Anxiety and depressive symptom burden and its association with functional impairment in pulmonary fibrosis in Greece

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Introduction

- Anxiety and depressive symptoms are common among patients with fibrotic interstitial lung diseases (ILDs), contributing to the multidimensional burden of disease [1,2].
- Recent studies have linked psychological distress with greater respiratory symptom burden and poorer perceived health status [2,3].
- Assessing psychological symptoms alongside functional impairment may provide a more comprehensive understanding of patient-reported disease burden.

Objective

To characterise anxiety and depressive symptom burden among patients with pulmonary fibrosis (PF) in Greece and explore associations with functional impairment.

Methods

Study design & Participants

- An online cross-sectional survey was conducted by the Hellenic Pulmonary Fibrosis Association "Lungs of Life" in Greece during May–June 2026.
- Adults with self-reported PF who provided informed consent were eligible.

Statistical analysis

- Results were summarised as n (%) or median (Q1–Q3), overall and by diagnosis group.
- Exploratory multivariable logistic regression examined factors associated with PHQ-9 ≥10 and GAD-7 ≥10, adjusting for activity impairment, oxygen-device use, age, sex, diagnosis group, and respondent type.
- Sensitivity analyses were restricted to patient-completed questionnaires.

Data collection

Questionnaires were completed by patients or by caregivers on their behalf. The survey captured:

- **Anxiety symptoms:** GAD-7 (0–21), assessing symptoms over the preceding 2 weeks.
- **Depressive symptoms:** PHQ-9 (0–27), assessing symptoms over the preceding 2 weeks.
- **Functional impairment:** WPAI activity impairment (0–100%), assessing impairment in usual activities over the preceding 7 days.
- **PHQ-9 functional difficulty item:** Perceived difficulty with work, household tasks, or interpersonal relationships due to problems reported in the PHQ-9.
- **Additional characteristics:** Diagnosis group, oxygen-device use, age, sex, and respondent type.

Moderate-to-severe symptoms were defined as GAD-7 ≥10 or PHQ-9 ≥10, respectively.

Results

Study population:

- The final sample included 165 patients with a median age of 74 years. (Table 1)

Table 1. Patient characteristics

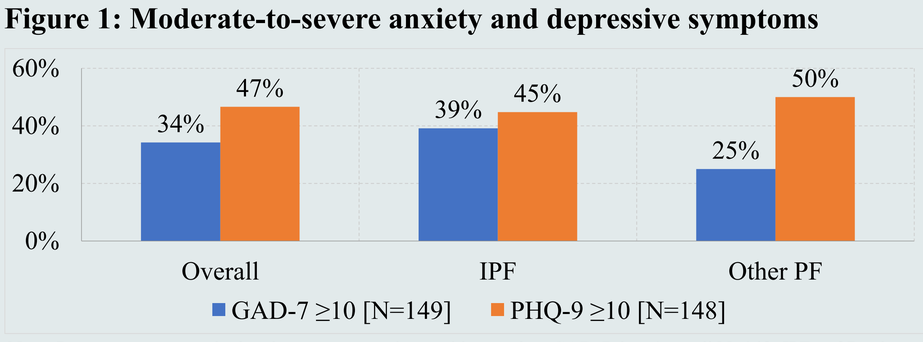
Characteristic	Total (N=165)
Age, years, median (Q1–Q3)	74 (68–80)
Male, n (%)	114 (69.1%)
Diagnosis, n (%)	
Idiopathic pulmonary fibrosis	107 (65%)
Other pulmonary fibrosis	58 (35%)
Time since diagnosis, years, median (Q1–Q3)	6 (3–9)
Questionnaire completed by, n (%)	
Patient	106 (64%)
Caregiver on behalf of the patient	59 (36%)
Use of any oxygen device, n/N (%)	99/160 (62%)

Age and time since diagnosis were available for 161 patients. Percentages were calculated using available responses. Other PF included autoimmune-related ILD (n=21), unknown type (n=18), progressive PF (n=4), unclassifiable ILD (n=4), fibrotic sarcoidosis (n=3), and other/free-text diagnoses (n=8). Diagnoses were self-reported.

Anxiety and depressive symptom burden

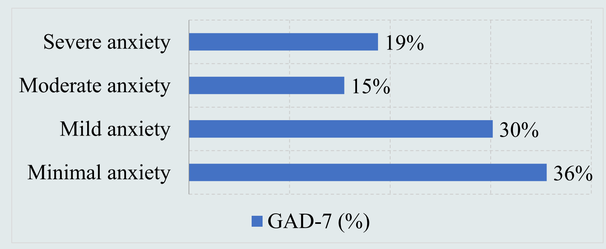
- Median GAD-7 and PHQ-9 scores were 7 (Q1–Q3: 2–12) and 9 (4–14), respectively.
- Severe anxiety symptoms were reported by 19% of patients, while 25% reported moderately severe or severe depressive symptoms (Fig. 2).
- Anxiety symptom scores were numerically higher in IPF than other PF, whereas depressive symptom scores were broadly similar across diagnosis groups. (Fig. 1)

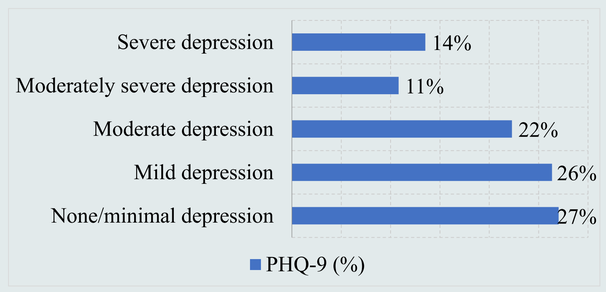
Figure 1: Moderate-to-severe anxiety and depressive symptoms



Note: Percentages were calculated among respondents with complete GAD-7 data (overall N=149; IPF n=97; other PF n=52) or PHQ-9 data (overall N=148; IPF n=96; other PF n=52). Moderate-to-severe symptoms were defined as scores ≥10.

Figure 2: Anxiety and depressive symptom severity distributions



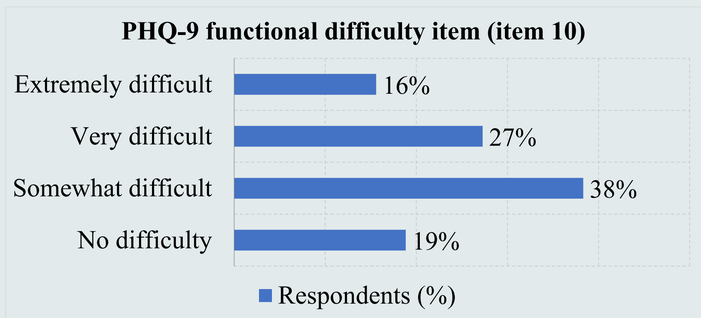


Note: Severity categories are mutually exclusive. Percentages were calculated among patients with complete GAD-7 (N=149) or PHQ-9 (N=148) data.

Impact on daily functioning

Among respondents with available data (N=154), 42.9% reported that the problems assessed by the PHQ-9 made work, household tasks, or getting along with others very or extremely difficult. (Fig.3)

Figure 3. Difficulty with daily functioning related to PHQ-9 symptoms

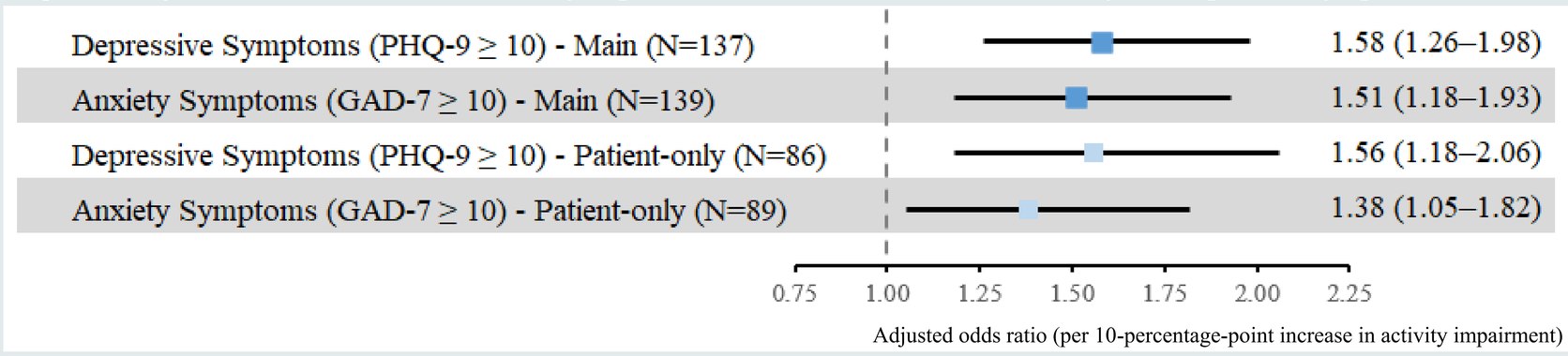


Note: Responses to the PHQ-9 functional difficulty item (N=154), assessing how much the problems reported in the preceding PHQ-9 items interfered with work, household tasks, or getting along with other people. Response categories are mutually exclusive. This item does not contribute to the PHQ-9 total score.

Factors associated with psychological symptom burden (Figure 4)

- Higher activity impairment was associated with greater odds of moderate-to-severe depressive and anxiety symptoms after multivariable adjustment. These associations remained evident in sensitivity analyses restricted to patient-completed questionnaires.
- Older age was associated with lower odds of moderate-to-severe anxiety symptoms (OR 0.94; 95% CI: 0.90–0.99; p=0.014), but not depressive symptoms.
- Oxygen-device use and diagnosis group were not statistically associated with either outcome.

Figure 4. Adjusted association between activity impairment and moderate-to-severe anxiety and depressive symptoms



Note: Odds ratios were estimated using multivariable logistic regression. Outcomes were moderate-to-severe depressive symptoms, defined as PHQ-9 ≥10, and moderate-to-severe anxiety symptoms, defined as GAD-7 ≥10. The main models included activity impairment, oxygen-device use, age, sex, diagnosis group, and respondent type. Activity impairment was modelled per 10-percentage-point increase. The sensitivity analysis was restricted to patient-completed questionnaires and therefore did not include respondent type.

Limitations

- The cross-sectional design precludes causal inference.
- Voluntary online participation may limit representativeness. Self-reported and caregiver-proxy responses may introduce reporting bias, particularly when assessing subjective psychological symptoms.
- GAD-7 and PHQ-9 are symptom-screening instruments rather than clinical diagnostic assessments; somatic symptoms may overlap with PF manifestations.
- Missing data resulted in varying sample sizes. Exploratory analyses were not adjusted for multiple testing.

Conclusions

- Moderate-to-severe anxiety and depressive symptoms were common among respondents with PF in Greece. Greater activity impairment was associated with higher adjusted odds of both outcomes.
- These findings support considering psychological symptom burden alongside functional impairment in comprehensive PF care and supportive care planning.

References: [1] D. Du et al., Transl. Psychiatry, vol. 16, article 110, Feb. 2026; [2] N. Avitzur et al., Thorax, online ahead of print, May 2026; [3] M. J. Moura et al., Acta Med. Port., vol. 39, no. 9, pp. 539–543, Sep. 2026.

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