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Rethinking pilot retention in the United States: An analysis of key factors

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ABSTRACT

Pilot retention remains a persistent challenge for U.S. regional airlines, yet empirical evidence on its structural drivers is limited. This study examines how airline pilots perceive the relative importance of key retention factors and whether these priorities differ across demographic and professional characteristics. Using a quantitative cross-sectional survey of 57 U.S.-based regional airline pilots, the study applies an adapted rank-order instrument and non-parametric statistical tests. The findings show that financial factors, quality of life, and schedule predictability form a top tier of nearly equal importance, while professional recognition consistently ranks lowest. Age shows a detectable association with retention priorities: pilots aged 35 and under ranked quality of life higher than older cohorts, a pattern requiring replication with larger samples. The results support the relevance of motivation and job embeddedness theories and suggest that non-financial factors play an increasingly central role in pilot retention strategies in the U.S. airline labor market.

1. Introduction

The aviation industry faces a persistent and multifaceted challenge in pilot retention. Airlines, particularly regional airlines, continue to struggle to retain qualified pilots, especially captains. The Regional Airline Association's 2022 Annual Report states that the retention of qualified captains is one of the industry's top concerns. Several sources report that over 500 regional airline aircraft were parked in 2022 due to pilot retention, resulting in degraded service to numerous smaller markets throughout the United States (Regional Airline Association, 2022; Skores, 2023). Despite short-term relief from hiring rates at the mainline carriers in 2024 and 2025, forecasts indicate substantial demand for airline pilots over the next decade, which will continue to strain the current pool of qualified pilots in the United States. Additionally, pilot supply-demand imbalances extend beyond the US, with global analyses indicating persistent shortages across multiple aviation markets (Kioulepoglou et al., 2024).

Academic and industry research has long recognized the significance of pilot retention within the broader debate on pilot supply and demand. Previous studies have examined various aspects of pilot shortages and retention across different geographical and operational contexts. Efthymiou et al. (2021) investigated pilot retention at Ryanair, a European Low-Cost Carrier (LCC), and identified key factors such as quality of life, career progression, and compensation as major influences on pilots' intentions to remain. Studies conducted in Asia found that robust compensation packages, supportive organizational cultures, and career growth opportunities are common themes to counter competitive hiring practices and enhance pilots' quality of life (Amornpipat, 2019; Shanker, 2019). In Australia, Lambeth et al. (2022) examined structural shifts in pilot compensation trends and found that productivity-based pay and seniority-based scheduling systems positively affected pilots' decisions to remain, particularly within a highly unionized workforce. Together, these studies provide a foundation for understanding the determinants of pilot retention in diverse international contexts.

Despite insights from international studies, research on pilot retention in the United States remains limited. Much of the existing literature concentrates on the effects of the COVID-19 pandemic (Kim & Choi, 2024; Kioulepoglou & Blundell, 2022; Mizzi et al., 2022; Sobieralski, 2020; Vulturius et al., 2024), with comparatively little emphasis on the long-term structural and organizational factors shaping retention within U.S. regional airlines. Regional airlines operate low-cost business models that may not allocate sufficient financial resources to offer

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competitive compensation packages relative to mainline airlines, limiting their ability to compete for talent solely on monetary terms (Higgins et al., 2016; Lutte, 2018; Wild, 2022). This creates a pressing need to explore additional dimensions of retention, including quality of life, career development, and organizational support.

The aim of this paper is to examine how pilots at U.S. regional airlines assess the importance of key retention factors and how these assessments vary with demographic and professional characteristics, including age, gender, position, experience, and military background. By addressing these points, this paper contributes to the existing body of knowledge by offering a better understanding of the determinants of pilot retention in the U.S. context. The findings inform airline management, regulators, and training institutions about the evolving dynamics of pilot retention, thereby supporting the development of evidence-based strategies to strengthen workforce stability in a critical segment of the aviation industry.

2. Literature review

Airline pilots must undergo extensive training and stringent certification standards, which require years of flight training and experience. Depending on age, airline pilots also maintain medical certification and undergo annual or semi-annual exams. Their skills and knowledge are continually evaluated through their airline's training program (Albelo et al., 2024). Aircraft type ratings often take several weeks to months of training and cost tens of thousands of dollars (U.S. Government Accountability Office [U.S. GAO], 2023). These extensive training, experience, and certification requirements make replacing airline pilots difficult and costly (Fraher, 2019).

Kiernan (2018) examined a Part 135 business jet charter company and found that the cost to replace a pilot was $17,406. These turnover costs include recruiting, hiring, onboarding, training, and equipping a pilot. Turnover costs can range from 50% to 250% of a pilot's yearly salary. Additionally, ongoing training and investment in the pilot increases the expense of initial hiring. This calculation varies substantially depending on the specific business model and the type of air carrier. A recent government study indicates that initial qualification costs for airlines to certify a pilot range from $25,000 to $50,000 (U.S. GAO, 2023). Despite variability in turnover costs, the key takeaway is that the longer pilots are retained, the lower the impact of turnover costs on employers.

The pilot workforce possesses significant bargaining power in negotiations due to the difficulty of replacing them. This bargaining power is compounded by an increasing demand for pilots and a shortage of qualified applicants entering the workforce (Gittell et al., 2004; Harvey & Turnbull, 2006). While airline pilot strikes are rare in the US (the last strike occurred in 2010), labor unions can employ a variety of work actions to disrupt airline operations and garner media support (Fraher, 2019). In the U.S., the Railway Labor Act (RLA) is designed to prevent disruptions to critical services, including air transportation. However, settling collective bargaining agreements (CBAs) may take months or even years (von Nordenflycht & Kochan, 2003).

In contrast, Harvey and Turnbull (2006) explain several reasons why airline pilots have an incentive to remain with their current employers. First, the advantages gained through accumulated seniority include better schedules and higher pay. Next, if a pilot leaves their employer for another airline, they typically start at the bottom of the seniority list. They are generally not given credit for experience at their previous airline. Additionally, pilots' core skills are not easily transferable to other industries (Efthymiou et al., 2021).

Increasing seniority also provides a protective measure to pilots in the case of system shocks or other conditions that may lead to furloughs and/or job loss. Furloughs and job loss may occur for a variety of reasons, including macroeconomic downturns – decline in economic conditions creating furloughs or airline collapse; medical – loss of medical certification; disciplinary – incidents leading to negative pilot records or media attention; regulatory – reduction of pilot workforce through single-pilot operations; and technological – growth of automation leading to unmanned flight (Bennett, 2016, p. 112). If these conditions occur, furloughs and job loss typically affect junior pilots first, and most senior pilots are less susceptible to the effects. This is also true in the context of mergers and acquisitions, where senior pilots may retain their date of hire during union merger negotiations (Fraher, 2013).

Complicating matters even further are the business models employed by regional airlines and LCCs in the post-deregulation period. Deregulation has encouraged an environment of unfettered competition, driving airlines to lower fares, thereby reducing costs while increasing efficiency at the expense of other initiatives (Bennett, 2016, p. 63). Michael O'Leary, the controversial leader of European LCC, Ryanair, explains why high workforce and asset productivity are essential to a competitive business model: "Everything is geared toward efficiency, and we have to be more aggressive than our competitors [to survive]" (Bennett, 2003). These carriers are organized to withstand price wars and system shocks, and as a result, they exhibit broadly similar behaviors toward their employment practices (Hunter, 2006; Wild, 2022).

Bennett (2016) conducted a thorough qualitative study of pilot groups at many airlines across Europe, capturing how high-efficiency employment practices may affect the pilot workforce at some carriers. He stated that some pilots felt that efforts to maximize the efficiency of equipment and personnel are impacting safety, specifically in the areas of pilot fatigue and aircraft maintenance. For example, some pilots felt that airlines treat flight duty limitations as productivity goals rather than the maximum limits of safe operation with respect to pilot performance and fatigue management. Despite airlines' claims that their crew utilization falls within legal limits, scheduling and pilot utilization practices directly affect pilots' decisions to stay or leave (Efthymiou et al., 2021).

Efthymiou et al.'s (2021) study on pilot retention provides a methodological foundation for exploring the factors influencing pilot retention within the airline industry. Their exploratory mixed-methods approach, which utilized both qualitative interviews and a quantitative survey, identified key drivers of retention, including being based at home, predictable rosters, competitive salaries, and job security. This research demonstrated how these factors shape pilots' decisions to stay or leave their employer and provided valuable insights into retention strategies for low-cost carriers. However, research suggests that employee perceptions and attitudes toward retention vary significantly across cultural contexts (Majumdarr & Dasgupta, 2024; Zhang et al., 2012). While Efthymiou et al. (2021) focus on a European airline, applying their findings to the U.S. market requires adaptations to account for differences in terminology used to describe factors of pilot retention.

2.1. Theoretical frameworks for employee retention

Numerous theoretical frameworks explain employee retention, including Organization Fit, Equity, Human Capital, Social Exchange, Psychological Contract, Job Embeddedness, and motivation theories. Although distinct in origin, these frameworks converge on a shared assumption that employees are more likely to remain when their work environments satisfy psychological and material needs, align with personal values, and generate perceptions of fairness and reciprocity. These theories emphasize retention as a multidimensional decision shaped by motivation, exchange relationships, and the perceived costs of leaving.

Motivation theories provide a foundational lens for understanding retention by explaining why individuals choose to maintain employment relationships. Motivation is defined as the internal drive to fulfill unmet needs (Ryan & Deci, 2000), and content theories describe the types of needs that organizations must address to sustain commitment. Maslow's Hierarchy of Needs and Alderfer's ERG theory both suggest that employees seek fulfillment across security, social connection, and personal growth, although ERG theory allows these needs to operate

simultaneously rather than sequentially (Alderfer, 1969; Maslow, 1943). Herzberg's Two-Factor Theory further clarifies that while compensation and working conditions prevent dissatisfaction, long-term retention depends on intrinsic motivators such as recognition, responsibility, and achievement (Herzberg et al., 1959). McClelland's Need Theory complements this view by emphasizing that dominant motivational drivers, including achievement, affiliation, and power, are shaped by cultural and life experiences (Johnson & McClelland, 1984). Together, content theories indicate that retention is strengthened when organizations balance extrinsic conditions with opportunities for psychological growth and individual fulfillment.

Process theories, including equity, expectancy, goal-setting, and reinforcement theories, provide critical insights into the motivational dynamics within organizational structures (Oban, 2018). Process theories explain how motivation is translated into sustained behavior. Rather than focusing on needs alone, process theories emphasize employees' cognitive evaluations of effort, outcomes, and fairness. Equity theory suggests that employees continuously compare their input-output ratios with those of others and adjust their commitment accordingly (Adams, 1963). Expectancy theory argues that motivation depends on the perceived likelihood that effort will lead to valued rewards (Vroom, 1964), while goal-setting theory highlights the importance of clear, challenging, and attainable objectives in sustaining performance (Locke, 1968). Reinforcement theory further demonstrates that consistent rewards and feedback strengthen desired behaviors over time (Skinner, 1958). Collectively, these theories suggest that retention is reinforced when organizational systems align effort with fair, transparent, and meaningful outcomes.

Job Embeddedness Theory extends retention research by incorporating non-work influences that anchor employees to their organizations. Mitchell et al. (2001) presented embeddedness as the combined effects of links, fit, and sacrifice across both work and community domains. This framework shifts attention away from dissatisfaction-based turnover models toward the forces that make leaving costly or disruptive. Subsequent research has shown that high embeddedness not only reduces turnover but also enhances performance and resilience during organizational change (Hom et al., 2017; Lee et al., 2021). Employees may therefore remain even when dissatisfied if community ties, family responsibilities, or geographic stability increase the perceived sacrifice of departure (Ng & Feldman, 2012).

Recent extensions of job embeddedness theory emphasize embeddedness by proxy, in which employees' decisions are shaped by the needs of spouses, children, and extended family members. Factors such as children's schooling, spousal employment, proximity to relatives, and community involvement increasingly influence retention decisions (Burrows et al., 2022; Ng & Feldman, 2013; Peltokorpi & Allen, 2024; Porter et al., 2019). These findings reinforce the idea that retention is a cumulative outcome of workplace conditions and broader life contexts.

When integrated, motivation and job embeddedness theories suggest that employee retention is driven by a combination of need fulfillment, perceptions of fairness, reciprocal exchange, and contextual constraints. This synthesis is particularly relevant in regional airline operations, where financial limitations often limit pay competitiveness relative to mainline carriers (Higgins et al., 2016; Lutte, 2018). Although compensation gaps persist, investments in quality of life initiatives and non-financial incentives can increase the social and psychological costs of leaving. By strengthening both motivational alignment and embeddedness, airlines can make turnover decisions more complex and encourage pilots to remain despite external financial opportunities (Harvey & Turnbull, 2006; Warnock-Smith et al., 2020).

3. Methodology

This study adopts a quantitative cross-sectional research design to examine the key determinants influencing regional airline pilot retention in the United States. The paper utilizes an established and validated survey instrument previously employed in a European study on pilot retention and adapts it to the U.S. operational context (Efthymiou et al., 2021). The research collects rank-ordered data reflecting pilots' perceptions of the relative importance of various factors affecting their decision to remain with their employing airline. Fig. 1 provides an example of the rank-ordered survey item format used.

The target population for this study was active airline pilots employed at U.S. regional carriers operating under 14 CFR Part 121. Participants were recruited via nonprobability (convenience/snowball) sampling through professional networks and social media. As such, the sample is not a probability-based representation of the target population, and results should be interpreted as exploratory and context-specific. No defined sampling frame (e.g., union roster, company employee list) was available, precluding calculation of a traditional response rate. The survey distribution relied on aviation-focused social media communities (e.g., LinkedIn, Facebook, Reddit). Incomplete responses and participants who did not meet the criteria were excluded. Survey data were collected from April to May 2025 using a Qualtrics survey link. Fifty-seven valid responses were retained from the 113 total submissions ($n = 57$).

Demographic items included age, gender, experience, flight deck position, military experience, and carrier type. Age was dichotomized into '35 and Under' and 'Over 35′ for two reasons. First, this cut-point aligns with the age groupings used by Efthymiou et al. (2021), enabling direct cross-study comparison. Second, the sample distribution (82% aged 35 or younger, $n = 47$; 18% aged over 35, $n = 10$) required dichotomization to maintain adequate cell sizes for nonparametric testing. The resulting groups reflect the early-career concentration typical of the regional airline workforce. Experience was divided into quartiles to permit exploratory analysis of whether retention factors varied across career stages, following precedent established in prior retention research (Efthymiou et al., 2021). The largest demographic group comprised American male first officers aged 35 and under without prior military experience. Table 1 presents the participant demographics.

The survey instrument used by Efthymiou et al. (2021) was adapted to reflect the terminology, labor structure, and operational characteristics of the United States airline industry. The core framework of rank-order retention categories from the original instrument (financial, lifestyle, professional opportunity, recognition, rosters, and operational) was retained; however, several adjustments were made to align with U.S. labor contract structures, crew scheduling practices, and cultural differences. Items addressing commuting policies, union representation, and seniority systems were added, given their particular importance to U.S. pilots. Several terms were revised to American English, including 'Rosters' to 'Schedule' and 'Lifestyle' to 'Quality of Life.' Fig. 2 provides an overview of the adapted factor structure.

Demographic factors, including age, gender, commercial flying experience, position, and military background, were selected as independent variables in the statistical analysis. These were chosen based on prior research indicating that airline pilots at different career stages may prioritize different retention factors (Lambeth et al., 2022; Nikle & Bjerke, 2018; Shanker, 2019), and to assess whether gender or military background significantly influences retention factors. The dependent variable constructs included Financial, Quality of Life, Professional Opportunity, Recognition, Schedule, and Operational Experience aspects of retention.

The Mann-Whitney U test and the Kruskal-Wallis test were conducted to assess whether differences in participants' evaluations of retention factors were statistically significant across demographic groups. Non-parametric tests were selected due to the use of ranked data in the dependent variables (Frey, 2016). All statistical analyses were conducted using Positron (version 2025.12.2 build 5) and R (version 4.5.2) statistical software. The study received ethical clearance, and participation was voluntary and anonymous, with informed consent obtained before respondents began the survey.

The most important factor I look for in a job as a pilot is:

Please rank these factors in order of importance to you, with 1 being the most important, 2 being the 2nd most important, and on down to 6 for the 6th most important.

_____ Financial (1)
_____ Quality of Life (2)
_____ Professional Opportunity (3)
_____ Recognition (4)
_____ Schedule (5)
_____ Operational Excellence (6)

Fig. 1. Sample of rank-ordered question from survey instrument.

Table 1
Participant demographics.

Demographics		n	%
Age Group	≤ 35 years	47	82.5
	> 35 years	10	17.5
Experience	Q1 (least)	15	26.3
	Q2	14	24.6
	Q3	14	24.6
	Q4 (most)	14	24.6
Gender	Male	51	89.5
	Female	5	8.8
	Other/NA	1	1.8
Military Background	Yes	4	7.0
	No	53	93.0
Position	Captain	21	36.8
	First Officer	36	63.2
Carrier Type	Regional	57	100.0

4. Results and discussion

4.1. Sample characteristics

The survey gathered 57 usable responses from U.S. regional airline pilots, representing approximately 0.30% of the estimated 19,000 regional airline pilots in the United States. The sample skews young and early-career: 82.5% of respondents were 35 years old or younger (n = 47), and 63.2% were First Officers (n = 36), compared with 36.8% Captains (n = 21). This age and position distribution reflects the current regional airline environment, where rapid mainline hiring has reduced the number of senior pilots and compressed upgrade timelines for those who remain.

The sample was 89.5% male (n = 51), 8.8% female (n = 5), and 1.8% other or not specified (n = 1), consistent with FAA data indicating approximately 89% of medical certificate holders are male (Federal Aviation Administration 2025a). Pilots with a military background comprised 7.0% of the sample (n = 4). Demographic imbalances reflect both the nonprobability sampling approach and underlying workforce

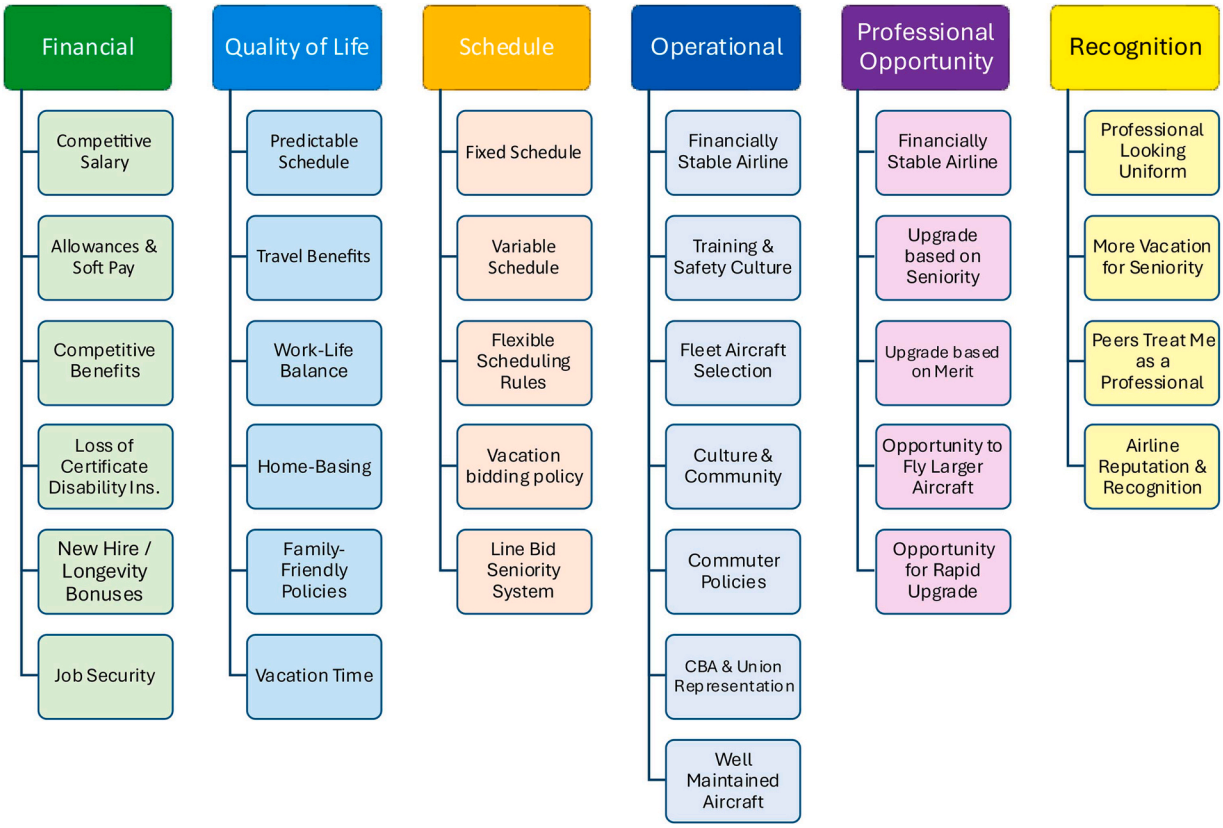

Fig. 2. Factors of pilot retention in U.S. airlines.

characteristics, including the age structure of Part 121-qualified pilots at regional carriers experiencing high attrition to mainline carriers.

4.2. Overall retention factor hierarchy

A Friedman test confirmed that pilots do not rank retention factors equally ($\chi^2 = 171.6$, df = 5, $p < .001$). Three constructs clustered at the top with tied median ranks of 2: Quality of Life (M = 2.07, SD = 1.21), Financial (M = 2.23, SD = 1.17), and Schedule (M = 2.39, SD = 0.92). Operational factors ranked fourth (Mdn = 4, M = 4.44, SD = 1.12), Professional Opportunity fifth (Mdn = 5, M = 4.39, SD = 1.16), and Recognition last (Mdn = 6, M = 5.49, SD = 0.91).

When asked to identify the single most important retention factor, 43.9% (n = 25) selected Quality of Life, 35.1% (n = 20) selected Financial, and 15.8% (n = 9) selected Schedule. Professional Opportunity accounted for 3.5% (n = 2) of top selections, Operational 1.8% (n = 1), and no respondent selected Recognition as most important. The pattern is consistent across both rank-order and top-choice measures: quality of life and financial factors dominate, schedule follows closely, and recognition contributes little to stay-or-leave decisions. Table 2 presents the rank summary for retention factors and the percentage of pilots ranking each factor #1.

This hierarchy is consistent with Herzberg's two-factor framework in practice. When baseline conditions meet expectations, the factors that shape day-to-day friction and personal sustainability become the most important levers for retention (Herzberg et al., 1959). In this sample, formal recognition programs, awards, and similar signals do not appear to carry retention weight relative to quality-of-life and compensation.

These findings align with Efthymiou et al. (2021), who found Quality of Life ranked first (mean = 2.58), Financial second (mean = 2.88), and Recognition last (mean = 4.70) among Ryanair pilots. Despite differences in regulatory environments, carrier types, and geography, both studies identify the same top-tier priorities and the same bottom-tier irrelevance of recognition. The similarity across samples supports the view that these preferences are not limited to a single airline or region.

The convergence of findings between this U.S. regional sample and Efthymiou et al.'s (2021) European study raises the question of whether these retention priorities represent a shared occupational characteristic among commercial pilots in Western aviation markets, or whether they may generalize more broadly. Additional research in other regions, particularly Asia, the Middle East, and Africa, may help determine whether the observed hierarchy of quality of life, financial, and schedule factors reflects global pilot preferences or culturally specific patterns shaped by labor market conditions and regulatory environments in Europe and North America.

4.3. Subfactor results within each construct

Quality of Life. Being based near home was the highest-ranked subfactor (Mdn = 2; 43.9% ranked first), followed by work-life balance (Mdn = 2; 35.1% ranked first) and a predictable schedule (Mdn = 3; 15.8% ranked first). Vacation time, family-friendly policies, and travel benefits ranked lower. This pattern is consistent with job embeddedness theory: home basing supports community and family links that increase the cost of leaving (Mitchell et al., 2001). In operational terms, domicile access functions as a retention tool even when network economics favor consolidation.

Financial. Job security led this construct (Mdn = 1, 52.6% ranked first), followed closely by competitive salary (Mdn = 2, 38.6% ranked first). Benefits ranked third (Mdn = 3), followed by allowances, disability insurance, and signing bonuses. The pairing of job security and salary likely reflects sensitivity to instability in the regional market, including furlough risk and carrier failures. Retention value comes from compensation paired with credible signals of stability, not compensation alone.

Schedule. Flexible work rules ranked highest (Mdn = 2, 38.6% ranked first), with fixed schedules (29.8% ranked first) and bid-line seniority systems (19.3% ranked first) following. Variable schedules and vacation bidding rules ranked lowest. The absence of demographic variation at the screening stage suggests schedule preferences are relatively uniform across this sample.

Operational. Well-maintained aircraft ranked highest (Mdn = 2, 38.6% ranked first), followed by unambiguous SOPs (29.8% ranked first) and highly skilled fellow pilots (21.1% ranked first). A proactive training environment and well-equipped aircraft ranked lower. These priorities suggest operational excellence functions as a baseline expectation rather than a retention differentiator.

Professional Opportunity. Employer financial stability dominated (Mdn = 1, 80.7% ranked first). Opportunities to fly larger aircraft (10.5% ranked first) and merit-based promotion (7.0% ranked first) trailed substantially. The ordering suggests pilots discount advancement promises when stability is uncertain. For regional carriers, signaling stability may matter more than faster upgrade timelines.

Recognition. Within this low-priority construct, recognition as a professional ranked highest (Mdn = 2, 43.9% ranked first), followed by additional vacation for long service (Mdn = 2, 35.1% ranked first). Uniforms and formal recognition programs ranked lower. At the construct level, recognition carries minimal weight for retention; however, professional respect may still contribute to engagement, even if it does not independently influence stay-or-leave decisions.

4.4. Demographic effects

A hierarchical false discovery rate (FDR) procedure was used to evaluate each construct for demographic differences in subfactor priorities. Five of six constructs met the Benjamini–Hochberg screening threshold at q = 0.10: Financial, Recognition, Professional Opportunity, Operational, and Quality of Life (all FDR-adjusted p = 0.029). Schedule did not pass screening (p = 0.283), suggesting that schedule subfactor priorities are similar across demographic groups. The results below summarize subfactor ordering and practical implications by construct.

Age group was the only demographic characteristic associated with a detectable difference in retention factor prioritization after FDR correction. Younger pilots (≤35 years, n = 47) ranked Quality of Life significantly higher than older pilots (>35 years, n = 10), Mann–Whitney U = 361.0, p = 0.005, FDR-adjusted p = 0.032, rank-biserial r = 0.54. Younger pilots assigned Quality of Life a median rank of 1, compared to a median rank of 3 among older pilots. This large effect remained significant after correction for multiple comparisons across 24 general-factor tests, making it the most reliable demographic signal in the study.

This pattern is consistent with career-stage differences in retention priorities. Younger pilots appear to prioritize quality of life earlier in their careers rather than treating it as something earned through seniority. For regional airlines, the implication is direct: quality-of-life improvements may produce stronger retention returns for younger cohorts than equivalent investments in compensation alone. However, the small number of older pilots (n = 10) limits interpretive confidence, and this exploratory finding requires replication with larger, age-balanced samples before informing policy recommendations.

Table 2
Rank Summary for retention factors and (%) of pilots ranking each factor #1.

Factor	n	Median	Percent	Mean	SD
Quality of Life	57	2	43.9	2.07	1.21
Financial	57	2	35.1	2.23	1.17
Schedule	57	2	15.8	2.39	0.92
Operational	57	4	1.8	4.44	1.12
Professional Opportunity	57	5	3.5	4.39	1.16
Recognition	57	6	0.0	5.49	0.91

Note. Participants ranked six retention factors from 1 (most important) to 6 (least important).

The pattern parallels Efthymiou et al. (2021), who found that younger Ryanair pilots also prioritized lifestyle factors more heavily. This similarity between a European low-cost carrier (n = 394) and U.S. regional pilots (n = 57) suggests the age-related pattern may extend beyond this sample, though replication is needed to confirm.

First Officers showed a modest tendency to rank operational factors higher than Captains (FDR-adjusted p = 0.082). In Herzberg et al.'s (1959) framework, operational items function as hygiene factors: they shape day-to-day dissatisfaction more than long-term fulfillment. Because First Officers operate with less authority to alter procedures or cockpit workflow, they may be more sensitive to the operational climate than Captains, who can buffer friction through role authority and experience (Bennett, 2016).

Several hypothesized differences did not reach significance after correction. Gender and military background comparisons must be interpreted cautiously, given severe power limitations: with 5 female respondents versus 51 male, and only 4 pilots with military experience versus 53 without. The absence of significant findings does not indicate that differences do not exist; it indicates this sample was unable to detect them. Experience quartiles and position comparisons similarly showed no evidence of differential priorities after FDR correction. Non-significant results should not be interpreted as evidence of no difference.

5. Conclusions

Addressing the worldwide pilot retention challenge requires a nuanced understanding of the financial, quality of life, and operational factors that influence pilots' decisions to remain with or leave their employers. This study examined these factors among regional airline pilots in the United States.

Financial, quality of life, and schedule factors formed a top tier of nearly equal importance, challenging the conventional assumption that compensation alone drives retention. The sample demographics help explain this pattern. The analytic sample consists of 57 U.S. regional airline pilots, skewing young: 82.5% (n = 47) were aged 35 or younger, with only 17.5% (n = 10) over 35. This age distribution is considerably younger than the overall Airline Transport Pilot certificate holder population (mean age 50.3 years) but consistent with the regional airline workforce, where rapid hiring cycles and shorter career tenure produce younger pilot populations than legacy carriers (Federal Aviation Administration, 2025b). Gender composition (89% male) aligns with FAA data indicating approximately 89% of medical certificate holders are male (Federal Aviation Administration, 2025a).

Pilots aged 35 or younger ranked quality of life significantly higher than older pilots, an effect that survived multiple testing corrections and distinguished itself from other demographic comparisons that did not reach significance after adjustment. This pattern points to a shift in how pilots plan their careers. Older pilots may perceive the industry differently and accept demanding schedules with negative quality of life ramifications as "paying their dues," but younger pilots categorize quality of life as an immediate priority rather than something earned through seniority. This finding aligns with Efthymiou et al.'s (2021) observation that younger European pilots expressed similar priorities.

From a practical standpoint, regional airlines should focus retention efforts on quality of life alongside compensation. Enhancing schedule predictability and implementing family-friendly initiatives could mitigate the loss of early-career pilots. Despite differing regulatory environments and labor rules, the key findings largely replicate those reported by Efthymiou et al. (2021), suggesting the prioritization of quality of life may reflect broader occupational patterns, though additional replication is required.

Notable differences between U.S. and European pilots include domicile placement, commuting practices, and seniority systems. Domicile location carries greater weight in the United States, where many pilots commute long distances, a practice less common in Europe. Seniority is also more deeply entrenched in the U.S., governing schedules, flight assignments, and aircraft type almost exclusively. Despite these structural differences, quality of life remains among the most important retention factors in both contexts.

The study offers four contributions to theory and practice. First, it addresses a clear empirical gap in U.S. pilot retention research while demonstrating hierarchical FDR control in a retention context, reducing false discovery risk across extensive subgroup comparisons. Second, it explicitly links classic motivation theories, particularly Herzberg's two-factor framework, with job embeddedness theory, demonstrating how off-the-job embeddedness factors such as home basing and schedule predictability materially influence retention in a seniority-driven profession. Third, it identifies age as a variable shaping retention priorities, providing empirical support for age-related patterns in career expectations and contributing to broader debates on changing workforce values in safety-critical professions. Fourth, the consistency of findings with Efthymiou et al. (2021) across different labor and regulatory environments provides preliminary cross-cultural support, though replication in additional markets is needed to confirm generalizability.

Finally, the study sheds further light on the critical role of quality of life, financial, and scheduling factors in pilot retention at U.S. regional airlines, echoing concerns identified in the introduction regarding competitive pressures from mainline and legacy airlines (Regional Airline Association, 2022; U.S. GAO, 2023). The prioritization of quality-of-life factors, particularly among younger pilots, highlights shifting expectations and suggests that regional airlines may benefit by addressing non-financial retention factors. Consequently, airlines and unions should proactively incorporate these insights into their collective bargaining strategies, prioritizing pilot quality of life enhancements alongside traditional financial compensation.

5.1. Limitations and future research

This study is subject to several limitations. A key limitation concerns the size and composition of the survey sample. The analytic sample comprises 57 U.S. regional airline pilots, representing approximately 0.30% of the estimated 19,000 regional airline pilots in the United States. Participants were recruited via nonprobability sampling through professional networks and social media; as such, the sample is not statistically representative of the broader regional pilot population. Furthermore, the demographic distribution of respondents is uneven: 82% (n = 47) were aged 35 or younger, only 9% (n = 5) were female, and just 7% (n = 4) reported military background. These imbalances limit the statistical power of subgroup analyses, particularly for underrepresented categories. Non-significant findings for these comparisons should not be interpreted as evidence of no difference; they indicate that this sample was unable to detect such differences. Accordingly, the study is positioned as exploratory and provides initial empirical insight into retention priorities among U.S. regional airline pilots rather than definitive population-level conclusions.

The rank-ordered survey design imposes forced choices that may not fully capture pilot preferences, as respondents must differentiate between factors that may be equally important, potentially inflating differences and concealing tied preferences (Alwin & Krosnick, 1985; van Eijnatten et al., 2015). Likert-scale instruments would allow independent ratings, support parametric analysis (when distributional assumptions are met), and enable more nuanced modelling of factor importance. Moreover, self-selection bias may have influenced the results, as pilots who chose to participate may hold stronger views on retention issues than those who did not complete the survey. The study did not collect data on family care responsibilities, which may influence Quality of Life rankings and should be included in future research.

Finally, traditional reliability measures, such as Cronbach's alpha, were not applicable because the data were in a rank-order format and therefore do not support scale-based internal consistency estimates. Each domain represented a distinct construct, thereby preventing the use of composite reliability analysis.

Building on these limitations, three areas warrant follow-on research. First, a Likert-scale instrument would support validity testing and, where assumptions hold, increase analytic power. Second, mixed-methods studies using semi-structured interviews may explain the mechanisms underlying the quantitative patterns, particularly the reasons younger pilots prioritize quality of life. Third, replication with a larger, stratified sample (target n = 200+) would enable adequately powered tests of gender, military background, and carrier-type effects that remain inconclusive here.

Data availability

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

Ethics statement

This study received exempt status approval from the University of North Dakota Institutional Review Board (Protocol #IRB0006445) and Embry-Riddle Aeronautical University Institutional Review Board (Protocol #25-124). Dublin City University Research Ethics Committee accepted the UND IRB approval under a reliance agreement. All participants provided informed consent prior to completing the survey.

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CRediT authorship contribution statement

Michael J. Hickey: Writing – original draft, Project administration, Methodology, Formal analysis, Data curation, Conceptualization. **Marina Efthymiou:** Writing – review & editing, Supervision, Project administration, Methodology, Formal analysis, Conceptualization. **Robert O. Walton:** Writing – review & editing, Validation, Project administration, Data curation, Conceptualization. **Aman Gupta:** Writing – review & editing, Writing – original draft, Validation, Project administration, Methodology, Investigation, Data curation, Conceptualization. **James Higgins:** Writing – review & editing, Validation, Supervision, Software, Resources, Methodology, Investigation, Formal analysis, Data curation.

Declaration of competing interests

Marina Efthymiou is a member of the Editorial Board for the *Journal of the Air Transport Research Society* and serves as Associate Editor for the *Journal of Air Transport Management*. All other authors declare no competing interests.

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