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Satisfaction following correction of spinal deformity: Cultural and regional effects on outcome

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ABSTRACT

Corrective spine surgery for spinal deformities, such as adolescent idiopathic scoliosis (AIS) and adult spinal deformity (ASD), aims to enhance the quality of life by addressing physical impairments. However, the extent of patient satisfaction after surgery, which includes pain management, functional recovery, and psychological contentment, exhibits considerable variation across different cultural and geographical landscapes. This review describes the influence of cultural and regional disparities on postoperative satisfaction in AIS and ASD surgery with a particular emphasis on the disparities between the US and Japan. This review underscores the intricate relationship between surgical outcomes and patient-reported satisfaction metrics. The investigation reveals significant contrasts in patient satisfaction and clinical results between these 2 countries, attributed to divergent cultural expectations, lifestyle adaptations, and perceptions of bodily image. These distinctions are crucial for healthcare professionals to recognize, as they necessitate a culturally nuanced approach to patient care. This comparative review not only enhances the understanding of patient experiences across cultures but also provides valuable guidance for physicians in customizing their strategies to align with the varied expectations of their patients, thereby improving postoperative satisfaction and overall quality of life. This review emphasizes the necessity of a tailored and culturally sensitive approach to managing spinal deformities, underscoring the need to factor in cultural and regional elements to enhance patient satisfaction and surgical outcomes.

Introduction

The surgical intervention for spinal deformities, notably adolescent idiopathic scoliosis (AIS) and adult spinal deformity (ASD), stands as a pivotal therapeutic approach aimed at ameliorating the structural and functional impairments associated with these conditions [1,2]. These deformities, characterized by abnormal curvatures of the spine, not only impose physical limitations but also affect the psychological well-being of patients, thereby necessitating a multidimensional approach to treatment that prioritizes both physical correction and patient satisfaction [1,2].

In recent years, the global medical community has witnessed significant advancements in surgical techniques and postoperative care protocols for spinal deformity correction [1,2]. Despite these strides, the subjective nature of patient satisfaction—a composite measure encompassing pain relief, functional improvement, aesthetic satisfaction, and psychological well-being—presents a complex challenge, with reported outcomes exhibiting marked variability across different cultural and geographical contexts [3,4].

This variability underscores the necessity of exploring how cultural and regional factors influence patients' perceptions and satisfaction with their surgical outcomes. In a comprehensive analysis of data from the National Inpatient Sample, Brown NJ, et al. examined a cohort of 17,433 ASD patients, revealing that ethnicity significantly influences the likelihood of receiving surgery, surgical complexity, and complication rates [5]. This underscores the critical need for culturally tailored treatment approaches. Comparing the healthcare systems of the United States (US) and Japan—2 nations with high surgical care standards yet distinct cultural attitudes towards health—illustrates the profound impact of these differences [6,7]. Both nations boast high standards of surgical care for spinal deformities but differ significantly in cultural attitudes towards health, body image, and patient-physician interactions, potentially leading to divergent patient expectations and satisfaction levels post-surgery [6,7]. Such disparities in cultural attitudes can lead to varying patient

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expectations and satisfaction postsurgery, emphasizing the importance of understanding and integrating cultural competence in patient care for ASD.

This narrative review aims to synthesize and analyze findings from comparative studies between the US and Japan, focusing on the impact of cultural and regional differences on patient satisfaction following spinal deformity correction. By examining these differences, the review seeks to contribute to a deeper understanding of the multifaceted nature of patient satisfaction and to highlight the importance of incorporating cultural sensitivity into clinical practice to optimize patient outcomes and satisfaction post-surgery.

Materials and methods

In this narrative review, we adopted a qualitative approach to explore and synthesize existing literature on patient satisfaction and outcomes following spinal deformity correction, with a particular focus on comparative analyses between the US and Japan. The review was structured around key themes identified from an initial survey of the literature, including cultural and regional influences on patient perceptions, differences in clinical outcomes, and implications for clinical practice.

Data extraction and synthesis

Data were extracted from the selected sources to capture key information such as study objectives, methodologies, patient demographics, surgical techniques, and main findings related to patient satisfaction and outcomes. This qualitative information was synthesized thematically to highlight similarities and differences in surgical experiences and satisfaction levels between the 2 cultural contexts. Special attention was given to studies that discussed the role of cultural expectations, patient-doctor communication, and societal norms in shaping patient satisfaction.

Analytical framework

The review was guided by an analytical framework that considered both the biomedical outcomes of spinal deformity correction (e.g., pain relief, functional improvement) and the psychosocial aspects of patient satisfaction (eg, self-image, quality of life). This dual perspective allowed for a comprehensive understanding of how surgical interventions are perceived and valued differently across cultural boundaries.

By adopting this narrative approach, the review aims to provide a rich, contextual understanding of how cultural and regional factors influence patient satisfaction and outcomes following spinal deformity correction. Through the thematic synthesis of the selected literature, the review highlights the complexity of patient experiences and the need for culturally sensitive clinical practices in orthopedic surgery.

Results

Our narrative synthesis highlighted key themes in patient satisfaction and outcomes post-spinal deformity correction, with a focus on cultural and regional contexts (Tables 1 and 2).

Cultural and regional influences on patient perceptions

One of the most pronounced findings across the studies was the significant influence of cultural and regional factors on shaping patient perceptions and satisfaction with spinal deformity correction surgeries (Tables 1 and 2). Theologis et al. [11] indicates a complex web of factors affecting satisfaction post-surgery. Across ethnic groups, a desire for symmetry such as evenness of shoulders, hips, and waist was prevalent. Interestingly, concerns varied significantly across ethnicities; for example, Asian patients exhibited a strong preference for height, while African American and Hispanic patients expressed more concern about breast evenness and the aesthetic outcome in clothes.

These factors manifest distinctly in different cultural contexts, such as in the US and Japan, leading to varied patient expectations and assessments of surgical success [8–15]. In the North American context, where cultural values heavily emphasize individualism and personal autonomy, patients often have a strong focus on aesthetic outcomes and pain relief following spinal deformity correction surgeries [8,9]. This focus reflects a broader cultural inclination towards prioritizing individual appearance and personal comfort. Such cultural norms significantly shape patients' preoperative expectations and their assessments of postoperative satisfaction. Studies, such as the one by Watanabe et al. [8], underline these cultural influences by highlighting the differences in baseline scores between North American and Japanese patients with idiopathic scoliosis, particularly in domains related to pain, function, and self-image.

In contrast, the Japanese cultural context, which places a higher value on societal harmony and collective well-being, leads patients to put a greater emphasis on the functional outcomes of surgery, such as enhanced mobility and the capacity to perform daily activities without discomfort [14–16]. This perspective is deeply intertwined with societal values that favor collective well-being and resilience, often resulting in a more stoic acceptance of aesthetic outcomes and a stronger focus on communal integration during the post-recovery phase. Japanese patients' emphasis on functional recovery over aesthetic results aligns with these broader societal norms, indicating a distinct cultural approach to evaluating surgical success [6].

Furthermore, the study by Morse et al. extends this understanding [9]. The study collected preoperative SRS-30 outcomes from 1,853 children with AIS belonging to 6 different ethnic groups: US white, black, Hispanic, Asian, as well as native Japanese and Koreans. The analysis adjusted for age, sex, major curve magnitude, and body mass index, and compared 4 domains of the SRS-30: pain, appearance, activity, and mental health [9]. The results highlighted significant disparities: white participants reported higher levels of pain compared with their Japanese and Korean counterparts. In the domain of appearance, Korean and Japanese children reported the lowest scores, suggesting a different cultural perception of appearance related to scoliosis. Moreover, Korean children had the lowest scores in activity and mental health domains, as well as the lowest total scores, indicating that the impact of scoliosis on quality of life might be perceived differently across cultures and ethnicities.

Disparities in clinical outcomes and satisfaction

The study by Elsamadicy et al. [16] sheds light on the complexities of racial disparities in healthcare utilization and outcomes following spinal fusion for adolescent idiopathic scoliosis (AIS). Their findings indicate that, although racial differences markedly influence hospital stays and costs—particularly for Hispanic patients—race does not significantly affect surgical outcomes. Notably, the Black cohort had a higher need for blood transfusions, underscoring existing disparities in healthcare management [17].

In parallel, the comparative studies on spinal deformity surgeries between the US and Japan reveal nuanced disparities in clinical outcomes and patient-reported satisfaction, intricately tied to cultural and regional influences. In the US, higher post-surgical satisfaction levels are often reported, a phenomenon that can be attributed to significant enhancements in self-image and more pronounced pain relief, as highlighted by the findings of Yagi et al., which demonstrated similar effectiveness in ASD surgery but noted lower satisfaction scores in Japan [14,15]. This contrast in satisfaction levels might stem from cultural differences in body image perceptions and the societal stigma associated with spinal deformities, suggesting that American patients place a higher value on aesthetic outcomes and pain alleviation.

Table 1
Comparison of clinical and surgical outcomes between different ethnic groups in AIS surgery.

Study	Study design	Sample size	Ethnicity	Follow-up	findings
Watanabe K, et al. [8]	Retrospective comparisons	100 patients	USA vs JPN	Baseline	USA had significantly lower scores in pain (p<.01, 3.7±0.8 vs. 4.3±0.4), function (p<.01, 3.9±0.6 vs. 4.2±0.5), and activity (p<.01, 4.5±0.8 vs. 4.9±0.3) compared with JPN. JPN had significantly lower scores in the self-image (p<.01, 4.0±0.7 vs. 3.5±0.5).
Morse LJ, et al. [9]	Retrospective comparisons	1,853 patients	USA white (1234), black (213), Hispanic (78), Asian (29), JPN (192), KOR (107).	Baseline	Whites had more pain than JPN or KOR (JPN: 4.52, KOR: 4.47, white: 4.04). KOR and JPN had the lowest appearance scores (JPN: 2.89, KOR: 2.73, US Asian: 3.55, Hispanic: 3.11, black: 3.47, white: 3.29). KOR had the lowest activity (3.64), mental (3.70), total (3.63).
Theologis AA, et al. [11]	Retrospective comparisons	1,977 patients	Caucasian (57%),African American (11%), Asian/Asian American(6%), Hispanic (3%), Other (2%)	2-year postop	Asians were least likely to be concerned about the evenness of shoulders, hips, waist, ribs, and chest, however, expressed the greatest concern about height. African Americans and Hispanics were more likely to be concerned about breast evenness and anterior chest and looking better in clothes. African Americans and Hispanics were more self-conscious about the scar.
Elsamadicy AA et al [17]	Retrospective comparisons	3,432patients	White (61.1%), Black (16.1%), Hispanic (12.6%), Other (10.,%).	Perioperative period	The blood transfusions was significantly greater in the Black cohort (White: 16.7%; Black: 25.0%; Hispanic: 24.5%; Other: 22.7%, p<.001). The rate of complications encountered during admission was greatest in the Other cohort (White: 21.9%; Black: 23.6%; Hispanic: 22.2%; Other: 34.9%, p<.001).
Toombs et al. [3]	Retrospective comparisons	541 patients	USA, Ghana, Pakistan, Spain, Egypt, and China	2-year post-op	Countries with lowest access to care (Ghana, Egypt, and Pakistan) displayed larger curves, more levels fused, longer operative time, and greater estimated blood loss (p<.001).

USA, United States of America; JPN, Japan; KOR, Korea. Numbers or parentages in parenthesis.

Table 2
Comparison of surgical outcomes between different ethnic groups in ASD surgery.

Study	Study design	Sample size	Ethnicity	Follow-up	findings
Diebo, et al. [10]	Propensity score matched analysis	288 patients	USA vs. KOR vs. JPN	2-y postop	Compensation for sagittal is ethnicity dependent. KOR patients favor thoracic compensation via hypokyphosis, and JPN favor pelvic compensation via retroversion.
Hosogane N, et al. [12]	Retrospective comparisons	211 patients	USA vs. JPN	2-y postop	JPN had better pain but worse functional scores at baseline than that in the USA. Self-image and mental health scores in JPN were significantly worse at baseline and at 2 y.
Yagi M, et al. [14]	Propensity score matched analysis	186 patients	USA vs. JPN	2-y postop	Similar clinical improvement between the USA and JPN (SRS-22function; 4.2±0.9 vs. 4.3±0.6, p=.60, pain; 3.8±0.9 vs. 4.1±0.8, p=.13, satisfaction; 4.3±0.9 vs 4.2±0.7, p=.61, total; 4.0±0.8 vs. 4.1±0.5, p=.60).
Yagi M, et al. [15]	Propensity score matched analysis	108 patients	USA vs. JPN	2-y postop	Significantly lower satisfaction in JPN than in the USA at 2-y postop(satisfaction: 4.3±0.9 vs. 4.0±0.8, p<.01).

USA, United States of America; JPN, Japan; KOR, Korea.

Conversely, in Japan, despite the substantial benefits of surgery, patients reported lower satisfaction levels related to self-image. This could reflect a cultural predisposition towards valuing functional recovery and the ability to resume daily activities, as indicated by Yagi et al. [15], which reported similar clinical outcomes for adolescent idiopathic scoliosis in adults (AISA) surgery in young adults between the 2 countries but observed differences in satisfaction correlations, pointing towards cultural nuances in patient satisfaction.

Both North American and Japanese patients experienced significant post-surgical improvements in pain and function [10–15]. However, the degree of pain relief reported was more substantial among North American patients, possibly due to varying pain management protocols or differing cultural thresholds and expressions of pain relief. This is further complicated by the findings of Toombs et al. [17], which observed larger curve magnitudes and more complications in countries with lower access to care, suggesting that disparities in clinical outcomes are also influenced by regional healthcare access.

Self-image and mental health

In the context of spinal deformity surgeries, the differential impact on self-image and mental health between North American and Japanese patients is markedly influenced by cultural and societal values. North American patients often report notable improvements in self-image and mental health post-surgery, a reflection of the Western cultural emphasis on individual appearance and personal well-being [11–14]. This aligns with the findings of Theologis et al. [11], which documented the influence of ethnicity on appearance concerns and satisfaction in adolescents undergoing spinal fusion for AIS, underscoring the significant role cultural and ethnic backgrounds play in shaping perceptions of self-image and mental health.

Conversely, Japanese patients, despite experiencing improvements, tend to report lower satisfaction levels in these domains [12,14,15]. This could be attributed to a societal tendency in Japan to prioritize functional recovery over aesthetic improvements, reflecting a cultural ethos that values collective well-being over individual appearance. This perspective is supported by the study of Hosogane et al. [12], which found that Japanese patients initially showed better pain management but worse functional domain scores, which improved to levels comparable to the US at 2 years. This suggests a nuanced cultural difference in the valuation and perception of self-image and mental health, indicating that while functional recovery is initially prioritized, the importance of self-image and mental health gains recognition over time.

Overall satisfaction

The literature review reveals a notable disparity in overall post-surgical satisfaction between North American and Japanese patients, with North Americans generally reporting higher levels of satisfaction [11,12,14,15]. This difference in satisfaction levels can be attributed to the distinct baseline expectations set by patients in each country. North American patients often have a higher valuation of immediate, tangible surgical outcomes, such as pain relief and aesthetic improvements, which are closely aligned with Western cultural values that em-

phasize individual well-being and appearance [6,7]. This is in contrast to Japanese patients, who may place greater emphasis on long-term functional recovery and the ability to reintegrate into societal roles, reflecting a cultural inclination towards collective well-being and social harmony.

Ethnicity-dependent spinal alignment's impact

The ethnically driven compensatory strategies highlighted by Diebo et al. [10], combined with findings from other studies, suggest that postural adjustments and perceptions of surgical outcomes in adult spinal deformity surgery are deeply rooted in cultural and ethnic backgrounds. For instance, Dave et al.'s [18] study illustrates that patients with normalized pelvic tilt (PT) postsurgery demonstrate better outcomes and reduced lower-extremity and thoracic compensations, emphasizing the importance of considering regional compensations in surgical planning. Furthermore, the multi-ethnic alignment normative study by Sardar et al. [19] reveals that sagittal spinal alignment varies with race, with Asian populations presenting lower lumbar lordosis and thoracic kyphosis. This suggests that optimal postoperative alignment strategies should be individualized, taking into account racial and ethnic norms. Shen et al.'s [20] analysis of coronal alignment underscores the association between cranial coronal alignment and surgical risk and outcomes in ASD, while Yagi et al.'s [21] international validation of the PRISM model points to the value of preventive procedures in minimizing mechanical failure following ASD surgery. These nuanced insights affirm the complexity of post-surgical satisfaction and reinforce the need for personalized, culturally informed surgical care strategies that address not only the universal goals of deformity correction but also the specific expectations and lifestyle requirements of diverse patient populations. The ethnicity-dependent compensatory strategies could lead to variations in postural adjustments and the perception of surgical outcomes, thereby affecting patient satisfaction in ways that are deeply intertwined with cultural and ethnic backgrounds [18–21].

Cultural expectations versus clinical outcomes

The findings of Yagi et al. [15] bring to light the lower satisfaction levels reported by Japanese patients compared with their American counterparts in ASD surgery, despite achieving similar scores in pain relief and functional improvement. This underscores the complex interplay between cultural expectations, baseline satisfaction levels, and the perceived success of surgical outcomes. The discrepancy in satisfaction levels, despite comparable clinical improvements, suggests that the evaluation of surgical success extends beyond mere physical recovery and is significantly influenced by cultural norms and values regarding health, appearance, and functionality. Theologis et al. [9] described that the concern for surgical scars was prominent among all ethnicities, indicating a universal aspect of patient care that transcends cultural boundaries. African Americans and Hispanics reported a higher level of self-consciousness regarding scars. These findings suggest a potential correlation between scar concerns and the preference for minimally invasive surgical procedures over open surgeries, warranting further exploration in the literature.

Implications for clinical practice

This review underscores the essential role of cultural competence in clinical practice. It is imperative that healthcare providers adopt a patient-centered approach that respects the diverse cultural backgrounds and personal values of patients.

Patient counseling: The insights from the studies, such as those by Diebo et al. and Yagi et al. emphasize the pivotal role of culturally informed preoperative counseling [10,14]. These findings suggest that healthcare providers should customize their discussions to resonate with the cultural values and expectations of their patients. For example, while some patients may prioritize immediate postoperative appearance and pain management, others may focus on the long-term functional benefits of the surgery and its impact on daily life.

Setting expectations: The necessity for clear communication about realistic postoperative outcomes is paramount in both cultural contexts. For North American patients, specifically addressing expectations around pain relief and aesthetic outcomes could lead to higher post-surgical satisfaction, as indicated by the lower satisfaction scores in Japan noted by Yagi et al. [15] despite similar clinical outcomes.

Discussion

The comparative analysis of patient satisfaction and outcomes following spinal deformity correction surgeries between the US and Japan reveals profound insights into how cultural and regional influences shape patient perceptions, clinical outcomes, and the broader implications for clinical practice. This discussion integrates findings from the reviewed studies with relevant literature to explore these key themes in depth.

Cultural and regional influences on patient perceptions

A significant finding from the reviewed literature is the impact of cultural and regional factors on patient satisfaction and perceptions post-surgery. In the US, patients often report higher levels of satisfaction, particularly with improvements in self-image and mental health following surgery. This phenomenon can be attributed to Western cultural norms that prioritize individualism, personal aesthetics, and the pursuit of personal well-being [6,7]. The emphasis on individual appearance and the societal valorization of aesthetic outcomes in the West likely contribute to the higher satisfaction rates observed among North American patients.

Conversely, in Japan, the cultural context shifts towards valuing functional recovery and the ability to resume daily activities, reflecting an Eastern cultural emphasis on social harmony and collective well-being [6,7]. This cultural disposition towards prioritizing functional outcomes over aesthetic improvements may explain why Japanese patients, despite experiencing significant benefits from surgery, report lower satisfaction levels, particularly in domains related to self-image and mental health. These cultural nuances underscore the critical need for healthcare providers to adopt culturally sensitive approaches in patient counseling and in setting realistic postoperative expectations.

Differences in clinical outcomes

Both North American and Japanese patients report significant improvements in pain and function post-surgery, yet the extent and nature of these improvements vary. North American patients often experience more pronounced pain relief, which may be linked to different pain management strategies or to the patients' expectations regarding pain outcomes post-surgery [8–15]. The greater emphasis on pain relief in the North American context might also reflect the cultural prioritization of individual comfort and well-being.

In contrast, Japanese patients' lower baseline satisfaction with self-image and the relatively smaller improvements in this domain post-surgery could be indicative of deeper cultural differences in body image perceptions and the societal stigma associated with spinal deformities [3,9]. Fujita et al. [16] analyzed the surgical outcome in Japanese patients who had total hip arthroplasty (THA) and pointed out that, despite higher overall QoL reported by Japanese patients after THA, they experience difficulties with activities requiring deep hip flexion, a crucial aspect of Asian lifestyle. This study underlines the importance of culturally informed postoperative care that addresses lifestyle-specific activities to optimize patient satisfaction and quality of life. The cultural tendency in Japan to minimize the focus on personal aesthetics in

favor of functional gains might contribute to these observed differences in clinical outcomes and patient satisfaction.

Implications for clinical practice and disparities in care

The disparities in post-surgical patient satisfaction and outcomes across different cultures, specifically between the US and Japan, have profound implications for clinical practice [11,12,14,15]. They underscore the importance of a culturally informed approach that acknowledges and integrates patients' cultural backgrounds and values into care. Clinicians must consider these nuances when discussing surgical options and recovery, tailoring their approach to meet culturally specific expectations.

The study by Howard et al. [22] in an Enhanced Recovery After Surgery (ERAS) context adds another layer of complexity, showing that even within standardized care protocols designed to improve outcomes, disparities exist by race/ethnicity. Black, Indigenous, and people of color (BIPOC) patients in an ERAS program experienced longer hospital stays and were less likely to be discharged directly home compared with White patients. This suggests that while ERAS programs are a step towards standardized, high-quality post-operative care, they are not immune to the systemic issues that contribute to healthcare disparities.

In the US context, patients may prioritize aesthetic outcomes and pain relief, necessitating a focus on these aspects in patient education and support programs [22–24]. Meanwhile, in Japan, the emphasis might be on functional recovery and daily activity reintegration, reflecting different cultural values in patient care [16,21]. These insights are crucial for developing postoperative support programs that are culturally congruent [25,26].

For instance, US support programs could benefit from incorporating strategies that address body image, pain management, and psychological support. In Japan, rehabilitation efforts might be more effective if they focus on restoring function and addressing societal perceptions of disability [27].

The findings from Howard et al. imply a need for continuous evaluation of recovery pathways to identify and address the contributors to disparities in outcomes [22]. This is essential for advancing equitable healthcare practices that ensure all patients receive consistent and high-quality post-operative care, regardless of their cultural or ethnic background.

Conclusions

The studies collectively highlight significant influences of ethnicity, culture, and healthcare system differences on the outcomes, and satisfaction of spinal deformity surgeries. Ethnic and cultural backgrounds also affected patient-reported outcomes, appearance concerns, and compensatory mechanisms for spinal alignment. Access to care and healthcare system differences further influenced disease severity at presentation, operative and complications. These findings underscore the importance of considering cultural, ethnic, and systemic factors in the management and evaluation of spinal deformity treatments.

Declarations of competing interests

The authors declare no conflict of interest associated with this manuscript.

Author contribution

M.Y. designed the study; R.M., H.F., and M.Y. performed the experiments and analyzed the data; S.E. provided critical reagents; M.Y. supervised the experiments; R.M., and M.Y. wrote the manuscript.

Ethical approval

The study did not require approval from the relevant institutional ethical review board, because this study did not include any interaction or intervention with human subjects or include any access to identifiable private information.

Consent was not required because this study involved no human subject.

Affirmation of authorship

We the undersigned certify that each author has participated in and has contributed sufficiently to the work to take public responsibility for the appropriateness of the experimental design and method, and the collection, analysis and interpretation of the data and that this final version has been reviewed and approved for submission and/ or publication. We also certify that the sequence of authorship below is identical to that on the submitted manuscript.

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