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Psychological resilience and treatment adherence in rheumatoid arthritis–cancer comorbidity: Evidence-based intervention pathways

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Abstract: Patients with coexisting rheumatoid arthritis and cancer face complex clinical and psychosocial challenges that may influence psychological adaptation and health related behaviors. This study examined psychological resilience, treatment adherence, quality of life, pain severity, and disease activity related indicators among patients with rheumatoid arthritis alone, cancer alone, and rheumatoid arthritis cancer comorbidity. A cross-sectional observational design was employed, and forty adult patients were recruited from a tertiary care hospital. Participants completed validated self-report measures of resilience, treatment adherence, quality of life, and pain severity, while clinical data for rheumatoid arthritis disease activity and inflammatory markers were extracted from medical records. Group comparisons and within group correlation analyses were conducted. Psychological resilience differed significantly across disease groups, with patients with cancer demonstrating lower resilience than those with rheumatoid arthritis or comorbid disease. Quality of life and pain severity also varied significantly by disease group, with cancer patients reporting poorer quality of life and higher pain levels. Treatment adherence did not differ significantly across groups. Within group analyses revealed that psychological resilience was positively and significantly associated with treatment adherence only among patients with rheumatoid arthritis cancer comorbidity, while no significant associations were observed in the rheumatoid arthritis only or cancer only groups. Resilience was not significantly associated with quality of life in any group. These findings suggest that resilience may play a context dependent role in supporting treatment adherence in patients with complex comorbidity, highlighting the importance of targeted psychosocial intervention pathways in multidisciplinary care.

Keywords: cancer; psychological resilience; quality of life; rheumatoid arthritis; treatment adherence; multimorbidity

1. Introduction

Patients with coexisting rheumatoid arthritis (RA) and cancer face unique challenges that extend beyond the additive effects of each disease alone [1]. They must navigate multiple treatment pathways [2], coordinate care across specialties [3], and cope with overlapping symptom burdens such as pain, fatigue, and functional impairment [4]. These challenges may place significant demands on psychological resources and self-management capacities, particularly concerning maintaining consistent adherence to treatment. Despite the clinical relevance of this population, research examining psychosocial functioning in patients with rheumatoid arthritis–cancer comorbidity remains limited [5], and existing studies often focus on biomedical outcomes rather than psychological adaptation and behaviour.

As survival rates improve and populations age, an increasing number of patients are living with both rheumatologic and oncologic conditions simultaneously [1], creating a growing subgroup of individuals with complex comorbidity profiles and heightened care needs [4]. The intersection of these two chronic conditions necessitates an interdisciplinary approach to treatment that addresses not only the physical symptoms but also the psychological and social burdens associated with both diseases [3]. Overall, this convergence of chronic illnesses highlights the necessity for further investigation into the psychosocial aspects of living with both rheumatoid arthritis and cancer to enhance the quality of life for those affected [6].

Psychological resilience has emerged as an important construct in understanding how individuals adapt to chronic illness. Resilience broadly refers to the capacity to maintain or regain psychological well-being in the face of adversity, stress, or prolonged health-related challenges [7]. In patients with chronic inflammatory diseases, higher resilience has been associated with better emotional adjustment and reduced psychological distress [8]. In oncologic populations, resilience has been linked to psychological adjustment during treatment, emotional regulation, and perceived control [9]. However, the role of resilience is not uniform across disease contexts, and its relevance may depend on illness trajectory, symptom burden, and the complexity of treatment demands [10].

Treatment adherence represents a critical behavioural outcome in both rheumatologic and oncologic care. In rheumatoid arthritis (RA), adherence to disease-modifying therapies is essential for controlling inflammation, preventing joint damage, and preserving function. In cancer, adherence to chemotherapy and supportive treatments is closely linked to therapeutic effectiveness and survival outcomes [11]. For patients managing both conditions concurrently, adherence may be particularly challenging due to polypharmacy and treatment-related side effects [12]. Understanding the psychosocial factors that support or undermine adherence in this context is therefore of substantial clinical importance [13].

Quality of life and pain severity are central outcomes in both rheumatoid arthritis (RA) and cancer, frequently used to assess disease impact and treatment effectiveness [14]. Pain is a defining feature of rheumatoid arthritis and a common consequence of cancer and its treatment [15]. Quality of life reflects broader physical, emotional, and social functioning [16]. Although resilience is often assumed to contribute to better quality of life and lower perceived symptom burden, empirical findings have been inconsistent, suggesting that psychological resources and subjective health outcomes may be related through complex and indirect pathways [17].

Existing research has largely examined resilience, adherence, quality of life, and pain in isolation or within single disease populations. Few studies have simultaneously compared these psychosocial outcomes across patients with rheumatoid arthritis, cancer, and rheumatoid arthritis cancer comorbidity, and even fewer have explored whether the relationships among these variables differ by disease configuration. Such comparative approaches are essential for identifying disease specific patterns and for informing targeted psychosocial interventions.

The present study addresses these gaps by examining psychological resilience, treatment adherence, quality of life, and pain severity across three patient groups: rheumatoid arthritis alone, cancer alone, and rheumatoid arthritis cancer comorbidity.

In addition, the study explores the association between resilience and adherence as well as resilience and quality of life within each disease group, with particular attention to whether resilience plays a differential role in the context of comorbidity. By integrating psychosocial outcomes with descriptive indicators of rheumatoid arthritis disease activity and inflammatory burden, this study aims to provide a comprehensive and clinically relevant perspective on psychological adaptation and health related behaviour in patients facing complex multimorbidity. The findings are intended to inform evidence based psychosocial intervention pathways and to support more individualized and context sensitive approaches to care in psycho oncological and rheumatologic settings.

2. Methods

2.1. Study design and setting

This study employed a cross-sectional observational design to examine psychological resilience, treatment adherence, quality of life, pain severity, and disease related clinical characteristics among patients with rheumatoid arthritis, cancer, and rheumatoid arthritis cancer comorbidity. The study was conducted at the Department of Rheumatology and Immunology, Tianjin Medical University General Hospital, Tianjin, China. The hospital is a tertiary care medical centre providing specialized rheumatology and oncology services. Data were collected over a defined recruitment period from patients attending outpatient clinics or receiving inpatient care.

2.2. Participants and eligibility criteria

Participants were recruited using consecutive sampling based on predefined inclusion and exclusion criteria. Eligible participants were adults aged eighteen years or older with a confirmed diagnosis of rheumatoid arthritis, cancer, or concurrent rheumatoid arthritis and cancer, as documented in their medical records. Rheumatoid arthritis diagnoses were established according to accepted rheumatologic diagnostic criteria, while cancer diagnoses were confirmed through histopathological or oncologic documentation. Patients classified as having rheumatoid arthritis cancer comorbidity were required to have both diagnoses present at the time of assessment or documented sequentially prior to enrolment.

Patients were excluded if they had severe cognitive impairment, active psychiatric disorders that interfered with questionnaire completion, or were unable to provide informed consent. All eligible patients were approached by trained research personnel and provided written informed consent prior to participation.

2.3. Data collection procedures

After consent was obtained, participants completed a series of standardized self-report questionnaires administered in a quiet clinical setting. Demographic information including age and gender was collected using a structured data collection form. Clinical information was obtained through a combination of patient self-report and medical record review. For patients with rheumatoid arthritis, including those with

comorbid cancer, disease activity and inflammatory marker data were extracted from clinical records corresponding to the nearest routine assessment.

2.4. Measures

2.4.1. Psychological resilience

Psychological resilience was assessed using a validated resilience scale designed to measure an individual's capacity to adapt to stress and adversity in the context of chronic illness. Higher total scores reflected greater levels of resilience.

2.4.2. Treatment adherence

Treatment adherence was measured using a standardized self-report adherence scale that evaluates the extent to which patients follow prescribed medical treatments. Higher scores indicated better adherence to treatment recommendations.

2.4.3. Quality of life

Quality of life was assessed using a validated health related quality of life instrument encompassing physical, emotional, and social domains of functioning. Higher scores represented better perceived quality of life.

2.4.4. Pain severity

Pain severity was assessed using a numerical rating scale in which participants rated their average pain intensity. Higher scores indicated greater pain severity.

2.4.5. Rheumatoid arthritis disease activity and biomarkers

For participants with rheumatoid arthritis, disease activity was assessed using the Disease Activity Score in twenty-eight joints. This included tender joint count and swollen joint count obtained through clinical examination, as well as inflammatory markers. Laboratory indicators included C-reactive protein and erythrocyte sedimentation rate. Serological markers, including rheumatoid factor and anti-citrullinated protein antibody levels, were recorded when available. These measures were analysed descriptively to characterize disease activity and inflammatory burden and were not used for inferential comparisons across disease groups.

2.5. Statistical analysis

Statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS) version 25. Continuous variables were summarized using means and standard deviations or medians and ranges as appropriate, while categorical variables were summarized using frequencies and percentages. Normality of continuous variables was assessed using Kolmogorov-Smirnov and Shapiro-Wilk tests. Homogeneity of variance was evaluated using Levene's test.

Group differences in psychological resilience, treatment adherence, quality of life, and pain severity were examined using one way analysis of variance. When assumptions of normality or homogeneity of variance were violated, robust test statistics were consulted and results were interpreted conservatively. Post hoc comparisons were conducted using Tukey tests, with consideration given to unequal group sizes.

Associations between psychological resilience and treatment adherence as well as between resilience and quality of life were examined using Spearman rank

correlation analysis due to non-normal distribution of selected variables. Correlation analyses were conducted for the overall sample and separately within each disease group to explore disease specific association patterns. Statistical significance was defined as a two-sided p value of less than zero point zero five.

2.6. Ethical considerations

The study protocol was reviewed and approved by the institutional ethics committee of Tianjin Medical University General Hospital. All procedures were conducted in accordance with the principles of the Declaration of Helsinki. Participants were informed that participation was voluntary and that they could withdraw from the study at any time without affecting their medical care. All data were anonymized and handled confidentially.

3. Results

3.1. Participant characteristics

A total of 40 participants were included in the present analysis, encompassing individuals diagnosed with rheumatoid arthritis (RA), cancer, and RA–cancer comorbidity. The overall study population represented a typical clinical cohort of middle-to-older adults receiving long-term management for chronic inflammatory and oncologic conditions.

The mean age of participants was comparable across disease groups as shown in **Table 1**. Patients with RA had a mean age of 62.2 ± 3.9 years, while those with cancer exhibited a slightly higher mean age of 65.6 ± 5.5 years. Participants with RA–cancer comorbidity had a mean age of 64.4 ± 4.0 years. The overlapping confidence intervals and similar age ranges across groups indicate that age distribution was broadly balanced and unlikely to act as a major confounding factor in subsequent analyses.

Table 1. Participant characteristics by disease group.

Characteristic	RA (n = 15)	Cancer (n = 12)	RA–Cancer (n = 13)	Total (N = 40)
Age, years (mean $\pm$ SD)	62.2 $\pm$ 3.9	65.6 $\pm$ 5.5	64.4 $\pm$ 4.0	—
Gender, n (%)				
Male	5 (33.3)	7 (58.3)	8 (61.5)	20 (50.0)
Female	10 (66.7)	5 (41.7)	5 (38.5)	20 (50.0)
Treatment type, n (%)				
RA treatment	15 (100.0)	0 (0.0)	0 (0.0)	15 (37.5)
Chemotherapy	0 (0.0)	12 (100.0)	1 (7.7)	13 (32.5)
Combined treatment	0 (0.0)	0 (0.0)	12 (92.3)	12 (30.0)

Note: Data are presented as mean $\pm$ standard deviation or number (percentage). Gender distribution did not differ significantly across disease groups ($\chi^2 = 2.69$, $p = 0.26$).

Gender distribution was also comparable across disease groups. Overall, the cohort comprised equal numbers of male and female participants (50.0% each). In the RA group, females were more prevalent, accounting for 66.7% of cases, whereas males predominated in the cancer (58.3%) and RA–cancer comorbidity (61.5%) groups. Statistical testing confirmed that these differences did not reach significance

($\chi^2 = 2.69$, $df = 2$, $p = 0.26$), supporting the demographic comparability of the study groups.

Treatment allocation closely aligned with clinical diagnosis, reflecting real-world therapeutic practice. All patients in the RA group received RA-specific treatment, and all patients in the cancer group were treated with chemotherapy. Among patients with RA–cancer comorbidity, the majority (92.3%) received combined rheumatologic and oncologic treatment, while a small subset (7.7%) received chemotherapy alone. These treatment patterns confirm the internal consistency of the dataset and provide appropriate clinical context for interpreting subsequent psychosocial and behavioral outcomes.

3.2. Psychological resilience across disease groups

Psychological resilience scores differed significantly across disease groups. One-way analysis of variance demonstrated a significant main effect of disease status on resilience ($F(2, 37) = 4.82$, $p = 0.014$), with a moderate effect size ($\eta^2 = 0.21$). As shown in **Table 2**, patients with rheumatoid arthritis had a mean resilience score of 41.47 ± 4.55 , while patients with RA–cancer comorbidity had a mean score of 40.77 ± 4.05 . Patients with cancer alone exhibited a lower mean resilience score (36.83 ± 3.38). The corresponding 95% confidence intervals indicated limited overlap between the cancer group and the other two groups. Post hoc comparisons using Tukey’s HSD test did not reveal statistically significant pairwise differences between individual disease groups (all $p > 0.05$). However, homogeneous subset analysis demonstrated that the cancer group formed a separate subset from the rheumatoid arthritis and RA–cancer comorbidity groups, consistent with the overall pattern observed in the descriptive statistics (**Table 2**).

Table 2. Psychological resilience scores by disease group.

Disease group	<i>n</i>	Mean $\pm$ SD	95% CI
Rheumatoid arthritis (RA)	15	41.47 ± 4.55	38.95–43.99
Cancer	12	36.83 ± 3.38	34.69–38.98
RA–Cancer comorbidity	13	40.77 ± 4.05	38.33–43.21

Abbreviations: RA, rheumatoid arthritis; CI, confidence interval; SD, standard deviation.
Note: Group differences were examined using one-way analysis of variance.

3.3. Treatment adherence across disease groups

Treatment adherence scores were compared across disease groups using Welch’s analysis of variance due to violations of homogeneity of variances. As shown in **Table 3**, patients with rheumatoid arthritis had a mean adherence score of 3.53 ± 1.13 , patients with cancer had a mean score of 4.17 ± 0.84 , and patients with RA–cancer comorbidity had a mean score of 3.92 ± 0.49 . Welch’s analysis of variance indicated that differences in treatment adherence across disease groups were not statistically significant (Welch $F(2, 22.29) = 1.37$, $p = 0.275$). Given the non-significant overall test, post hoc pairwise comparisons were not interpreted.

Table 3. Treatment adherence scores by disease group.

Disease group	<i>n</i>	Mean ± SD	95% CI
Rheumatoid arthritis (RA)	15	3.53 ± 1.13	2.91–4.16
Cancer	12	4.17 ± 0.84	3.64–4.70
RA–Cancer comorbidity	13	3.92 ± 0.49	3.62–4.22

Abbreviations: RA, rheumatoid arthritis; CI, confidence interval; SD, standard deviation.

Note: Group differences were assessed using Welch’s analysis of variance due to heterogeneity of variances.

3.4. Quality of life across disease groups

Quality of life scores differed significantly across disease groups. One-way analysis of variance demonstrated a significant main effect of disease status on quality of life ($F(2, 37) = 11.57, p < 0.001$). As shown in **Table 4**, patients with rheumatoid arthritis reported the highest mean quality of life score (61.13 ± 5.17), followed by patients with RA–cancer comorbidity (56.00 ± 3.27), while patients with cancer alone reported the lowest quality of life (53.67 ± 3.55). Post hoc comparisons using Tukey’s HSD test did not identify statistically significant pairwise differences between individual disease groups (all $p > 0.05$). Homogeneous subset analysis indicated that the cancer and RA–cancer comorbidity groups clustered together, whereas the rheumatoid arthritis group formed a separate subset, consistent with the overall pattern observed in the descriptive statistics (**Table 4**).

Table 4. Quality of life scores by disease group.

Disease group	<i>n</i>	Mean ± SD	95% CI
Rheumatoid arthritis (RA)	15	61.13 ± 5.17	58.27–63.99
Cancer	12	53.67 ± 3.55	51.41–55.92
RA–Cancer comorbidity	13	56.00 ± 3.27	54.03–57.97

Abbreviations: RA, rheumatoid arthritis; CI, confidence interval; SD, standard deviation.

Note: Group differences were examined using one-way analysis of variance.

3.5. Pain severity across disease groups

Pain severity differed significantly across disease groups. One-way analysis of variance demonstrated a significant main effect of disease status on pain scores ($F(2, 37) = 12.16, p < 0.001$). As shown in **Table 5**, patients with rheumatoid arthritis reported the lowest mean pain score (5.80 ± 0.86), followed by patients with RA–cancer comorbidity (6.46 ± 0.78), whereas patients with cancer alone reported the highest pain levels (7.42 ± 0.90). Post hoc comparisons using Tukey’s HSD test did not reveal statistically significant pairwise differences between individual disease groups (all $p > 0.05$). Homogeneous subset analysis indicated that the rheumatoid arthritis and RA–cancer comorbidity groups clustered together, while the cancer group formed a separate subset, consistent with the overall pattern observed in the descriptive statistics (**Table 5**).

Table 5. Pain severity scores by disease group.

Disease group	<i>n</i>	Mean ± SD	95% CI
Rheumatoid arthritis (RA)	15	5.80 ± 0.86	5.32–6.28
Cancer	12	7.42 ± 0.90	6.84–7.99
RA–Cancer comorbidity	13	6.46 ± 0.78	5.99–6.93

Abbreviations: RA, rheumatoid arthritis; CI, confidence interval; SD, standard deviation
 Note: Group differences were examined using one-way analysis of variance.

3.6. Association between psychological resilience and quality of life by disease group.

Within-group associations between psychological resilience and quality of life were examined using Spearman's rank correlation analysis (**Table 6**). In patients with rheumatoid arthritis, no statistically significant association was observed between resilience and quality of life (Spearman's $\rho = -0.16$, $p = 0.56$, $N = 15$). Similarly, among patients with cancer, the correlation between resilience and quality of life was not statistically significant ($\rho = 0.29$, $p = 0.36$, $N = 12$). In the RA–cancer comorbidity group, resilience was also not significantly associated with quality of life ($\rho = 0.21$, $p = 0.49$, $N = 13$). Across all disease groups, correlation coefficients were small in magnitude and did not reach statistical significance.

Table 6. Within-group correlations between psychological resilience and quality of life.

Disease group	<i>N</i>	Spearman's ρ	<i>p</i> -value
Rheumatoid arthritis	15	−0.16	0.56
Cancer	12	0.29	0.36
RA–Cancer comorbidity	13	0.21	0.49

Note: Associations were assessed using Spearman's rank correlation coefficient.

3.7. Association between psychological resilience and treatment adherence by disease group

Within-group associations between psychological resilience and treatment adherence were examined using Spearman's rank correlation analysis (**Table 7**). In patients with rheumatoid arthritis, no statistically significant association was observed between resilience and treatment adherence (Spearman's $\rho = 0.24$, $p = 0.40$, $N = 15$). Similarly, among patients with cancer, resilience was not significantly correlated with adherence ($\rho = -0.39$, $p = 0.21$, $N = 12$). In contrast, among patients with RA–cancer comorbidity, psychological resilience was positively and significantly associated with treatment adherence ($\rho = 0.57$, $p = 0.042$, $N = 13$), indicating a moderate positive relationship within this subgroup. The significant association observed in the RA–cancer comorbidity group is illustrated in **Figure 1**.

Table 7. Within-group correlations between psychological resilience and treatment adherence.

Disease group	<i>N</i>	Spearman's ρ	<i>p</i> -value
Rheumatoid arthritis	15	0.24	0.40
Cancer	12	−0.39	0.21
RA–Cancer comorbidity	13	0.57	0.042

Note: Correlations were assessed using Spearman's rank correlation coefficient.

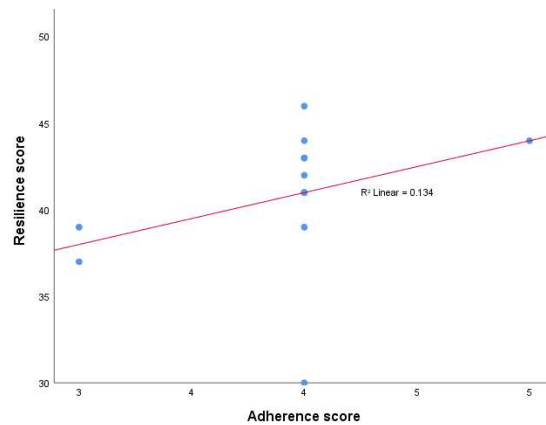


Figure 1. Association between psychological resilience and treatment adherence in patients with RA–cancer comorbidity. Scatterplot illustrating the relationship between resilience and adherence scores among patients with concurrent rheumatoid arthritis and cancer ($n = 13$). The fitted line represents a linear trend for visualization purposes. Spearman’s rank correlation analysis indicated a significant positive association between resilience and adherence ($\rho = 0.57$, $p = 0.042$).

3.8. Rheumatoid arthritis disease activity and inflammatory markers

Among participants with rheumatoid arthritis, disease activity indices and inflammatory biomarkers were examined descriptively to characterise the clinical context of the cohort. As summarised in **Table 8**, the mean DAS28 score was 4.21 ± 0.99 , indicating moderate-to-high disease activity. The mean tender joint count (TJC28) was 11.0 ± 5.72 , and the mean swollen joint count (SJC28) was 7.67 ± 4.27 . Inflammatory marker levels showed substantial variability within the RA population. Mean C-reactive protein (CRP) was 15.77 ± 8.30 mg/L, and mean erythrocyte sedimentation rate (ESR) was 40.4 ± 12.6 mm/h. Serological markers were also elevated, with mean rheumatoid factor (RF) levels of 17.88 ± 8.09 IU/mL and mean anti-citrullinated protein antibody (ACPA) levels of 24.93 ± 16.90 U/mL. Descriptive statistics indicated a broad range of disease activity and inflammatory burden across individuals.

Table 8. Rheumatoid arthritis disease activity and inflammatory markers.

Variable	Mean $\pm$ SD	Range
DAS28	4.21 ± 0.99	2.29–5.78
TJC28	11.0 ± 5.72	0–20
SJC28	7.67 ± 4.27	0–15
CRP (mg/L)	15.77 ± 8.30	0.5–27.5
ESR (mm/h)	40.4 ± 12.6	14–56
RF (IU/mL)	17.88 ± 8.09	9.9–41.8
ACPA (U/mL)	24.93 ± 16.90	7.6–74.5

Abbreviations: DAS28, Disease Activity Score in 28 joints; TJC28, tender joint count; SJC28, swollen joint count; CRP, C-reactive protein; ESR, erythrocyte sedimentation rate; RF, rheumatoid factor; ACPA, anti-citrullinated protein antibody.

Note: Values are presented as mean $\pm$ standard deviation and range. Analyses were restricted to participants with rheumatoid arthritis.

4. Discussion

The present study examined psychological resilience, treatment adherence, quality of life, pain severity, and disease activity related clinical indicators in patients with rheumatoid arthritis (RA), cancer, and rheumatoid arthritis-cancer comorbidity (RA-cancer). By integrating psychosocial outcomes with clinical symptom burden and inflammatory context, the findings offer a nuanced understanding of how disease configuration shapes psychological functioning and health related behaviour. Several important patterns emerge from the results, particularly regarding the differential role of resilience across disease groups and its selective association with treatment adherence in patients experiencing comorbidity.

Psychological resilience differed significantly across disease groups, with patients diagnosed with cancer alone demonstrating lower resilience compared with those living with rheumatoid arthritis or combined rheumatoid arthritis and cancer. This finding suggests that resilience may be influenced not only by disease severity or symptom burden but also by illness trajectory and adaptation processes [18,19]. Rheumatoid arthritis is typically characterized by a long duration and gradual progression, which may allow individuals to develop coping strategies, psychological adjustment, and illness related mastery over time [20–22]. In contrast, cancer often presents as an acute and existentially threatening diagnosis, frequently accompanied by abrupt changes in identity, uncertainty regarding prognosis, and aggressive treatment regimens [23]. These features may challenge psychological adaptation, resulting in lower observed resilience scores among patients with cancer alone.

Interestingly, RA-cancer patients did not demonstrate reduced resilience relative to those with rheumatoid arthritis alone. This pattern challenges a simplistic cumulative burden model in which comorbidity is assumed to uniformly worsen psychological outcomes [24]. Instead, it suggests that resilience may function as an adaptive resource that is preserved or even reinforced in the context of managing multiple chronic conditions [25]. Individuals with established experience coping with rheumatoid arthritis may enter cancer treatment with pre-existing psychological skills, health system familiarity, and self-management competence, which could buffer against further psychological disruption [26–28]. This interpretation aligns with emerging literature indicating that prior illness experience can shape responses to subsequent health stressors in complex and sometimes protective ways [29].

Treatment adherence did not differ significantly across disease groups at the group level, indicating that diagnostic category alone does not explain variation in adherence behaviour. However, the within-group analyses revealed a critical finding: psychological resilience was significantly and positively associated with treatment adherence only in RA-cancer. This disease specific association highlights resilience as a context dependent factor whose behavioural relevance may be amplified when individuals face competing treatment demands and complex care regimens [30,31]. Patients managing both rheumatologic and oncologic therapies must navigate multiple medications, appointments, and side effects, increasing cognitive and emotional demands. In this context, resilience may facilitate persistence, self-regulation, and engagement with treatment plans, translating psychological capacity into observable adherence behaviour [32,33].

The absence of a significant resilience adherence association in the rheumatoid arthritis only and cancer only groups further underscore the importance of disease context. In single disease states, adherence may be more strongly influenced by structural factors such as treatment simplicity, clinician monitoring, or standardized care pathways [34,35]. By contrast, in comorbidity settings where care is fragmented and self-management demands are higher, psychological resources such as resilience may become more salient determinants of adherence [36,37]. This finding provides an important empirical basis for targeted psychosocial interventions aimed at enhancing resilience specifically among patients with multimorbidity, rather than assuming uniform effects across all patient groups [38,39].

Quality of life and pain severity also differed significantly across disease groups, with patients with cancer reporting lower quality of life and higher pain levels compared with those with rheumatoid arthritis, while RA-cancer patients occupied an intermediate position. These results are consistent with the known symptom profiles of oncologic disease and its treatments, which often involve intense pain, fatigue, and functional disruption [40–42]. The intermediate pattern observed in the comorbidity group suggests that while additional disease burden is present, quality of life is not uniformly diminished beyond that seen in cancer alone. This again points to the possibility that adaptive processes developed during long term rheumatologic illness may partially mitigate the impact of cancer related symptoms on perceived quality of life [43–45].

Notably, resilience was not significantly correlated with quality of life within any disease group, including the comorbidity group. This finding indicates that resilience and quality of life, while related conceptually, may operate through distinct pathways. Quality of life reflects a broad appraisal of physical, emotional, and social functioning, which may be heavily influenced by symptom severity, treatment side effects, and functional limitations [46,47]. Resilience, by contrast, reflects the capacity to adapt psychologically to stress and adversity, which may not directly translate into improved quality of life perceptions, particularly when symptom burden remains high [48–50]. This dissociation reinforces the importance of distinguishing between psychological resources and subjective outcome measures, rather than assuming direct correspondence between them [51,52].

The descriptive analysis of rheumatoid arthritis disease activity and inflammatory markers provides important clinical context for interpreting the psychosocial findings. The observed levels of disease activity and inflammation indicate that patients with rheumatoid arthritis in this cohort were experiencing active disease, underscoring that preserved resilience and quality of life were not simply artifacts of low symptom burden. Instead, these psychosocial outcomes appear to coexist with ongoing inflammatory activity, supporting the view that psychological adaptation can occur even in the presence of significant physical disease [53,54]. This reinforces the relevance of psychosocial assessment and intervention alongside biomedical management in chronic inflammatory conditions [55,56].

The findings of this study suggest that psychological resilience plays a differentiated role across disease contexts, exerting its most pronounced behavioural influence in patients managing comorbid rheumatoid arthritis and cancer. While resilience alone does not appear sufficient to enhance quality of life or reduce pain

severity, it may be a critical factor supporting adherence in complex treatment environments. These results underscore the importance of moving beyond single disease models in psycho oncological research and highlight the need for tailored intervention pathways that account for multimorbidity, illness history, and the specific demands placed on patients. By situating resilience within a broader clinical and behavioural framework, this study contributes to a more nuanced understanding of how psychological resources interact with disease complexity to shape health outcomes.

5. Conclusion

This study demonstrates that psychological resilience, treatment adherence, quality of life, and pain severity vary meaningfully across patients with rheumatoid arthritis, cancer, and rheumatoid arthritis cancer comorbidity. While overall resilience levels were lower in patients with cancer, individuals with rheumatoid arthritis cancer comorbidity did not exhibit diminished resilience despite greater clinical complexity. Importantly, resilience was selectively associated with treatment adherence only in the comorbidity group, suggesting that psychological resources become particularly relevant when patients face multiple and competing therapeutic demands. In contrast, resilience was not significantly associated with quality of life or pain severity, indicating that psychological adaptation and subjective health outcomes may follow distinct pathways.

The findings highlight the importance of considering disease context when evaluating psychosocial factors and caution against assuming uniform effects of resilience across patient populations. In patients managing comorbid inflammatory and malignant disease, resilience may function as a key facilitator of sustained engagement with treatment, rather than as a direct determinant of symptom burden or perceived quality of life. These results support the integration of resilience focused psychosocial strategies into multidisciplinary care models for patients with complex multimorbidity, particularly where treatment adherence is critical for long term outcomes. Future research with larger samples and longitudinal designs is warranted to clarify causal mechanisms and to determine whether targeted resilience enhancing interventions can improve adherence and clinical trajectories in this vulnerable population.

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