



Correlation Between Personality Traits and Patient Outcomes Following Elective Spine Surgery: A Pre-Post Interventional Study

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Abstract

Background: Patient outcomes following elective spine surgery can be influenced by a variety of factors, including the patient's psychological state and personality traits. Understanding the relationship between personality traits and surgical outcomes could improve patient care and enhance recovery.

Objectives: To assess the correlation between personality traits and patient outcomes following elective spine surgery, utilizing pre- and post-surgical evaluations.

Study Design: A pre-post interventional study design was used to evaluate the impact of personality traits on patient recovery after elective spine surgery.

Methods: A total of 40 patients undergoing elective spine surgery at the Department of Orthopaedics, JSS Hospital, Mysuru, were included in the study using purposive sampling. The Big Five Personality Traits (Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness) were measured pre-operatively. Outcomes, including functional status, pain levels, and quality of life, were assessed post-operatively. Data were analyzed using SPSS software, and a p-value < 0.05 was considered statistically significant.

Results: The study identified significant correlations between specific personality traits and patient outcomes. High levels of conscientiousness were associated with better recovery and improved functional outcomes, while high neuroticism was correlated with delayed recovery and lower satisfaction levels post-surgery.

Conclusion: Personality traits can significantly influence patient outcomes following elective spine surgery. Incorporating psychological evaluations into pre-surgical planning may help improve recovery and patient satisfaction.

Keywords: Personality traits, Elective spine surgery, Patient outcomes, Conscientiousness, Neuroticism, Psychological evaluation, Functional recovery, Pre-post study

Introduction

Elective spine surgery is often performed to alleviate chronic pain, improve mobility, and enhance the quality of life for patients with various spinal conditions, such as degenerative disc disease, herniated discs, or spinal stenosis [1]. While the primary focus of surgical interventions is on physiological and anatomical factors, recent research has highlighted the

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critical role of psychological factors, including personality traits, in influencing postoperative outcomes [2]. Personality traits, as described by the Big Five model, encompass five broad dimensions: Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness [3]. These traits affect how individuals perceive, cope with, and recover from stressful situations, such as major surgeries [4]. For instance, patients with high levels of conscientiousness may adhere better to post-surgical care regimens and have a more positive attitude toward recovery, while those with high neuroticism may experience higher levels of anxiety and pain, potentially delaying recovery [5]. The relationship between psychological factors and surgical outcomes is increasingly being explored in spine surgery, as patient satisfaction and functional recovery can be influenced by both physical and mental health [6]. This study aims to assess the correlation between personality traits and patient outcomes following elective spine surgery, with the goal of identifying key psychological predictors that may influence recovery.

Methodology

Study Design

This was a pre-post interventional study conducted at the Department of Orthopaedics, JSS Hospital, Mysuru, over a period of 22 months (July 2022 – April 2024). The study was designed to evaluate the relationship between personality traits and patient outcomes after elective spine surgery.

Sample Size and Sampling Technique

The sample size for this study was calculated using the following formula:

$$S = Z^2 \times QD^2S = \frac{Z^2 \times P \times Q}{D^2}$$

Where:

- **S** = sample size,
- **Z** = 1.6 (confidence level),
- **P** = 2.6% (prevalence proportion),
- **Q** = 1 - P = 0.976,
- **D** = margin of error = 5% (expressed as 0.05).

The calculated sample size was **40 patients**, and the sampling technique used was **purposive sampling**.

Inclusion and Exclusion Criteria

- **Inclusion criteria:** Patients aged 30-65 years undergoing elective spine surgery for conditions such as herniated discs, spinal stenosis, or degenerative disc disease.
- **Exclusion criteria:** Patients with a history of psychiatric illness, cognitive impairment, or previous spine surgeries were excluded from the study.

Data Collection

Personality traits were assessed using the **Big Five Inventory (BFI-44)**, which measures five personality dimensions: Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness [7]. Pre-operative evaluations were conducted using the **Oswestry Disability Index (ODI)** and the **Visual Analog Scale (VAS)** for pain assessment. Post-operative outcomes were measured at 6 weeks and 6 months following surgery, using the same tools.

Outcome Measures

The primary outcomes were:

1. **Functional recovery:** Measured using the Oswestry Disability Index (ODI).
2. **Pain levels:** Assessed using the Visual Analog Scale (VAS).
3. **Quality of life:** Evaluated using the Short Form Health Survey (SF-36).

Statistical Analysis

Data were analyzed using SPSS version 26. Pearson correlation coefficients were used to assess the relationship between personality traits and patient outcomes. A p-value < 0.05 was considered statistically significant.

Results

Table 1: Patient Demographics

Demographics	n = 40
Mean Age (years)	45.6 ± 8.7
Male (%)	60%
Female (%)	40%
BMI (kg/m ²)	26.2 ± 3.5
Duration of Symptoms (months)	18.2 ± 6.9

The average age of patients was 45.6 years, with a slight predominance of males (60%). The average duration of symptoms before surgery was 18.2 months.

Table 2: Personality Trait Distribution (Pre-Surgery)

Personality Trait	Mean Score ± SD
Neuroticism	3.2 ± 0.8
Extraversion	4.1 ± 1.0
Openness	3.5 ± 0.7
Agreeableness	4.2 ± 0.6
Conscientiousness	4.8 ± 0.5

Conscientiousness had the highest average score, while Neuroticism had the lowest, indicating that the majority of patients scored higher in positive personality traits, which may influence recovery outcomes.

Table 3: Pre-Operative Pain Levels (VAS Score)

VAS Score (0-10)	Mean \pm SD
Pre-operative VAS score	7.5 \pm 1.2

The average pre-operative pain level was 7.5, indicating severe pain among patients prior to surgery.

Table 4: Post-Operative Pain Levels (VAS Score)

Time Interval	Mean \pm SD
6 weeks post-op	3.5 \pm 1.1
6 months post-op	2.1 \pm 0.9

Post-operatively, there was a significant reduction in pain levels, with a mean VAS score of 2.1 at 6 months.

Table 5: Functional Recovery (Oswestry Disability Index)

Time Interval	Mean ODI Score \pm SD
Pre-operative	62.3 \pm 10.5
6 weeks post-op	45.2 \pm 9.1
6 months post-op	32.5 \pm 7.8

Significant improvements in functional status were observed post-surgery, with a notable reduction in ODI scores at both 6 weeks and 6 months ($p < 0.01$).

Table 6: Correlation Between Neuroticism and Post-Op Outcomes

Outcome Measure	Correlation Coefficient (r)
Post-op Pain (VAS)	0.65
Post-op Functional Recovery (ODI)	0.58

Neuroticism was positively correlated with higher post-op pain levels and poorer functional recovery ($p < 0.05$), suggesting that patients with high neuroticism had less favorable outcomes.

Table 7: Correlation Between Conscientiousness and Post-Op Outcomes

Outcome Measure	Correlation Coefficient (r)
Post-op Pain (VAS)	-0.68
Post-op Functional Recovery (ODI)	-0.71

Conscientiousness was negatively correlated with post-op pain levels and positively correlated with functional recovery ($p < 0.05$), indicating that higher conscientiousness led to better post-operative outcomes, including reduced pain and improved functional recovery.

Overall quality of life improved significantly post-surgery, with notable gains in physical functioning, social functioning, and mental health ($p < 0.01$).

The majority of patients (85%) did not experience a recurrence of symptoms post-operatively, with only a small proportion reporting mild or severe recurrences.

Table 8: Post-Operative Quality of Life (SF-36)

SF-36 Domain	Mean Score (6 months post-op)
Physical Functioning	80.2 \pm 7.5
Role Physical	75.5 \pm 6.9
Bodily Pain	70.3 \pm 8.2
General Health	78.1 \pm 7.1
Vitality	72.6 \pm 7.8
Social Functioning	85.0 \pm 5.9
Role Emotional	76.3 \pm 6.2
Mental Health	79.0 \pm 6.4

Table 9: Recurrence of Symptoms

Symptom Recurrence	Percentage (%)
No recurrence	85
Recurrence of mild symptoms	10
Recurrence of severe symptoms	5

The majority of patients (70%) were highly satisfied with their post-operative outcomes, indicating that personality traits and surgical intervention had a positive impact on their overall recovery and satisfaction.

Table 10: Patient Satisfaction

Satisfaction Level	Percentage (%)
Highly satisfied	70
Satisfied	25
Dissatisfied	5

Discussion

The results of this study suggest that personality traits play a significant role in determining post-operative outcomes following elective spine surgery. Specifically, high levels of conscientiousness were associated with improved functional recovery, reduced pain, and higher satisfaction post-operatively [9]. Conscientious individuals tend to be more disciplined and goal-oriented, which likely contributes to better adherence to post-operative care regimens and a more positive attitude towards recovery [10]. Conversely, patients with higher levels of neuroticism demonstrated poorer post-operative outcomes, including higher pain levels, delayed functional recovery, and lower satisfaction [11]. Neuroticism is associated with emotional instability, anxiety, and negative emotional responses to stressful situations, which may exacerbate the perception of pain and hinder the recovery process [12]. The findings align with previous studies that highlight the impact of psychological factors on surgical outcomes, particularly in spine surgery [13]. It is well-established that psychological distress can impair recovery, while positive psychological traits, such as conscientiousness and optimism, can enhance recovery and improve overall

patient outcomes [14]. This underscores the importance of integrating psychological assessments into pre-surgical planning, as it may help identify patients at higher risk for poor outcomes and allow for targeted interventions, such as cognitive behavioral therapy or psychological counseling, to improve post-surgical recovery [15]. In terms of functional recovery, the results of the Oswestry Disability Index (ODI) and Visual Analog Scale (VAS) scores demonstrated significant improvements in both pain and functional status post-operatively. However, patients with higher neuroticism scores experienced less favorable outcomes, highlighting the need for more comprehensive patient management strategies that address both physical and psychological factors [16].

Quality of life, as measured by the Short Form Health Survey (SF-36), also improved significantly post-surgery. Patients with higher conscientiousness scores reported better quality of life outcomes, particularly in the domains of physical functioning, social functioning, and mental health. These results suggest that personality traits can have a lasting impact on a patient's overall well-being and satisfaction following surgery [17]. Given the significant correlation between personality traits and post-surgical outcomes, it may be beneficial for healthcare providers to incorporate psychological evaluations into routine pre-operative assessments for elective spine surgery. By identifying patients with high levels of neuroticism or low conscientiousness, healthcare providers can implement targeted interventions aimed at improving psychological resilience and coping strategies, thereby enhancing post-operative outcomes [18]. In conclusion, this study provides evidence that personality traits are an important predictor of patient outcomes following elective spine surgery. Conscientiousness is associated with better recovery and improved functional outcomes, while neuroticism is linked to poorer outcomes. Incorporating psychological assessments into pre-operative planning may improve patient management and optimize recovery following spine surgery.

Conclusion

This study demonstrates a significant correlation between personality traits and post-operative outcomes in patients undergoing elective spine surgery. High levels of conscientiousness are associated with better functional recovery, lower pain levels, and higher patient satisfaction, while neuroticism is linked to poorer outcomes. These findings suggest that psychological factors should be considered during pre-surgical planning to improve recovery and overall patient outcomes. Incorporating psychological assessments and interventions may help mitigate the negative impact of certain personality traits on post-operative recovery, leading to improved patient care and satisfaction.

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