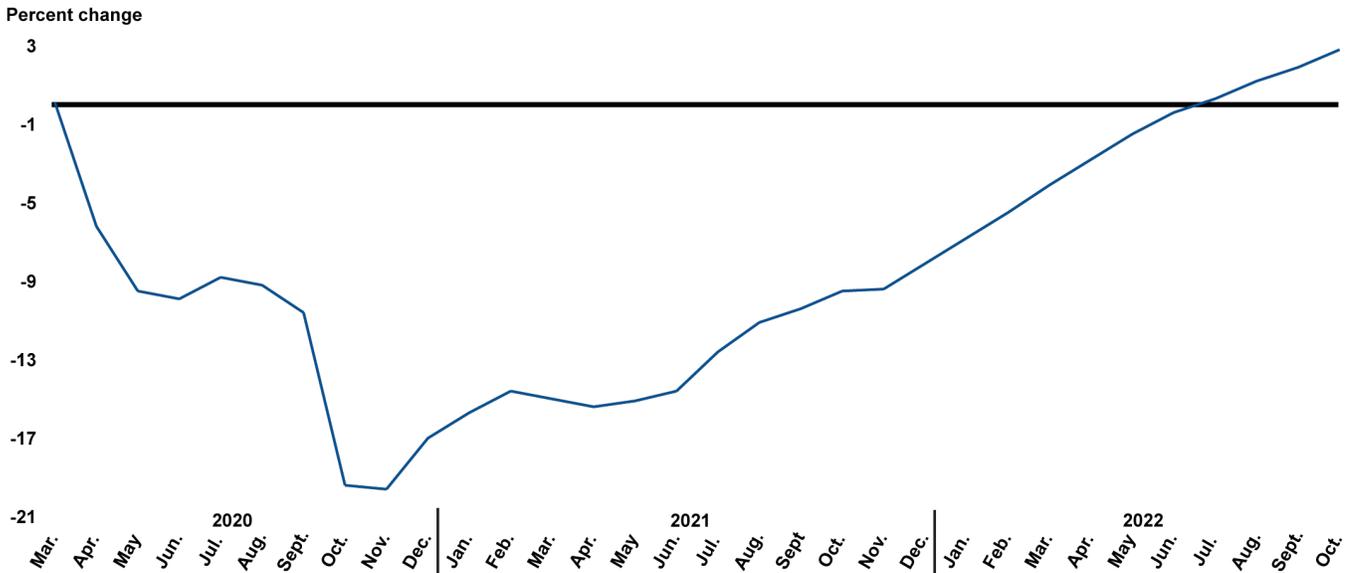
While recipients receiving payments from PSP were prohibited from conducting involuntary terminations and furloughs during specified time periods, they could—and did—offer voluntary incentives to reduce their workforce. Those incentives included voluntary unpaid leave or separation or early retirement. For example, at one airline about 18,000 employees participated in early retirement and voluntary separation programs in 2020, according to the airline’s financial filings. Airlines also halted non-essential hiring.

These actions resulted in significant reductions in the airlines’ workforces in 2020, as shown in figure 1. For example, the number of full-time employees for major U.S. passenger airlines decreased by about 9.5 percent between February 2020 and May 2020.¹⁴ As passenger demand for air travel returned in the spring of 2021, airlines began hiring new employees, including pilots. In October 2022, the number of full-time employees at major U.S. passenger airlines was 2.8 percent above pre-pandemic levels (February 2020).

¹³These laws were the CARES Act (Pub. L. No. 116-136, § 4112, 134 Stat. 281, 498 (2020) (codified at 15 U.S.C. § 9072), the Consolidated Appropriations Act, 2021 (Pub. L. No. 116-260, div. N, tit. IV, § 402, 134 Stat. 1182, 2053 (2020) (codified at 15 U.S.C. § 9092), and the American Rescue Plan Act of 2021 (Pub. L. No. 117-2, § 7301, 135 Stat. 4, 104-107)(codified at 15 U.S.C. § 9141).

¹⁴We analyzed data on full-time employees for the major airlines, defined by BTS as airlines with over \$1 billion annual operating revenue. We only analyzed data for passenger airlines, and we excluded five cargo airlines that are considered major airlines.

Figure 1: Percentage Change from March 2020 to October 2022 in Full-Time Employees at Major U.S. Passenger Airlines, Compared to February 2020



Source: GAO analysis of Bureau of Transportation Statistics data. | GAO-23-105524

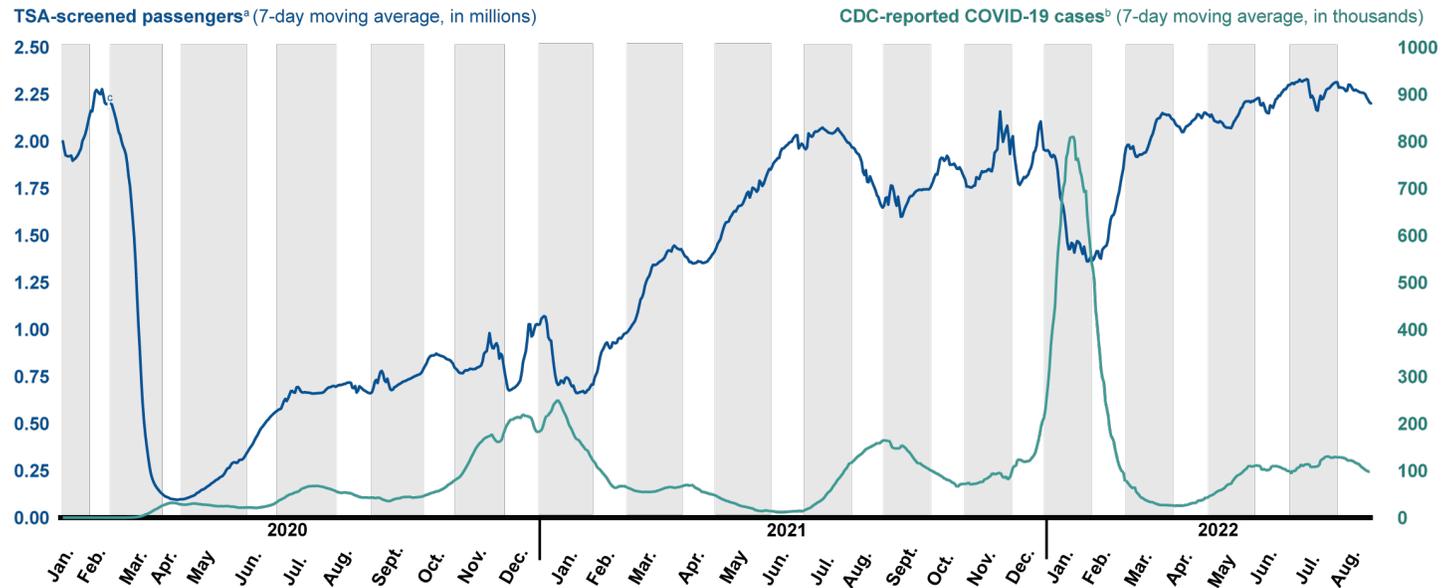
Note: We analyzed data on full-time employees for the major airlines, defined by BTS as airlines with over \$1 billion annual operating revenue. We only analyzed data for passenger airlines, and we excluded five cargo airlines that are considered major airlines.

According to an aviation industry association, by summer 2021, after COVID-19 vaccines became more widely available to the public, passenger demand for domestic leisure air travel was returning to near pre-pandemic levels. For example, the number of passengers on scheduled passenger domestic flights in the second half of 2021 was about 13.6 percent below the number during the same period in 2019.¹⁵ TSA screening data, a proxy for passenger demand, shows that demand for air travel continued to increase in 2022.¹⁶ For example, from January through June 2022 screening levels were about 3.5 percent higher than the previous 6 months. See figure 2 for key trends during the COVID-19 pandemic.

¹⁵Our scope was limited to data from 10 airlines that sell passengers' tickets that report monthly data to BTS. The airlines we included in this calculation were Alaska Airlines, Allegiant Air, American Airlines, Delta Air Lines, Frontier Airlines, Hawaiian Airlines, JetBlue Airways, Southwest Airlines, Spirit Airlines, and United Airlines.

¹⁶TSA screened passenger data include TSA, airport, and airline employees transiting checkpoints and therefore represents slightly more than actual passenger traffic.

Figure 2: Transportation Security Administration (TSA)-Screened Passengers and Centers for Disease Control and Prevention (CDC)-Reported COVID-19 Cases, January 2020 through August 2022



Source: GAO analysis of TSA and CDC information. | GAO-23-105524

^aTSA screened passenger data include TSA, airport, and airline employees transiting checkpoints and therefore represents slightly more than actual passenger traffic. The 7-day moving averages were calculated as the (current day + 6 preceding days)/7, where data were reported. The TSA data were accessed on August 16 and August 18, 2022. TSA data are subject to change.

^bReported COVID-19 cases include confirmed and probable cases. The 7-day moving averages were calculated as the (current day + 6 preceding days)/7, where data were reported. The CDC data were accessed on August 17, 2022.

^cThe TSA screened passenger data on February 29, 2020 were not reported and therefore not included in the 7-day moving average.

DOT’s Regulatory Efforts

While U.S. airlines’ business practices are largely deregulated, a number of consumer protections are in place at the federal level.¹⁷ DOT, which is

¹⁷The Airline Deregulation Act of 1978 largely deregulated U.S. airlines’ business practices, including removing federal control over airline pricing and routes, and state and local governments are generally preempted by federal law from regulating airlines’ prices, routes, or service. See 49 U.S.C. § 41713(b)(1). As such, state governments and individuals are prevented from bringing lawsuits against airlines on prices, services, and routes. However, airline passengers may still bring lawsuits against airlines concerning contractual obligations undertaken by an airline, including for an airline’s failure to honor its contract of carriage, a legal document that includes rights, liabilities, and duties of the airline and passenger.

responsible for ensuring airlines comply with federal consumer protection laws and regulations, has authority to investigate and order airlines to stop engaging in unfair or deceptive practices, and may promulgate consumer protection regulations under this authority.¹⁸ DOT's Office of Aviation Consumer Protection is responsible for investigating potentially unfair and deceptive airline practices, such as unrealistic scheduling of flights. The office also provides compliance assistance to airlines. If DOT finds that an airline has violated consumer protection requirements, it has the authority to take enforcement action, including assessing civil penalties. DOT also provides information to educate passengers about their rights and services provided by airlines.

In addition, DOT requires airlines to provide cash refunds to passengers whose flights are cancelled or significantly changed, and DOT issued a proposed rule in August 2022 to define these terms.¹⁹ Beyond DOT's requirement for airlines to provide cash refunds to passengers for cancelled or significantly changed flights, airline compensation to passengers is generally limited. Airlines are not required to provide accommodations for flight disruptions unless specified in an airline's contract of carriage or customer service plan, although airlines may provide additional accommodations in certain circumstances. As we have previously reported, airline assistance to affected passengers can vary significantly.²⁰ Flight disruptions, particularly if they are long lasting, can significantly inconvenience passengers.

¹⁸See 49 U.S.C. § 41712, 49 U.S.C. § 40101(a)(4),(9).

¹⁹Current regulations do not define cancelled or significantly changed flights in the context of an airline's legal obligation to provide refunds. However, DOT's August 2022 Notice of Proposed Rulemaking, *Airline Ticket Refunds and Consumer Protections*, proposes to define a significant change of flight itinerary. 87 Fed. Reg. 51550 (Aug. 22, 2022). The proposed definition would include, among other things, changes to a flight itinerary for a domestic flight when a passenger departs from the origination airport 3 or more hours earlier than the scheduled departure, or arrives at the destination airport 3 hours or more later than the scheduled arrival time. DOT also proposes to define a cancelled flight as a flight that was published in the airline's Computer Reservation System at the time the ticket was sold, but was not operated. This rulemaking closed for public comment on December 16, 2022.

²⁰GAO, *Commercial Aviation: Information on Airline IT Outages*, [GAO-19-514](#) (Washington, D.C.: June 12, 2019).

Flight Cancellations Rose Substantially in Late 2021, with Airline-Caused Cancellations and Delays Outpacing Pre-Pandemic Levels

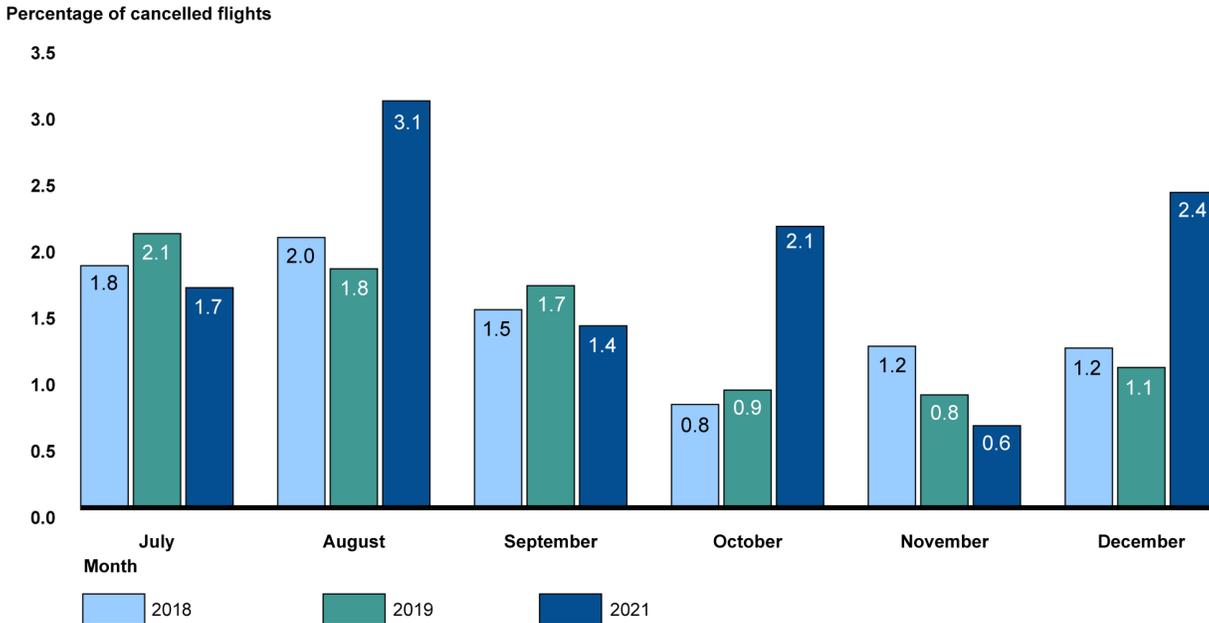
Our analysis found that flight cancellations increased in the second half of 2021 and the first 4 months of 2022, outpacing cancellation rates in both 2018 and 2019 despite fewer flights overall. In addition, BTS data show that factors within the airlines' control were the leading causes of flight cancellations and delays in the last 3 months of 2021, as well as in April 2022.

Flight Cancellations Increased in the Second Half of 2021, Outpacing Pre-Pandemic Rates, but Delay Rates Were Roughly the Same

Based on our analysis, flight cancellation rates increased from July through December 2021, despite around 14 percent fewer scheduled flights during that time period.²¹ In early 2021, air traffic remained low. As travel demand rose in the second half of the year, cancellation rates increased in several months compared to the same time period in 2018 and 2019 (see fig. 3). Specifically, flight cancellations in the last 6 months of 2021—when passenger demand was approaching near pre-pandemic levels—were up approximately 16 percent compared to the last half of 2019. The majority of U.S. airlines reporting data to BTS (7 of 10) cancelled a larger percentage of their flights in the last half of 2021 compared to both 2018 and 2019.

²¹Cancellation rates are calculated by dividing the total number of cancelled flights by the number of scheduled flights.

Figure 3: Percentage of Total Flights Cancelled from July through December, 2018, 2019, and 2021

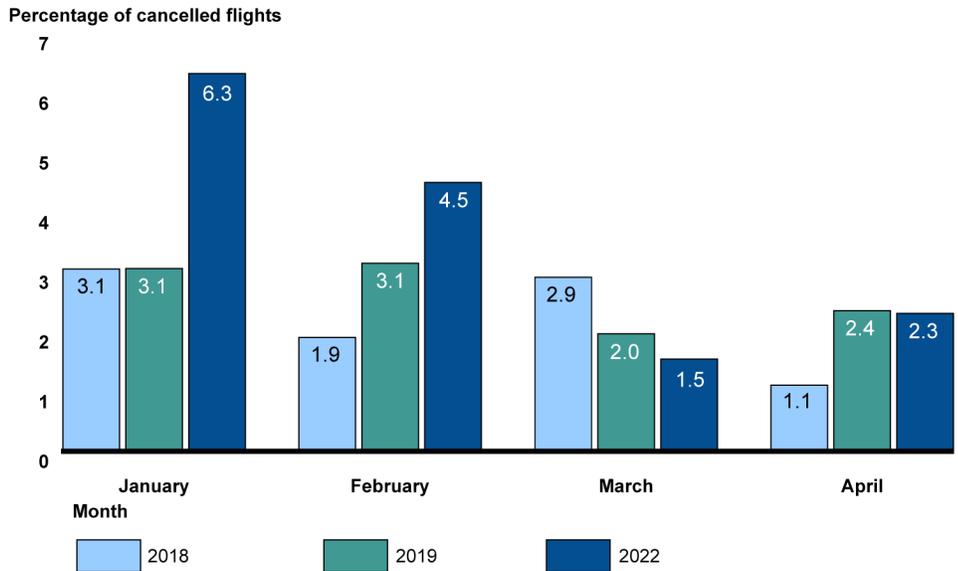


Source: GAO analysis of Bureau of Transportation Statistics data. | GAO-23-105524

Note: For the purposes of this analysis, we excluded 2020 data. Given the effects of the pandemic on the industry, 2020 airline operational data are not comparable to other years.

Flight cancellations increased in early 2022. Compared to 2018 and 2019, airlines continued to cancel flights at higher rates through February 2022, with substantial improvement in March and April (see fig. 4). Many of these winter cancellations were primarily caused by weather events. We found that the total number of flight cancellations in the first 4 months of 2022 (81,593) exceeded the flights cancelled during the same time period in 2018 (56,356) and 2019 (67,190).

Figure 4: Percentage of Total Flights Cancelled from January through April, 2018, 2019, and 2022



Source: GAO analysis of Bureau of Transportation Statistics data. | GAO-23-105524

Note: For the purposes of this analysis, we excluded 2020 data. Given the effects of the pandemic on the industry, 2020 airline operational data are not comparable to other years.

Airlines continued to experience flight cancellations throughout 2022, beyond the timeframe of our analysis.²² According to data separately reported by BTS, cancellations over Memorial Day weekend (Friday May 27, 2022, through Monday May 30, 2022) increased to 3.1 percent of flights compared to 1.1 percent during the 2019 Memorial Day holiday.²³ Flight cancellations continued over the July Fourth 2022 holiday weekend. More broadly, BTS data indicate that the cancellation rate in 2022 was the highest in the past decade, with the exception of 2020. Air travel demand continued to rise despite the disruptions. From January through June 2022, passenger throughput was about 3.5 percent higher than the previous 6 months, according to TSA data.²⁴ Additionally, in December 2022 Southwest cancelled 16,700 flights during the holiday travel period, according to the airline’s financial filings. Media reports at

²²Due to lags in reporting BTS airline performance data, we were only able to analyze flight disruptions between July 2021 and April 2022.

²³BTS reports data about delays and cancellations during holiday travel seasons by reporting airline for 10 major airlines from 1987 to present.

²⁴TSA-screened passenger data include TSA, airport, and airline employees’ transiting checkpoints, and therefore represents slightly more than actual passenger traffic.

the time of the event estimated that these cancellations represented over 70 percent of the airline's scheduled flights on certain days. The disruption resulted in DOT initiating an investigation into Southwest to determine whether the airline set an unrealistic schedule and provided timely refunds and reimbursements to passengers.

Sustained cancellation events, or a series of days where an airline cancelled a large percentage of daily flights, lasted longer and became more common as travel demand increased. Specifically, while some flight cancellations are inevitable due to weather and other events, BTS data indicate that both in the second half of 2021 and in early 2022 airlines experienced longer, more frequent sustained cancellation events as compared to the 2 years before the pandemic.²⁵ Our analysis showed:

- From July to December 2021, on average, it took 1.9 days for an airline to recover from a sustained cancellation event. In comparison, in both the second halves of 2018 and 2019, it took airlines around 1.5 days on average to recover. In the first 4 months of 2022, it took airlines even longer to recover from these events, averaging nearly 3 days per event compared to 1.6 days and 1.3 days in the first 4 months of 2019 and 2018, respectively.
- In the last half of 2021, there were 6.3 percent more sustained cancellation events than during the same time period in 2018, and 12.2 percent more than in 2019, despite 14 percent fewer scheduled flights compared to 2019.²⁶ In the first 4 months of 2022, the number of sustained cancellation events increased even more substantially, with 56.9 percent more events in this time period compared to the same 4-month time period in 2018, and 42.9 percent more than in the first 4 months of 2019.²⁷ There were 12.6 percent fewer scheduled flights during the relevant 2022 time period as compared to the same time period in 2019.

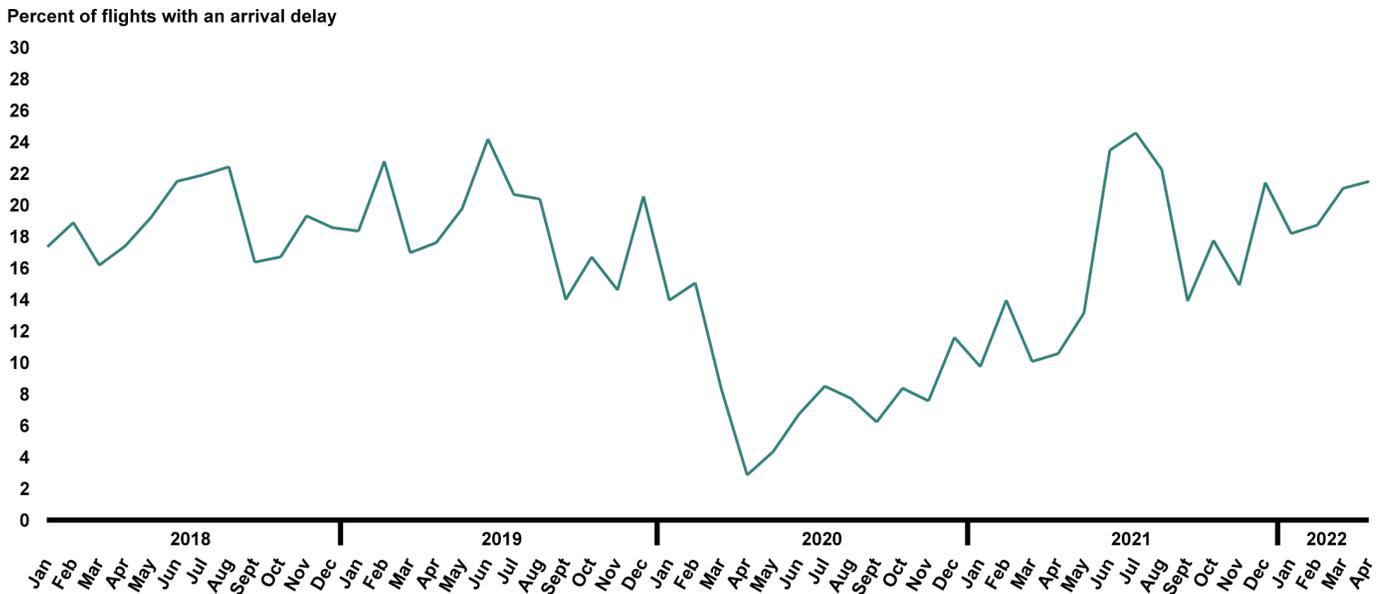
²⁵We defined sustained cancellation events as an ongoing series of days where an airline cancelled flights at a higher rate than 95 percent of the days in 2018 and 2019. When an airline's daily cancellation rate dropped below this threshold, we considered it "recovered" from the event. To account for seasonal trends in airline operations, we adjusted the daily cancellation threshold each quarter.

²⁶From July through December of each year, we identified 95 sustained cancellation events in 2018, 90 in 2019, and 101 in 2021.

²⁷From January through April of each year, we identified 51 sustained cancellation events in 2018, 56 in 2019, and 80 in 2022.

Although flight delays have steadily increased with the return of air travel demand in the summer of 2021, they remained similar to pre-pandemic levels through April 2022 (see fig. 5). In the second half of 2021, approximately 19 percent of domestic flights were delayed at least 15 minutes compared to 18 percent of flights in 2019 and 19 percent of flights in 2018. Flight delays were also similar to pre-pandemic levels for both shorter delays under 45 minutes, and longer delays over 75 minutes. While there may be other contributing factors, fewer flights in the last half of 2021 compared to 2018 and 2019 may have helped mitigate the number of flight delays and congestion in the national airspace.

Figure 5: Percentage of Flights Delayed from January 2018 through April 2022



Source: GAO analysis of Bureau of Transportation Statistics data. | GAO-23-105524

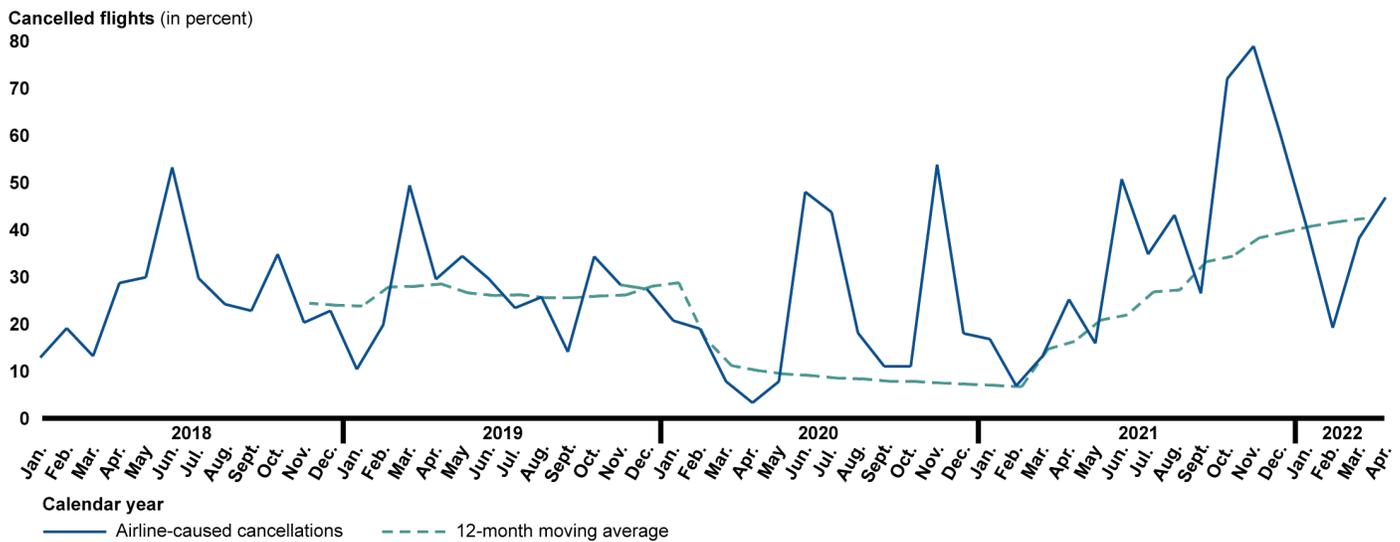
Note: Flights are considered delayed by BTS if they arrive at least 15 minutes late.

Airline-Caused Cancellations and Delays Have Increased Since the Pandemic Began, with a Substantial Increase in Cancellations in Late 2021

Unlike in 2018 and 2019, our analysis of BTS data showed that factors within the airlines' control were the leading causes of flight cancellations

in the last 3 months of 2021.²⁸ In 2018 and 2019, weather was the leading cause of flight cancellations. However, the proportion of airline-caused cancellations began to increase after February 2021 (see fig. 6). From October through December 2021, airlines caused 60 percent or more of flight cancellations each month, exceeding any point reached in 2018 and 2019.²⁹ Airlines were again the leading cause of flight cancellations in April 2022.

Figure 6: Percentage of Cancelled Flights Caused by Airlines, January 2018 through April 2022



Source: GAO analysis of Bureau of Transportation Statistics data. | GAO-23-105524

Note: Airlines attribute cancellations in BTS data to one of four causes: Extreme weather events; Air Carrier (the airline or factors within an airline’s control); the National Aviation System, such as Federal

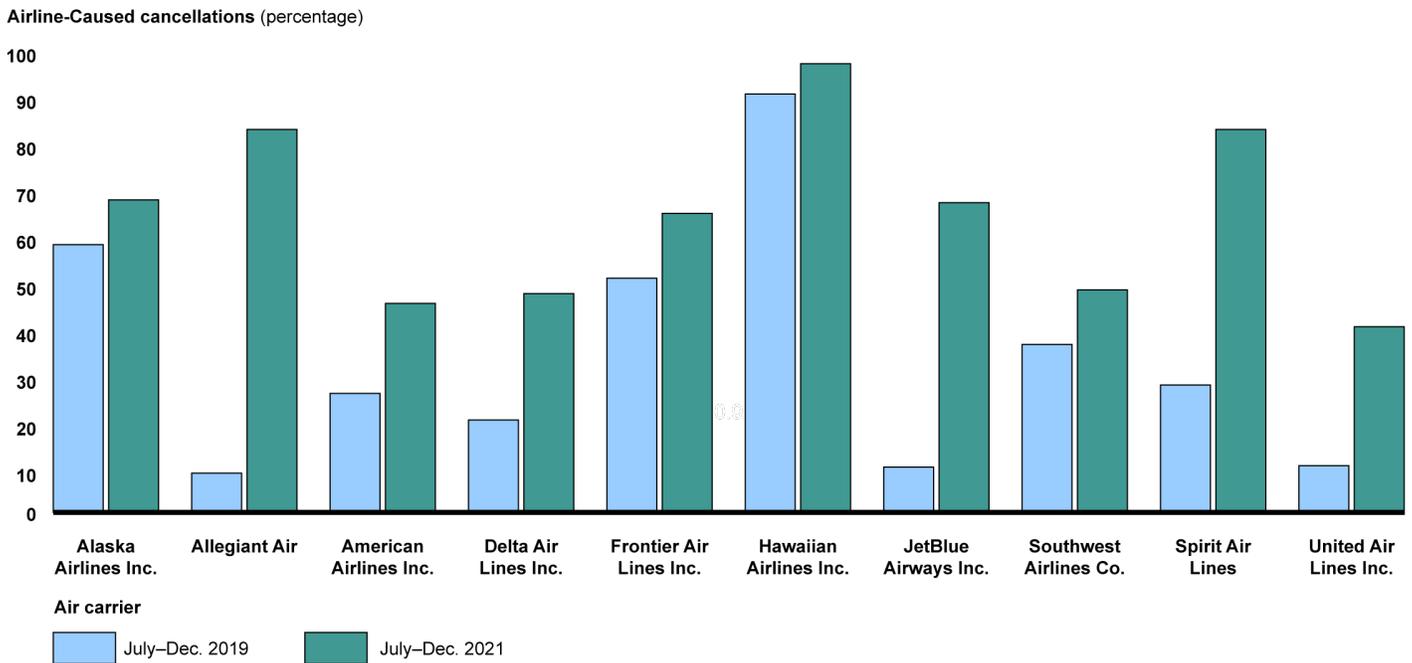
²⁸According to BTS, air carrier delays and cancellations can represent issues like staffing, mechanical issues with a plane, or IT outages; however, these specific causes are not captured in BTS’ data. Airlines are required to report data about delays, cancellations, and causal factors to DOT, and airlines certify the accuracy of the data. DOT officials said that DOT does not take any steps to verify the attributed cause of cancellations or delays. However, DOT does perform some checks to validate the data, including cross checking the data with another database. DOT officials said that the data in the two databases generally correspond.

²⁹Aligning with our data analysis, we found that factors within an airline’s control extended three selected flight disruptions that occurred in late 2021. In each case, airline representatives told us that airline staffing and other operational challenges contributed to each incident, and extended the amount of time it took the airlines to recover from an initial disruptive event, such as severe weather. Appendix 2 provides additional details about each of the flight disruptions we examined and their reported causes, and we discuss airlines’ operational challenges more broadly later in the report.

Aviation Administration ground delays and airspace congestion; or security, such as airport security breaches.

From July through December 2021, the percentage of airline-caused cancellations increased for every airline reporting BTS data compared to 2019 (see fig. 7).

Figure 7: Percentage of Total Cancelled Flights Attributed to Airlines, July through December 2019, 2021



Source: GAO analysis of Bureau of Transportation Statistics data. | GAO-23-105524

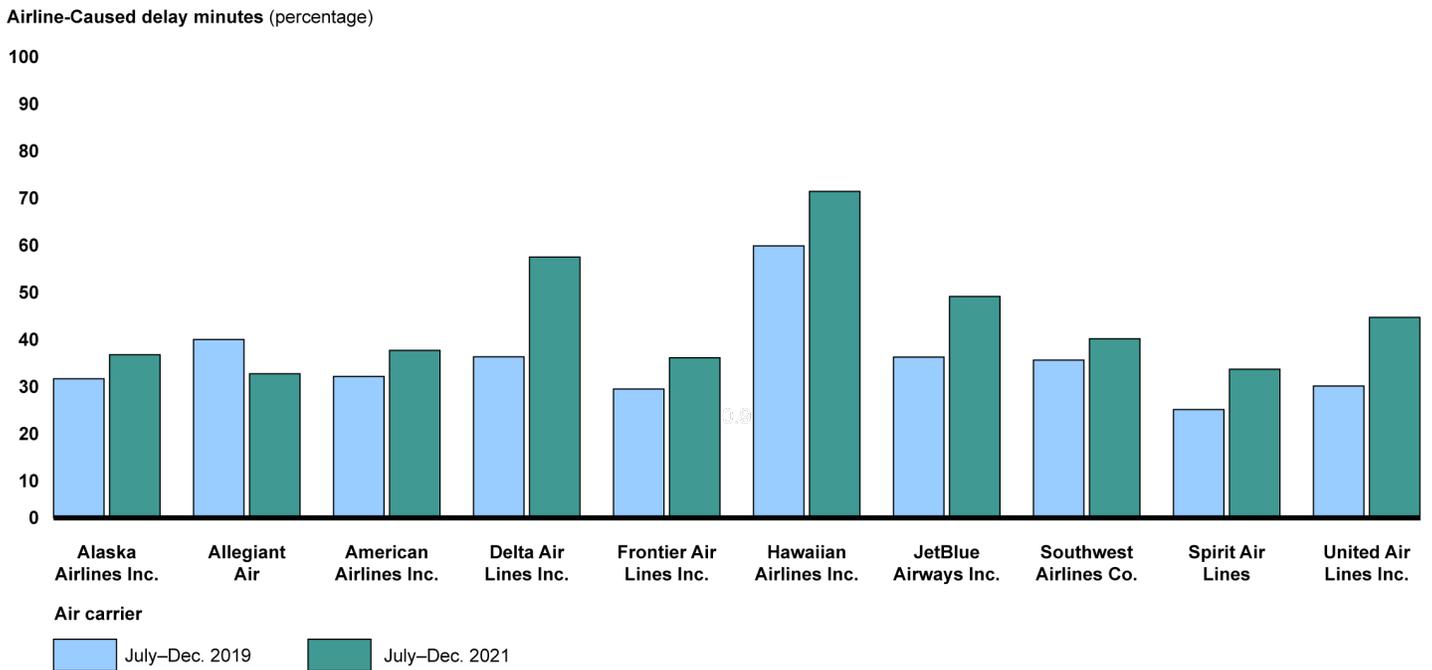
Note: Cancelled flights attributed to airlines represents the percentage of airline-caused cancelled flights out of the total number of flight cancellations during that time period.

Although flights were delayed at similar rates in 2021 overall compared to 2018 and 2019, the reported causes of flight delays changed during the pandemic. In 2018 and 2019, late-arriving aircraft were generally the leading cause of flight delays, shifting to airline-caused delays when the pandemic began in March 2020.³⁰ Airlines continued to be the leading cause of delays throughout 2021, as air traffic returned to near pre-pandemic levels. For all but one airline reporting BTS data, the percentage of airline-caused delays they reported increased in the last half of 2021 compared to the same time period in 2019 (see fig. 8). These

³⁰Late arriving aircraft can cause a delayed flight, but that previous flight is delayed for another cause. Flights flying connected routes are not linked in the BTS dataset, and therefore, the initial cause of the delay is unknown.

patterns generally continued through April 2022. Because airlines can report multiple causes for a flight’s delay and BTS data on delays are reported in minutes, a single flight may have delay-minutes attributed to more than one cause.

Figure 8: Percentage of Delay-Minutes Attributed to Airlines, July through December 2019, 2021



Source: GAO analysis of Bureau of Transportation Statistics data. | GAO-23-105524

While BTS data on flight disruptions (including flight cancellations and/or delays) do not include the number of passengers on each scheduled flight, the 2021 and 2022 flight disruptions affected large numbers of travelers during the pandemic. Our own estimate suggests that flight cancellations from July 2021 through April 2022 potentially affected over 15 million passengers, and flight delays during that time period potentially affected over 116 million passengers.³¹

³¹Our estimate is based on an average of 102 passengers per flight from DOT onboarding data from July 2021 through April 2022. We multiplied this number by the number of cancelled and delayed flights during that same time period, to estimate the number of passengers who were affected by flight disruptions.

Airlines Attempted to Respond to Operational Challenges and Persistent Flight Disruptions with a Range of Actions

Stakeholders Said Staffing and Scheduling Challenges Made It Harder for Airlines to Manage Flight Disruptions

While BTS data do not provide additional detail on cancellations and delays beyond the broad causal categories, airline and union representatives told us that operational challenges made managing disruptive events more difficult when air travel began to rebound in 2021. For example, representatives from all four airlines and three unions we spoke with said it was more difficult than before the pandemic for airlines to ensure they had enough crew to staff aircraft and to set reliable airline schedules.

The airline and union representatives we spoke with cited a number of different staffing challenges that affected their operations, including:

- **A need for additional pilots and crew.** Representatives from three of the four airlines we spoke with said they faced challenges hiring pilots to operate flights due to increased competition for workers. For example, representatives from one airline told us that because all airlines were trying to hire pilots at the same time, each pilot was receiving multiple job offers to pick from. Representatives from one union said that low staffing levels affected a member airline's operations and contributed to a flight disruption in June 2021. Specifically, the airline did not have enough employees available to operate the number of flights needed to match travel demand.
- **Training capacity.** Representatives from three of the four airlines we talked to reported challenges operating training facilities and onboarding new employees as flight operations rapidly increased in 2021. Representatives from one airline told us that they had stopped conducting training during the first year of the pandemic.³² Consequently, the airline had to handle a large number of staff certifications when operations increased. In addition, one union's representatives said that an airline's choice to retire certain aircraft

³²Due to the pandemic, FAA issued regulatory exemptions providing airlines grace periods for certain personnel to complete some training requirements.

added to the backlog, as pilots needed to then be retrained on other aircraft types.

- **Performance of pre-pandemic staffing models.** Representatives from all three unions we interviewed and one industry association acknowledged that some airlines relied on scheduling practices, such as pre-pandemic staffing models, that proved to be too optimistic in light of staffing levels. Representatives from one union said some airlines made poor business decisions by overscheduling flights. These decisions, along with a backlog in training and staff availability issues, complicated airlines' ability to meet their schedules. Representatives from all four airlines also described changes in staffing models, including employees' reluctance to pick up shifts, as a challenge for their operations in 2021. According to representatives from one union, airlines will not be able to plan for as high a sign-up rate for extra shifts as before the pandemic, despite their hiring efforts. Representatives from one airline told us that a reluctance to pick up shifts in 2021 had contributed to flight disruptions.³³ Representatives from two unions told us that pilots and flight crews were more reluctant to pick up shifts for a number of reasons, including disruptive and unruly passengers and increased scheduling uncertainty.

Airlines Have Ongoing Efforts to Address Staffing and Other Operational Challenges

To reduce flight disruptions, airline representatives we interviewed in spring 2022 said they were taking a variety of actions to rebuild their workforces following the pandemic and improve the resilience of their airline networks. Based on these interviews, as well as our review of airlines' publicly available financial documents and press releases, these actions remained a work in progress throughout the summer of 2022.

Many of the actions airline representatives pointed to focused on staffing and training issues:

- **Hiring new employees and increasing incentives.** Since 2021, airlines have worked to hire employees in a range of positions, including pilots, flight attendants, training staff, and staff that are

³³Representatives from one airline said COVID-19 infections among employees were a major contributor to flight disruptions throughout late 2021, but representatives from two airlines said that Omicron-variant infections among their employees contributed specifically to flight disruptions during the 2021 end-of-year holiday period.

responsible for developing crew schedules (i.e., crew schedulers). One airline eventually exceeded the number of employees it had before the pandemic, according to a July 2022 press release.³⁴ Another airline told us it had 75 percent more crew-schedulers in April 2022 than it did during its summer 2021 flight disruption. Representatives from all four airlines we interviewed said that they offered increased pay and other incentives to attract and retain employees. According to three union representatives and two industry associations, airlines were also offering increased pay and other incentives. One industry association representative stated that airlines were offering pilots 200 or 300 percent more pay to fly on certain days.³⁵

- **Increasing training capacity.** To increase training capacity, airlines focused on recruiting new training staff and in some cases, opening new training facilities. Representatives from one airline said that they needed to hire twice the number of training staff to support their hiring efforts. In another instance, airline representatives told us they focused on increasing workforce flexibilities for training staff after experiencing a shortage of flight instructors. Specifically, the airline improved recruitment by allowing flight instructors to work part-time.³⁶ Representatives from another airline said that in response to the employee attrition it experienced, it opened another training facility for flight attendants.
- **Improving staffing models.** Representatives from two airlines told us they had refined their approach to staffing, with the aim of minimizing the number of employees who need to be rescheduled during a flight disruption. For example, representatives from one airline said that they began pairing pilots with flight attendants so that they travel as a group to a hub and then on to the next flight. If a flight is cancelled,

³⁴The airline measured employment levels in terms of full-time equivalent employees, according to the airline's press release.

³⁵For regional airlines, incentives were not always successful at attracting and retaining employees. For instance, a representative from a regional airline we interviewed said that offering increased pay, such as signing and retention bonuses ranging from \$20,000 to \$40,000, was not enough to compete with higher-paying cargo and network airlines. Other regional airlines have signed new contracts that include additional financial incentives, but it is not clear yet how these will affect retention. For example, in September 2022, pilots at Horizon Airlines ratified an amendment to their contract that included pay rate increases of 74 percent for captains and 85 percent for first officers.

³⁶We have previously reported on challenges regarding flight instructor hiring and retention. See GAO, *Collegiate Aviation Schools: Stakeholders' Views on Challenges for Initial Pilot Training Programs*, [GAO-18-403](#) (Washington, D.C.: May 15, 2018).

Effect of Capacity Cuts on Small Communities Access to the National Airspace System

According to the Transportation Research Board, airlines may reduce flights on routes that they view as least profitable or uneconomical to serve, such as smaller communities. According to a 2020 DOT Inspector General report, from 2005 through 2017, small communities lost about one-third of their departures. This report found that when communities that received subsidies through the Essential Air Service Program were excluded, small communities lost about 40 percent of departures on average. As we have previously reported, the pandemic may also exacerbate the loss of service to small communities.

Sources: [GAO-22-104429](#); DOT Office of the Inspector General, Changes in Airline Service Differ Significantly for Smaller Communities, but Limited Data on Ancillary Fees Hinders Further Analysis, EC 2020036 (May 2020). | [GAO-23-105524](#)

the airline keeps the pilot and flight attendants together, and reschedules them on another flight. Before adopting this approach, the airline had to reschedule each employee separately.

Airlines also took actions to improve operational performance system-wide and during flight disruptions:

- **Reducing flights and airline schedules.** Airlines attempted to increase the reliability and resilience of their networks—including their ability to manage and recover from flight disruptions—by reducing flight schedules. In 2021, airlines reduced the number of scheduled flights to respond to flight disruptions, and made additional reductions in 2022. Representatives from three airlines said that after their flight disruptions in 2021, they reduced capacity by decreasing the number of scheduled flights.³⁷ Some of these airlines continued capacity reductions into 2022. For example, in 2022, American Airlines reported in its second quarter public financial report that its domestic capacity during that time period was down 6.6 percent compared to the second quarter of 2019.
- **Developing technology improvements.** Representatives from two airlines we interviewed described technology improvements their airline developed to address flight disruptions more quickly and decrease reliance on manual processes. For example, one airline compiled information about flight disruptions so it could apply lessons learned from past flight disruptions to improve the outcomes of future flight disruptions. To help improve outcomes during a major disruption, the airline also rolled out new technology that it had been working on for several years that identifies flights to delay, rather than cancel, and reschedules those flights. This tool, according to the airline representative, helps achieve better outcomes during a flight disruption because it forces the scheduling system to build the delayed flights later into the schedule, so that the airline can ultimately complete the flight.
- **Providing some accommodations for affected passengers.** During a flight disruption, airlines told us they try to provide compensation for affected passengers. An airline representative said that the airline managed its October 2021 flight disruption by accommodating many

³⁷The fourth airline we interviewed, a regional airline, notified DOT in early 2022 that it did not have staff available to continue providing “Essential Air Service” to 31 small communities and plans to exit these markets. DOT’s Essential Air Service program helps ensure that eligible small communities will be served by a certain minimum level of scheduled air service.

Consumer Advocate and Trade Association Perspective on Airline Accommodations

Two consumer representatives and one trade association we interviewed were generally not satisfied with airlines' responses to flight disruptions and said that more could be done to help passengers. They also characterized airlines' customer service as inadequate. For example, representatives from one consumer advocate and one trade association consumer said that airlines should be held to higher standards, including reducing wait times for passengers who need to be rescheduled on another flight, and providing more advanced notice when flights are disrupted.

The same two consumer representatives and one trade association also identified ticket refunds as a significant issue. Early in the pandemic, airlines offered passengers time-limited travel vouchers for significant delays and cancellations instead of refunds to which consumers were entitled. Two consumer representatives said that strengthening DOT rules around refunds, and increased enforcement action if airlines do not provide timely refunds to passengers would help protect passengers during air travel. We discuss DOT actions relating to refunds later in the report.

Source: GAO analysis of interviews. | GAO-23-105524

passengers on different flights the same day; automatically emailing hotel, meal and transportation vouchers to some passengers; reimbursing hotel, meal, and transportation costs for other passengers; and providing compensation to all passengers affected by delays that were within the airline's control and all cancellations.

While airline representatives said they generally attempt to accommodate passengers who are disrupted by a delay or cancellation, passengers sometimes still experience extensive delays in reaching their final destination. According to a consumer representative, last minute cancellations are especially disruptive to passengers because their other reservations, such as for hotels or cruises, can also be affected. Passengers stranded during trips can also miss important events like weddings or business meetings. Some academic researchers have estimated that the delay a passenger actually experiences can be significantly greater than the amount of time an individual flight or set of flights is delayed.³⁸ Their research suggests that passengers experience significant delays when flights are cancelled, or when a flight delay causes them to miss a connecting flight. If flights that are still operating during a disruption have few empty seats, there will be fewer opportunities to rebook passengers whose flights were cancelled earlier that day, or who missed a connection due to a delay.

³⁸Lance Sherry, "A Model for Estimating Airline Passenger Trip Reliability Metrics from System-wide Flight Simulation," *Journal of Transport Literature* (April 2013); Cynthia Barnhart, Douglas Fearing, and Vikrant Vaze, *Modeling Passenger Travel and Delays in the National Air Transportation System* (2014), *Operations Research* 62 (3): 580-601.

DOT and FAA Are Taking Actions to Address Flight Disruptions, Including Analyzing Airlines' Scheduling Practices

DOT and FAA Are Taking Several Actions to Address Flight Disruptions

DOT's Office of Aviation Consumer Protection applies its existing enforcement approach to promote regulatory compliance with consumer protections.³⁹ According to DOT officials, this approach reflects DOT's preference to use all available tools, including working with industry to ensure they understand their obligations and taking enforcement action for violations of consumer protection regulations, to achieve compliance. DOT used a range of methods in response to flight disruptions during the pandemic. These methods included processing passenger complaints, issuing guidance, including guidance about airlines' obligations to provide refunds for cancelled or significantly delayed flights, conducting investigations, and conducting outreach to airlines. In addition, DOT also took enforcement actions related to airlines' failure to provide refunds for cancelled or significantly delayed flights.

However, given the deregulated nature of the airline industry, DOT has limited authority to regulate airline delays and cancellations. Under its authority to prohibit unfair and deceptive practices, DOT requires that airlines provide refunds for flights that are cancelled or significantly changed. Beyond these requirements, an airline is not required to provide compensation to passengers for scheduling changes unless the airline voluntarily promises to provide compensation such as in its contract of carriage or customer service plan.

In 2020, at the start of the pandemic, DOT received an unprecedented number of complaints about airline practices. In total, DOT received

³⁹In January 2023, DOT issued a notice of its sanction and enforcement practices, titled Notice Regarding Investigatory and Enforcement Policies and Procedures. The notice, issued in response to a prior recommendation we made, describes, among other things, methods that DOT uses to ensure compliance and DOT's intention to take enforcement action when it sees a pattern or practice of violations. Specifically, in October 2020, we recommended that DOT provide additional information on the process it uses to investigate potential consumer protection violations, assess risk, and pursue enforcement action. See [GAO-21-109](#) for additional information.

102,560 complaints in 2020, and although complaints decreased in 2021 (49,958), they are expected to be higher in 2022, significantly above pre-pandemic levels.⁴⁰ In 2020, most complaints submitted to DOT were about ticket refunds (e.g., delays in refunding the cost of a cancelled flight or a passenger being offered a travel credit rather than a cash refund), and refund complaints continued to be the highest ranking complaint category into 2022. Complaints about flight problems, which include delays and cancellations, were the highest-ranking category pre-pandemic, and were ranked fourth in 2020 (see table 1).

Table 1: Annual Refund and Flight Problem Complaints Submitted to the Department of Transportation, 2018 to 2022

Year	Number of Complaints about Refunds ^a	Refund Complaints as a Percentage of Total Complaints	Ranking ^b	Number of Complaints about Flight Problems ^c	Flight Problems Complaints as a Percentage of Total Complaints	Ranking
2018	1,329	8.5	6	4,517	29.1	1
2019	1,574	10.3	5	4,757	31	1
2020	89,511	87.3	1	1,498	1.5	4
2021	29,507	59.1	1	6,311	12.6	2
January through September 2022	14,239	29.2	1	12,607	25.9	2

Source: GAO analysis of Department of Transportation data. | GAO-23-105524.

^aThese numbers include complaints against U.S. airlines, foreign airlines, travel agents, tour operators, and miscellaneous entities.

^bDOT has multiple complaint categories, of which refunds and flight problems are two of the categories.

^cThe flight problems complaint category includes complaints about cancellations, delays, or other deviations from the schedule, whether planned or unplanned. These numbers include complaints against U.S. airlines, foreign airlines, travel agents, tour operators, and miscellaneous entities.

DOT officials stated that they review submitted complaints to determine whether a violation of airline consumer protection laws has occurred. Given the increased volume of complaints received during the pandemic, beginning in 2020 and continuing into 2022, the Office of Aviation Consumer Protection increased the number of staff processing consumer complaints. Specifically, DOT hired 6 temporary employees to help its

⁴⁰These numbers include complaints against U.S. airlines, foreign airlines, travel agents, tour operators, and miscellaneous entities. In 2020, DOT received 35,914 complaints against U.S. airlines, and in 2021, DOT received 20,350 complaints against U.S. airlines. Complaints to airlines are generally much higher than to DOT. DOT estimates that for every complaint the agency receives, airlines receive 50 such complaints. See [GAO-19-76](#). Full year 2022 was not available at the time of our analysis.

existing 15 full-time employees, increasing its staffing level by 40 percent. For fiscal year 2023, DOT received \$1 million above its request to increase efforts to protect consumers from deceptive practices.⁴¹ The fiscal year 2024 budget request includes a request for funding for an aviation consumer complaint system and an approximately \$2 million request to bolster aviation consumer protection activities, including hiring eight additional staff, which will build on staff increases expected to start in 2023.⁴²

In 2020, DOT issued guidance that addresses, among other things, airlines' obligations to provide refunds for cancelled or significantly delayed flights. We have previously reported on these guidance documents, specifically:⁴³

- In April 2020, DOT issued guidance that addresses airlines' legal obligations to provide refunds; that guidance stated that given the challenges facing the industry, DOT would provide airlines an opportunity to become compliant before taking enforcement action against airlines that provided travel vouchers to passengers instead of refunds they were entitled to. Airlines would have to take certain corrective actions to avoid enforcement action.⁴⁴
- In May 2020, DOT issued additional guidance about refunds, which answers common questions to help ensure that passengers understand when they are entitled to a refund, and that airlines are complying with aviation consumer protection requirements. The guidance also stated that airlines could not retroactively apply changed refund policies to passengers and clarified that passengers with non-refundable tickets who changed or cancelled their reservation are generally not entitled to a refund or voucher, even if

⁴¹Joint Explanatory Statement, December 20, 2022.

⁴²DOT, Office of the Secretary of Transportation, *Budget Estimates, Fiscal Year 2024*.

⁴³[GAO-21-109](#).

⁴⁴DOT, *Enforcement Notice Regarding Refunds by Carriers Given the Unprecedented Impact of the COVID-19 Public Health Emergency on Air Travel* (Apr. 3, 2020). These actions included contacting passengers who received a voucher when they were entitled to a refund to notify them of the option for a refund and ensuring that airlines personnel understand the circumstances under which refunds are made.

the changes were because of health or safety concerns related to COVID-19.⁴⁵

DOT has applied this guidance during investigations it conducts. For example:

- In November 2021, DOT settled its investigation with Air Canada for \$4.5 million for its failure to provide timely refunds to passengers during the pandemic for flights it cancelled or significantly changed.
- In January 2021, DOT found that United Airlines had changed its refund policy to restrict the circumstances under which passengers whose flights were changed would be eligible for a refund, and applied the policy retroactively to passengers. DOT advised United Airlines that it considered this action a violation of DOT's prohibition on unfair and deceptive practices. In response to DOT's investigation, in June 2020, United changed its policy and agreed to take other corrective actions. Consistent with its April 2020 and May 2020 guidance, DOT later dismissed complaints related to this issue in January 2021.

In November 2022, DOT took enforcement action against six airlines and assessed more than \$7.25 million in fines for the airlines' extreme delays in providing refunds to passengers whose flights were cancelled or significantly changed by the airline.⁴⁶ While most of these airlines are foreign airlines, DOT fined one domestic airline, Frontier Airlines, due to changes the airline made to its refund policy in March 2020.⁴⁷ Specifically, until March 25, 2020, Frontier defined a significant change that would entitle passengers to a refund as a "schedule change of more than 3 hours." On March 25, 2020, Frontier changed its definition to a schedule change that could not be accommodated on the same calendar day or a misconnection. Frontier applied this policy retroactively and provided credits instead of refunds to tens of thousands of customers who purchased tickets under the earlier more generous policy. The airline also instructed passengers to redeem travel credits through an online system that did not function for 15 days. Due to these actions, DOT fined Frontier

⁴⁵DOT, *Frequently Asked Questions Regarding Airline Ticket Refunds Given the Unprecedented Impact of the COVID-19 Public Health Emergency on Air Travel* (May 12, 2020).

⁴⁶According to DOT officials, these enforcement actions contributed to airlines refunding more than \$600 million to passengers whose flights were cancelled or significantly changed.

⁴⁷Other domestic airlines received more passenger complaints about refunds in 2020 than Frontier Airlines.

\$2.2 million. In late October 2020, Frontier changed its definition of a significant change back to its original definition.

In addition to the investigations and enforcement actions that DOT conducts, officials from the Office of Aviation Consumer Protection monitor airlines that have experienced flight disruptions to discuss the flight disruption and its causes. As part of this monitoring, DOT officials remind airlines of their obligation to comply with their customer service commitments, inquire about the timeliness of refunds provided to affected passengers, and warn airlines about their obligation to set realistic schedules, among other things. For example, after disruptions in Spirit Airline's flights in July-August 2021, DOT officials told us they contacted the airline to discuss the flight disruption, the underlying cause, and to obtain assurance from the airline that it was providing timely refunds to passengers.

DOT also requires that airlines develop and adhere to a customer service plan, which describes the accommodations the airline provides to passengers for flight cancellations or misconnections, as well as airlines' commitments to providing refunds to passengers. According to DOT officials, DOT enforces airlines' adherence to airlines' customer service plans because it would be an unfair and deceptive practice for an airline to promise a service and not provide it. As mentioned previously, DOT requires airlines to provide requested refunds for flights that the airline significantly delays or cancels. However, DOT regulations do not currently define what constitutes a significant delay or cancellation. Airlines instead may set their own threshold for a significant delay, resulting in inconsistent policies across airlines regarding when a passenger is entitled to a refund.

DOT issued a notice of proposed rulemaking (NPRM) that proposes to define some of the terms, such as cancellations and significant changes, which are included in airlines' customer service plans.⁴⁸ Specifically, in August 2022, in part due to the significant increase in passenger complaints about refunds, DOT issued an NPRM entitled, *Airline Ticket Refunds and Consumer Protections*.⁴⁹ In this NPRM, DOT proposes to codify its interpretation that an airline's failure to provide a refund for

⁴⁸*Airline Ticket Refunds and Consumer Protections*, 87 Fed. Reg. 51550, 51550 (Aug. 22, 2022).

⁴⁹87 Fed. Reg. at 51557.

cancelled or significantly changed flights is an unfair practice. Among other things, the NPRM also proposed to define for the first time the terms “significant change” and “cancellations” for the purposes of consumer refunds.⁵⁰ The comment period on this rulemaking closed on December 16, 2022. A public hearing was scheduled for March 21, 2023.

In August 2022, the Secretary of Transportation sent a letter to airlines urging them to provide essential services to passengers, and in early September, DOT released the Airline Customer Service Dashboard on its aviation consumer protection webpage. The dashboard helped to increase transparency about the services each airline provides if a flight is delayed or cancelled for reasons within the airlines’ control.⁵¹ The information in the dashboard is based on information in customer service plans for each of the 10 largest U.S. airlines that sell tickets. According to DOT officials, all 10 airlines included in the dashboard made changes to their customer service plans as a result of the Secretary of Transportation’s August 2022 letter. For example, DOT officials said that prior to the release of the dashboard, none of the airlines guaranteed meals and hotels for passengers affected by flight disruptions. After the dashboard’s release, 9 out of 10 airlines included on the dashboard guaranteed providing hotels when passengers have to wait overnight and 10 airlines guaranteed meals or vouchers for meals for passengers on flights that are delayed 3 hours or more. According to DOT officials, the dashboard has benefitted passengers by helping them understand their rights when flights are delayed and cancelled, and providing transparency about what service and amenities each airline offers.

The Secretary of Transportation has also conducted additional outreach to airlines to ensure operational reliability after persistent flight disruptions in 2022. For example, in June 2022, after thousands of flights were cancelled, the Secretary of Transportation held a roundtable with airline chief executives to discuss how to ease flight disruptions. According to

⁵⁰DOT has proposed to define a cancelled flight as a flight that was published in a carrier’s Computer Reservation System at the time of the ticket sale, but was not operated by the carrier. The proposed definition for a significant change would include, among other things, changes to a flight itinerary for a domestic flight when a passenger departs from the origination airport 3 or more hours earlier than the scheduled departure, or arrives at the destination airport 3 hours or more later than the scheduled arrival time.

⁵¹DOT’s Airline Customer Service Dashboard can be found at: <https://www.transportation.gov/airconsumer/airline-customer-service-dashboard>. Department of Transportation, “Airline Customer Service Dashboard” (Washington, D.C.), accessed February 2, 2023.

DOT officials, the Secretary also urged airlines to take steps to improve the air travel experience for affected passengers, including ensuring that passengers can quickly contact an airline customer service representative during flight disruptions. The Secretary also warned airlines at this meeting that DOT would take enforcement action if airlines did not abide by consumer protection regulations, or if airlines were not responsive to passengers whose flights are delayed or cancelled, according to media reports.

The agency has also taken action to address flight disruptions stemming from air traffic control issues.⁵² For example, FAA officials said that Florida's airspace has become increasingly congested because of growth in air traffic demand during the pandemic and closures of airspace for military and commercial space operations. In May 2022, FAA, airline, and industry representatives met to discuss how congestion was contributing to flight disruptions in the area, and these meetings continued periodically throughout the summer of 2022. In response, FAA planned to increase the number of air traffic controllers from 241 to 275 at the Jacksonville Air Traffic Control Center, as of May 2022. As of December 2022, FAA officials said that there are 254 air traffic controllers, including trainees, at the Jacksonville Air Traffic Control Center. FAA officials said that increasing air traffic control staffing, along with frequent communication with the industry, may help FAA manage Florida's airspace.⁵³

DOT Increased its Monitoring of Airlines' Scheduling Practices

Recent flight disruptions, such as the Southwest Airlines flight disruptions over the 2022–2023 holiday travel season, have prompted DOT to increase its oversight of airlines' scheduling practices. DOT's current actions to monitor airlines' scheduling practices include analyses of airport-pairs (a flight between two airports), chronically delayed flights, and an airline's network; reviewing monthly passenger complaint data;

⁵²FAA is responsible for managing air traffic flow in the national airspace system, and monitors the system's efficiency.

⁵³In summer 2022, some airlines asserted that air traffic controller staffing shortages were contributing to flight disruptions nationwide. FAA officials did not identify air traffic controller shortages as contributing to flight disruptions. Our analysis of BTS data found that between the start of the pandemic and April 2022, circumstances within the National Aviation System did not cause the majority of flight disruptions nationwide.

and routinely meeting with airlines. Some of DOT's actions to monitor airlines' scheduling practices are long standing, while others are more recent, reflecting increased DOT oversight. DOT monitors airlines' scheduling practices under its statutory authority to prohibit unfair and deceptive practices in the aviation industry, described in more detail below.

DOT has broad authority to regulate unfair and deceptive practices of airlines, which includes unrealistic scheduling practices.⁵⁴ In a rule issued in 2020, DOT defined the terms "unfair" and "deceptive".⁵⁵ The rule also states that proof of intent is not necessary to establish unfairness or deception.

DOT regulations prohibit unrealistic scheduling, which is one type of unfair and deceptive practice.⁵⁶ In rulemakings DOT has defined unrealistic scheduling as the scheduling of flights that airlines cannot generally and reasonably be expected to fulfill.⁵⁷ Apart from this definition, DOT officials confirmed to us that unrealistic scheduling can take different forms, as discussed below.

Some stakeholders, including unions and others, have raised concerns about airlines' scheduling practices in light of the increase in flight cancellations in 2021 and 2022. Some of these stakeholders we

⁵⁴The Secretary may investigate and decide whether an air carrier, foreign air carrier, or ticket agent has been or is engaged in an unfair or deceptive practice or an unfair method of competition in air transportation or the sale of air transportation. If the Secretary, after notice and an opportunity for a hearing, finds that an air carrier, foreign air carrier, or ticket agent is engaged in an unfair or deceptive practice or unfair method of competition, the Secretary shall order the air carrier, foreign air carrier, or ticket agent to stop the practice or method. See 49 U.S.C. §41712(a). The Secretary may also assess civil penalties when an airline engages in unfair and deceptive practices or unfair methods of competition. 49 U.S.C § 46301.

⁵⁵14 C.F.R. § 399.79(b). A practice is "unfair" if it causes or is likely to cause substantial injury, which is not reasonably avoidable, and the harm is not outweighed by benefits to consumers or competition. The rule defines a practice as being "deceptive" if it is likely to mislead a consumer, acting reasonably under the circumstances, with respect to a material matter.

⁵⁶14 C.F.R. § 399.81.

⁵⁷DOT adopted this definition in its first rule prohibiting unrealistic scheduling in 1984. See 49 Fed. Reg. 40566 (Oct. 17, 1984).

interviewed said that airlines were publishing unrealistic flight schedules given their staffing levels.

To determine whether airlines are potentially setting unrealistic schedules, DOT now conducts analyses at three levels, described in more detail below:

- **Chronically delayed flight analysis:** According to documents provided by DOT, DOT has monitored chronically delayed flights for many years. According to DOT documentation, DOT regularly analyzes BTS data to identify flights that are chronically delayed for 2 or more months. DOT regulations have defined “chronically delayed” flights as any domestic flight that is operated at least 10 times a month and arrives more than 30 minutes late (including cancelled flights) more than 50 percent of the time during that month.⁵⁸ Holding out a flight that is chronically delayed for more than 4 consecutive months is one form of unrealistic scheduling.⁵⁹
- **Airport-pair analysis:** In summer 2022, DOT developed its airport-pair analysis as an internal means of monitoring potential unrealistic scheduling. DOT’s airport-pair analysis establishes a threshold for non-weather related cancellations that could indicate that an airline is setting an unrealistic schedule. DOT has developed internal guidance describing how it conducts this analysis. As of March 2023, this guidance is in draft form. According to DOT officials, they expect that DOT’s analysis may change as it learns from its current investigations of airline scheduling. DOT plans to review its draft guidance concurrently with its investigations, and will formalize its draft guidance in 2023.
- **System-wide analysis:** According to documents provided by DOT, DOT has been regularly monitoring commercial and BTS system-wide delay and cancellation data, media reports, and analyzing monthly passenger complaint data as part of its oversight of airlines’ scheduling practices. However, more routine and systematic evaluation of passenger airlines began in early 2022 when DOT met with the largest U.S. airlines that sell tickets, and continued in summer 2022, and more recently, following the Southwest 2022-2023 holiday disruptions. At these meetings, DOT discusses network scheduling

⁵⁸14 C.F.R. § 399.81(c). DOT considers all of the airline’s flights that are operated between two given cities whose departure times are within 30 minutes of the most frequently scheduled departure time to be one single flight.

⁵⁹14 C.F.R. § 399.81(c)(4).

and operational performance during periods of significant disruptions and high demand, as well as customer care, including asking for assurances that airlines are meeting consumer protection requirements. According to documents provided by DOT, DOT used system-wide cancellation and on-time performance rates to engage with airlines about their scheduling practices. DOT considers these meetings to be part of its routine monitoring, and plans to continue them. However, unlike its airport-pair analysis, DOT has not yet developed internal guidance for its system-wide analysis. DOT plans to develop internal written guidance for its system-wide analysis in 2023.

According to DOT officials, since the summer of 2022, DOT has used its analyses to help determine whether any airline cancelled a high percentage of flights at the airport-pair level, over a sustained period.⁶⁰ To conduct its analysis of domestic routes, DOT starts with BTS system-wide data. DOT also uses FAA data to analyze cancellations for international airport-pairs that involve one U.S. point, and to understand whether FAA operations may have contributed to the cancellation. As of March 2023, DOT officials said that they are working with FAA officials to establish regular data transmissions for DOT's analysis.

If DOT identifies an airline-specific airport-pair or flight, it analyzes additional data, such as the causes of the cancellations. Based on that analysis, if the evidence suggests a practice of unrealistic scheduling, DOT will initiate an investigation of the airline. When DOT pursues an enforcement action against an airline, it first initiates an informal proceeding which could result in a consensus agreement with the airline.⁶¹ If DOT has reasonable grounds to believe an airline has engaged in unrealistic scheduling and efforts to settle with the airline have failed, DOT may issue a notice instituting an enforcement proceeding before an administrative law judge.⁶² According to DOT officials, its last enforcement order against an airline for engaging in unrealistic

⁶⁰If an airline violates a consumer protection requirement, including the requirement prohibiting unrealistic scheduling, the airline could be subject to civil penalties of up to \$40,272 per violation. The maximum civil penalty amount is periodically adjusted for inflation.

⁶¹14 C.F.R. § 399.79(e). During the informal proceeding, DOT provides the alleged violator an opportunity to be heard and present relevant evidence.

⁶²14 C.F.R. § 399.79 (f), 14 C.F.R. § 302.407.

scheduling was in 1992, when an airline failed to operate a substantial portion of scheduled flights between Florida and the Bahamas.⁶³

As of March 2023, DOT is investigating four U.S. airlines for potential unrealistic scheduling. According to DOT officials, DOT has open investigations based on its airport pair, system-wide, and chronically delayed flights analyses.

Although DOT has had a practice of regularly monitoring airlines' scheduling practices, we found that its oversight efforts have increased in light of recent notable airline flight disruptions, including those affecting millions of Southwest Airlines passengers during the winter 2022–2023 holiday season. In response to these events, Congress has conducted hearings on airline operations and performance, and DOT has initiated investigations on unrealistic scheduling, including an investigation to determine whether Southwest was providing timely refunds and whether it engaged in unrealistic scheduling.⁶⁴ More broadly, the persistence of flight disruptions affecting millions of passengers have prompted DOT to focus more attention on airline scheduling practices. According to DOT officials, DOT's fiscal year 2024 budget request includes a commitment to monitor airlines' scheduling practices using all available data and tools. Sustaining this oversight and analysis—including DOT's analyses of airline scheduling practices at the airport-pair, flight, and system-wide level—will be important to ensuring that airlines maintain realistic schedules and minimize the impact of flight disruptions on passengers.

Agency Comments and Our Evaluation

We provided a draft of this report to DOT for review and comment. When we initially provided the draft to DOT, we recommended that the Assistant General Counsel for the Office of Aviation Consumer Protection use network-level (i.e., system-wide) data to identify instances of potential unrealistic scheduling for investigation. We believed that this recommendation was warranted because it could allow DOT to be better positioned to understand whether airlines were setting realistic schedules that flight and airport-pair analyses would not reveal and could strengthen

⁶³The orders that DOT publishes on its website only go back to 2002.

⁶⁴See, for example, *Executive Session and Hearing: Strengthening Airline Operations and Consumer Protections*, U.S. Senate Committee on Commerce, Science, and Transportation, 118th Cong., 1st Sess., February 9, 2023.

DOT's ability to protect passengers against unfair and deceptive practices.

After reviewing our report, DOT provided substantive and technical comments, including new documentation, which we incorporated as appropriate. This documentation contained information further clarifying DOT's recently adopted systematic approach to analyzing airlines schedules system-wide. It also contained internal draft guidance about DOT's airport-pair analysis and information about DOT's meetings with airlines. We reviewed the additional information that DOT provided, which demonstrated that the agency is using system-wide data to identify instances of potential unrealistic scheduling. Accordingly, we revised our report to withdraw our recommendation.

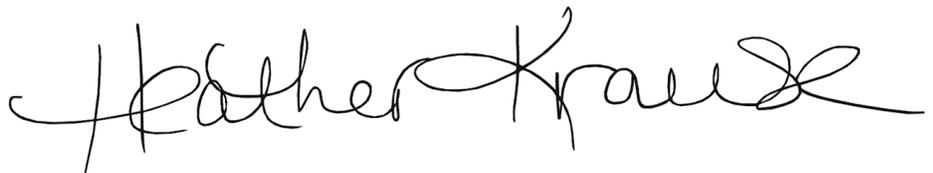
We also revised the report to reflect the additional information that DOT provided. Specifically:

- We incorporated information about how DOT conducts analysis of airlines' scheduling practices system-wide, specifically by analyzing BTS system-wide delay and cancellation data and reviewing monthly passenger complaint data. We also emphasized the importance of DOT sustaining its oversight and analysis of airlines' scheduling practices, including system-wide.
- We incorporated information about DOT's past meetings with airlines to reflect that DOT now considers this a routine part of its monitoring.
- We incorporated information about how DOT has developed draft internal guidance describing how it conducts its airport-pair analysis.

As discussed in this report, DOT's oversight of airlines' scheduling practices has increased over the course of our review leveraging multiple tools. In light of ongoing flight disruptions that have affected millions of passengers and staffing challenges, which affect an airline's entire network, it is important that DOT sustain these efforts to analyze airlines' scheduling practices. These efforts will be an important component of DOT's oversight of the aviation industry and will help ensure that DOT is meeting its consumer protection mission.

As agreed with your offices, unless you publicly announce the contents of this report earlier, we plan no further distribution until 15 days from the report date. At that time, we will send copies to the appropriate congressional committees and other interested parties. In addition, the report is available at no charge on the GAO website at <http://gao.gov>.

If you or your staff have any questions about this report, please contact Heather Krause at (202) 512-2834 or krauseh@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 key contributions to this report are listed in appendix III.

A handwritten signature in black ink that reads "Heather Krause". The signature is written in a cursive style with a large, stylized initial 'H' and a long, sweeping underline.

Heather Krause
Director, Physical Infrastructure

This report examines: (1) how flight disruptions in 2021 and 2022 and their underlying causes compare to the 2 years preceding the COVID-19 pandemic; (2) the operational challenges airlines faced in managing flight

Appendix I: Objectives, Scope, and Methodology

disruptions, and actions airlines have taken to address them; and (3) the actions taken by the Department of Transportation (DOT) and the Federal Aviation Administration (FAA) in 2021 and 2022 to help address flight disruptions.

Flight Delays and Cancellations Analyses

To examine how flight disruptions in 2021 and 2022 compare to the 2 years preceding the COVID-19 pandemic, we analyzed data from DOT's Bureau of Transportation Statistics (BTS) from January 2018 through April 2022, the most recently available data at the time of our analysis, on U.S. domestic flight delays and cancellations, airline employment, and passenger enplanements.¹ BTS flight delay and cancellation data are reported within the agency's Airline Service Quality Performance System (ASQP) database. Our scope was limited to the 17 airlines that are required by statute to report monthly data to ASQP on flight delays and cancellations, representing approximately 96 percent of domestic passenger traffic in the United States.² For our arrival-delay analyses, we used the BTS definition of a delayed flight—that is, we considered a flight

¹For the purposes of our analysis, we excluded 2020 data in certain instances because given the effects of the pandemic on the industry, 2020 airline operational data are not comparable to other years. Because there is a several month lag before BTS publishes each month's airline performance data, we were limited to analyzing data through April 2022.

²Airlines whose share of the industry's total domestic passenger revenues is at least 0.5 percent must submit flight performance data to DOT, including data on flight delays and cancellations. Because the reporting of domestic-scheduled passenger revenue is determined on an annual basis, the number of reporting airlines changes on an annual basis. From 2018–2022, the number of airlines required to report this data has varied from 18 airlines in 2018 to 17 in 2022, with the mix of airlines changing minimally over 5 years. The 17 airlines required to report flight performance data to DOT in 2021 and 2022 are Alaska Airlines, Allegiant Air, American Airlines, Delta Air Lines, Endeavor Air, Envoy Air, Frontier Air Lines, Hawaiian Airlines, Horizon Air, JetBlue Airways, Mesa Airlines, PSA Airlines, Republic Airways, SkyWest Airlines, Southwest Airlines, Spirit Air Lines, and United Air Lines.

delayed if it arrived at least 15 minutes later than its scheduled arrival time. We also reported our results by marketing airline. This approach allowed us to report flight cancellations and delays by the airline that would sell a passenger’s ticket, rather than the airline that operated the flight. This meant that certain small and regional airlines, such as Horizon and SkyWest, were not explicitly shown in our analysis.

To define and analyze sustained cancellation events, we analyzed daily flight cancellation rates in 2018 and 2019 for each marketing airline in the ASQP database. We defined a sustained cancellation event as a series of days where an airline’s daily cancellation rate was high enough to exceed 95 percent of pre-pandemic daily cancellation rates. We initially looked at the distribution of daily flight cancellation rates across both years and found that the data were positively skewed, with many days where airlines reported no cancellations or low percentages of cancellations. As a result, we decided to proceed with a 95th percentile threshold that could account for this, rather than a standard deviation threshold that assumes a normal bell-curve data distribution. Because flight disruptions are affected by seasonal weather events (for example, winter storms), we adjusted the 95th percentile threshold each quarter (see table 2).

Table 2: 95th Percentile Thresholds for GAO’s Analyses of Sustained Cancellation Events

Quarter	95th Percentile Threshold Airlines that exceed this percentage of daily cancellations are counted in GAO’s analysis
1	9
2	5
3	6
4	3

Source: GAO analysis of Bureau of Transportation Statistics data. | GAO-23-105524.

We assessed the reliability of ASQP data by reviewing documents, interviewing relevant BTS officials, and conducting electronic data tests to identify any errors in the data. When conducting these tests, we identified 77 flights where the reported causes of delay (in minutes) did not add up to the total reported minutes of delay, as required by BTS. We followed up with BTS about these flights, and BTS agreed to follow up with the affected airlines and correct the data errors. Because the 77 records represented a small proportion of the data used in our analysis, we decided to drop these records, as well as any duplicates in the data, from our analysis results.

While noting these limitations, we determined the data were sufficiently reliable for our purposes of describing flight delays and cancellations over this time period and the length and reported causes of those delays and cancellations.

Selected Flight Disruptions

We also used ASQP data to select three flight disruptions in 2021 to use as illustrative examples. Our selection criteria included reviewing ASQP data to identify periods of high cancellation rates in 2021 and ensuring a range of airline business models (e.g., major, low-cost, and ultra-low cost airlines). After we identified five flight disruptions that met these criteria, we also reviewed media reports discussing those disruptions to understand the reported causes at the time of the disruption. We ultimately chose to analyze three disruptions, representing each airline business model: a network airline, a low-cost airline, and an ultra-low-cost-airline. Our review of these data was subject to the same ASQP data limitations described above.

Review of Literature on Flight Disruptions and Airline Actions

To understand more about the broad causes of flight disruptions and actions airlines have taken to address them, we conducted a literature review of academic and trade articles. Specifically, we conducted searches that spanned a range of literature published from January 2018 through March 2022—including academic studies, including dissertations and empirical analysis, as well as government reports, conference papers, and trade/industry articles. To identify relevant sources, we conducted searches in various databases, such as Scopus, ProQuest, EBSCO, and Dialog. The search terms used to locate relevant sources included “air carrier,” “aviation,” “cancel,” “delay,” and “service disruption.” We then reviewed the 189 results and excluded results that were not (1) specific to the U.S. airline industry and discussed the causes of flight disruptions and airlines’ ability to recover from them; (2) did not describe the impacts of the COVID-19 pandemic; or (3) did not describe how passengers were affected by flight disruptions. We reviewed the abstracts of the remaining results to select the most relevant full-text articles for in-depth review, and ultimately identified seven results that were relevant. We primarily used these results as contextual sources and incorporated them as needed into the final report.

Examining Airline, DOT, and FAA Actions

To determine the actions that airlines have taken to address flight disruptions, we reviewed publicly available financial reports submitted to the Securities and Exchange Commission for each of the airlines we interviewed that sell tickets to passengers. We analyzed annual financial reports for fiscal year 2020 and 2021 and quarterly reports for the first quarter of 2021 through the second quarter of 2022. We analyzed these reports to obtain information on the effects of the pandemic on airlines and actions they took in response. We also reviewed press releases that airlines issued that discussed their flight disruptions, and actions to address these disruptions, in the summer and fall of 2021. As discussed below, we conducted semi-structured interviews with airlines. In addition, to obtain the passenger perspective on flight disruptions and additional actions that airlines could be taking, we conducted semi-structured interviews with consumer organizations.

To examine the actions that DOT and FAA have taken to help address flight disruptions, we reviewed federal statutes and regulations that describe DOT's authority to prohibit unfair and deceptive practices and ensure that airlines are setting realistic schedules, among other things. We also reviewed DOT documentation, such as reports and rulemakings, guidance, and enforcement orders to understand the actions DOT has taken to help address flight disruptions. In addition, to understand the trends in airline service, we reviewed data on passenger complaints submitted to DOT from January 2018 to September 2022. We also conducted multiple interviews with DOT's Office of Aviation Consumer Protection and FAA, as described below.

To report the number of full-time employees working at major passenger airlines over time, we analyzed airline employment data from BTS' TranStats database from February 2020 to October 2022. We analyzed data for 13 major airlines, defined as airlines with over \$1 billion annual operating revenue. However, given the scope of our review, we excluded the five airlines that were cargo airlines. In addition, we analyzed Transportation Security Administration passenger throughput data and Centers for Disease Control and Prevention-reported COVID-19 cases between January 2020 and August 2022 to understand passenger air traffic and the number of reported COVID-19 cases.

To inform our second and third objectives, we conducted semi-structured interviews with representatives from a non-generalizable sample of 15

stakeholders, including four airlines; three unions representing pilots and flight attendants; three industry associations; two consumer organizations; one trade association; and two academics. We also interviewed DOT officials and FAA officials. We interviewed three airlines that met our selection criteria for our selected flight disruptions (that is, had a high period of cancellations and a range of airline business models) and interviewed an additional airline to represent the regional airline perspective. We selected our other stakeholders based on both background research and prior GAO work. See table 3 for a complete list of individuals and entities we interviewed. Because we selected a sample of stakeholders, findings from these interviews are not generalizable to all airlines and organizations.

Table 3: List of Entities and Individuals Interviewed

Category	Category member
Agencies	Department of Transportation
Agencies	Federal Aviation Administration
Airlines	American Airlines
Airlines	SkyWest Airlines
Airlines	Southwest Airlines
Airlines	Spirit Airlines
Unions	Air Line Pilots Association
Unions	Allied Pilots Association
Unions	Association of Flight Attendants
Industry Associations	Airlines for America
Industry Associations	Coalition of Airline Pilots Association
Industry Associations	Regional Airline Association
Consumer Organizations	American Economic Liberties Project
Consumer Organizations	National Consumers League
Trade Associations	American Society of Travel Advisors
Academic Researchers	Dr. Lance Sherry, Associate Professor, George Mason University
Academic Researchers	Dr. Vikrant Vaze, Associate Professor, Dartmouth College

Source: GAO. | GAO-23-105524

We conducted this performance audit from November 2021 to April 2023 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.

We created snapshots for selected flight disruptions—prolonged periods of flight delays or cancellations, or both—at three airlines in 2021. We selected these three flight disruptions based on the selection criteria outlined in appendix I. Every airline

Appendix II: Selected Flight Disruption Snapshots

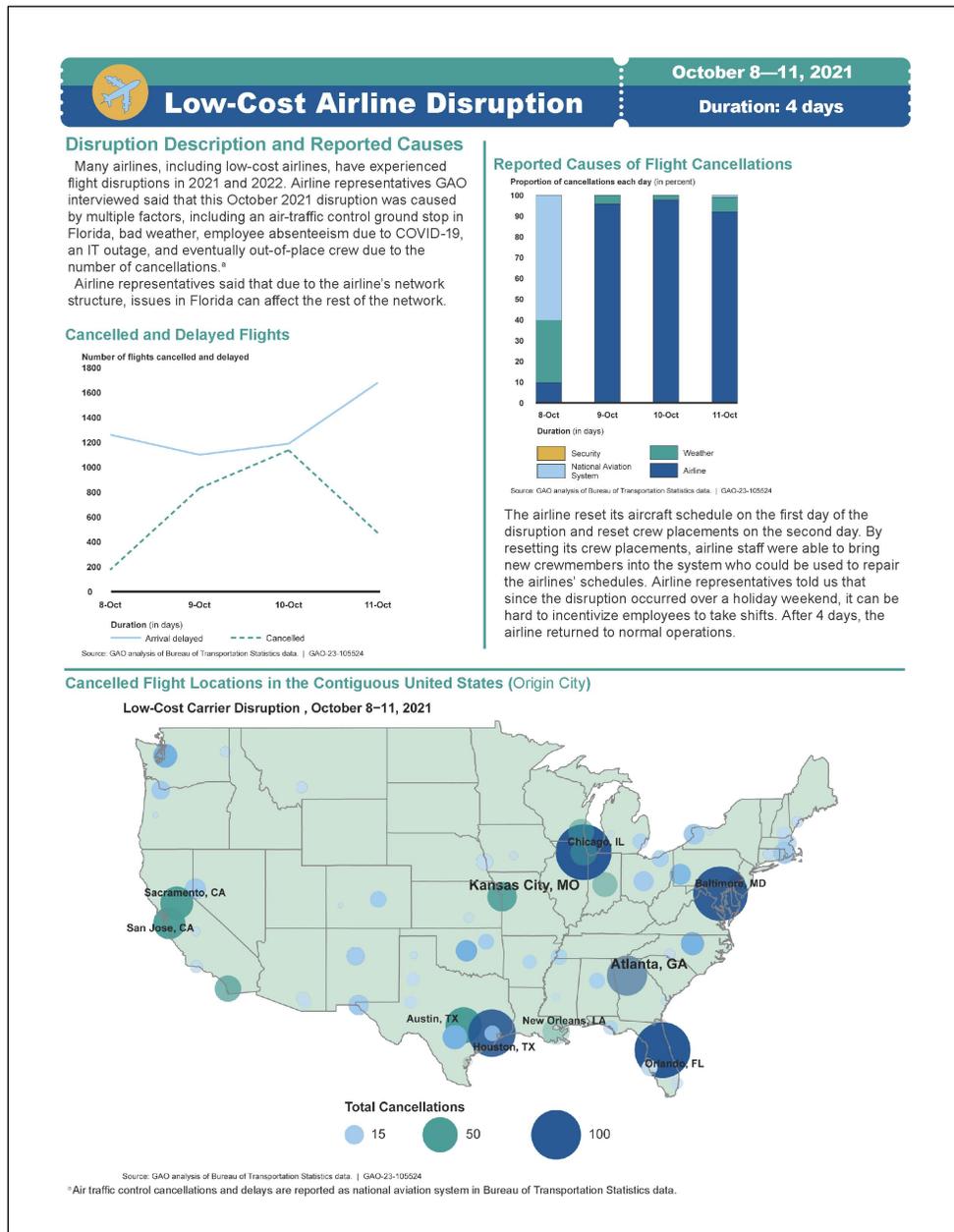
reporting to DOT experienced flight disruptions in the form of sustained cancellation events from July 2021 through April 2022.¹ As illustrative examples, these selected snapshots show how various internal and external factors can compound and extend flight disruptions when they occur. These factors may not initially be clear to passengers who experience a flight disruption. As part of our analysis of the Department of Transportation's (DOT) Bureau of Transportation Statistics (BTS) data, we compiled data on flight cancellations, delays, and flight cancellation locations for each day of the three disruptions. We also analyzed and summarized data on the reported causes of those flight cancellations. To provide more detailed information about the specific causes of each disruption, we interviewed representatives from the affected airline as well as union representatives, if available. We used these data to create a snapshot profiling each disruption from a variety of sources and included a map showing how flight cancellations were distributed across affected airline's network in the contiguous United States.

¹For more information on how we identified and analyzed sustained cancellation events, see appendix I.

Figure 9 Cancelled and Delayed Flights, October 8, 2021 through October 11, 2021

Figure 10 Reported Causes of Flight Cancellations, October 8, 2021 through October 11, 2021

Figure 11 Cancelled Flight Locations in the Contiguous United States (Origin City), October 8, 2021 through October 11, 2021



Accessible Data for Figure 9 Cancelled and Delayed Flights, October 8, 2021 through October 11, 2021

Day-Month	Flight Arrival Delayed	Flight Cancelled
8-Oct	1261	176
9-Oct	1100	831
10-Oct	1189	1137
11-Oct	1680	472

Accessible Data for Figure 10 Reported Causes of Flight Cancellations, October 8, 2021 through October 11, 2021

Day-Month	Percent Cancellations by Carrier	Percent Cancellations by Weather	Percent Cancellations by NAS	Percent Cancellations by Security
8-Oct	9.65909090	30.11363640	60.22727270	0.00000000
9-Oct	95.78820700	0.00000000	4.21179300	0.00000000
10-Oct	97.71328060	2.28671940	0.00000000	0.00000000
11-Oct	91.94915250	6.99152540	1.05932200	0.00000000

Accessible Data for Figure 11 Cancelled Flight Locations in the Contiguous United States (Origin City), October 8, 2021 through October 11, 2021

Low-Cost Disruption Origin City Name	Total number of cancelled flights
Albuquerque, NM	13
Albany, NY	7
Amarillo, TX	2
Atlanta, GA	65
Austin, TX	53
Hartford, CT	5
Birmingham, AL	10
Nashville, TN	77
Boise, ID	7
Boston, MA	13
Buffalo, NY	17
Burbank, CA	47
Baltimore, MD	121
Bozeman, MT	5
Charleston, SC	9
Cleveland, OH	11

**Appendix II: Selected Flight Disruption
Snapshots**

Low-Cost Disruption Origin City Name	Total number of cancelled flights
Charlotte, NC	5
Columbus, OH	16
Colorado Springs, CO	11
Corpus Christi, TX	4
Cincinnati, OH	9
Dallas, TX	131
Washington, DC	24
Denver, CO	160
Des Moines, IA	3
Detroit, MI	9
Panama City, FL	8
El Paso, TX	16
Eugene, OR	1
Fresno, CA	3
Fort Lauderdale, FL	55
Spokane, WA	4
Grand Rapids, MI	2
Greer, SC	3
Hayden, CO	0
Houston, TX	91
Harlingen/San Benito, TX	0
Washington, DC	4
Houston, TX	10
Wichita, KS	4
Indianapolis, IN	25
Islip, NY	8
Jackson/Vicksburg, MS	3
Jacksonville, FL	12
Las Vegas, NV	164
Los Angeles, CA	30
Lubbock, TX	7
New York, NY	19
Long Beach, CA	23
Little Rock, AR	8
Midland/Odessa, TX	6
Kansas City, MO	35
Orlando, FL	127

**Appendix II: Selected Flight Disruption
Snapshots**

Low-Cost Disruption Origin City Name	Total number of cancelled flights
Chicago, IL	127
Memphis, TN	10
Manchester, NH	7
Miami, FL	27
Milwaukee, WI	27
Minneapolis, MN	16
New Orleans, LA	30
Montrose/Delta, CO	1
Myrtle Beach, SC	8
Oakland, CA	53
Oklahoma City, OK	18
Omaha, NE	11
Ontario, CA	18
Chicago, IL	29
Norfolk, VA	7
West Palm Beach/Palm Beach, FL	6
Portland, OR	14
Philadelphia, PA	10
Phoenix, AZ	100
Pittsburgh, PA	18
Pensacola, FL	1
Palm Springs, CA	6
Providence, RI	18
Portland, ME	5
Raleigh/Durham, NC	21
Richmond, VA	0
Reno, NV	17
Rochester, NY	3
Fort Myers, FL	30
San Diego, CA	28
San Antonio, TX	24
Savannah, GA	3
Santa Barbara, CA	6
Louisville, KY	12
Seattle, WA	23
San Francisco, CA	18

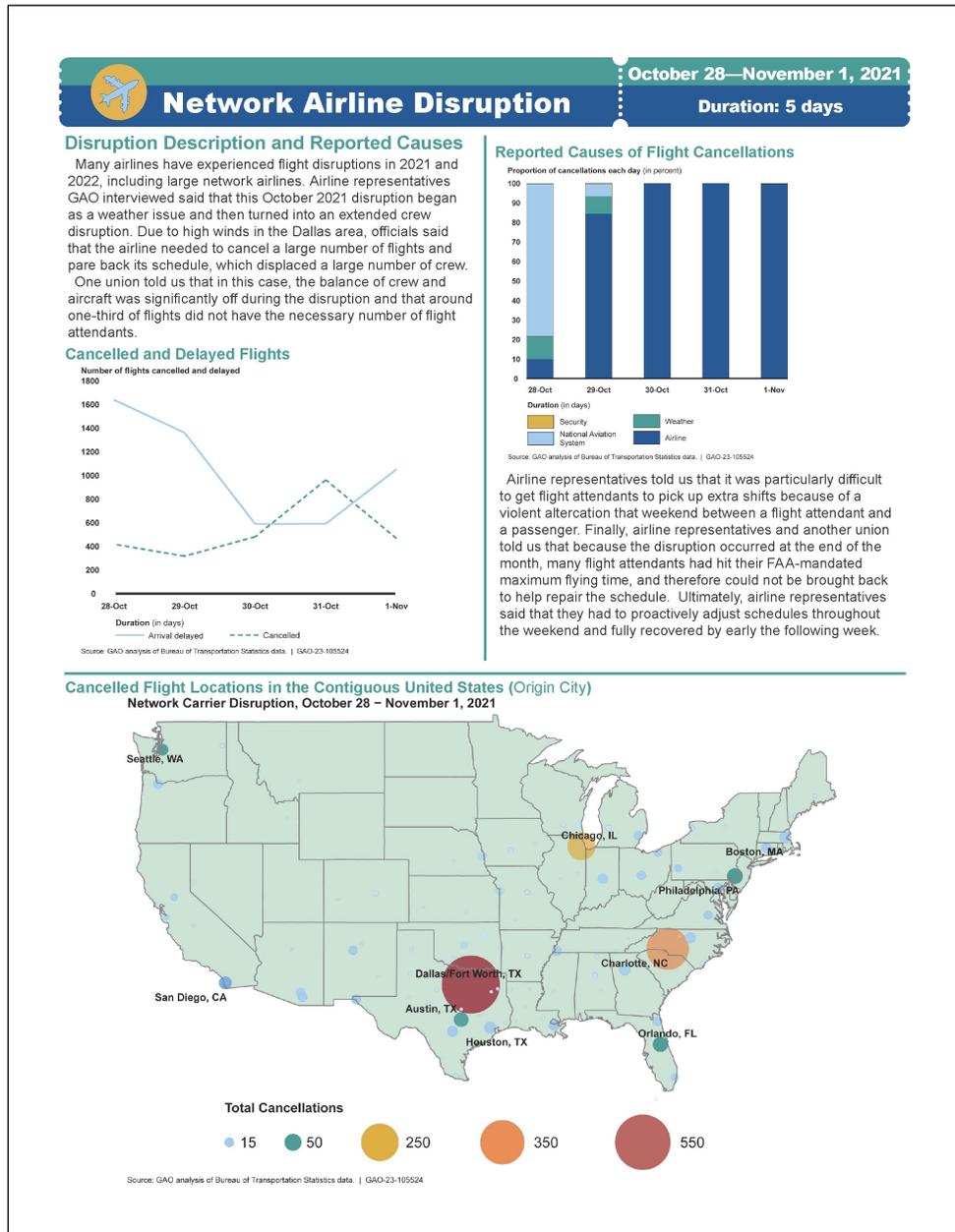
**Appendix II: Selected Flight Disruption
Snapshots**

Low-Cost Disruption Origin City Name	Total number of cancelled flights
San Jose, CA	41
Salt Lake City, UT	28
Sacramento, CA	44
Santa Ana, CA	30
Sarasota/Bradenton, FL	10
St. Louis, MO	77
Tampa, FL	77
Tulsa, OK	10
Tucson, AZ	7
Valparaiso, FL	6

Figure 12 Cancelled and Delayed Flights, October 28, 2021 through November 1, 2021

Figure 13 Reported Causes of Flight Cancellations, October 28, 2021 through November 1, 2021

Figure 14 Cancelled Flight Locations in the Contiguous United States (Origin City), October 28, 2021 through November 1, 2021



Accessible Data for Figure 12 Cancelled and Delayed Flights, October 28, 2021 through November 1, 2021

Day-Month	Flight Arrival Delayed	Flight Cancelled
28-Oct	1640	418
29-Oct	1361	317
30-Oct	589	481
31-Oct	591	962
1-Nov	1052	467

Accessible Data for Figure 13 Reported Causes of Flight Cancellations, October 28, 2021 through November 1, 2021

Day-Month	Percent cancellation by Carrier	Percent cancellation by Weather	Percent cancellation by NAS	Percent cancellation by Security
28-Oct	9.80861240	11.72248800	78.22966510	0.23923440
28-Oct	84.22712930	8.88888889	6.62460570	0.31545740
28-Oct	100.00000000	0.00000000	0.00000000	0.00000000
28-Oct	100.00000000	0.00000000	0.00000000	0.00000000
1-Nov	99.78586720	0.21413280	0.00000000	0.00000000

Accessible Data for Figure 14 Cancelled Flight Locations in the Contiguous United States (Origin City), October 28, 2021 through November 1, 2021

Network Disruption Origin City Name	Total number of cancelled flights
Allentown/Bethlehem/Easton, PA	0
Abilene, TX	3
Albuquerque, NM	13
Waco, TX	3
Arcata/Eureka, CA	0
Alexandria, LA	1
Augusta, GA	0
Albany, NY	5
Waterloo, IA	0
Amarillo, TX	3
Watertown, NY	0
Aspen, CO	0

**Appendix II: Selected Flight Disruption
Snapshots**

Network Disruption Origin City Name	Total number of cancelled flights
Atlanta, GA	20
Appleton, WI	0
Austin, TX	38
Asheville, NC	1
Scranton/Wilkes-Barre, PA	0
Kalamazoo, MI	0
Hartford, CT	16
Bakersfield, CA	0
Bangor, ME	3
Birmingham, AL	4
Billings, MT	0
Bismarck/Mandan, ND	0
Bloomington/Normal, IL	1
Nashville, TN	32
Boise, ID	2
Boston, MA	24
Beaumont/Port Arthur, TX	1
Brownsville, TX	1
Baton Rouge, LA	3
Burlington, VT	0
Buffalo, NY	5
Burbank, CA	2
Baltimore, MD	16
Bozeman, MT	2
Columbia, SC	3
Akron, OH	0
Chattanooga, TN	2
Charlottesville, VA	0
Charleston, SC	7
Cedar Rapids/Iowa City, IA	2
Cleveland, OH	10
College Station/Bryan, TX	1
Charlotte, NC	317
Columbus, OH	13
Champaign/Urbana, IL	2
Colorado Springs, CO	5

**Appendix II: Selected Flight Disruption
Snapshots**

Network Disruption Origin City Name	Total number of cancelled flights
Columbia, MO	4
Corpus Christi, TX	2
Charleston/Dunbar, WV	0
Columbus, GA	0
Cincinnati, OH	8
Mosinee, WI	0
Daytona Beach, FL	0
Dayton, OH	0
Dubuque, IA	1
Washington, DC	56
Denver, CO	32
Dallas/Fort Worth, TX	605
Durango, CO	0
Del Rio, TX	2
Des Moines, IA	4
Detroit, MI	15
Panama City, FL	0
Eagle, CO	0
El Paso, TX	15
Erie, PA	0
Eugene, OR	0
Evansville, IN	1
New Bern/Morehead/Beaufort, NC	0
Newark, NJ	22
Key West, FL	2
Fargo, ND	1
Fresno, CA	3
Fayetteville, NC	0
Flagstaff, AZ	1
Fort Lauderdale, FL	12
Florence, SC	0
Flint, MI	0
Sioux Falls, SD	1
Fort Smith, AR	2
Fort Wayne, IN	0
Garden City, KS	1

**Appendix II: Selected Flight Disruption
Snapshots**

Network Disruption Origin City Name	Total number of cancelled flights
Spokane, WA	4
Longview, TX	2
Grand Junction, CO	0
Gainesville, FL	0
Gulfport/Biloxi, MS	1
Green Bay, WI	0
Grand Island, NE	1
Killeen, TX	2
Grand Rapids, MI	6
Greensboro/High Point, NC	2
Greer, SC	3
Hilton Head, SC	0
Houston, TX	1
White Plains, NY	0
Harlingen/San Benito, TX	1
Huntsville, AL	3
Ashland, WV	0
Washington, DC	9
Houston, TX	25
Wichita, KS	2
Idaho Falls, ID	1
Wilmington, NC	5
Indianapolis, IN	18
Islip, NY	0
Ithaca/Cortland, NY	0
Jackson, WY	0
Jackson/Vicksburg, MS	2
Jacksonville, FL	15
New York, NY	21
Lansing, MI	0
Las Vegas, NV	40
Lawton/Fort Sill, OK	2
Los Angeles, CA	60
Lubbock, TX	3
Lake Charles, LA	1
Lexington, KY	1

**Appendix II: Selected Flight Disruption
Snapshots**

Network Disruption Origin City Name	Total number of cancelled flights
Lafayette, LA	0
New York, NY	35
Long Beach, CA	0
Little Rock, AR	4
Laredo, TX	2
La Crosse, WI	0
Lynchburg, VA	0
Midland/Odessa, TX	2
Kansas City, MO	12
Orlando, FL	41
Harrisburg, PA	2
Memphis, TN	16
Mission/McAllen/Edinburg, TX	5
Medford, OR	0
Montgomery, AL	1
Manhattan/Ft. Riley, KS	2
Manchester, NH	0
Miami, FL	135
Milwaukee, WI	8
Melbourne, FL	0
Moline, IL	0
Monroe, LA	1
Mobile, AL	2
Marquette, MI	0
Monterey, CA	2
Madison, WI	4
Missoula, MT	0
Minneapolis, MN	14
New Orleans, LA	21
Montrose/Delta, CO	1
Myrtle Beach, SC	6
Jacksonville/Camp Lejeune, NC	0
Oklahoma City, OK	11
Omaha, NE	13
Ontario, CA	10
Chicago, IL	138

**Appendix II: Selected Flight Disruption
Snapshots**

Network Disruption Origin City Name	Total number of cancelled flights
Norfolk, VA	12
West Palm Beach/Palm Beach, FL	11
Portland, OR	17
Greenville, NC	0
Newport News/Williamsburg, VA	0
Philadelphia, PA	43
Phoenix, AZ	123
Peoria, IL	0
Pittsburgh, PA	11
Pensacola, FL	1
Palm Springs, CA	5
Providence, RI	1
Portland, ME	6
Rapid City, SD	0
Bend/Redmond, OR	0
Raleigh/Durham, NC	21
Richmond, VA	12
Reno, NV	10
Roanoke, VA	0
Rochester, NY	2
Roswell, NM	1
Rochester, MN	0
Fort Myers, FL	17
Santa Fe, NM	1
San Diego, CA	27
San Antonio, TX	21
Savannah, GA	3
Santa Barbara, CA	0
South Bend, IN	0
San Luis Obispo, CA	1
Salisbury, MD	0
State College, PA	0
Louisville, KY	5
Seattle, WA	23
San Francisco, CA	24

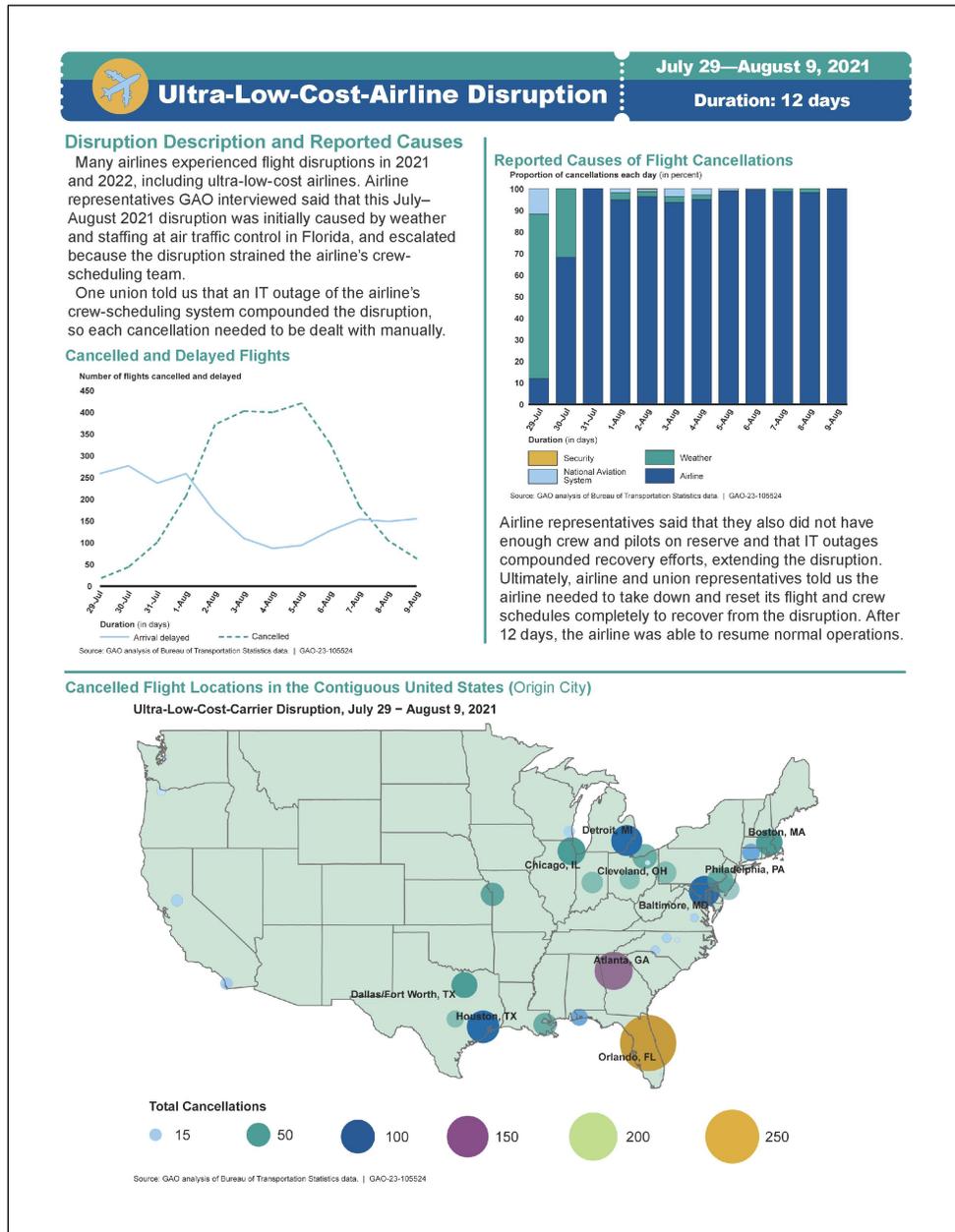
**Appendix II: Selected Flight Disruption
Snapshots**

Network Disruption Origin City Name	Total number of cancelled flights
Springfield, MO	1
St. George, UT	1
Shreveport, LA	3
San Jose, CA	6
San Angelo, TX	3
Salt Lake City, UT	18
Sacramento, CA	8
Santa Ana, CA	13
Springfield, IL	1
Wichita Falls, TX	1
Sarasota/Bradenton, FL	1
St. Louis, MO	20
Santa Rosa, CA	0
Charlotte Amalie, VI	3
Christiansted, VI	2
Stillwater, OK	0
Syracuse, NY	2
Tallahassee, FL	3
Toledo, OH	0
Tampa, FL	35
Bristol/Johnson City/Kingsport, TN	2
Tulsa, OK	8
Tucson, AZ	16
Traverse City, MI	0
Texarkana, AR	1
Tyler, TX	2
Knoxville, TN	1
Valparaiso, FL	7
Fayetteville, AR	5
Yuma, AZ	1

Figure 15 Cancelled and Delayed Flights, July 29, 2021 through August 9, 2021

Figure 16 Reported Causes of Flight Cancellations, July 29, 2021 through August 9, 2021

Figure 17 Cancelled Flight Locations in the Contiguous United States (Origin City), July 29, 2021 through August 9, 2021



Appendix II: Selected Flight Disruption
Snapshots

Accessible Data for Figure 15 Cancelled and Delayed Flights, July 29, 2021 through August 9, 2021

Day-Month	Flight Arrival Delayed	Flight Cancelled
29-Jul	259	17
30-Jul	277	44
31-Jul	237	101
1-Aug	259	208
2-Aug	171	372
3-Aug	110	403
4-Aug	87	400
5-Aug	94	421
6-Aug	128	327
7-Aug	154	184
8-Aug	149	105
9-Aug	155	63

Accessible Data for Figure 16 Reported Causes of Flight Cancellations, July 29, 2021 through August 9, 2021

Day-Month	Percent cancellation by Carrier	Percent cancellation by Weather	Percent cancellation by NAS	Percent cancellation by Security
29-Jul	11.76470600	76.47058800	11.76470600	0.00000000
30-Jul	68.18181800	31.81818200	0.00000000	0.00000000
31-Jul	100.00000000	0.00000000	0.00000000	0.00000000
1-Aug	94.71153800	3.36538500	1.92307700	0.00000000
2-Aug	96.23655900	2.41935500	1.07526900	0.26881700
3-Aug	93.54838700	2.72952900	3.72208400	0.00000000
4-Aug	95.00000000	2.00000000	3.00000000	0.00000000
5-Aug	98.81235200	0.23753000	0.95011900	0.00000000
6-Aug	99.38837900	0.00000000	0.61162100	0.00000000
7-Aug	98.91304300	1.08695700	0.00000000	0.00000000
8-Aug	98.09523800	1.90476200	0.00000000	0.00000000
9-Aug	100.00000000	0.00000000	0.00000000	0.00000000

**Appendix II: Selected Flight Disruption
Snapshots**

Accessible Data for Figure 17 Cancelled Flight Locations in the Contiguous United States (Origin City), July 29, 2021 through August 9, 2021

Ultra-Low-Cost Carrier Disruption Origin City Name	Total number of cancelled flights
Atlantic City, NJ	41
Atlanta, GA	126
Austin, TX	27
Hartford, CT	29
Nashville, TN	29
Boston, MA	61
Burbank, CA	2
Baltimore, MD	83
Akron, OH	4
Cleveland, OH	55
Charlotte, NC	9
Columbus, OH	36
Charleston/Dunbar, WV	4
Denver, CO	47
Dallas/Fort Worth, TX	59
Detroit, MI	84
Newark, NJ	98
Fort Lauderdale, FL	247
Greensboro/High Point, NC	9
Houston, TX	92
Indianapolis, IN	41
Las Vegas, NV	164
Los Angeles, CA	139
Latrobe, PA	27
New York, NY	33
Kansas City, MO	48
Orlando, FL	274
Milwaukee, WI	13
Minneapolis, MN	28
New Orleans, LA	47
Myrtle Beach, SC	128
Oakland, CA	17
Chicago, IL	69

**Appendix II: Selected Flight Disruption
Snapshots**

Ultra-Low-Cost Carrier Disruption Origin City Name	Total number of cancelled flights
West Palm Beach/Palm Beach, FL	3
Portland, OR	9
Philadelphia, PA	58
Phoenix, AZ	8
Pittsburgh, PA	43
Pensacola, FL	26
Raleigh/Durham, NC	4
Richmond, VA	8
Fort Myers, FL	33
San Diego, CA	15
Louisville, KY	23
Seattle, WA	4
Sacramento, CA	13
Santa Ana, CA	15
St. Louis, MO	26
Charlotte Amalie, VI	4
Christiansted, VI	2
Tampa, FL	86

GAO Contact

Appendix III: GAO Contact and Staff Acknowledgments

Heather Krause at (202) 512-2834 or KrauseH@gao.gov.

Staff Acknowledgments

In addition to the contact named above, Jonathan Carver (Assistant Director); Amy Suntok (Analyst in Charge); Amy Abramowitz; Paul Aussendorf; Melanie Maralit Diemel; Melissa Greenaway; Delwen Jones; Frances Tirado; Alicia Wilson; and Elizabeth Wood made key contributions to this report.

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