Physical and situational inequality on airplanes predicts air rage

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We posit that the modern airplane is a social microcosm of class-based society, and that the increasing incidence of "air rage" can be understood through the lens of inequality. Research on inequality typically examines the effects of relatively fixed, macrostructural forms of inequality, such as socioeconomic status; we examine how temporary exposure to both physical and situational inequality, induced by the design of environments, can foster antisocial behavior. We use a complete set of all onboard air rage incidents over several years from a large, international airline to test our predictions. Physical inequality on airplanes—that is, the presence of a first class cabin—is associated with more frequent air rage incidents in economy class. Situational inequality—boarding from the front (requiring walking through the first class cabin) versus the middle of the plane—also significantly increases the odds of air rage in both economy and first class. We show that physical design that highlights inequality can trigger antisocial behavior on airplanes. More broadly, these results point to the importance of considering the design of environments—from airplanes to office layouts to stadium seating—in understanding both the form and emergence of antisocial behavior.

physical inequality | situational inequality | antisocial behavior | social class | air rage

Recent media attention has been devoted to the phenomenon colloquially known as "air rage" (1, 2): a form of antisocial behavior by airplane passengers becoming abusive or unruly, antagonizing crew members and other passengers, and endangering flight safety. Such incidents can be emotionally traumatic for passengers and staff, and expensive and reputationally damaging for airlines (3). Although virtually no empirical research examines the antecedents of this hazardous and increasingly common phenomenon, popular explanations for air rage include crowded planes, frustrating delays, and shrinking seats (1, 2). We advance an alternative view: the modern airplane reflects a social microcosm of class-based society, making inequality salient to passengers through both the physical design of the plane (the presence of a first class cabin) and, more subtly, the boarding procedure (whether economy passengers must pass through the first class cabin). We hypothesize that both types of inequality on airplanes—physical (presence of first class) and situational (boarding location)—trigger antisocial behavior (negative, often aggressive behaviors that are harmful to others) (4).

Since Durkheim (5), scholars across disciplines have investigated inequality and social class. The influence of social class—individuals' material resources and relative rank in the socioeconomic hierarchy—is ubiquitous, and can affect critical outcomes, such as health, well-being, emotions, and behavior (6–12). Economic scholars often conceptualize class as socioeconomic status, comprised of relatively chronic and macrostructurally determined factors, such as education, income, and geographic location (e.g., refs. 13 and 14). Our theoretical account suggests that inequality also manifests in everyday environments via both physical and situational factors. We argue that both physical and situational inequality increases the salience of individuals' rank in the socioeconomic hierarchy, and shapes individuals' likelihood of antisocial behavior.

We define physical inequality as inequality in physical space or amenities in the built environment; for example, companies might provide cubicles for staff but private offices for executives, and many public spaces, from stadiums to airplanes, have tiered seating systems. Second, within environments with physical inequality, we refer to variation in the salience of that physical inequity as situational inequality: for example, a floor plan that requires staff to walk past executive offices to arrive at their cubicles, or stadium or airplane seating that requires passing through the expensive seats to arrive at the less expensive ones. Indeed, previous research suggests that people's perceptions of their relative socioeconomic status are influenced by situational factors (15–17) and that the salience of inequality exerts an impact, as evidenced by poorer health outcomes in impoverished neighborhoods that border wealthier areas (18).

We argue that exposure to both physical and situational inequality can result in antisocial behavior. Our perspective extends prior research on inequality in several ways. First, criminological and economic research typically examines how variance in stable macrostructural factors, such as socioeconomic status, predicts outcomes, including violent crime and economic mobility (13, 14, 19–21); we show that in addition to such stable macrostructural factors, even temporary exposure to physical inequality—being literally placed in one's "class" (economy class) for the duration of a flight—relates to antisocial behavior, and that situational inequality—being reminded of economy or first class via the boarding procedure—further predicts such behavior. Second, building on recent research demonstrating that increasing the visibility of inequality decreases prosocial behavior by relatively higher social

Significance

We suggest that physical and situational inequality are built into people's everyday environments—such as the modern airplane—and that exposure to these forms of inequality can trigger antisocial behavior. Analyses reveal that air rage is more common in economy class on airplanes, where inequality is physically present, and in both economy and first class when inequality is situationally salient. We extend research demonstrating that the salience of inequality decreases prosocial behavior by higher class individuals, showing that temporary exposure to physical and situational inequality predicts antisocial behavior among individuals in both higher and lower classes. Moreover, we explore a novel predictor of inequality-induced antisocial behavior—the design of physical environments—augmenting research on macrostructural forms of inequality.

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class individuals (22, 23), we show that situational inequality increases antisocial behavior among both higher and lower social class individuals.

We situate our research in the common experience of airplane travel, suggesting that airplanes serve as a microcosm of class-based society that can expose people to both physical and situational inequality, resulting in greater odds of antisocial behavior in the form of air rage. First, we hypothesize that economy passengers are exposed to physical inequality when airplanes have a first class cabin (compared with when they do not), and that air rage by economy passengers will be more likely on flights with (relative to planes without) a first class cabin. Second, situational inequality occurs on airplanes when economy passengers board the airplane from the front—necessitating passing through the first class cabin and already-seated first class passengers—than from the middle, where passengers typically walk directly into their respective class. We hypothesize that such situational inequality increases the salience for economy passengers of their relatively disadvantaged status compared with first class passengers; such awareness has been shown to prompt negative emotions and aggressive behavioral scripts (24–26). Specifically, we predict that the odds of air rage by economy passengers will be greater in planes with first class cabins that board from the front versus the middle of the aircraft.

Third, we hypothesize that first class passengers are made more aware of their relatively advantaged status (compared with economy passengers) in the presence of situational inequality, increasing the odds of air rage by first class passengers. Particularly when making downward social comparisons to the disadvantaged, research shows that higher social class individuals are more selfish, entitled, and scornful (15, 22, 27, 28), psychological states that foster antisocial behavior (29). Dovetailing with research demonstrating that increased visibility of inequality decreases other-regarding behavior among wealthier individuals (23), we predict greater odds of air rage among first class passengers when situational inequality is present: when flights are boarded from the front versus the middle of the airplane.

To test our predictions, we obtained a private database of all incidents of air rage from a large international airline over several years (circa 2010) of between 1 and 5 million flights. (We present a range to protect airline confidentiality.)

Results

Descriptive and comparative information on the onboard incidents that were matched to a flight is in Table 1. We first examined the base rate of air rage (i.e., the number of incidents per 1,000 flights). Supporting our account, air rage is relatively more common in economy class on flights with first class (incidence rate of 1.58) than flights without first class (0.14; $t = 37.17$, $P < 0.0001$). The incidence of air rage in first class (0.31) is intermediate and significantly different from the incidence of air rage in economy with ($t = -29.37$, $P < 0.0001$) and without ($t = 8.02$, $P < 0.0001$) first class.

We used binary logistic regression with robust SEs, and clustering on flight route, predicting whether or not a flight contained an incident of air rage in the relevant cabin and including controls for commonly invoked explanations for air rage, such as seat pitch (leg room) and seat width, delay amount, and cabin space, as well as additional controls for flight distance, number of seats, and whether or not the flight was international.

We first examined how our control variables related to air rage (Table 2). In economy class (models 1 and 2), planes with larger cabin area, longer flights, flights with longer delays, and domestic (compared with international) flights had comparatively greater odds of air rage. We did not find evidence that seat pitch significantly related to air rage, and seat width marginally predicted lower odds of air rage in model 1 ($P = 0.05$), but significantly related to greater odds of air rage in model 2 ($P < 0.01$). In first class (model 3), planes with more first class seats, planes with larger cabin areas, and longer flights significantly related to air rage; seat width, delay length, and international/domestic did not significantly relate to air rage. The effects of additional control variables are in *SI Methods*.

We hypothesized that physical inequality—the presence of first class on an airplane—would predict greater incidence of air rage in economy. Table 2 (model 1) shows that the chances of an onboard economy incident are 3.84-times higher when first class is present versus absent ($P < 0.001$); dividing the coefficients from the regression (1.3463 first class present/0.1419 delay hours), presence of first class is associated with greater odds of air rage equivalent to the effect of an additional 9-h and 29-min flight delay. We also hypothesized that situational inequality—boarding from the front of the plane—would predict greater incidence of air rage in economy. As predicted, front boarding of planes predicted 2.18-times greater odds of an economy cabin incident than middle boarding ($P = 0.005$; model 2), an effect equivalent to an additional 5-h and 58-min flight delay (0.7772 front boarding/0.1305 delay hours). Finally, our hypothesis that situational inequality—boarding from the front of the plane—would predict greater incidence of air rage in first class was supported: front boarding of planes predicted 11.86 greater odds of a first class air rage incident than boarding from the middle ($P = 0.013$; model 3). (For models predicting first class incidents, the coefficient for delay hours was not significantly different from zero. Therefore we are unable to provide an estimate of this effect in delay hours.)

We observed differences in the types of air rage in economy versus first class. For example, incidents in first class were more likely to be a result of belligerent behavior, involving a passenger's expression of strong anger (36.3% of the incidents in first class vs. 27.8% in economy class), whereas incidents in economy were more likely to result from emotional outbursts (6.2% of the incidents in economy class vs. 2.2% in first class; proportion comparison z-tests all $P < 0.01$). These preliminary results are consistent with research linking high status to displays of anger

Table 1. Description of onboard incidents

Disruptive passengers	Percent of incidents (%)	Incident type	Percent of incidents (%)	Cabin	Percent of incidents (%)*
Female	23.83	Belligerent behavior	29.00	First class	15.26
Male	72.49	Drugs	0.14	Economy class	83.98
Two or more people	0.66	Emotional	5.50	Missing	0.76
Missing	3.02	Intoxication	31.75		
		Noncompliant	18.67		
		Sexual	0.90		
		Smoking	10.90		
		Other (e.g., medical related)	3.14		

Data reported here are at the incident (rather than the flight) level of analysis.

*A t test between raw number of incidents between economy and first class is significant at $P < 0.0001$.

Table 2. **Logistic regression models predicting onboard incidents**

Variable	Model 1	Model 2	Model 3
Dependent variable	Economy class incident	Economy class incident	First class incident
Dataset	All flights	Flights with first class	Flights with first class
Predictor variables			
Economy seats	1.0010 (0.0012)	1.0031** (0.0014)	—
First class seats	—	—	1.0342** (0.0139)
Economy seat width (cm)	0.9514* (0.0243)	1.2175*** (0.0922)	—
Economy seat pitch (cm)	0.9887 (0.0101)	1.0093 (0.0125)	—
First class seat width (cm)†	—	—	0.8147 (0.1101)
Flight distance in miles	1.0004**** (0.0001)	1.0004**** (0.0001)	1.0003** (0.0001)
Flight delay in hours	1.1524**** (0.0151)	1.1393**** (0.0157)	1.0526 (0.0468)
Cabin area (m^2)	1.1186** (0.0528)	1.1213** (0.0610)	1.4777*** (0.1969)
International flight (1 = yes)	0.6840**** (0.0681)	0.7185*** (0.0720)	0.8212 (0.1869)
First class present (1 = yes)	3.8431**** (0.4743)	—	—
Boarding from front (1 = yes)	—	2.1754*** (0.6083)	11.8594** (11.8367)
McFadden's pseudo R^2	0.1028	0.0578	0.0675

Values presented are odds ratios with robust SEs. The full dataset represented ~150–300 unique arrival and departure airports, and between 500 and 1,000 unique flight routes. SEs are adjusted clusters based on plane route (i.e., the specific departure airport and arrival airport combination). All models include fixed effects for flight regions (suppressed for space but included in *SI Methods*). Observations were dropped because they were in a flight region that had no incidents. Flights with first class present are ~46.1% of the population of flights. No flights without first class boarded from the middle of the plane. *$P < 0.10$, **$P < 0.05$, ***$P < 0.01$, ****$P < 0.0001$.

†Seat pitch data are not available because many first class seats had their own pods/beds.

and low status to reduced self-control (30, 31), and suggest that the visibility of inequality may induce different types of antisocial behavior among the relatively advantaged and disadvantaged.

Conclusion

Class-based seating is both more prevalent and more unequal in recent years, with first class cabins claiming an increasingly large share of total space (32). As both inequality and class-based airplane seating continue to rise, incidents of air rage may similarly climb in frequency. Building on previous interdisciplinary research on inequality, we demonstrate that both physical and situational factors present in everyday environments are associated with dangerous, class-specific antisocial behaviors among both the "haves" and the "have nots."

Methods

Our study was approved by the University of Toronto Ethics Review Board (Protocol 32624) and did not require informed consent. We examined a population of flights from a large international airline over several years (circa 2010). We used a private database that contained all documented disruptive passenger incidents during this time period (n = 1,500 to 4,000). Of these, we selected only those incidents that occurred on board and could be matched to a flight record; we used these data in our analyses (see *SI Methods* for additional details). The airline classified each incident by flight number and date, and recorded disruptive passengers' seating class, gender, and incident type (e.g., belligerent behavior or emotional outburst).

We combined the air rage incident data with a proprietary database of the population of flights from this airline in the time period (n = 1–5 million flights). The flight database included flight characteristics (e.g., plane model details and flight details, such as departure and arrival locations, delays, and distance). Using the plane models indicated in the dataset, we coded the physical layout of each airplane with readily available online information from the airline, including seat and cabin dimensions. We operationalized physical inequality on the plane by the presence or absence of first class on all flights; we operationalized situational inequality by boarding type—front boarding or middle boarding planes—within flights that contained a first class cabin.

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Supporting Information

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SI Methods

We obtained the data on air rage incidents and boarding patterns for flights directly from the airline after entering into a confidentiality agreement. We matched these data to a population of flights from a proprietary dataset purchased from OAG Worldwide. We spoke with the airline's Director of Corporate Security to connect 34 onboard incidents that we could not initially match to the population of flights. Results not including these 34 corrected incidents are consistent with those reported in the paper. We were unable to match 197 incidents in the airline's database to a flight in the population of flight data, because of some combination of incomplete data from the purchased dataset, human error in the recording of incidents, and the fact that data were not collected by OAG Worldwide for flights from very small, regional airports. We also deleted 59,000 flights over the sample time period from the purchased flight data because of missing departure dates.

The airline defines a disruptive passenger as causing one or more crew members to become less able to maintain order in the cabin. The airline uses many categories for incident type (Table 1); the airline designates each incident as only one type.

In 7.8% of incidents, there was more than one incident tied to a specific flight. We coded flights with multiple onboard incidents as a flight with an incident, rather than including multiple rows in the dataset for the same flight. We also conducted our analyses excluding these flights with multiple incidents and the effects are consistent with those reported in the paper. Note that of all flights with onboard incidents, only four flights also had incidents that occurred at the departure airport (before boarding), suggesting that the incidents we observe onboard are not simply the result of a generally belligerent set of passengers.

The airline provided the gender of the disruptive passenger for 41.8% of cases, and also provided (only) the first name to researchers to maintain customer confidentiality. A research assistant coded the remaining disruptive passengers' gender, and was unable to do so in a small percentage of onboard incidents with gender-neutral first names (3.02%).

Our dataset included some plane details, such as the plane make and model; where possible, we supplemented this information with plane details from the airline's website and other sites, such as www.seatguru.com. For this airline, flights recorded by OAG Worldwide as having a three-cabin plane (e.g., first class, business class, and economy class) were very rare, less than 0.03% of flights. In addition, one plane model for this airline, representing ~3.6% of all flights, was configured in both a two- and three-cabin layout. The OAG Worldwide dataset did not indicate which layout was used for each flight, but the airline website indicated that only a third of the actual planes of this model number in their fleet had a three-cabin layout. However, no incidents of air rage were reported by passengers in business class on these three-cabin or potential three-cabin planes, precluding further analysis of the predictors of air rage in such "three-class" planes. For the analyses reported in the paper, we recoded these flights—those with a three-cabin or potential three-cabin layout—such that the first and business classes were both coded as first class seats, and the physical dimensions of first and business class were averaged.

We did not have access to individual passenger data or how fully flights were sold; however, examining annual reports for the organization demonstrated that customer yield (the percentage of seats that are unsold on flights) was similar and low (~3–5%) during the years we examined.

Tables S1 and S2 contain correlation matrices and descriptive statistics. Table S3 contains robustness checks with additional controls (month of the year, day of week, time of day, and flight frequency), as well as reports odds ratios for all of the global flight regions. Results are consistent with those reported in the main text.

We also sought to identify other possible markers of inequality and status. First, we attempted to explore how the availability of "economy plus" seating, which allows economy passengers to upgrade to slightly roomier seats, could alter perceptions of inequality among economy class passengers. Unfortunately, this feature was implemented by the airline in specific planes—not in entire plane models—over a period of years, making it impossible for us to examine this question because our dataset indicates only which plane model, but not which specific plane, is used for each flight. Second, we attempted to identify employee behaviors that might accentuate perceptions of inequality among economy class passengers, such as gate agents' reminders not to use the first class boarding lane, and flight attendants' use of curtains to separate first class and economy cabins or reminders not to use first class washrooms. Unfortunately, however, these employee-level data were not tracked by the airline.

Table S1. Flight level variable descriptives and correlations (all flights)

Variable	Mean	SD	1	2	3	4	5	6	7	8
1. Economy incident (= 1)	0.0008	0.0284	1.000							
2. Economy seats on aircraft	77.3954	54.5150	0.043							
3. Flight distance in miles	828.7911	1071.8160	0.046	0.793						
4. Flight delay in hours	0.1831	0.5285	0.011	0.062	0.076					
5. Economy seat width (cm)	44.7551	2.1920	0.006	0.023	0.102	0.062				
6. Economy seat pitch (cm)	80.0689	4.9370	0.022	0.478	0.489	0.046	-0.155			
7. Cabin area [height × width (m^2)]	5.9459	2.4896	0.041	0.912	0.794	0.055	-0.081	0.676		
8. International flight (= 1)	0.3328	0.4712	0.015	0.260	0.381	0.074	0.135	0.234	0.276	
9. First class present (= 1)	0.4608	0.4985	0.025	0.661	0.530	0.066	0.206	0.317	0.613	0.296

Table S2. Flight level variable descriptives and correlations (only flights with first class)

Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10	11
1. First class incident (= 1)	0.0003	0.0168	1.000										
2. Economy incident (= 1)	0.0015	0.0392	−0.001										
3. First class seats on aircraft	14.2108	7.6034	0.022	0.038									
4. Economy seats on aircraft	116.3521	58.2437	0.021	0.038	0.925								
5. Flight distance in miles	1443.3130	1322.5140	0.022	0.041	0.777	0.714							
6. Flight delay in hours	0.2206	0.5919	0.002	0.011	0.050	0.045	0.060						
7. First class seat width (cm)*	52.2694	1.2478	0.002	0.005	0.229	0.272	0.120	−0.007					
8. Economy seat width (cm)	45.2445	0.7398	0.004	0.008	0.097	0.153	0.100	−0.000	−0.497				
9. Economy seat pitch (in cm)	81.7603	6.7471	0.008	0.016	0.509	0.348	0.405	0.046	0.337	−0.366			
10. Cabin area [height × width (m^2)]	7.5961	2.7509	0.019	0.035	0.916	0.867	0.736	0.049	0.276	0.172	0.640		
11. International (= 1)	0.4837	0.4997	0.007	0.011	0.228	0.151	0.350	0.055	−0.045	−0.013	0.243	0.212	
12. Front boarding (= 1)	0.8616	0.3453	−0.019	−0.035	−0.877	−0.762	−0.736	−0.060	0.089	−0.084	−0.627	−0.873	−0.273

*Seat pitch data are not available for first class because many first class seats had their own pods/beds.

Table S3. Robustness logistic regression models predicting onboard incidents

Variable	Model 1	Model 2	Model 3
Dependent variable	Economy class incident	Economy class incident	First class incident
Dataset	All flights	Flights with first class	Flights with first class
Predictor variables			
Economy seats	1.0008 (0.0012)	1.0034** (0.0015)	—
First class seats	—	—	1.0389*** (0.0152)
Economy seat width (cm)	0.9542* (0.0230)	1.2755** (0.0928)	—
Economy seat pitch (cm)	0.9874 (0.0100)	1.0120 (0.0128)	—
First class seat width (cm)†	—	—	0.8014 (0.1095)
Flight distance in miles	1.0004**** (0.0000)	1.0004**** (0.0001)	1.0003** (0.0002)
Flight delay (h)	1.1450**** (0.0167)	1.1324**** (0.0174)	1.0263 (0.0556)
Cabin area (m^2)	1.1282*** (0.0522)	1.1298** (0.0602)	1.5079*** (0.2090)
International (1 = yes)	0.6348 **** (0.0679)	0.6321**** (0.0736)	0.6985 (0.1682)
First class present (1 = yes)	4.0358**** (0.4860)	—	—
Boarding from front (1 = yes)	—	2.3452*** (0.6018)	14.5774*** (14.9644)
Departure time (hours since midnight)	1.0610**** (0.0108)	1.0555**** (0.0113)	1.0719**** (0.0174)
Flight frequency	1.0000 (0.0000)	0.9999** (0.0000)	0.9999 (0.0001)
Month (April base category)			
August	0.7926** (0.0936)	0.7856** (0.0959)	0.8886 (0.2329)
December	0.7004*** (0.0873)	0.6772*** (0.0899)	0.7176 (0.2120)
February	0.7985* (0.0963)	0.7899* (0.0998)	1.3023 (0.3466)
January	0.9545 (0.1060)	0.9552 (0.1104)	0.7830 (0.1973)
July	0.8626 (0.0936)	0.8311 (0.0940)	0.7973 (0.2373)
June	1.0048 (0.1045)	0.9678 (0.1053)	1.0626 (0.3235)
March	0.8410 (0.0955)	0.8274 (0.0981)	1.1010 (0.3162)
May	0.8737 (0.0928)	0.8737 (0.0942)	1.3086 (0.3785)
November	0.9916 (0.1345)	0.9484 (0.1394)	1.1489 (0.2955)
October	0.8826 (0.1034)	0.8466 (0.1046)	0.8678 (0.2486)
September	0.8073 (0.0991)	0.7895* (0.1005)	0.5751 (0.2080)
Day of week (Friday base category)			
Monday	1.1156 (0.0947)	1.0852 (0.0956)	1.1615 (0.2278)
Saturday	0.9791 (0.0851)	0.9246 (0.0847)	1.0270 (0.2346)
Sunday	0.8935 (0.0831)	0.8771 (0.0847)	1.0171* (0.2239)
Thursday	0.9819 (0.0917)	0.9391 (0.0932)	1.1982 (0.2734)
Tuesday	0.9835 (0.0828)	0.9529 (0.0840)	0.8530 (0.2079)
Wednesday	1.1212 (0.1025)	1.1259 (0.1076)	0.9695 (0.1967)
Departure region–Arrival region (North East Asia–North America base category)			
Western Europe–North America	2.7185*** (0.7986)	2.3992*** (0.6798)	2.2256 (1.4225)
Caribbean–Caribbean	—	—	—
Caribbean–North America	4.3515**** (1.6960)	2.6477** (1.0756)	1.3763 (1.2952)
Central America–North America	5.0667**** (1.9621)	3.0136*** (1.2487)	2.7034 (2.3901)
Lower South America–Lower South America	4.5467*** (2.5514)	3.1730** (1.7454)	1.4500 (1.8677)
Lower South America–North America	1.6300 (0.6397)	1.5842 (0.6269)	0.5646 (0.2442)
Upper South America–North America	2.1686 (1.0466)	1.6923 (0.8105)	3.0285 (2.8611)
Middle East–North America	1.6573** (0.3753)	1.6140** (0.3628)	2.3261** (0.9126)
North America–North East Asia	1.1166 (0.2305)	1.0902 (0.2263)	1.3890 (0.5479)
North America–Western Europe	1.5173 (0.4418)	1.3800 (0.3893)	1.2410 (0.7806)
North America–Caribbean	4.3375**** (1.7686)	2.5632** (1.1050)	3.1779 (2.9010)
North America–Central America	4.3579**** (1.7757)	2.5610** (1.1041)	1.2651 (1.3415)
North America–Lower South America	0.8515 (0.1796)	0.8302 (0.1696)	0.2969 (0.2746)
North America–Upper South America	3.5670*** (1.4991)	2.7456*** (1.0720)	—
North America–Middle East	1.7707*** (0.3936)	1.7261*** (0.3786)	1.8967* (0.7141)
North America–North America	2.5737** (0.9614)	1.6259 (0.6388)	1.3173 (1.1065)
North America–Southwest Pacific	0.3888**** (0.0597)	0.3661**** (0.0592)	0.8155 (0.1967)
Southwest Pacific–North America	0.9666 (0.1519)	0.8753 (0.1456)	1.6312* (0.4083)
McFadden's pseudo R^2	0.1080	0.0630	0.0758

Values presented are odds ratios with robust SEs. The full dataset represented ∼150–300 unique arrival and departure airports, and between 500 and 1,000 unique flight routes. SEs are adjusted clusters based on plane route (i.e., the specific departure airport and arrival airport combination). All models include fixed effects for flight regions. Observations were dropped because they were in a flight region that had no incidents. Flights with first class present are ∼46.1% of the population of flights. No flights without first class boarded from the middle of the plane. *$P < 0.10$, **$P < 0.05$, ***$P < 0.01$, ****$P < 0.0001$.

†Seat pitch data are not available because many first class seats had their own pods/beds.