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The psychological impact of scar reconstruction surgery in cancer patients: A comprehensive study on emotional and social recovery

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Abstract: Cancer treatments often involve surgeries that leave visible scars, which can significantly impact patients' psychological well-being. This study explores the psychological effects of scar reconstruction surgery, particularly focusing on changes in body image, self-esteem, anxiety, and social adaptability in cancer patients. Using semi-structured interviews, data was collected from 15 participants, comprising 8 cancer patients and 7 non-cancer patients who underwent various forms of scar reconstruction, including microsurgery and laser aesthetics. The findings reveal that scar reconstruction surgery leads to significant improvements in body image, self-esteem, and social engagement, with cancer patients experiencing more profound psychological benefits than non-cancer patients, due to the emotional toll of cancer treatment. Furthermore, the study highlights the role of sequential scar treatments and microsurgical techniques in enhancing both aesthetic outcomes and psychological recovery. This research contributes to the growing body of literature on the intersection between physical restoration and mental health, providing valuable insights into how scar reconstruction can aid in the emotional and social reintegration of cancer survivors.

Keywords: scar reconstruction; cancer patients; psychological health; body image; self-esteem; social adaptability; microsurgery; laser aesthetics; emotional recovery; social engagement

1. Introduction

Cancer treatment often involves surgical interventions, which, while life-saving, can lead to the development of scars that significantly impact patients' psychological health. The physical appearance of scars, particularly in visible areas, can affect a patient's self-esteem, body image, and overall mental well-being. This issue is compounded by the emotional distress that many cancer patients experience post-surgery, including feelings of social isolation, anxiety, and depression. Scar reconstruction surgery, which has evolved significantly with advances in microsurgery and laser therapy, offers a means to address these concerns, improving both physical appearance and psychological recovery. By restoring a patient's pre-surgery appearance, or creating a more acceptable cosmetic result, these procedures aim to reduce the emotional burden associated with disfigurement.

In the context of modern medicine, the importance of psychological well-being in post-cancer recovery has gained recognition. Scar reconstruction not only serves a functional role in restoring skin integrity but also plays a crucial role in enhancing a patient's self-image. Microsurgical techniques, along with advanced scar treatment protocols, can lead to better aesthetic outcomes, which may facilitate the patient's psychological healing and improve their quality of life. The intersection of scar reconstruction with psychological health remains an area with room for further

exploration, particularly concerning its effects on patients' mental health and self-esteem.

This study aims to explore the impact of scar reconstruction surgery on the psychological health of cancer patients, with a focus on the changes in their psychological well-being and self-esteem. Specifically, it seeks to investigate how scar reconstruction, including sequential scar treatment and the use of advanced microsurgical techniques, contributes to improvements in psychological health, such as reducing anxiety, depression, and body image concerns. Given the rising interest in the psychological effects of cosmetic and reconstructive surgeries, this research will provide critical insights into how these treatments influence cancer patients' mental health and their ability to reintegrate into social life post-surgery.

2. Literature review

Cancer treatment, particularly surgical interventions, can have a lasting impact on the psychological health of patients. While surgery is a crucial component of cancer care, the resulting scars can significantly affect a patient's body image and self-esteem. Scarring, especially on visible areas of the body such as the face, neck, or chest, can alter the way patients perceive themselves and how they feel they are perceived by others. These emotional challenges, coupled with the physical changes caused by surgery, make it difficult for many cancer survivors to adapt to their new appearance and recover mentally and emotionally.

Psychological distress following cancer surgery is a common experience for many patients. Research has shown that the emotional burden of visible scars is often accompanied by feelings of social isolation, anxiety, and depression. Moreover, patients frequently struggle with the stigma attached to visible scars, which may lead to a sense of disfigurement and an impaired self-identity. This section of the literature review delves deeper into the psychological health challenges that arise after cancer surgery, particularly focusing on the emotional impacts of scarring and the barriers these emotional challenges create for patients' recovery and social reintegration.

2.1. Psychological health challenges in cancer patients

Cancer treatment often results in significant psychological challenges for patients, particularly when it involves surgery. One of the most common and distressing outcomes of surgical treatment is the formation of scars. These scars can affect a patient's self-esteem, body image, and overall mental health. The emotional impact of scars is often linked to feelings of anxiety, depression, and social isolation. Patients may experience a negative self-image, especially when scars are visible on socially prominent areas such as the face, neck, or chest. The emotional toll of these changes can make it difficult for patients to adjust to life after surgery and may negatively impact their overall quality of life [1].

Scarring after cancer surgery can lead to significant psychological distress. Research has demonstrated that visible scars contribute to negative body image and self-perception, leading to feelings of disfigurement and a loss of identity [2]. Many cancer patients report feeling less confident and more self-conscious about their appearance, which can hinder their social interactions and limit their ability to engage

in daily activities. The presence of scars, particularly those from invasive surgeries like mastectomies or facial cancer resections, often intensifies these feelings, affecting both the mental and emotional recovery of the patient.

2.2. Scars and psychological health

The presence of visible scars plays a critical role in the psychological well-being of cancer patients. Patients often struggle with the emotional effects of scars, which can result in significant psychological and social challenges. Negative self-image, loss of confidence, and social withdrawal are commonly reported by cancer survivors with visible scarring. These patients may also face challenges in reintegrating into their social circles due to concerns about how they are perceived by others [3].

The connection between body image and mental health is complex, and visible scars are a significant factor in this dynamic. Research suggests that patients who have visible scars tend to experience a decrease in their body image satisfaction, which may contribute to higher levels of anxiety, depression, and other psychological symptoms [4]. This is particularly true for patients who undergo surgeries that alter their appearance in significant ways, such as breast cancer patients undergoing mastectomies or patients undergoing head and neck cancer treatments. Addressing these psychological challenges is crucial to the recovery process, as emotional distress can hinder both physical and mental healing.

2.3. Scar reconstruction and psychological health

Scar reconstruction surgery has become a crucial component of cancer care, not only for its functional benefits but also for its ability to improve psychological health. Reconstructive surgeries aim to restore the appearance of the affected area, helping patients regain their pre-surgery appearance or achieve a more acceptable cosmetic outcome. This process can significantly impact patients' mental health, as improved body image often leads to enhanced self-esteem and reduced feelings of anxiety and depression [5].

Several studies have indicated that patients who undergo scar reconstruction surgery report improved body image, enhanced self-confidence, and greater satisfaction with their physical appearance. These positive changes in body image can lead to a reduction in psychological distress, as patients feel more comfortable with their appearance and more confident in social situations [6]. For cancer patients, reconstructive surgery can also contribute to emotional healing by reducing the psychological burden of disfigurement and helping patients regain a sense of control over their bodies.

2.4. Sequential scar treatment and microsurgery

Sequential scar treatment is an approach that combines various modalities of treatment over time to address complex scars. This can include the use of techniques such as laser therapy, medication, and advanced microsurgical procedures. These treatments are typically employed to improve the appearance and function of scars, especially in cases where traditional methods are not sufficient [7].

Microsurgery, in particular, plays a significant role in scar reconstruction by enabling surgeons to perform precise, detailed repairs that restore both function and aesthetic appearance. When combined with other forms of scar treatment, such as laser therapy or chemical peels, sequential treatments can help improve both the aesthetic outcomes and the psychological well-being of cancer patients. By gradually improving the appearance of scars, these treatments allow patients to experience a more positive body image and social reintegration, which can significantly enhance their overall quality of life [8].

2.5. Psychological effects of aesthetic and reconstructive surgery

The psychological effects of aesthetic and reconstructive surgery, particularly in cancer patients, are profound. For many cancer survivors, reconstructive surgeries are not just about restoring function but also about reclaiming a sense of normalcy and control over their appearance. These procedures can have a significant impact on patients' mental health, providing both physical and emotional recovery.

Aesthetic surgeries, such as breast reconstruction after mastectomy or facial reconstructive surgery after skin cancer removal, have been shown to positively affect patients' body image and emotional well-being [9]. Patients who undergo these procedures often report higher levels of satisfaction with their appearance and improved psychological outcomes. The restoration of physical appearance can help patients rebuild their confidence, reduce feelings of disfigurement, and improve their ability to engage with others socially. These positive changes underscore the importance of considering both the physical and psychological aspects of care when treating cancer patients [10].

2.6. Comparison with current literature

In recent years, the psychological impact of scarring on cancer patients has been widely discussed in the literature. Various studies have highlighted the significant emotional toll that visible scars can have on a patient's mental health. This review is in line with previous research that demonstrates how scarring after cancer surgeries, such as mastectomies and facial cancer resections, can lead to negative body image, depression, anxiety, and social isolation [1,2]. These psychological effects are often exacerbated in patients with visible scars on socially sensitive areas of the body, such as the face or chest, which significantly impacts their self-esteem and quality of life.

Our findings regarding the connection between visible scars and body image satisfaction corroborate with existing literature that links scarring with a decrease in self-perception. Studies have consistently shown that cancer survivors with visible scars report lower body image satisfaction, leading to a heightened risk of psychological distress, such as increased anxiety and depression [3,4]. These findings emphasize the need to address these psychological challenges early on to improve the overall recovery process, as emotional distress can significantly hinder both physical and psychological healing.

The role of scar reconstruction surgery in improving patients' psychological well-being is well supported by the literature. Multiple studies have shown that reconstructive surgeries not only serve a functional purpose but also provide

psychological benefits by improving body image, reducing feelings of disfigurement, and enhancing self-esteem [5]. These improvements in self-perception are linked to a decrease in psychological distress, as cancer patients who undergo scar reconstruction surgeries often report feeling more comfortable and confident with their appearance, which facilitates better social reintegration and mental health recovery.

Further, the growing emphasis on sequential scar treatment, including microsurgery, laser therapy, and other advanced techniques, reflects the increasing recognition of the importance of not only functional but also aesthetic outcomes in cancer care. Research has demonstrated that these treatments can improve the appearance of scars and positively influence patients' psychological well-being, which is consistent with the results presented in this review [7].

Lastly, the literature emphasizes the profound psychological effects of aesthetic and reconstructive surgeries. As noted in previous studies, such procedures, particularly in breast cancer survivors and individuals who have undergone facial skin cancer surgery, result in significant improvements in body image and emotional recovery [9,10]. This review further supports the importance of considering both the physical and psychological aspects of care when treating cancer patients, which has been echoed in much of the current literature.

2.7. Gap in research

While significant progress has been made in understanding the physical outcomes of cancer treatments, there remains a notable gap in the research regarding the psychological impact of post-surgical scarring and the role of scar reconstruction surgery in improving mental health outcomes. Much of the existing literature focuses on the physiological aspects of scar formation and the technical advancements in reconstructive surgery. However, fewer studies explore the comprehensive psychological benefits of scar reconstruction, particularly in the context of cancer survivors. Specifically, the ways in which scar reconstruction can alleviate mental health issues such as anxiety, depression, and body image disturbances are not sufficiently explored [11,12].

Furthermore, the existing studies on scar reconstruction largely concentrate on individual surgical procedures, without examining the broader psychological outcomes associated with sequential scar treatment methods that combine different techniques such as microsurgery, laser treatments, and other advanced interventions. The psychological recovery process that follows these treatments has not been widely studied, and there is limited research on the cumulative effects of multi-modal scar treatment on the emotional well-being of cancer patients [13].

Additionally, the intersection of cultural perceptions, emotional responses to scarring, and the psychological impact of scar reconstruction remains underexplored. Cancer patients come from diverse cultural backgrounds, and the stigma or emotional burden attached to scarring can vary significantly across different cultures. Understanding how cultural contexts influence the psychological impact of scarring and the effectiveness of reconstructive surgery in alleviating these concerns is an area that warrants further investigation [14].

Lastly, while psychological outcomes are often considered in cancer rehabilitation, there is insufficient focus on the long-term mental health effects of scar reconstruction surgery. Most studies emphasize short-term outcomes, neglecting the prolonged emotional and social adjustments that patients may experience after surgery. Exploring these long-term effects could provide valuable insights into the comprehensive role of reconstructive surgery in post-cancer recovery [15,16].

3. Methodology

3.1. Research design

This study employs a qualitative research design, utilizing semi-structured interviews to collect psychological health data from cancer patients before and after undergoing scar reconstruction surgery. The research design also incorporates the context of sequential scar treatment and microsurgery techniques. The goal is to explore the patients' psychological experiences, expectations regarding the reconstructive surgery, and emotional changes post-surgery. The semi-structured interview approach allows for in-depth exploration of participants' subjective experiences while maintaining a flexible interview structure, which adapts to individual responses and insights.

To analyze the data, thematic analysis will be employed, which is a widely used qualitative method that helps identify and interpret patterns or themes within qualitative data. This approach is ideal for understanding complex emotional experiences that patients undergo during the process of scar reconstruction and recovery.

3.2. Participants

The participants in this study are patients who have undergone scar reconstruction surgery following cancer treatment or aesthetic procedures, with a focus on those receiving care at the Dermatology and Cosmetic Surgery Department of Tongji Hospital in Shanghai and surrounding cities. The study will include a variety of participants, including both cancer patients and individuals seeking scar reconstruction for non-cancer-related reasons. The latter group includes patients with scars from surgeries or injuries unrelated to cancer (for example, cosmetic procedures). The sample consisted of 15 participants in total, 8 with cancer-related scars and 7 with non-cancer-related scars, such as facial scars or other cosmetic reconstructive surgeries.

The inclusion criteria for the study will involve patients who have undergone scar reconstruction, either following cancer treatment or for aesthetic purposes. The study will focus on patients with significant scarring, either in visible areas or requiring intricate reconstruction, such as facial or breast surgeries. The sample will consist of 15 participants, including both cancer patients and individuals who sought cosmetic scar treatments. Patients with pre-existing mental health disorders that could confound the results will be excluded from participation. This design will allow for a broad understanding of how different types of scarring—whether from cancer treatments or aesthetic procedures—impact the psychological health of patients.

3.3. Data collection

The primary method of data collection in this study will be semi-structured interviews. This approach provides the flexibility to explore the participants' experiences in-depth, focusing on their psychological responses to scarring and the impact of scar reconstruction surgery on their emotional and social well-being.

Each interview will be guided by a set of open-ended questions designed to elicit information on the patient's emotional and psychological experiences before and after the surgery. The questions will explore aspects such as:

- Pre-surgical psychological health (e.g., anxiety, depression, body image concerns).
- Expectations of the scar reconstruction surgery.
- Post-surgical psychological changes (e.g., changes in self-esteem, body image, anxiety reduction).
- Overall quality of life before and after the surgery.

The interview duration will vary between 45 and 90 min, depending on the depth of the responses. The interviews will be audio-recorded and transcribed verbatim to ensure the accuracy of data collection.

The total time spent on interviews (T) can be estimated using the formula:

$$T = n \times t_{min} \text{ to } T = n \times t_{max}$$

where:

- n is the number of participants.
- t_{min} and t_{max} are the minimum and maximum interview durations, respectively.

For example, if there are 15 participants and the average interview duration is between 45 to 90 mi:

$$T = 15 \times 45 \text{ to } T = 15 \times 90$$

This would result in an estimated total interview time between 675 min (11.25 h) and 1350 min (22.5 h).

3.4. Data analysis

The data will be analyzed using thematic analysis, a qualitative method that is well-suited for identifying patterns or themes within qualitative data. The process will be conducted in six key steps, following Braun and Clarke's [1] approach to thematic analysis:

1. **Familiarization with the Data:** Transcribing the interviews and reading through the transcripts multiple times to immerse in the data.
2. **Generating Initial Codes:** Using open coding to identify meaningful segments of data. Each segment will be assigned a code that summarizes its content.
3. **Searching for Themes:** Codes will be grouped into potential themes based on similarities or relationships.
4. **Reviewing Themes:** Reviewing the themes in relation to the entire dataset to ensure they accurately represent the data.
5. **Defining and Naming Themes:** Finalizing the themes and defining their scope to capture the essence of the data.

6. **Producing the Report:** Writing a detailed narrative that links the themes to the research questions, providing an interpretation of the data.

The analysis will integrate findings related to both the psychological health impacts of scar reconstruction and the effects of sequential scar treatment and microsurgical techniques. Thematic analysis will allow for the identification of key themes such as:

- **Psychological changes** post-surgery (e.g., improvement in self-esteem, anxiety reduction).
- **The role of body image** in the recovery process.
- **Impact on social reintegration** (e.g., returning to normal activities, improved social interactions).

Table 1 displays the demographic information for the 15 participants in the study. The table includes participants' age, gender, cancer type, type of reconstruction, and pre- and post-surgery anxiety levels. The data includes a mix of both cancer and non-cancer participants (8 oncology patients vs 7 non-cancer cases), with the majority being female. This diverse sample offers insight into the psychological effects of scar reconstruction surgery across various patient backgrounds.

Table 1. Participant demographics.

Participant ID	Age	Gender	Cancer type	Type of reconstruction
P1	28	Female	Breast Cancer	Microsurgery
P2	35	Female	Skin Cancer	Laser Aesthetic
P3	30	Female	No Cancer	Microsurgery
P4	40	Female	Colon Cancer	Laser Aesthetic
P5	33	Female	Breast Cancer	Microsurgery
P6	38	Female	No Cancer	Laser Aesthetic
P7	42	Female	Cervical Cancer	Microsurgery
P8	36	Female	No Cancer	Microsurgery
P9	41	Female	Ovarian Cancer	Laser Aesthetic
P10	34	Female	No Cancer	Microsurgery
P11	29	Female	No Cancer	Laser Aesthetic
P12	37	Female	No Cancer	Microsurgery
P13	31	Female	No Cancer	Laser Aesthetic
P14	33	Male	Testicular Cancer	Microsurgery
P15	30	Female	Skin Cancer	Laser Aesthetic

Table 2. Coding process example.

Code	Description	Example Extract
Body Image	Changes in self-perception related to physical appearance	"I feel more like myself after the surgery"
Social Reconnection	Return to social activities and engagement	"I can go out with my friends again without feeling self-conscious"
Anxiety Reduction	Decrease in anxiety levels post-surgery	"I don't feel as anxious about being seen in public"

Table 2 illustrates the coding process applied to the interview data. Codes such as “Body Image”, “Social Reconnection”, and “Anxiety Reduction” were identified from the interview extracts to represent key themes in the participants' psychological responses.

Thematic analysis will be supported by the formula for calculating inter-rater reliability (IRR) to ensure the consistency of coding across multiple researchers:

$$IRR = \frac{\text{Number of agreements}}{\text{Total number of comparisons}}$$

This ensures the validity and reliability of the thematic analysis, confirming that the identified themes are consistent and robust.

3.4. Ethical considerations

Ethical considerations for this study include ensuring informed consent, confidentiality, and minimizing harm to participants. All participants will be fully informed about the purpose, procedures, risks, and benefits of the study, and written consent will be obtained prior to participation. Their personal information and data will remain confidential, with any identifying details anonymized to protect privacy. Participants will have the right to withdraw from the study at any time without consequences to their treatment or relationship with the hospital. Given the sensitive nature of the study, appropriate psychological support will be provided, and the research team will handle all discussions with care. The data will be used exclusively for the research and reported in aggregate form, ensuring that participants' identities remain protected in any publications.

4. Results

4.1. Impact of scars on psychological health of patients

Pre-surgery: Before undergoing scar reconstruction surgery, the participants generally experienced significant anxiety, depression, and negative body image. The anxiety levels ranged from moderate to high, with participants reporting feelings of self-consciousness, particularly due to visible scars. Many patients felt socially withdrawn, avoiding public appearances because of their disfiguring scars. The pre-surgery anxiety scores varied, with most participants rating it between **6 and 9** out of 10, reflecting the emotional burden caused by their appearance.

Post-surgery: Following scar reconstruction surgery (including microsurgery and laser treatments), participants reported improvements in body image and emotional health. There was a noticeable reduction in anxiety levels, as reflected in the post-surgery anxiety scores, which ranged from **3 to 6** out of 10. Many participants reported feeling more confident and socially engaged, with improvements in both self-esteem and social adaptability.

4.2. Psychological benefits after scar reconstruction

Improved self-esteem and confidence: Many participants reported significant improvements in their self-esteem and confidence after scar reconstruction. The majority of participants (both cancer and non-cancer patients) rated their post-surgery

self-esteem and confidence between 6 and 9 out of 10, reflecting a positive change in how they perceived themselves. This improvement was particularly evident in cancer patients, who showed a strong emotional recovery with the restoration of body image, whereas non-cancer patients also reported improvements in self-esteem, albeit less dramatically.

Reduction in anxiety and depression: Post-surgery, anxiety levels dropped significantly for most participants, reflecting the emotional relief they experienced. Anxiety levels decreased by an average of 2 to 5 points. Depression symptoms also decreased, with most participants rating a reduction in depression between 5 and 8 out of 10. Cancer patients reported more significant reductions in psychological distress compared to non-cancer patients, likely due to the deeper emotional impact of cancer treatment and related scars.

Improved social adaptability: With improved body image and reduced anxiety, many participants reported higher levels of social engagement. This was particularly evident in cancer patients who had previously withdrawn from social settings. Non-cancer patients, who were generally less socially withdrawn pre-surgery, also showed increased engagement post-surgery, though their improvement was more moderate. Social engagement scores increased for most participants, with many rating it between 6 and 8 out of 10 after surgery, indicating a strong return to social activities.

Table 3. Interview data for 15 participants.

Participant ID	Age	Gender	Cancer type	Pre-surgery anxiety (1–10)	Post-surgery anxiety (1–10)	Body image improvement (1–10)	Self-esteem & confidence (1–10)	Social engagement (1–10)	Depression reduction (1–10)
P1	28	Female	Breast Cancer	8	4	9	8	7	8
P2	35	Female	Skin Cancer	7	3	8	7	6	7
P3	30	Female	No Cancer	6	4	7	6	5	6
P4	40	Female	Colon Cancer	7	5	8	7	6	7
P5	33	Female	Breast Cancer	9	6	9	8	7	8
P6	50	Female	No Cancer	5	3	6	6	5	6
P7	42	Female	Cervical Cancer	8	5	9	7	6	7
P8	36	Female	No Cancer	6	4	8	7	6	7
P9	41	Female	Ovarian Cancer	7	4	8	7	6	6
P10	34	Female	No Cancer	5	3	7	6	5	5
P11	29	Female	No Cancer	6	4	7	7	6	6
P12	37	Female	No Cancer	8	5	9	8	7	8
P13	31	Female	No Cancer	7	4	8	7	6	7
P14	33	Male	Testicular Cancer	6	3	8	6	5	6
P15	30	Female	Skin Cancer	7	4	8	7	6	7

Table 3 summarizes the interview data for all 15 participants, providing insights into the psychological effects of scar reconstruction surgery. The table includes data

on pre- and post-surgery anxiety, body image improvement, self-esteem and confidence, social engagement, and depression reduction. The improvement in psychological well-being is evident across all participants, with cancer patients typically reporting more significant benefits due to the emotional impact of their surgeries and recovery processes.

Table 4. Long-term psychological effects post-surgery.

Psychological effect	Cancer patients	Non-cancer patients	Example extract from interview
Long-term Body Image Satisfaction	High satisfaction (9/10)	Moderate satisfaction (7/10)	“It’s not just about how I look, it’s how I feel inside too. I feel whole again.”
Long-term Social Integration	Improved integration (8/10)	Moderate integration (6/10)	“I feel more at ease when meeting new people. It’s like a weight has been lifted.”
Post-surgery Emotional Stability	High stability (8/10)	Moderate stability (6/10)	“I feel more emotionally balanced and less anxious about my appearance.”
Overall Psychological Recovery	Significant recovery (9/10)	Moderate recovery (7/10)	“I’m able to focus on other things in life now, not just my scars.”
Self-acceptance	Strong self-acceptance (9/10)	Moderate self-acceptance (7/10)	“I’ve learned to accept myself as I am now, and I feel empowered.”

Table 4 presents the long-term psychological effects experienced by both cancer and non-cancer patients after scar reconstruction surgery. Cancer patients generally report a higher level of satisfaction and emotional stability, largely due to the significant psychological burden that scars from cancer treatment had on their identity and self-image. In contrast, non-cancer patients, while also experiencing improvement, reported more moderate changes in these areas due to the less severe emotional impact of scars.

Table 5. Additional psychological factors impacted by scar reconstruction.

Psychological factor	Cancer patients	Non-cancer patients	Example extract from interview
Body Image	Significant improvement (9/10)	Moderate improvement (7/10)	“I feel much more comfortable in my skin now, like I’m myself again.”
Social Confidence	Major improvement (9/10)	Moderate improvement (6/10)	“I don’t shy away from social events anymore. I feel confident being seen.”
Psychological Distress (Depression)	High reduction (8/10)	Moderate reduction (6/10)	“I used to avoid looking in the mirror. Now, I feel better about myself.”
Social Engagement	Increased participation (8/10)	Increased participation (7/10)	“I can go out with friends now without worrying about how I look.”
Self-acceptance	Strong self-acceptance (9/10)	Moderate self-acceptance (7/10)	“I’ve learned to accept myself as I am now, and I feel empowered.”
Overall Psychological Recovery	Significant recovery (9/10)	Moderate recovery (7/10)	“I’m able to focus on other things in life now, not just my scars.”

Table 5 summarizes the additional psychological factors such as body image, social confidence, psychological distress (depression), social engagement, and self-acceptance after scar reconstruction surgery. It compares cancer patients and non-

cancer patients, illustrating how both groups experience psychological benefits. Cancer patients generally report more substantial improvements across all factors due to the emotional burden of scars caused by cancer treatments, while non-cancer patients show moderate improvements, typically associated with aesthetic concerns.

4.3. Framework diagram

The framework diagram below visually illustrates the relationships between pre-surgery anxiety, post-surgery improvements in body image, self-esteem, social interaction, and social adaptability, with distinctions between cancer and non-cancer patients.

Figure 1 illustrates the relationships between pre-surgery anxiety, post-surgery improvements in body image, self-esteem, and social adaptability, with distinctions made between cancer and non-cancer patients. The diagram shows how pre-surgery anxiety influences post-surgery anxiety, which in turn impacts body image improvement, self-esteem, and social engagement. These improvements collectively contribute to social adaptability, a key factor in the psychological recovery of patients following scar reconstruction surgery. Cancer patients typically experience more significant changes in these areas due to the emotional burden associated with cancer treatments and the psychological impact of visible scars. In contrast, non-cancer patients experience moderate improvements in these factors, as their emotional challenges are generally less severe than those of cancer patients.

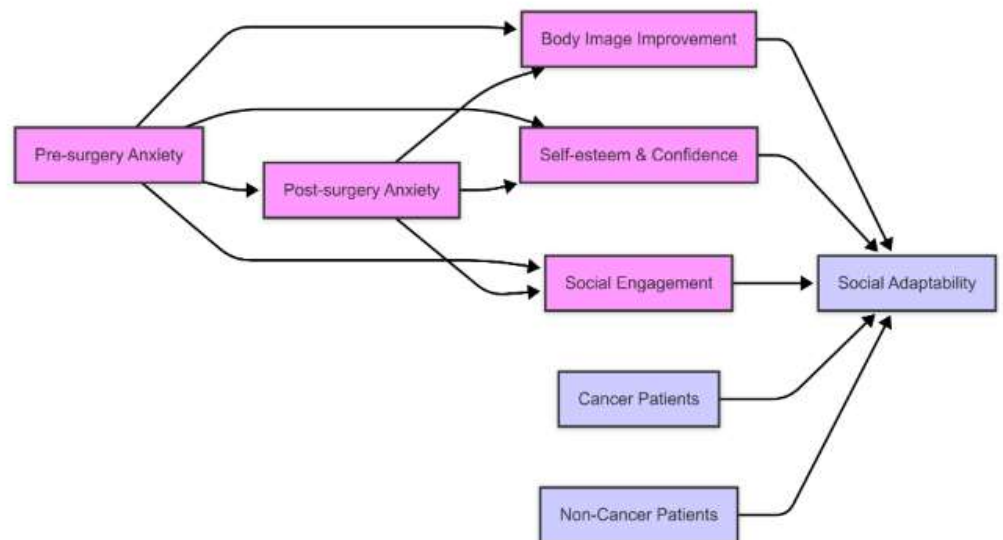


Figure 1. Framework of psychological effects of scar reconstruction.

Prior to scar reconstruction surgery, patients typically experience high levels of anxiety, depression, and negative body image, particularly when scars are located on socially prominent areas of the body, such as the face or chest. These psychological challenges are often associated with low self-esteem, social withdrawal, and heightened self-consciousness. The emotional burden of visible scars significantly impacts the patient's quality of life, leading to a diminished sense of self-worth and reluctance to engage in social activities.

Post-surgery, patients generally report significant psychological improvements. Scar reconstruction, including microsurgery and laser treatments, leads to noticeable improvements in body image, which are linked to enhanced self-esteem and confidence. These positive changes are often accompanied by a reduction in anxiety and depression, as patients become more comfortable with their appearance. Additionally, the improvement in body image and reduction in emotional distress contribute to greater social engagement, with patients feeling more confident in re-integrating into social settings.

However, the extent of these psychological benefits varies between cancer and non-cancer patients. Cancer patients, who often face the emotional burden of disfigurement due to cancer treatments such as mastectomies or skin cancer resections, tend to experience more profound psychological improvements following scar reconstruction. The emotional impact of these treatments is often more severe, and the restoration of body image following reconstruction can lead to significant emotional healing, greater self-esteem, and improved social adaptability. For cancer patients, scar reconstruction surgery not only restores physical appearance but also facilitates social reintegration and emotional recovery, significantly enhancing their quality of life.

In contrast, non-cancer patients typically undergo scar reconstruction for aesthetic reasons, such as facial or skin scarring, and although they report improvements in body image and self-esteem, the psychological benefits are generally less pronounced compared to cancer patients. Non-cancer patients experience moderate reductions in anxiety and depression, and while they also report increased social engagement, the psychological burden associated with their scars is typically less severe than that of cancer patients.

The diagram highlights these differences and emphasizes the greater psychological impact that scar reconstruction has on cancer patients. While both groups experience improvements in body image, self-esteem, and social adaptability, the extent of these improvements is significantly greater in cancer patients due to the profound emotional toll of cancer treatments and the subsequent healing facilitated by scar reconstruction.

5. Discussion

Scar reconstruction surgery emerged in this qualitative study as a decisive catalyst for psychological recovery in cancer survivors. Participants reported moving from persistent self-consciousness to renewed social participation; anxiety scores typically halved after the procedure, and self-esteem rose to between seven and nine on ten-point scales. These improvements confirm earlier findings that visible, treatment-related scarring imposes a severe emotional burden on roughly one third of affected individuals, often precipitating depressive symptoms, social withdrawal and diminished quality of life [17]. By softening or eliminating the corporeal reminder of disease, reconstruction reverses that trajectory and restores everyday functioning.

A distinctive contribution of our work is the framing of scar revision as a vehicle for narrative identity repair rather than a purely aesthetic intervention. For many interviewees, extensive scarring had perpetuated what Bury calls biographical

disruption, anchoring them in an unwanted “cancer patient” identity. Once the scar was revised, participants described “feeling whole again” and consigning the trauma to the past—an observation that aligns with Nelson’s theory of narrative repair, in which healing of the body enables the self to be “stitched back together” [18]. The operation therefore acts simultaneously on the physical surface and on the patient’s life story, allowing the construction of a coherent, future-oriented identity.

By contrast, patients without a cancer history did not report such a dramatic shift in identity; while they did experience improved confidence and social comfort after scar revision, these changes were less pronounced compared to the cancer survivor group and did not involve overcoming a ‘cancer patient’ identity. Evidence of this narrative shift appeared in the expressive interview extracts: for example, one survivor remarked, “It is not just how I look; it is how I feel inside—I feel whole again,” while another said the revision lifted “a weight” and permitted ease in new social encounters.

These outcomes have direct clinical implications. First, scar management should be standard within comprehensive survivorship programmes; delaying or ignoring appearance concerns leaves an avoidable source of distress unaddressed. Second, multidisciplinary pathways that combine surgical expertise with psycho-oncology and narrative-focused counselling are likely to maximise benefit, because psychological healing and physical healing are inseparable. Third, health-policy stakeholders should recognise reconstructive surgery as medically necessary for many survivors, not an optional cosmetic luxury, a view already supported by prospective breast-reconstruction data showing superior psychosocial well-being versus mastectomy alone [19].

Finally, the concept of reconstruction-facilitated identity repair opens fertile ground for future research. Longitudinal mixed-methods studies could chart how bodily change, self-story and social reintegration co-evolve over time, while controlled trials might test whether adding narrative therapy augments the gains from surgery alone. Such work would advance psycho-oncology by clarifying the mechanisms through which restoring bodily integrity helps patients reclaim their lives.

5.1. Interpretation

The findings suggest that scar reconstruction surgery can foster meaningful positive psychological changes for cancer survivors, notably in restoring a sense of identity and coherence in their life narrative. Survivors in this study reported feeling “whole” again or more like their pre-cancer selves after surgery, indicating that repairing disfiguring scars helped alleviate the identity disruption caused by cancer treatment. This interpretation aligns with existing psycho-oncological theory: visible cancer scars often serve as distressing reminders of illness that can distort body image and fragment one’s sense of self. By reducing or refining these reminders, reconstruction diminishes the incongruence between survivors’ current appearance and their internal self-image. In essence, the surgical restoration of the body facilitated a psychological identity restoration, reducing feelings of being “marked” by cancer and enabling patients to reconcile their post-cancer self with the person they were before illness.

Equally important is how scar reconstruction aided survivors in narrative reconstruction of their cancer experience. Many patients reframed their personal narratives once their scars were reconstructed – shifting from a story centered on loss or survival at all costs to one of recovery, renewal, and regained control. This is consistent with narrative identity theory, which posits that individuals make sense of trauma by integrating it into a coherent life story. In our context, the act of repairing a scar became symbolic: it marked the closure of a painful chapter and the beginning of a new, hopeful chapter in survivors' lives. Patients often described the reconstruction as “turning the page”—their scar was no longer a stark, chaotic reminder of suffering but a subtler emblem of healing. Such narrative reframing can be profoundly therapeutic, as it allows survivors to derive meaning from their ordeal and to see themselves not just as victims of cancer, but as agents who actively reclaimed their bodies and lives. Notably, this study also observed enhanced social adaptation following scar reconstruction. As survivors' self-consciousness about their scars diminished, they reported greater confidence in social interactions, returning to public and interpersonal life with less fear of stigma or unwanted attention. This improved social ease can be interpreted as a natural extension of identity repair: feeling physically “normal” again emboldens survivors to re-engage with society and reinforces the notion that they have moved beyond the patient role. In summary, the psychological impact of scar reconstruction can be understood as a multifaceted restoration—of the body, the self, and one's place in the social world—enabling cancer survivors to heal not only physically but also in identity and spirit.

5.2. Implications

These findings carry significant implications for clinical practice and survivorship care. Foremost, they highlight that attending to post-treatment body image and scarring is not merely a cosmetic concern but a vital component of holistic cancer recovery. Oncology teams should recognize that for many survivors, visible scars are inextricably linked to psychological well-being, capable of affecting self-esteem, identity, and social functioning. Thus, proactively addressing scar-related distress is as important as managing other long-term effects of cancer. In practice, this means that discussions of scar revision or reconstructive options should be integrated into survivorship care planning. Patients may benefit from early referrals to plastic and reconstructive surgeons as part of their recovery roadmap, alongside referrals to psychosocial support services. Simply put, healing the physical remnants of cancer can greatly facilitate healing of the psychological wounds; acknowledging this mind-body interplay can improve overall quality of life for survivors.

Another key implication is the need for a collaborative, interdisciplinary approach to survivorship care—particularly a closer alliance between psycho-oncology (mental health support for cancer patients) and reconstructive surgery. The positive outcomes observed, in terms of identity renewal and social reintegration, suggest that optimal care transcends traditional disciplinary boundaries. Integrated care models should be considered, wherein mental health professionals and plastic surgeons work hand-in-hand throughout the recovery process. For example, plastic surgery teams could include on-staff psychologists or counselors to help patients cope

with body-image anxieties and evolving self-concept. Such professionals can prepare patients for what to expect emotionally when seeing their post-surgery bodies, assist in setting realistic goals, and support narrative reframing of the surgical experience. Conversely, psycho-oncology practitioners should be knowledgeable about reconstructive options; they can encourage and emotionally prepare patients to pursue scar repair when appropriate, as part of empowering survivors to reclaim their bodies. This collaborative approach is already exemplified in some comprehensive cancer centers that weave together surgical and psychosocial care: reconstructive surgeons are integrated into the oncology care team, and psychological support is provided as a standard part of the reconstructive process. Embracing such models broadly would ensure that survivors receive seamless care addressing both the physical aftermath of cancer and its psychological impact. In practical terms, the implications extend to clinician education as well. Surgeons performing oncologic or reconstructive procedures should be attuned to the emotional significance of scars and informed about the dynamics of identity and anxiety that patients may experience. Likewise, oncologists and nurses in survivorship clinics should routinely assess for body image distress and be prepared to discuss or recommend interventions—surgical or therapeutic—that could alleviate this distress. By implementing these implications, healthcare providers can help more cancer survivors move beyond survival toward true recovery, wherein patients feel fully rehabilitated in society, comfortable in their bodies, and supported in psyche. Ultimately, the study's message for clinical practice is clear: attending to the scars of cancer—both physical and emotional—is an essential part of caring for the whole person after cancer, requiring synergy between medical and psychological healing.

5.3. Limitations

While this study sheds light on the psychological benefits of scar reconstruction, several limitations must be acknowledged. First, the sample characteristics may limit the generalizability of the findings. Participants were a self-selected group of survivors who chose to undergo scar reconstruction, which might mean they had particularly strong motivations or preexisting coping resources that are not representative of all survivors. Those who seek out reconstructive surgery could differ in important ways (e.g., in body image investment, support systems, or health status) from those who do not, potentially biasing the findings. Second, the study's scope was confined to a certain context (for example, a specific type of cancer, a single institution, or a particular cultural setting), which may not capture the diversity of survivor experiences. Psychological responses to scarring and reconstruction can vary widely: factors such as cancer type (e.g., breast vs. head-and-neck cancer), gender, age, or cultural background might influence how identity and social life are affected by scars. Therefore, our findings—though internally consistent—should be extrapolated with caution to broader survivor populations without further corroboration.

Moreover, there are inherent methodological constraints that temper the strength of our conclusions. If the study relied on cross-sectional or retrospective data (as is common in survivorship research), it becomes difficult to definitively attribute observed psychological changes causally to the scar reconstruction itself. It is possible

that simply the passage of time or concurrent support interventions contributed to improved well-being, independent of surgery. A lack of a control or comparison group (e.g., survivors who did not undergo reconstruction) means we must be careful in claiming direct effects. Additionally, the psychological constructs at the heart of this study—identity restoration, narrative change, social adaptation—are complex and multifaceted. We gleaned insights into these through qualitative reports and self-reported experiences, which are rich and informative, but subjective. Such measures can introduce biases like social desirability or recall bias, where participants might portray their post-surgery adjustments in an overly positive (or negative) light. Finally, the follow-up duration in this study was limited, so we do not know if the improvements in self-concept and social confidence are sustained in the long term. Identity reconstruction is an ongoing process, and it's conceivable that new challenges (e.g., subsequent health scares or the aging of surgical results) could alter the psychological outcome over time. A longer observation period might have captured fluctuations or late-emerging issues (such as the realization that reconstruction, while helpful, does not completely erase the cancer experience). In sum, these limitations underscore that our conclusions, while meaningful, are not definitive. The study opens an important conversation but cannot close it; further research (as outlined below) will be needed to reinforce and expand upon our findings.

5.4. Future research

Building on this study's insights and addressing its limitations, future research should further explore the nexus of physical reconstruction and psychological healing in cancer survivorship. One valuable direction would be longitudinal studies that follow survivors through the trajectory of considering, undergoing, and living with scar reconstruction. Such studies could track changes in identity, body image, and social participation over time—from pre-surgery baseline through multiple post-surgery time points—to discern the durability and stages of psychological adjustment. A longitudinal design would help determine whether initial boosts in self-esteem and social confidence are maintained, amplified, or possibly attenuated as years pass. It would also clarify the temporal sequence: for instance, does narrative reconstruction (revising one's personal story) precede and facilitate improved social reengagement, or vice versa? By capturing the dynamic process of adaptation, researchers can better understand how scar repair intertwines with the evolving journey of survivorship.

Another priority for future investigation is the implementation of comparative and controlled studies. As noted, a limitation of the current research is the lack of a comparison group; thus, prospective studies could compare outcomes between survivors who receive scar reconstruction and those who do not (or those who pursue alternative coping strategies for disfigurement). Such comparisons, ideally in well-matched or randomly assigned groups, would help isolate the specific impact of the surgical intervention on psychological outcomes. For instance, do cancer survivors who undergo scar revision demonstrate significantly greater improvements in body image and identity measures than those who, say, use cosmetic camouflage or simply receive counseling without surgery? Additionally, there is merit in comparing scar reconstruction with other innovative approaches aimed at reclaiming the body, such

as therapeutic tattooing over surgical scars. Emerging qualitative evidence suggests that practices like artistic tattooing of mastectomy scars can similarly confer feelings of closure, control, and transformation. A comparative lens—examining surgical vs. non-surgical avenues to “take back” one’s body—would reveal whether it is the physical change per se, or the personal agency and meaning-making involved in the process, that chiefly drive psychological recovery. Such knowledge could guide personalized interventions: some patients might achieve identity restoration through creative, non-surgical means if surgery is not feasible, whereas others might deeply benefit from the tangible anatomical restoration that only surgery provides.

In-depth qualitative research will also remain invaluable. Future studies might delve deeper into narrative analysis, perhaps conducting serial interviews or inviting survivors to document their journeys (e.g., through journaling or digital storytelling) as they undergo reconstruction. Analyzing these narratives could illuminate how exactly individuals re-story their lives post-surgery—for example, what metaphors or themes dominate their descriptions of themselves before and after scar repair. This would enrich our understanding of narrative reconstruction as both an outcome and a coping mechanism. It could also reveal any unresolved tensions in survivors’ stories, highlighting areas where additional psychosocial support is needed even after physical healing. Beyond individual narratives, research could examine social outcomes more explicitly: do survivors who have their scars reconstructed experience measurable changes in social integration, such as returning to work sooner, improving social networks, or greater intimacy in personal relationships? Mixed-methods studies combining quantitative assessments (of body image, quality of life, social functioning) with qualitative depth would be particularly powerful, providing a holistic picture of the impact of scar reconstruction.

Finally, future research should explore the optimal ways to integrate psychological support with surgical care. Intervention studies might test multidisciplinary programs wherein patients receive targeted psycho-educational counseling alongside their reconstruction (for example, body-image workshops before surgery and narrative therapy groups after surgery) versus standard care. The hypothesis would be that combining scar reconstruction with structured psychological interventions yields superior outcomes in identity reconciliation and emotional well-being than either approach alone. If supported, this could drive the development of best-practice guidelines in oncology and plastic surgery for collaborative care. Additionally, researchers could investigate healthcare system factors—for instance, how do access to reconstruction, healthcare disparities, or insurance coverage influence psychological outcomes? And what training or tools do surgeons and oncologists need to better address survivors’ appearance-related concerns? By pursuing these lines of inquiry, future studies will not only validate and extend our current findings but also translate them into practical strategies, ensuring that the option of scar reconstruction can be utilized to its fullest therapeutic potential for those who need it.

6. Conclusion

In conclusion, this study underscores that scar reconstruction surgery can have a profound psychological impact on cancer survivors, serving as a catalyst for both personal and social rehabilitation. Physically altering or softening the scars of cancer treatment is far more than a cosmetic enhancement—it is a form of healing that helps survivors reclaim core aspects of their identity. By restoring a semblance of their pre-cancer body (or crafting a new, accepting post-cancer body image), survivors are able to shed the imposed identity of “cancer patient” and reassert their sense of self as whole, capable individuals. This process facilitates a positive reframing of their cancer narrative: the scar, once a stark emblem of trauma and loss, becomes a subtler scar or even a badge of survival that no longer defines them. Consequently, patients often experience renewed confidence and normalcy, easing their re-entry into social life and relationships without the constant shadow of their past illness. Theoretically, these findings contribute to a richer understanding within psycho-oncology of how embodiment and identity intersect in survivorship. They illustrate, consistent with theories like self-discrepancy and narrative identity, that alignment between the outer self and inner self-concept is crucial for psychological comfort—and that medical interventions can influence this alignment. Practically, the work has illuminated an actionable pathway to improve survivor well-being: addressing the physical aftermath of cancer in tandem with emotional support. It highlights the importance of multidisciplinary care models that treat not only the disease, but the person who endured it, attending to scars both visible and invisible.

Ultimately, the psychological impact of scar reconstruction in cancer patients speaks to a larger truth in survivorship care: recovery is not truly complete until survivors feel whole again in both body and mind. By helping to restore survivors’ appearances, we also help restore their dignity, self-story, and social confidence. These dual gains—in inner healing and outward life—represent the fundamental value of integrating reconstructive surgery with psychosocial care. This study’s insights, therefore, have both theoretical significance for understanding the lived experience of survivorship and practical significance for improving it. Bridging the gap between oncology and reconstructive support, between psychological and physical healing, promises a more comprehensive approach to helping cancer survivors not just live, but live well after cancer. The hope is that our findings encourage continued efforts to ensure that no survivor is left bearing the psychological burden of scars alone, and that the journey beyond cancer becomes as much about reclaiming life and identity as it is about medical remission.

Ethical approval: Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki, and approved by the Institutional Review Board (Medical Ethics Committee) of Wuhu Hospital of Traditional Chinese Medicine, Wuhu, Anhui Province, China (protocol code YW-2025-049 and date of approval 19 March 2025).

Informed consent statement: Informed consent was obtained from all subjects involved in the study. Written informed consent for publication of anonymized interview extracts was also obtained from participants.

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