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ABSORBED BUT EXHAUSTED? PASSION FOR WORK AND WELL-BEING PROFILES AMONG AIRLINE STAFF

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Introduction: Aviation operations depend on personnel who work under time pressure, irregular rosters, and safety-critical demands. This study adopted a person-centered approach to identify profiles that reflect both work engagement (vigor, dedication, absorption) and burnout (exhaustion, disengagement), as well as to investigate whether harmonious and obsessive forms of passion for work or job position predicts belonging to these profiles.

Methods: Cross-sectional survey data were collected from 200 airline employees (pilots, junior cabin crew members, and cabin management, i.e., purser/senior cabin crew) recruited through non-probability snowball sampling. After standardizing well-being indicators, latent profile analysis was used to compare two- to five-profile solutions, and multinomial logistic regression was applied to test predictors of profile membership.

Results: A four-profile solution was retained: Moderate engagement–low burnout (39.5%), Low engagement–high burnout (31.5%), High engagement–low burnout (17%), and High absorption–high exhaustion (12%). Harmonious passion was associated with a higher likelihood of the High engagement–low burnout profile and a lower likelihood of the Low engagement–high burnout profile. Obsessive passion differentiated profiles characterized by elevated absorption, including the High absorption–high exhaustion profile, but did not predict membership in the Low engagement–high burnout profile. Controlling for passion, pilots were less likely than junior cabin crew to belong to the Low engagement–high burnout profile.

Conclusions: These findings suggest that, in this sample, high engagement can coincide with substantial strain among airline staff and that passion for work is associated with more sustainable and more costly forms of engagement. Given the cross-sectional design and non-probability sampling strategy, the results should be interpreted as evidence of associations rather than causal relationships. Profile-based monitoring may inform prevention and recovery-support interventions, but its practical application requires further validation in longitudinal studies using larger, more representative samples and operational data.

Keywords: work engagement; burnout; harmonious and obsessive passion; latent profile analysis; aviation personnel

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INTRODUCTION

Airline operations rely on human performance in a work setting characterized by high reliability requirements, time pressure, variable schedules, and continuous exposure to demanding interpersonal and safety-critical situations. Across occupational groups, airline personnel routinely navigate irregular hours, fatigue-related constraints, and high levels of accountability, making employees' well-being strategically important for both organizational sustainability and safety culture [10,12,17]. Fatigue risk management frameworks acknowledge that operational demands and recovery opportunities can be structurally misaligned in aviation, underscoring the need for systematic monitoring of fatigue and its downstream consequences for performance and well-being [25,58]. Recent evidence and regulatory guidance further emphasize the relevance of roster characteristics, workload patterns, duty periods, night operations, time-zone changes, irregular schedules, and recovery opportunities for fatigue-risk monitoring in aviation [20,43].

Work engagement and burnout

Within occupational health psychology, work engagement, typically conceptualized as vigor, dedication, and absorption, reflects an energetic, motivational state associated with persistence and performance, whereas burnout, often captured by exhaustion and disengagement, reflects energy depletion and psychological distancing in response to chronic job stressors [31,46]. Importantly, engagement and burnout are related yet distinct; rather than representing the opposite ends of a single continuum, they are assumed to be partially independent outcomes of intertwined processes described in the Job Demands–Resources framework [6,7,18]. Consistent with this view, person-centered research demonstrates heterogeneous employee profiles characterized by different combinations of burnout and engagement [15]. For instance, Timms et al. [53] used the OLBI and UWES to identify five profiles, including groups that did not align with the extremes of a burnout–engagement continuum, highlighting the value of examining both constructs simultaneously.

In the aviation domain, where demands can be intense but professional meaning, role identity, and task significance are also high, this duality is particularly relevant: some employees may remain highly involved in their work while simultaneously experiencing substantial strain [23,51].

A person-centered perspective on well-being

Most empirical research in aviation well-being has been variable-centered, estimating average associations across the entire sample [1,59]. Such an approach can obscure the possibility that airline personnel cluster into qualitatively distinct configurations of engagement and burnout. Person-centered methods (e.g., latent profile analysis) address this limitation by identifying subgroups characterized by distinct patterns of well-being indicators rather than assuming one "typical" pattern [8,14,37]. Across occupational samples, person-centered research repeatedly demonstrates that high engagement can co-occur with meaningful strain, yielding "mixed" profiles [29,34].

From an airline management perspective, this heterogeneity is practically consequential. Aggregate mean levels can mask subgroups that appear highly engaged yet experience elevated exhaustion and may therefore require earlier recovery support and workload management, especially in safety-critical and customer-facing roles.

Passion for work as a motivational correlate

Beyond job demands and resources, motivational orientations can shape how employees invest effort and persist under pressure. The dualistic model of passion distinguishes harmonious passion, an autonomous, flexible internalization of work, from obsessive passion, a controlled, rigid internalization that can compel persistence even when costs accumulate [16,54,55]. Harmonious passion is typically linked to adaptive functioning, whereas obsessive passion is more ambivalent: it can energize high involvement but may also relate to conflict, rumination, and vulnerability to strain under sustained demands [16,54].

In aviation, this distinction is particularly relevant because high engagement and strong professional identity can support performance, yet rigid persistence without adequate recovery may increase the risk of exhaustion and disengagement over time [18,51]. Accordingly, passion may help differentiate more sustainable from more costly forms of engagement. Supporting this rationale, person-centered evidence indicates that harmonious and obsessive passion can form distinct within-person patterns that differ in their associations with well-being [39]. Therefore, we include both forms of passion as motivational correlates of engagement–burnout profiles.

Passion and job position as predictors of well-being profiles

Based on the dualistic model of passion, we expected harmonious and obsessive passion to differentiate engagement–burnout profiles in distinct ways. Harmonious passion should be associated with more sustainable engagement, whereas obsessive passion may be associated with high engagement and absorption that become costly when recovery is insufficient [16,54].

In addition, airline roles differ in operational constraints and resource structures. Junior cabin crew, pilots, and cabin management (i.e., purser/senior cabin crew members) share exposure to irregular schedules and safety accountability, but they may differ in job control, task boundaries, social support structures, and customer-facing emotional labor, factors known to be associated with burnout and engagement [6,31]. For example, service roles characterized by high emotional demands may show stronger links between emotional strain and burnout symptoms [9,24], whereas roles with higher control and clearer task boundaries may be relatively protective [26,52].

Despite strong theoretical reasons to expect heterogeneous well-being patterns in airline personnel, few studies have simultaneously (a) modeled distinct engagement–burnout profiles in airline staff, (b) tested dualistic passion (harmonious and obsessive) as correlates of profile membership, and (c) accounted for job position differences within the same analytic framework. This gap is important because average levels of engagement or burnout may obscure subgroups of employees who remain highly involved in work while also experiencing elevated strain. Existing evidence on fatigue and recovery management in aviation underscores the applied value of identifying at-risk configurations rather than relying solely on average levels [25].

Research objectives and hypotheses

Building on the Job Demands–Resources (JD–R) model, the primary objective of this study was to examine heterogeneity in work-related well-being among airline personnel. We used a person-centered approach to identify latent profiles based on core dimensions of engagement (vigor, dedication, absorption) and burnout (exhaustion, disengagement).

The second objective was to examine whether harmonious and obsessive passion differentiate profile membership. Drawing on the dualistic model of passion, we treated harmonious passion as a correlate of more sustainable engagement and obsessive passion as a correlate of more intense but potentially costly engagement under constrained recovery [54]. In addition, we examined whether profile membership differed across job positions (pilots, junior cabin crew members, and cabin management). Because prior evidence on role differences in airline well-being is mixed, we treated position effects as probabilistic rather than deterministic.

In sum, the present study aimed to identify latent engagement–burnout profiles in airline personnel and to examine whether dualistic passion for work and job position differentiate profile membership.

Hypotheses and research question

- H1. Multiple qualitatively distinct profiles combining engagement and burnout indicators will emerge (i.e., not only a “high–low” well-being continuum).
- H2. Higher harmonious passion will be associated with a higher likelihood of membership in the most adaptive profile (high engagement–low burnout) and a lower likelihood of membership in the most adverse profile (low engagement–high burnout).
- H3. Obsessive passion will be most strongly associated with profiles characterized by high engagement (especially elevated absorption), but its associations with strain will be more context-dependent and therefore less uniformly protective than those of harmonious passion.
- RQ1. Do profile distributions differ across job positions, and do any position effects remain when controlling for harmonious and obsessive passion?

METHODS

Participants and procedure

The sample comprised 200 airline employees. The gender distribution was balanced (women: n = 101, 50.5%; men: n = 99, 49.5%). Participants’ mean age was 31.35 years (SD = 6.14; range: 19–50). Most respondents reported having completed higher education (n = 151, 75.5%), followed by secondary education (n = 38, 19%), secondary vocational education (n = 9, 4.5%), and basic vocational education (n = 2, 1%). Regarding marital status, 33.5% reported being single (n = 67), 40% being in an informal relationship (n = 80), and 26.5% being married (n = 53). Participants’ mean tenure at their current airline was 4.64 years (SD = 3.84; range: 0–20; n = 199).

Job position was assessed with a single-choice item and recoded into three categories: pilots (captain, first officer), junior cabin crew members,

and cabin management (purser/senior cabin crew, including acting/temporary purser). In the present sample (*N* = 200), 65 participants were pilots (32.5%), 65 were junior cabin crew (32.5%), and 70 held cabin management roles (35.0%). Cabin management roles reflect onboard supervisory and coordination responsibilities. Junior cabin crew served as the reference category in regression analyses.

The study received a favorable opinion from the University College of Professional Education Ethics Committee (January 28, 2026). Data were collected using an online survey, and participants were recruited online through snowball sampling. The study was conducted in accordance with the ethical principles of the Declaration of Helsinki; participation was voluntary and anonymous, and informed consent was obtained from all participants.

Measures

The Passion Scale [30,54] was used to assess harmonious passion (HP) and obsessive passion (OP). The instrument comprises 12 items, with two 6-item subscales corresponding to HP (e.g., "My work is in harmony with other activities in my life") and OP (e.g., "I have difficulties controlling my urge to do my work") respectively. We used the Polish adaptation by Mudło-Głagolska et al. [38], modified to assess passion for work. Responses were provided on a 7-point Likert scale ranging from 1 (do not agree at all) to 7 (completely agree). Subscale scores were computed as mean item scores, with higher values indicating stronger harmonious or obsessive passion. In the present sample, internal consistency was good for HP (α = 0.83, 95% CI [0.79, 0.87]; ω = 0.83, 95% CI [0.80, 0.87]) and acceptable for OP (α = 0.76, 95% CI [0.70, 0.83]; ω = 0.77, 95% CI [0.72, 0.82]).

Work engagement was assessed with the 17-item Utrecht Work Engagement Scale (UWES-17; [46]), comprising three subscales: vigor (6 items; e.g., "At my work, I feel bursting with energy"), dedication (5 items; e.g., "I find the work that I do full of purpose and meaning"), and absorption (6 items; e.g., "I feel happy when I'm engrossed in my work"). We used the Polish adaptation by Szabowska-Walaszczyk et al. [50]. Items were rated on a 7-point scale from 0 (never) to 6 (every day). Subscale and total scores were computed as mean item scores (i.e., the sum of item responses divided by the number of items), yielding possible scores from 0 to 6, with higher values indicating higher work engagement. In the present sample, internal consistency was good: vigor showed α = 0.81 (95% CI [0.77, 0.85]) and ω = 0.81 (95% CI [0.76, 0.85]); dedication showed α = 0.80 (95% CI [0.76, 0.84]) and ω = 0.81 (95% CI [0.77, 0.85]); and absorption showed α = 0.81 (95% CI [0.77, 0.86]) and ω = 0.82 (95% CI [0.78, 0.86]).

Burnout was measured with the Oldenburg Burnout Inventory (OLBI; [19]), which conceptualizes burnout as two core dimensions: exhaustion (e.g., "There are days when I feel tired before I arrive at work") and disengagement from work (e.g., "Lately, I tend to think less at work and do my job almost mechanically"). In line with the original structure, each subscale consists of eight items, including four positively worded and four negatively worded statements. We used the Polish adaptation by Chirkowska-Smolak [13]. Items were rated on a 4-point Likert scale ranging from 1 (strongly agree) to 4 (strongly disagree). Scores were computed as mean item scores, with positively worded items reverse-coded so that higher scores indicated higher burnout. Reliability in the present sample was good: the exhaustion subscale showed α = 0.83 (95% CI [0.80, 0.87]) and ω = 0.85 (95% CI [0.82, 0.88]), whereas the disengagement subscale demonstrated α = 0.75 (95% CI [0.69, 0.81]) and ω = 0.75 (95% CI [0.70, 0.81]).

Analytical approach

All analyses were conducted in the R software environment (4.5.2; [42]). Five well-being indicators (vigor, dedication, absorption, exhaustion, and disengagement) were standardized (z-scores) prior to profiling.

We estimated two- to five-profile solutions using Gaussian mixture modeling (*tidyLPA*, Model 1; *mclust*; [32,41,44,49]). Profile enumeration was based on information criteria (AIC, BIC, SABIC, AWE, CLC, KIC) [3,47,48], classification diagnostics (entropy; [11]; AvePP overall and minimum; [40]), the minimum class size, and theoretical interpretability.

To confirm that profiles represented substantively distinct configurations, we tested between-profile differences for each well-being indicator using Welch ANOVAs [57], followed by Games–Howell post hoc comparisons [21] (adjusted p-values). Effect sizes were reported as η^2 and ω^2 [27,33]. The same Welch and Games–Howell procedures, as well as η^2 and ω^2 estimates, were applied to harmonious and obsessive passion.

We examined associations between profiles, passion, and job position using multinomial logistic regression (reference profile: Profile 3; reference position: junior cabin crew), reporting relative risk ratios (RRR) with 95% CIs [2]. Differences in profile distribution across positions were tested with χ^2 (and Fisher's exact test as a sensitivity check), and effect size was quantified with Cramér's V [2].

As a robustness check addressing classification uncertainty, we estimated a one-step latent class

regression (*flexmix*; [22,28]) in which class formation and class membership prediction by harmonious and obsessive passion and job position were modeled simultaneously, comparing two- to five class solutions using information criteria and entropy.

RESULTS

Descriptive statistics and preliminary analysis

The distributions of the analyzed variables spanned substantial portions of their respective scales, with medians generally near the scale midpoints. Skewness and kurtosis indices indicated no serious departures from normality (skewness range: −0.62 to 0.88; kurtosis range: −0.32 to 0.93), although harmonious passion showed slight negative skewness and obsessive passion exhibited positive skewness with increased kurtosis.

Work engagement dimensions were strongly and positively interrelated. Exhaustion and disengagement were negatively associated with engagement and positively associated with each other, whereas harmonious passion was positively related to engagement and negatively related to both exhaustion and disengagement. Obsessive passion showed positive associations with engagement, no association with exhaustion, and a negative association with disengagement.

Table 1 summarizes the results.

Latent profiles of work-related well-being

We identified latent profiles based on five standardized indicators of work-related well-being: vigor, dedication, and absorption (work engagement), as well as exhaustion and disengagement (burnout).

Model fit indices generally improved with additional profiles, with AIC, BIC, SABIC, CLC, and KIC reaching their minimum at the 5-profile solution (Table 2).

Tab. 1. Means, standard deviations, and intercorrelations.

Variable	M	SD	1	2	3	4	5	6
1 Vigor	23.50	5.65	–					
2 Dedication	18.62	5.30	0.73***	–				
3 Absorption	19.48	6.46	0.62***	0.66***	–			
4 Exhaustion	19.60	4.02	-0.69***	-0.52***	-0.30***	–		
5 Disengagement	20.10	3.70	-0.63***	-0.69***	-0.45***	0.68***	–	
6 Harmonious passion	29.50	6.53	0.65***	0.64***	0.36***	-0.60***	-0.68***	–
7 Obsessive passion	17.55	6.62	0.29***	0.40***	0.59***	0.02	-0.23***	0.18*

Note. * $p < 0.05$; *** $p < 0.001$.

Tab. 2. Model enumeration and classification quality (LPA).

k	AIC	BIC	SABIC	AWE	CLC	KIC	Entropy	AvePP (overall)	AvePP (min)	Smallest class n	Smallest class %
2	2542.08	2594.853	2544.164	2726.02	2511.687	2561.08	0.803	0.940	0.938	83	41.5
3	2394.265	2466.828	2397.13	2647.649	2352.007	2419.265	0.871	0.942	0.939	33	16.5
4	2394.335	2486.688	2397.981	2717.513	2339.863	2425.335	0.764	0.865	0.747	24	12.0
5	2350.141	2462.283	2354.568	2742.806	2283.761	2387.141	0.810	0.884	0.799	18	9.0

Note. Lower values indicate better fit for AIC/BIC/SABIC/AWE/CLC/KIC. Higher values indicate better classification for Entropy and AvePP. AvePP = average posterior probability of class membership (overall and minimum across classes).

However, profile enumeration was based not only on information criteria, but also on classification quality, smallest class size, parsimony, theoretical interpretability, and substantive distinctiveness. The five-profile model introduced an additional small class (*n* = 18; 9%) with limited incremental interpretability and did not provide a substantively clearer representation of engagement–burnout configurations. By contrast, the three-profile model, despite stronger classification quality, yielded a coarser representation that did not sufficiently differentiate operationally meaningful patterns of engagement–burnout co-occurrence.

We therefore retained the four-profile solution as the primary model. This solution provided a parsimonious and theoretically interpretable compromise: it preserved the key well-being configurations, including the mixed High absorption–high exhaustion profile, while maintaining an acceptable smallest class size (*n* = 24; 12%) and adequate classification accuracy (entropy = 0.764; overall AvePP = 0.865; minimum AvePP = 0.747). This decision was further supported by the robustness check reported in the 'Robustness check: one-step latent class regression' section.

Profile interpretation

Profile-specific means of the indicators for the retained four-profile solution are shown in Figure 1 and Table 3.

Profiles were labeled descriptively based on their pattern across engagement and burnout dimensions:

1. **High absorption–high exhaustion** (*n* = 24; 12%) showed elevated absorption alongside elevated exhaustion (and slightly elevated disengagement), indicating strong absorption accompanied by strain.
2. **Low engagement–high burnout** (*n* = 63; 31.5%) was characterized by markedly low vigor/dedication/absorption together with high exhaustion and disengagement.
3. **Moderate engagement–low burnout** (reference) (*n* = 79; 39.5%) showed near-average vigor and dedication, slightly below-average absorption, and below-average burnout indicators.
4. **High engagement–low burnout** (*n* = 34; 17%) exhibited very high vigor/dedication/absorption and very low exhaustion/disengagement.

Welch ANOVAs indicated significant between-profile differences for all five indicators, $F(3, 73.8–81.0) = 64.19–143.41$, $p < 0.001$, with large effects ($\eta^2 = 0.53–0.70$; $\omega^2 = 0.52–0.69$; Table 4).

Tab. 3. Profile means for well-being indicators ($k = 4$).

Profile	n	Vigor (SD)	Dedication (SD)	Absorption (SD)	Exhaustion (SD)	Disengagement (SD)
1	24	24.08 (2.84)	19.83 (2.63)	24.71 (4.29)	22.83 (1.66)	21.08 (1.38)
2	63	17.95 (4.21)	12.97 (3.31)	14.13 (4.64)	22.94 (3.31)	23.70 (2.27)
3	79	24.47 (3.37)	19.67 (2.86)	18.95 (4.17)	17.95 (1.98)	18.97 (2.08)
4	34	31.12 (2.35)	25.79 (2.65)	26.91 (4.99)	15.00 (2.92)	15.38 (3.17)

Note. Values are unstandardized scale means. Higher scores reflect higher standing on each dimension.

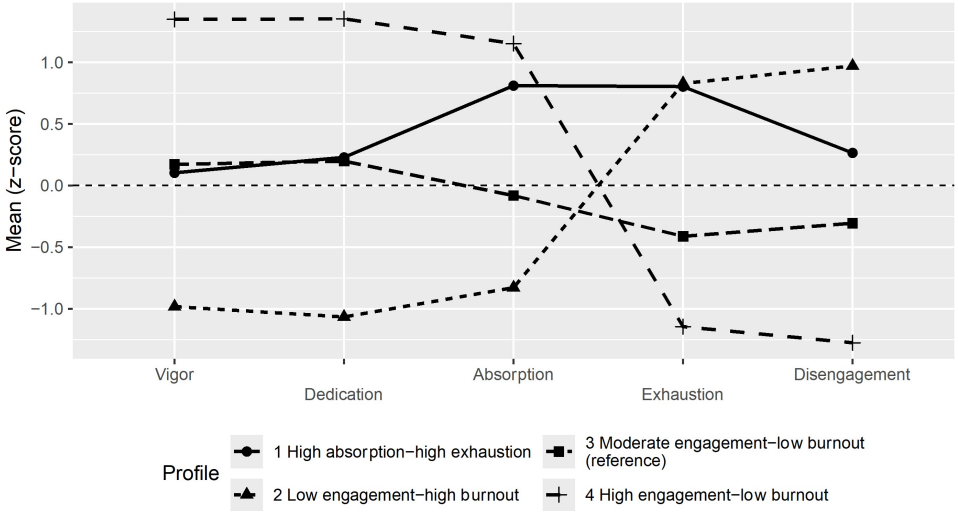

Fig. 1. Latent profiles of work-related well-being (*k* = 4).
Note. Note. Profiles were estimated using standardized indicators of work engagement: vigor, dedication, and absorption, and burnout: exhaustion and disengagement. Values represent z-score means; higher values indicate higher standing on each indicator.

Tab. 4. Welch ANOVA omnibus tests for between-profile differences (k = 4) with effect sizes from one-way ANOVA sums of squares.

Indicator	Welch F	df_1	df_2	p	η^2	ω^2
Vigor	134.43	3.00	80.96	< 0.001	0.63	0.62
Dedication	143.41	3.00	77.35	< 0.001	0.70	0.60
Absorption	64.19	3.00	73.79	< 0.001	0.53	0.52
Exhaustion	96.24	3.00	76.87	< 0.001	0.59	0.58
Disengagement	85.43	3.00	79.78	< 0.001	0.62	0.62

Games–Howell post-hoc tests showed that the Low engagement–high burnout profile differed from the Moderate engagement–low burnout reference profile on all engagement and burnout indicators (all adjusted $p < 0.001$), as did the High engagement–low burnout profile (all adjusted $p < 0.001$). The High absorption–high exhaustion profile was comparable to the reference profile in vigor

and dedication (adjusted $p \geq 0.945$), but differed in absorption, exhaustion, and disengagement (all adjusted $p < 0.001$). Notably, Profiles 1 and 2 did not differ in exhaustion (adjusted $p = 0.997$), indicating comparable exhaustion levels despite markedly different engagement patterns. Full Games–Howell comparisons are reported in Table 5.

Tab. 5. Games–Howell pairwise comparisons between profiles (adjusted p).

Indicator	Group 1	Group 2	ΔM	95% CI lower	95% CI upper	p_{adj}
Vigor	2 Low engagement–high burnout	1 High absorption–high exhaustion	-1.09	-1.45	-0.72	< 0.001
	3 Moderate engagement–low burnout (reference)	1 High absorption–high exhaustion	0.07	-0.26	0.40	0.945
	4 High engagement–low burnout	1 High absorption–high exhaustion	1.25	0.91	1.58	< 0.001
	3 Moderate engagement–low burnout (reference)	2 Low engagement–high burnout	1.15	0.85	1.45	< 0.001
	4 High engagement–low burnout	2 Low engagement–high burnout	2.33	2.02	2.64	< 0.001
	4 High engagement–low burnout	3 Moderate engagement–low burnout (reference)	1.18	0.92	1.43	< 0.001
Dedication	2 Low engagement–high burnout	1 High absorption–high exhaustion	-1.29	-1.64	-0.95	< 0.001
	3 Moderate engagement–low burnout (reference)	1 High absorption–high exhaustion	-0.03	-0.35	0.29	0.994
	4 High engagement–low burnout	1 High absorption–high exhaustion	1.12	0.77	1.48	< 0.001
	3 Moderate engagement–low burnout (reference)	2 Low engagement–high burnout	1.26	1.01	1.52	< 0.001
	4 High engagement–low burnout	2 Low engagement–high burnout	2.42	2.11	2.72	< 0.001
	4 High engagement–low burnout	3 Moderate engagement–low burnout (reference)	1.15	0.88	1.43	< 0.001
Absorption	2 Low engagement–high burnout	1 High absorption–high exhaustion	-1.64	-2.07	-1.20	< 0.001
	3 Moderate engagement–low burnout (reference)	1 High absorption–high exhaustion	-0.89	-1.31	-0.48	< 0.001
	4 High engagement–low burnout	1 High absorption–high exhaustion	0.34	-0.16	0.84	0.284
	3 Moderate engagement–low burnout (reference)	2 Low engagement–high burnout	0.75	0.44	1.05	< 0.001
	4 High engagement–low burnout	2 Low engagement–high burnout	1.98	1.56	2.40	< 0.001
	4 High engagement–low burnout	3 Moderate engagement–low burnout (reference)	1.23	0.83	1.63	< 0.001
Exhaustion	2 Low engagement–high burnout	1 High absorption–high exhaustion	0.03	-0.33	0.38	0.997
	3 Moderate engagement–low burnout (reference)	1 High absorption–high exhaustion	-1.21	-1.48	-0.95	< 0.001
	4 High engagement–low burnout	1 High absorption–high exhaustion	-1.95	-2.35	-1.55	< 0.001
	3 Moderate engagement–low burnout (reference)	2 Low engagement–high burnout	-1.24	-1.55	-0.93	< 0.001
	4 High engagement–low burnout	2 Low engagement–high burnout	-1.97	-2.40	-1.55	< 0.001
	4 High engagement–low burnout	3 Moderate engagement–low burnout (reference)	-0.73	-1.10	-0.37	< 0.001
Disengagement	2 Low engagement–high burnout	1 High absorption–high exhaustion	0.71	0.42	0.99	< 0.001
	3 Moderate engagement–low burnout (reference)	1 High absorption–high exhaustion	-0.57	-0.83	-0.31	< 0.001
	4 High engagement–low burnout	1 High absorption–high exhaustion	-1.54	-1.98	-1.10	< 0.001
	3 Moderate engagement–low burnout (reference)	2 Low engagement–high burnout	-1.28	-1.54	-1.02	< 0.001
	4 High engagement–low burnout	2 Low engagement–high burnout	-2.25	-2.69	-1.81	< 0.001
	4 High engagement–low burnout	3 Moderate engagement–low burnout (reference)	-0.97	-1.40	-0.54	< 0.001

Note. Values are ΔM (group 1 $-$ group 2) in z-scores.

Euclidean distances between profile centroids (based on all five indicators) were used to quantify profile distinctiveness, revealing that Profile 2 was the most distant from the reference Profile 3 (*D* = 2.58), followed by Profile 4 (*D* = 2.39) and Profile 1 (*D* = 1.61; full distance matrix in Table 6).

Tab. 6. Euclidean distances between profile centroids computed from five standardized indicators.

Profile	1 High absorption–high exhaustion	2 Low engagement–high burnout	3 Moderate engagement–low burnout (reference)	4 High engagement–low burnout
1 High absorption–high exhaustion	0.00	2.46	1.61	3.02
2 Low engagement–high burnout	2.46	0.00	2.58	4.92
3 Moderate engagement–low burnout (reference)	1.61	2.58	0.00	2.39
4 High engagement–low burnout	3.02	4.92	2.39	0.00

Note. Values are raw scale means.

Passion across profiles

Descriptively, both passion dimensions were lowest in Profile 2 (Low engagement–high burnout), whereas harmonious passion peaked in Profile 4 (High engagement–low burnout). Obsessive passion was relatively elevated in Profiles 1 and 4. These patterns are shown in Table 7 and further illustrated in Figure 2.

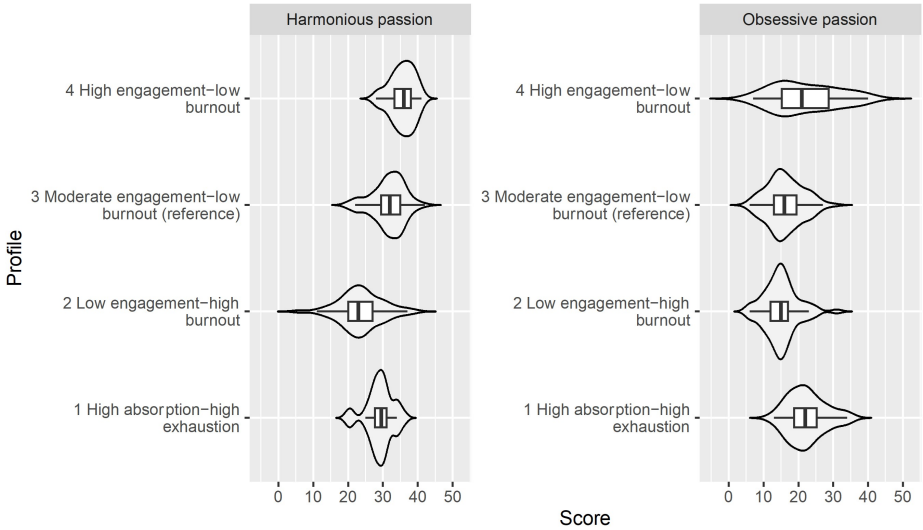

Fig. 2. Harmonious and obsessive passion across profiles.

Note. Note. Violin plots present the distribution of passion scores by latent profile.

Tab. 7. Mean passion for work scores by profile ($k = 4$).

Profile	n	Harmonious passion (SD)	Obsessive passion (SD)
1 High absorption–high exhaustion	24	29.08 (3.78)	22.29 (5.37)
2 Low engagement–high burnout	63	23.71 (6.22)	15.02 (4.76)
3 Moderate engagement–low burnout (reference)	79	31.62 (4.63)	16.2 (5.13)
4 High engagement–low burnout	34	35.56 (3.38)	22.00 (9.28)

Note. Values are raw scale means.

Welch ANOVAs indicated significant between-profile differences in both harmonious and obsessive passion, *F*(3, 70.61–81.49) = 14.95–51.16, *p* < 0.001, with medium-to-large effects (η^2 = 0.20–0.46; ω^2 = 0.19–0.45) (Table 8).

Tab. 8. Welch ANOVA (omnibus) for passion differences across profiles ($k = 4$).

Outcome	Welch F (df_1, df_2)	p	η^2	ω^2
Harmonious passion	51.16 (3, 81.49)	< 0.001	0.456	0.447
Obsessive passion	14.95 (3, 70.61)	< 0.001	0.199	0.187

Games–Howell post-hoc tests indicated a graded pattern for harmonious passion (Profile 2 < Profile 1 < Profile 3 < Profile 4), with all pairwise differences significant (adjusted $p \leq 0.043$). For obsessive passion, Profiles 1 and 4 showed comparably high levels (adjusted p = 0.999), and both exceeded Profiles 2 and 3 (adjusted $p \leq 0.007$), whereas Profiles 2 and 3 did not differ (adjusted p = 0.486) (Table 9). Euclidean distances between the profile centroids (based on z-scored indicators) are presented in Table 10.

Tab. 9. Games–Howell post-hoc comparisons for passion ($k = 4$).

Outcome	Group 1	Group 2	ΔM (G1–G2)	95% CI	p_{adj}
Harmonious passion (z)	1 High absorption–high exhaustion	2 Low engagement–high burnout	0.82	[0.38, 1.27]	< 0.001
	1 High absorption–high exhaustion	3 Moderate engagement–low burnout (reference)	-0.39	[-0.77, -0.01]	0.043
	1 High absorption–high exhaustion	4 High engagement–low burnout	-0.99	[-1.39, -0.60]	< 0.001
	2 Low engagement–high burnout	3 Moderate engagement–low burnout (reference)	-1.21	[-1.59, -0.84]	< 0.001
	2 Low engagement–high burnout	4 High engagement–low burnout	-1.81	[-2.20, -1.42]	< 0.001
	3 Moderate engagement–low burnout (reference)	4 High engagement–low burnout	-0.60	[-0.92, -0.29]	< 0.001
Obsessive passion (z)	1 High absorption–high exhaustion	2 Low engagement–high burnout	1.10	[0.59, 1.61]	< 0.001
	1 High absorption–high exhaustion	3 Moderate engagement–low burnout (reference)	0.92	[0.42, 1.42]	< 0.001
	1 High absorption–high exhaustion	4 High engagement–low burnout	0.04	[-0.73, 0.82]	0.999
	2 Low engagement–high burnout	3 Moderate engagement–low burnout (reference)	-0.18	[-0.51, 0.15]	0.486
	2 Low engagement–high burnout	4 High engagement–low burnout	-1.05	[-1.74, -0.37]	0.001
	3 Moderate engagement–low burnout (reference)	4 High engagement–low burnout	-0.88	[-1.56, -0.19]	0.007

Note. Values are ΔM (group 1 $-$ group 2) in z-scores.

Tab. 10. Euclidean distance between profile centroids (based on z-scored indicators).

Profile	Distance to Profile 3
1 High absorption–high exhaustion	1.61
2 Low engagement–high burnout	2.58
3 Moderate engagement–low burnout (reference)	0.00
4 High engagement–low burnout	2.39

To test these associations while accounting for job position, we estimated a multinomial logistic regression predicting profile membership from harmonious passion, obsessive passion, and job position (reference profile = Profile 3: Moderate engagement–low burnout; reference position = junior cabin crew). Results are presented in Table 11 as exponentiated coefficients (relative risk ratios) with 95% confidence intervals.

In the multinomial logistic regression, harmonious passion emerged as the most consistent predictor of profile membership relative to the reference profile. Higher harmonious passion was associated with a greater likelihood of belonging to Profile 4 (High engagement–low burnout) and a lower likelihood of belonging to Profile 2 (Low engagement–high burnout), relative to the reference profile.

Obsessive passion differentiated Profile 1 (High absorption–high exhaustion) and Profile 4 (High engagement–low burnout) from the Moderate profile, but it was not significantly associated with membership in Profile 2. Thus, obsessive passion was not a key marker of the most maladaptive profile (Profile 2), whereas it distinguished profiles characterized by higher absorption/engagement from the moderate reference profile.

After adjusting for harmonious and obsessive passion, the only significant effect of job position was that pilots were less likely to belong to Profile 2 (Low engagement–high burnout) than junior cabin crew, compared with Profile 3 (Moderate engagement–low burnout) (RRR = 0.19, 95% CI [0.06, 0.63], p = 0.007).

Tab. 11. Results of multinomial logistic regression predicting membership in latent profiles (reference: Profile 3 – Moderate).

Comparison (vs. Profile 3)	Predictor	RRR	95% CI	p
Profile 1 (High absorption–high exhaustion)	Harmonious passion	0.89	[0.79, 0.99]	0.031
	Obsessive passion	1.16	[1.07, 1.26]	< 0.001
	Pilot (vs. junior cabin crew)	1.18	[0.30, 4.68]	0.814
	Cabin management (vs. junior cabin crew)	3.09	[0.87, 11.07]	0.083
Profile 2 (Low engagement–high burnout)	Harmonious passion	0.74	[0.67, 0.81]	< 0.001
	Obsessive passion	0.93	[0.85, 1.01]	0.102
	Pilot (vs. junior cabin crew)	0.19	[0.05, 0.63]	0.007
	Cabin management (vs. junior cabin crew)	1.53	[0.56, 4.15]	0.407
Profile 4 (High engagement–low burnout)	Harmonious passion	1.35	[1.16, 1.57]	< 0.001
	Obsessive passion	1.18	[1.09, 1.27]	< 0.001
	Pilot (vs. junior cabin crew)	2.06	[0.61, 6.91]	0.244
	Cabin management (vs. junior cabin crew)	1.19	[0.32, 4.41]	0.800

Note. RRR (relative risk ratio) > 1 indicates a higher relative likelihood of being in the compared profile (vs. Profile 3) for a one-unit increase in the predictor, controlling for other predictors; RRR < 1 indicates a lower relative likelihood.

To aid interpretation of the multinomial model, we computed predicted probabilities of profile membership for low (−1 *SD*), mean, and high (+1 *SD*) levels of harmonious passion for each job position, holding obsessive passion constant at its sample mean (Table 12). Across positions, higher harmonious passion was associated with a marked shift away from the Low engagement–high burnout profile toward the High engagement–low burnout profile.

Tab. 12. Predicted profile membership probabilities across levels of harmonious passion by job position.

Position	Harmonious passion	Profile 1	Profile 2	Profile 3 (reference)	Profile 4
Junior cabin crew	$-1\,SD$	0.062	0.758	0.178	0.002
	Mean	0.088	0.322	0.552	0.038
	$+1\,SD$	0.044	0.049	0.614	0.293
Pilots	$-1\,SD$	0.185	0.359	0.447	0.009
	Mean	0.131	0.077	0.696	0.097
	$+1\,SD$	0.041	0.007	0.480	0.472
Cabin management	$-1\,SD$	0.126	0.757	0.116	0.001
	Mean	0.200	0.362	0.406	0.033
	$+1\,SD$	0.117	0.064	0.523	0.296

Note. Predicted probabilities were computed from the multinomial model at harmonious passion = $-1\,SD$, mean, and $+1\,SD$; obsessive passion was held at its sample mean.

Differences in profile distribution across job positions

Profile membership differed significantly across job positions ($\chi^2(6) = 19.40$, $p = 0.004$; Fisher's exact test $p = 0.005$). The association was small to moderate in magnitude (Cramér's $V = 0.22$). As presented in Table 13, pilots showed a higher share of Profiles 3 and 4 and a lower share of Profile 2 compared to junior cabin crew. Cabin management displayed a comparatively higher share of Profile 1.

Tab. 13. Profile distribution within job positions (row %).

Position	Profile 1	Profile 2	Profile 3 (ref.)	Profile 4
Junior cabin crew ($n = 65$)	5 (7.7%)	27 (41.5%)	24 (36.9%)	9 (13.8%)
Pilots ($n = 65$)	6 (9.2%)	10 (15.4%)	32 (49.2%)	17 (26.2%)
Cabin management ($n = 70$)	13 (18.6%)	26 (37.1%)	23 (32.9%)	8 (11.4%)

Note. Percentages are within rows (within position).

Robustness check: one-step latent class regression

As a robustness check to address potential classification uncertainty, we estimated a one-step latent class regression (*flexmix*) in which profile formation and the prediction of profile membership by harmonious passion, obsessive passion, and job position were modeled simultaneously. In this framework, the four-class solution was preferred based on the BIC (BIC = 2355.80), supporting $k = 4$ as the primary solution. The resulting entropy was high (0.90), indicating adequate separation. Overall, the one-step model corroborated the substantive conclusions derived from the main (two-step) approach (Table 14).

Tab. 14. One-step latent class regression (*flexmix*) model enumeration.

k	LogLik	AIC	BIC	SABIC	Entropy	p_{min}	p_{max}	n_{min}	n_{max}
2	-1196.2161	2442.432	2524.890	2445.687	0.8748	0.380	0.620	76	124
3	-1081.2255	2242.451	2374.384	2247.660	0.9012	0.185	0.495	37	99
4	-1032.1976	2174.395	2355.803	2181.557	0.8972	0.105	0.435	21	87
5	-995.7047	2131.409	2362.292	2140.524	0.9104	0.105	0.415	21	83

DISCUSSION

Latent profiles of work-related well-being in airline staff

Using a person-centered approach, we identified four distinct profiles of work-related well-being based on standardized indicators of work engagement (vigor, dedication, absorption) and burnout (exhaustion, disengagement). The retained solution did not represent a single continuum; instead, it captured qualitatively different combinations of investment and strain, consistent with the view that engagement and burnout are related yet distinct constructs [31,46] and with JD–R [6,18].

The High engagement–low burnout profile represents the most favorable configuration, whereas the Low engagement–high burnout profile reflects the highest-risk pattern. Notably, the High absorption–high exhaustion profile shows that deep involvement in work can co-occur with substantial energetic costs. This mixed pattern is consistent with stress–recovery perspectives, suggesting that sustained activation with insufficient recovery increases fatigue and may precede disengagement [35,36], which is particularly relevant in safety-critical, irregular-hour contexts [4,17]. Overall, these findings support H1 by identifying multiple distinct engagement–burnout configurations in the present sample, including a mixed "High absorption–high exhaustion" profile.

Passion as a correlate differentiating profiles

Harmonious passion showed a consistently adaptive pattern across profiles, whereas obsessive passion displayed a more ambivalent association, in line with the dualistic model of passion [54,56]. In the adjusted multinomial model, harmonious passion was associated with a higher likelihood of membership in the High engagement–low burnout profile and a lower likelihood of membership in the Low engagement–high burnout profile (relative to the Moderate profile), supporting H2. This pattern aligns with the idea that harmonious passion supports autonomy-consistent investment and more sustainable engagement [45,54].

Obsessive passion differentiated the more intensely engaged profiles (including High absorption–high exhaustion) but did not predict the Low engagement–high burnout profile. This provides nuanced support for H3 and suggests that obsessive passion may function as an "intensifier" of involvement whose costs depend on demands and recovery opportunities [56]. In operational terms, high absorption may be maintained even when exhaustion is elevated, indicating potentially costly engagement under constrained recovery [35,36].

However, because the study was cross-sectional, these associations should not be interpreted causally. Passion and well-being may influence each other over time [56]. Thus, it is also possible that employees' current well-being shapes how they report harmonious and obsessive passion, rather than passion only predicting well-being profile membership.

Job position and profile membership

Profile membership differed across job positions, suggesting that role context may shape the probability of well-being configurations while substantial within-role heterogeneity remains. Controlling for passion, pilots were less likely to belong to the Low engagement–high burnout profile than junior cabin crew (relative to the Moderate profile). This may reflect differences in job control, task structure, and autonomy, resources often linked to lower burnout risk [5,18]. Nevertheless, all roles share exposure to operational pressure, fatigue risk, and irregular hours, so position effects should be interpreted as gradients of risk [4,17].

Practical implications for airline well-being management

Two findings may be particularly relevant to practice, although they should be interpreted in light of the study's cross-sectional design and non-probability sampling strategy: (a) harmonious passion was the most consistent correlate of more adaptive versus more maladaptive profile membership among airline staff, and (b) job position mattered primarily for the probability of belonging to the Low engagement–high burnout profile.

First, harmonious passion emerged as the most practically informative motivational correlate of profile membership. This suggests that airline well-being initiatives should not focus solely on

increasing engagement in general, but rather on supporting conditions that foster harmonious passion through flexible, self-endorsed engagement, because this specific form aligned with the most favorable well-being configuration in the present study.

Second, obsessive passion showed a more selective pattern. Practically, this suggests that, in this sample, obsessive passion was not a marker of the globally adverse low-engagement/high-burnout profile, but it was relevant for a mixed pattern in which high absorption co-occurred with elevated exhaustion. Accordingly, interventions addressing obsessive passion should focus primarily on recovery protection and boundary management in highly engaged employees, rather than treating obsessive passion as a universal burnout-risk target.

Finally, profile distribution differed across job positions. This points to a tentative, role-sensitive implication: burnout-prevention screening and early support may be particularly important for junior cabin crew, although this pattern requires replication in larger and more representative samples.

Specifically, if replicated, profile-based monitoring could be implemented through brief, periodic well-being screening focused on engagement, exhaustion, disengagement, and recovery indicators. Such screening should be used as a preventive and supportive occupational health tool rather than as an individual performance evaluation. Employees showing a High absorption–high exhaustion pattern may benefit from recovery-oriented support, such as reviewing roster patterns, monitoring night-flight accumulation and recovery windows, strengthening boundary management, and providing early access to supervisory or occupational health support. The effectiveness of these actions should be evaluated longitudinally before profile-based monitoring is implemented as routine practice.

Contribution to the air transport context

Air transport work is characterized by a distinctive combination of service delivery demands, safety-critical performance expectations, and fatigue-relevant working time arrangements. By demonstrating that engagement and burnout cluster into multiple configurations, the present findings highlight that airline well-being management should not assume that high engagement is uniformly protective. If replicated, identifying subgroups such as High absorption–high exhaustion may help airlines detect early warning signs of high functioning accompanied by hidden costs, which is particularly consequential in operational environments where sustained attention and interpersonal regulation are central.

Robustness, limitations, and future directions

A methodological strength of this study is that the substantive conclusions were supported across estimation strategies (primary LPA plus a one-step latent class regression robustness check), reducing concerns that the results are artifacts of a single modeling approach. Nonetheless, several limitations apply.

First, the cross-sectional design prevents causal inference. Although passion was associated with profile membership, passion and well-being profiles may influence each other over time [56]. Longitudinal studies are needed to examine reciprocal relationships and transitions between profiles.

Second, the sample was recruited using snowball sampling and should be treated as a non-probability convenience sample. Although participants represented different airlines and airline affiliation was collected, the distribution across airlines was uneven; therefore, airline-level comparisons were not conducted. The findings should be generalized cautiously and replicated in larger, more balanced samples across airlines, countries, and roster systems.

Third, the sample size (N = 200) should be considered when interpreting the profile solution. Mixture solutions are sample- and indicator-dependent, and although the four-profile solution was theoretically meaningful and supported by robustness analyses, the smallest profile included 24 participants. The High absorption–high exhaustion profile should therefore be interpreted cautiously until replicated in larger samples.

Fourth, the study relied exclusively on self-report measures, which may be affected by common method variance, recall bias, and respondents' current affective state. Moreover, we did not include objective or administrative operational indicators such as roster characteristics, duty hours, number of sectors, night flights, time-zone changes, recovery windows, fatigue reports, absenteeism, or safety-related outcomes.

Future research would benefit from longitudinal and multi-source designs examining profile transitions (e.g., movement between Moderate engagement–low burnout and High absorption–high exhaustion) and testing whether job resources buffer the potential costs of obsessive passion in high-demand periods [6]. Incorporating operational indicators would strengthen the practical relevance

of future studies and help connect psychosocial profiles with safety-relevant operational constraints [4,17].

CONCLUSIONS

This study identified four engagement–burnout profiles among airline personnel, including a mixed High absorption–high exhaustion profile, indicating that high involvement in work may coexist with substantial strain. Harmonious passion was associated with more adaptive profile membership, whereas obsessive passion differentiated profiles marked by elevated engagement or absorption. However, given the cross-sectional design, non-probability sample, and self-report data, these findings should be interpreted as associations and require replication in longitudinal studies with larger samples and operational indicators.

AUTHORS' DECLARATION

Study Design: Karolina Mudło-Głagolska, Monika Szuryn, Paweł Larionow. Data Collection: Monika Szuryn. Statistical analysis: Karolina Mudło-Głagolska. Manuscript Preparation: Karolina Mudło-Głagolska, Monika Szuryn, Paweł Larionow. The authors declare no conflicts of interest.

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