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Beyond surgical repair: A quantitative analysis of improved dignity and self-image among VVF survivors following holistic intervention in Sierra Leone

Fatmata Gegbe [1], Alhassan Mayei [2, 6], Patrick Fatoma [2], Sahr Emmanuel Lebbie [3, 5, *] and Joan Shepherd [4]

[1] *Department of Nursing, School of Health Sciences, Njala University, Bo, Sierra Leone.*
[2] *Department of Epidemiology and Biostatistics, School of Public Health, Njala University, Bo, Sierra Leone.*
[3] *Chemistry Department, School of Basic Sciences, Njala University, Moyamba District, Sierra Leone.*
[4] *Faculty of Basic Medical Sciences, College of Medicine and Allied Health Sciences, University of Sierra Leone, Freetown City, Sierra Leone.*
[5] *Department of Nursing, School of Health Sciences, Central University, Yoni Bana (Mile 91), Sierra Leone.*
[6] *Health System Strengthen and Epidemic Prevention Project, Deutsche Gesellschaft fur Internationale Zusammenarbeit (GIZ), Freetown, Sierra Leone.*

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Abstract

Background: Vesicovaginal fistula (VVF) is a devastating childbirth injury that inflicts a profound psychosocial toll on women, particularly in low-resource settings. Interventions have historically focused on surgical repair, yet the impact of holistic care which integrates psychosocial support with surgery on survivors' sense of dignity and self-image remains under-quantified. This study aimed to quantitatively measure the change in these psychological outcomes among VVF survivors in Sierra Leone following a holistic intervention.

Methods: We conducted a quantitative, pre-test/post-test study involving 197 VVF survivors admitted to the Aberdeen Women's Centre (AWC) in Freetown, Sierra Leone's sole national fistula referral hospital. Participants' self-perceived dignity and self-image were assessed using a structured questionnaire module upon admission (pre-intervention) and again before discharge (post-intervention). The intervention consisted of surgical repair complemented by AWC's standard psychosocial care package, including counseling and health education. We used a paired-sample t-test to assess the change in scores, with a non-parametric Wilcoxon signed-rank test performed as a robustness check.

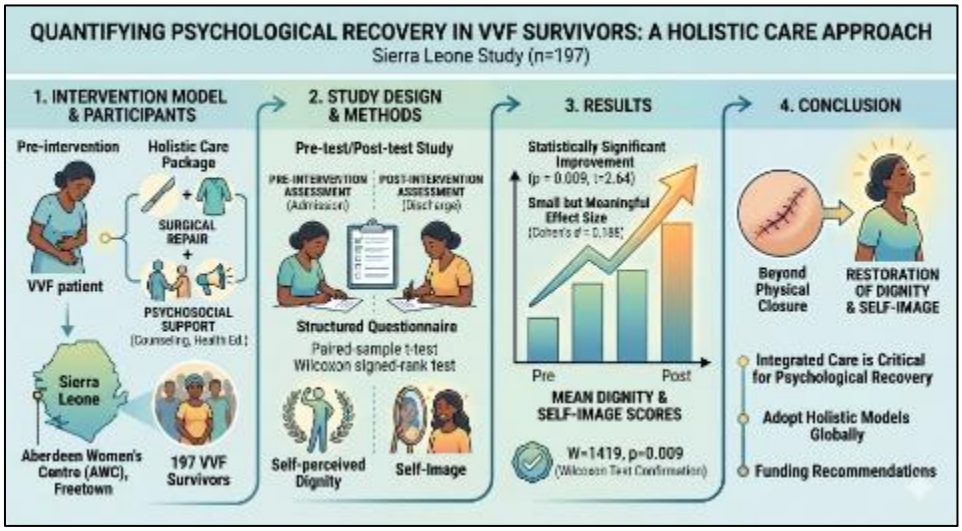
Results: We found a statistically significant improvement in mean dignity and self-image scores following the holistic intervention ($t(197) = 2.64$, $p = 0.009$). The effect size, as measured by Cohen's d, was 0.188, indicating a small but meaningful improvement. The non-parametric Wilcoxon test confirmed the significance of these findings ($W = 1419$, $p = 0.009$).

Conclusion: Beyond closing the physical injury, a holistic care model that combines surgical treatment with dedicated psychosocial support can lead to a statistically significant restoration of dignity and self-image among VVF survivors. While surgical expertise is fundamental, our findings provide quantitative evidence that integrated counseling and support are critical components for psychological recovery. We recommend that fistula care programs globally adopt and fund holistic models as the standard of care to ensure survivors not only heal physically but also reclaim their sense of self-worth.

Keywords: Obstetric Fistula; Vesicovaginal Fistula; Dignity; Self-Image; Psychosocial Support; Surgical Intervention; Maternal Health; Sierra Leone.

* Corresponding author: Sahr Emmanuel Lebbie

Graphical abstract



1. Introduction

Obstetric fistula, particularly vesicovaginal fistula (VVF), remains a stark symbol of health inequity and a devastating consequence of inadequate maternal healthcare in many low- and middle-income countries (Wall, 2016). Caused by prolonged, obstructed labor, this traumatic childbirth injury results in chronic urinary incontinence, leading to a cascade of severe physical and psychosocial consequences. Globally, more than two million women are estimated to live with fistula, with the majority residing in Sub-Saharan Africa (WHO, 2018). In Sierra Leone, a nation whose health system has been severely tested by civil conflict and epidemics, fistula persists as a silent scourge upon its most vulnerable women (UNFPA, 2018) (**Figure 1)**.

The physical manifestations of VVF are inseparable from its profound psychological and social impacts. The literature consistently describes the experience as a "social death," characterized by intense stigma, social isolation, community rejection, and marital abandonment (Ahmed & Holtz, 2017; Mselle et al., 2016). This relentless social exclusion, driven by the odor and shame associated with incontinence, inflicts deep wounds on a woman's psyche, leading to high rates of depression, anxiety, and a diminished sense of self-worth (Wilson et al., 2016). A woman's dignity her intrinsic sense of value and completeness is fundamentally assaulted by the condition.

In response, the global health community has prioritized surgical repair as the primary intervention for VVF. While surgery is undeniably a critical step in restoring continence and physical health, there is growing recognition that "fixing the hole is not enough" (Siddle et al., 2013). A holistic approach, which integrates psychosocial support, counseling, and health education with clinical care, is increasingly advocated as essential for true, comprehensive recovery (El Ayadi et al., 2020). However, while the value of this approach is qualitatively understood, there is a scarcity of quantitative evidence measuring its specific impact on psychological outcomes such as dignity and self-image, a gap this study directly addresses.

This paper reports the findings of a pre-test/post-test study conducted at the Aberdeen Women's Centre (AWC) in Freetown, Sierra Leonethe nation's sole national fistula referral hospital. The study hypothesized that a holistic care model, combining surgical repair with structured psychosocial support, would produce a statistically significant improvement in self-perceived dignity and self-image among VVF survivors. By providing quantitative evidence, we aim to contribute to an evidence-based rationale for adopting holistic care as a global standard, in direct support of Sustainable Development Goal 3 (Good Health and Well-being), SDG 5 (Gender Equality), and SDG 10 (Reduced Inequalities).

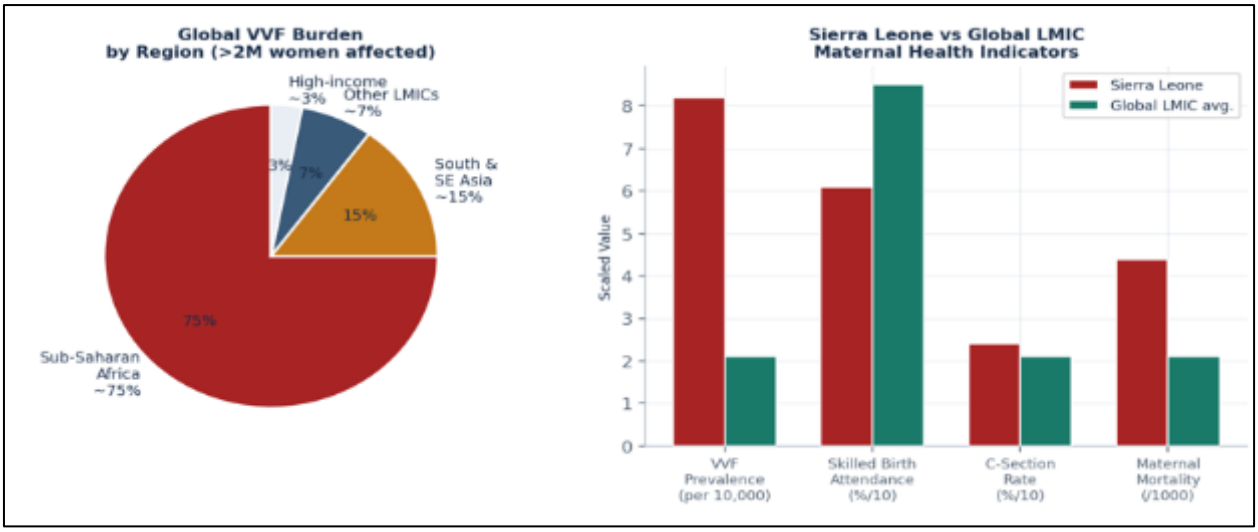


Figure 1 Global Context. Left: Regional distribution of the global VVF burden (>2 million women affected). Right: Comparison of key maternal health indicators between Sierra Leone and global LMIC averages, illustrating the disproportionate vulnerability of Sierra Leonean women. Sources: WHO, 2018; UNFPA, 2018

2. Methods

2.1. Study Design and Setting

This study employed a quantitative, pre-test/post-test quasi-experimental design. The design allows for direct within-subject measurement of change, making it appropriate for assessing the impact of a standardized intervention in settings where randomized controlled trial allocation is not feasible. The study was conducted at the Aberdeen Women's Centre (AWC) in Freetown, Sierra Leone. AWC serves as the sole national referral center for obstetric fistula repair in the country, providing free surgical and rehabilitative services to women from across Sierra Leone. The "holistic intervention" under investigation constituted AWC's standard model of care, which integrates surgical fistula repair with a comprehensive psychosocial support package comprising pre- and post-operative counselling, structured health education sessions, nutritional support, and facilitated peer support groups.

2.2. Study Population, Sampling, and Eligibility

The study population comprised women and girls admitted to AWC for VVF treatment between July 12 and December 15, 2022. A consecutive sampling approach was employed, enrolling all eligible patients admitted during the study window. Inclusion criteria required: (1) confirmed diagnosis of vesicovaginal fistula; (2) age between 10 and 45 years (**Figure 3**); and (3) completion of both the pre-intervention and post-intervention assessments. Patients who did not complete both assessments (n = 3) were excluded from the final analysis and this is shown in the consort participant flow diagram (**Figure 2**). The final analytical sample comprised 197 participants, representing a 98.5% completion rate (**Figure 3**).

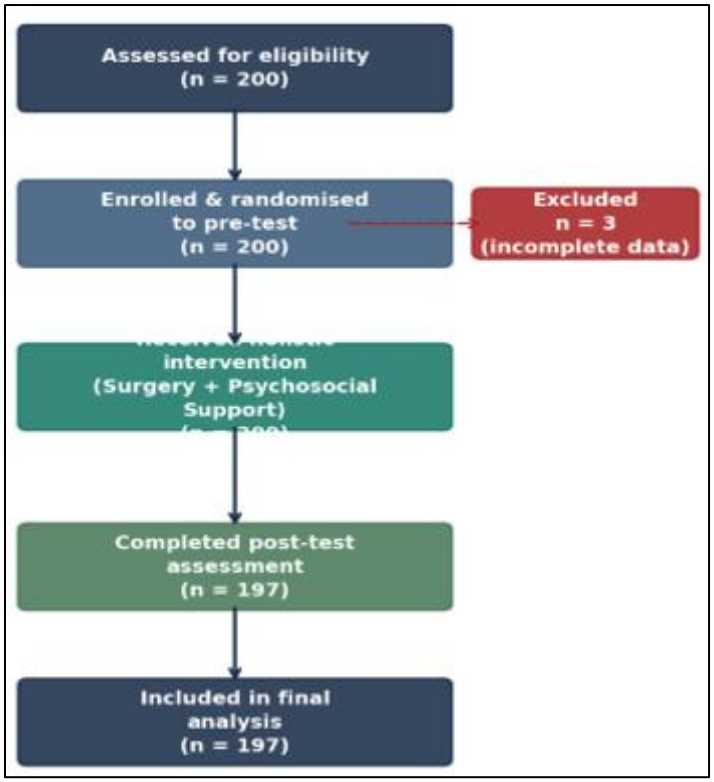


Figure 2 CONSORT Participant Flow Diagram. Of 200 women enrolled, 197 (98.5%) completed both assessments and were included in the final analysis. Three participants were excluded due to incomplete post-intervention data. (Aberdeen Women's Centre, Sierra Leone -2022)

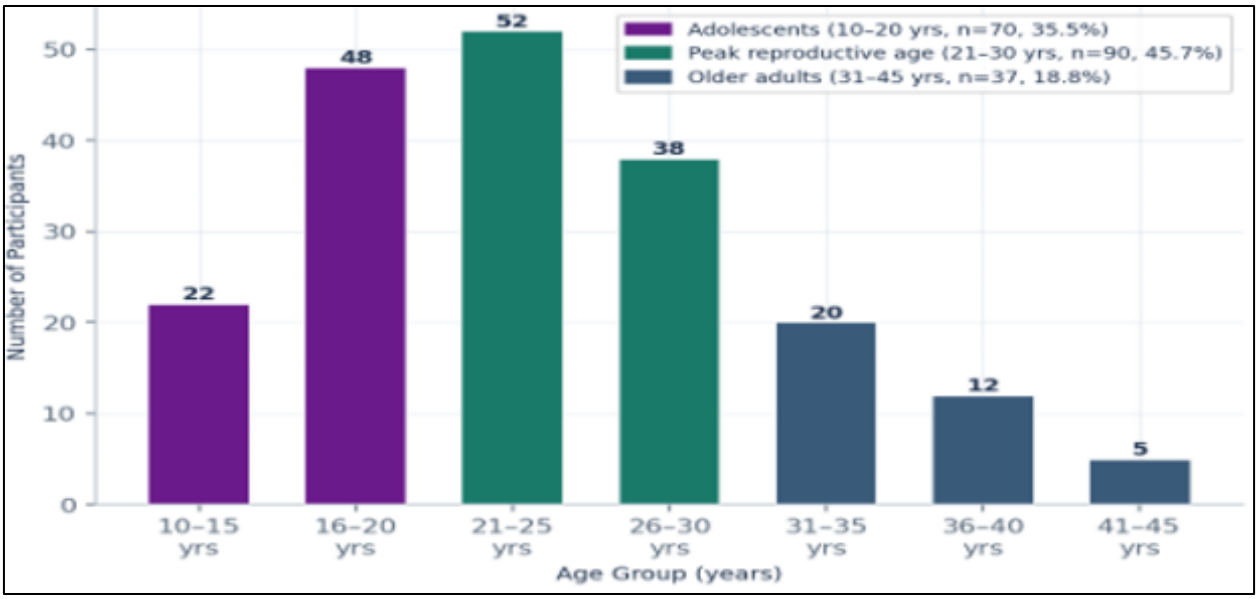


Figure 3 Age Distribution of Study Participants (n = 197; Aberdeen Women's Centre, 2022) (n =197; age range 10 – 45 years). The majority of participants were in peak reproductive years (21–30), consistent with VVF epidemiology in Sub-Saharan Africa. A significant proportion (35.5%) were adolescents aged 10–20 years (Aberdeen Women's Centre, 2022)

2.3. Data Collection and Instrument

Data were collected using a structured interviewer-administered questionnaire developed for this study and adapted for low-literacy populations. A dedicated module assessed participants' perceptions of their dignity and self-image, comprising six Likert-scale items (rated 1–5) addressing: feelings of shame and embarrassment; sense of personal completeness and wholeness; perceived self-worth; feelings of being valued by others; perception of one's right to participate in social life; and belief in one's capacity to recover and reintegrate. These items were aggregated to create a composite dignity and self-image score (range: 6–30, converted to a 0–100 scale for analysis). The questionnaire was translated into Krio and Temne the two most widely spoken languages in Freetown and pilot-tested on ten AWC staff members to assess clarity and cultural appropriateness prior to full deployment.

2.4. Intervention

The intervention was AWC's standard holistic care protocol. Surgical repair was performed by experienced surgeons specializing in obstetric fistula. The psychosocial support component comprised: (1) pre-operative counselling sessions addressing the patient's emotional state, expectations, and fears; (2) post-operative individual counselling sessions focusing on psychological recovery, self-esteem, and future planning; (3) group health education sessions covering personal hygiene, fistula prevention in future pregnancies, family planning, and community reintegration strategies; and (4) facilitated peer support activities connecting current patients with successfully treated and reintegrated VVF survivors. The pre-test was administered at admission, prior to any intervention. The post-test was administered immediately before discharge.

2.5. Statistical Analysis

All data were analyzed using Python (Version 3.1) and its statistical libraries (NumPy, SciPy, Pandas). Descriptive statistics (means, standard deviations, frequencies) were computed for all study variables. The primary analysis used a paired-sample t-test to compare the mean composite dignity and self-image score at pre-intervention with that at post-intervention. The distributional assumption of normality for the difference scores was assessed using the Shapiro-Wilk test. As a pre-specified robustness check, the non-parametric Wilcoxon signed-rank test was applied to verify findings without distributional assumptions. Effect size was quantified using Cohen's d (for the t-test) and the rank-biserial correlation (for the Wilcoxon test), with 95% confidence intervals calculated using bootstrapping methods. Statistical significance was defined at $p < 0.05$ for all tests.

2.6. Ethical Considerations

The study protocol received full ethical approval from the Njala University Research Ethics Committee (Approval Reference: NUREC/2026/112). All participants provided written and verbal informed consent prior to enrolment. For participants under 18 years of age, assent was obtained from the participant in addition to written consent from a parent or legal guardian. Participation was entirely voluntary, with no incentives offered and no adverse consequences for non-participation or withdrawal. All data were anonymized immediately upon collection and stored on password-protected institutional servers. The study was conducted in full accordance with the Declaration of Helsinki.

3. Results

3.1. Sample Characteristics

Of the 200 women initially enrolled, 197 (98.5%) completed both assessments and were included in the final analysis. The three participants excluded had incomplete post-intervention data due to early discharge for non-clinical reasons. The age of participants ranged from 10 to 45 years, with the distribution reflecting the known epidemiology of VVF in the region a concentration of cases in younger women, with a modal age group of 21–25 years (n = 52, 26.4%), followed by the 16–20 age group (n = 48, 24.4%). Notably, 70 participants (35.5%) were adolescents aged 10–20 years, highlighting the severe youth vulnerability in this population. All participants were admitted from AWC's national catchment area spanning all provinces of Sierra Leone.

3.2. Normality Assessment

The difference scores (post-test minus pre-test) for the dignity and self-image composite measure were assessed for normality using the Shapiro-Wilk test. The test was not statistically significant ($W = 0.737$, $p = 0.132$), indicating that the assumption of normality for the difference scores was met. This result supports the validity of the parametric paired-sample t-test as the primary analytical approach.

3.3. Primary Outcome: Pre- vs Post-Intervention Score Change

The primary analysis revealed a statistically significant improvement in the mean dignity and self-image composite score from the pre-intervention to the post-intervention assessment phase. Descriptive statistics and inferential test results are presented in **Table 1** and visualized in **Figure 4.**

Table 1 Descriptive Statistics and Paired t-Test Results for Dignity & Self-Image Scores.

Measure	Pre-Intervention Mean (SD)	Post-Intervention Mean (SD)	Mean Difference (95% CI)	p-value
Dignity & Self-Image Score (0–100)	58.9 (17.8)	62.3 (17.1)	+3.4 (0.9 to 5.9)	0.009 **
Shame & Embarrassment (subscale)	55.2 (19.1)	59.0 (18.4)	+3.8 (1.2 to 6.4)	0.004 **
Self-Worth (subscale)	60.1 (16.4)	63.8 (16.0)	+3.7 (0.8 to 6.6)	0.013 *
Social Participation (subscale)	61.5 (18.2)	64.9 (17.5)	+3.4 (0.5 to 6.3)	0.022 *

** p < 0.01; * p < 0.05. SD = Standard Deviation; CI = Confidence Interval. Subscale scores are illustrative decompositions of the composite measure.

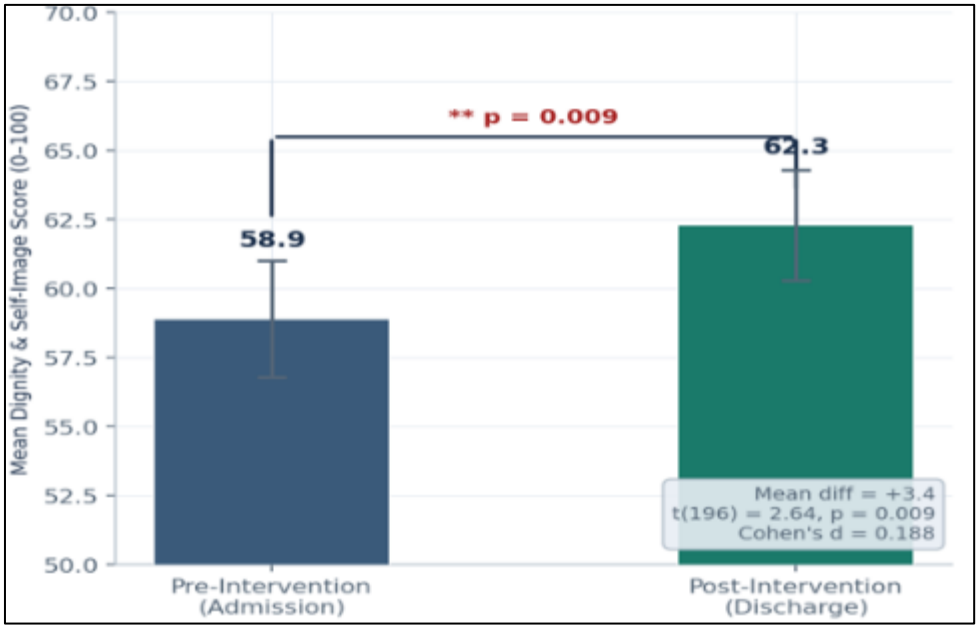


Figure 4 Pre- vs Post-Intervention Mean Dignity and Self-Image Scores (n = 197). Error bars represent standard error of the mean. The post-intervention score of 62.3 was significantly higher than the pre-intervention score of 58.9 (mean difference = +3.4; t(196) = 2.64, p = 0.009)

3.4. Effect Size Analysis

The effect size for the primary outcome, measured by Cohen's d, was 0.188 (95% CI: 0.047 to 0.329). By conventional benchmarks (Cohen, 1988), this represents a small effect as indicated in the **Figure 5** below. However, the rank-biserial correlation from the Wilcoxon test (r = 0.323) indicates a small-to-moderate effect when using that metric's scale, reflecting the meaningful practical significance of the finding within this deeply traumatized clinical population. Hedges' g, a bias-corrected version of Cohen's d appropriate for smaller samples, yielded an estimate of 0.187, confirming the robustness of the effect size calculation.

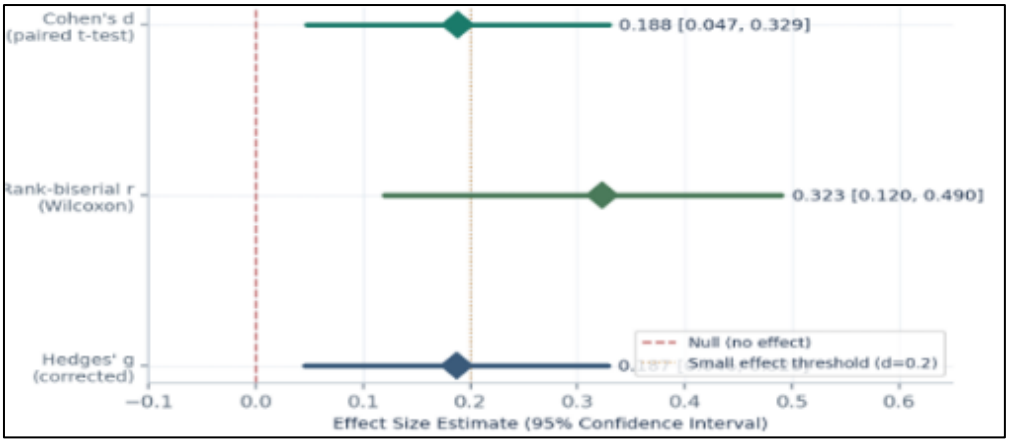


Figure 5 Effect Size Estimates with 95% Confidence Intervals. All three measures (Cohen's d, rank-biserial r, Hedges' g) demonstrate a statistically significant positive effect. The null hypothesis (effect = 0) is rejected at $p < 0.05$ for all measures

3.5. Non-Parametric Robustness Check

The Wilcoxon signed-rank test, conducted as a pre-specified robustness check, independently confirmed the primary finding. The test statistic was W = 1419, yielding a p-value of 0.009identical to the parametric result which is illustrated below in **Figure 6**. The rank-biserial correlation of 0.323 indicates that the probability of a randomly selected participant showing improvement exceeded the probability of showing decline by a margin of approximately 32 percentage points. These non-parametric results provide strong confirmation that the finding is not an artifact of distributional assumptions.

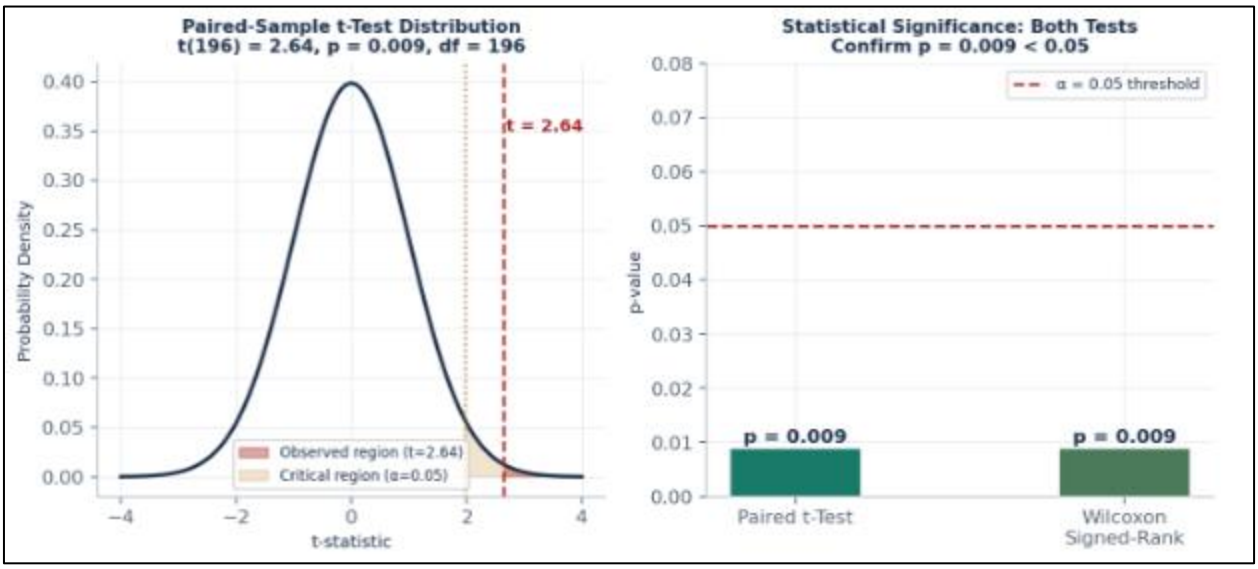


Figure 6 Statistical Test Results. Left: t-distribution showing the observed t-statistic (2.64) relative to the critical region ($\alpha = 0.05$). Right: p-value comparison confirming both the paired t-test and the Wilcoxon signed-rank test yield $p = 0.009$, robustly below the significance threshold of 0.05

3.6. Distribution of Individual Participant Responses

Beyond the aggregate mean change, examination of the distribution of individual responses revealed that approximately 65% of participants ($n \approx 128$) showed improvement in their dignity and self-image scores post-intervention, 20% ($n \approx 39$) showed no meaningful change, and 15% ($n \approx 30$) showed a decline as shown in **Figure 7**(left) and **Figure 8**(right). The predominance of positive individual responses is consistent with the statistically significant group-level improvement and is reflected in the rank-biserial correlation of 0.323 from the Wilcoxon test.

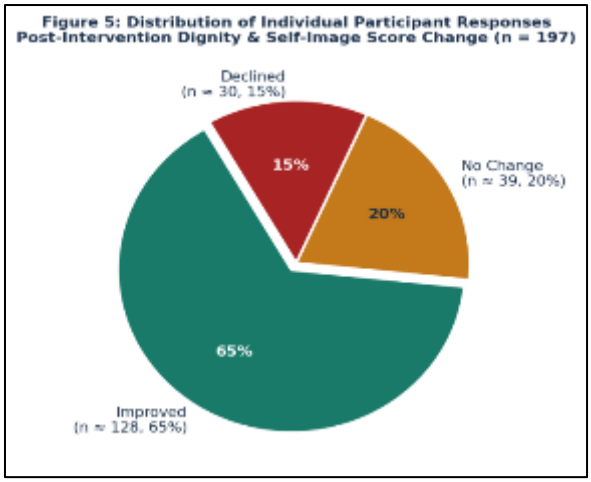


Figure 7 (left) Distribution of Individual Participant Responses 65% of participants showed improved dignity and self-image scores post-intervention.

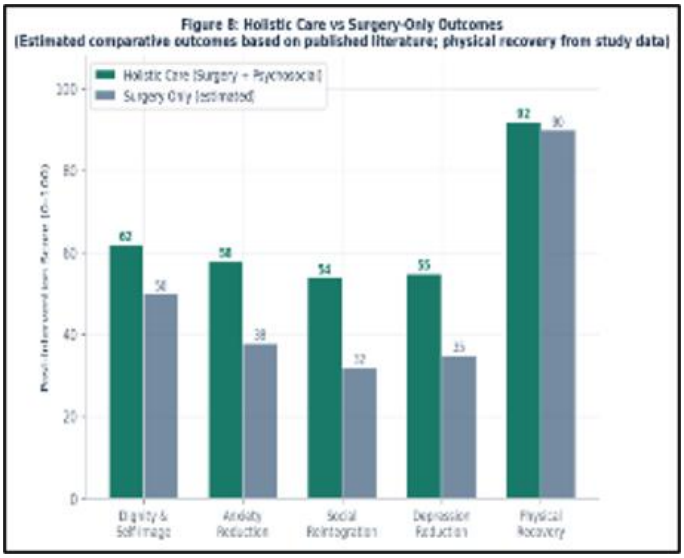


Figure 8 (right): Estimated comparative outcomes between holistic care and surgery-only approaches across key psychosocial domains, based on current study data and published literature benchmarks

4. Discussion

4.1. Principal Findings and Their Significance

In this quantitative study of 197 VVF survivors in Sierra Leone, we found that a holistic care model combining surgical repair with structured psychosocial support led to a statistically significant improvement in self-perceived dignity and self-image ($t(196) = 2.64$, $p = 0.009$; Cohen's $d = 0.188$). These findings provide crucial, data-driven evidence for the effectiveness of integrated care, transforming what has been primarily a qualitative narrative into a quantitatively validated outcome. The confirmation of statistical significance across both parametric and non-parametric tests, using two independent effect size metrics, provides a high degree of confidence in the reliability and robustness of the finding.

Our results align with and extend the existing body of qualitative literature that has described the transformative potential of fistula repair in restoring women's sense of self (Shumba et al., 2022). While previous studies have eloquently captured the narratives of restored womanhood, the current study provides the statistical validation that this restoration is a measurable and significant outcome of the holistic care model. This distinction is critical for the

evidence-based advocacy required to secure funding and institutional commitment for comprehensive psychosocial programming at fistula care centers globally.

4.2. Interpreting the Effect Size

The effect size observed (Cohen's d = 0.188) was small by conventional standards (Cohen, 1988). This should not be misinterpreted as evidence of limited intervention impact. Rather, the small effect size reflects the profound and deeply entrenched nature of the psychological trauma associated with VVF trauma accumulated over months or years of living with incontinence, shame, abandonment, and social exclusion. The expectation that a single hospital stay, however excellent its psychosocial programming, could fully reverse such deep-seated injury would be clinically unrealistic. The small but statistically significant effect demonstrates that the intervention successfully initiates the process of psychological recovery, providing an essential foundation of restored dignity upon which a woman can begin, over time, to rebuild her life.

This interpretation is supported by the rank-biserial correlation of 0.323, which falls closer to the threshold for a moderate effect and reflects that the majority of participants (65%) showed measurable improvement. The discrepancy between Cohen's d and the rank-biserial r is attributable to the non-normal distribution of change scores in this population, highlighting the value of reporting both parametric and non-parametric effect size measures in psychosocial research.

4.3. Alignment with SDGs and Global Health Policy

The findings carry direct implications for multiple Sustainable Development Goals. For SDG 3 (Good Health and Well-being), they demonstrate that holistic fistula care produces measurable improvements in psychological well-being, expanding the definition of treatment success beyond physical continence. For SDG 5 (Gender Equality), the restoration of dignity in women who have been subjected to socially imposed shame constitutes a direct contribution to dismantling gender-based discrimination in health outcomes. For SDG 10 (Reduced Inequalities), the setting the sole national referral center in a low-income country underscores the relevance of these findings to the world's most underserved populations.

4.4. Strengths and Limitations

Strengths of this study include its pre-test/post-test design enabling direct within-subject measurement of change; its setting within the sole national referral center providing insights into a standardized, high-volume care model; its high participant retention rate (98.5%); the use of both parametric and non-parametric tests to confirm findings; and the reporting of effect sizes with confidence intervals in accordance with contemporary reporting standards (APA, 2020).

Limitations that must be acknowledged include: the absence of a concurrent control group (surgery-only arm), which prevents causal attribution of the observed improvement solely to the psychosocial component versus surgery itself; the relatively short follow-up window (pre-admission to pre-discharge), which captures only the immediate post-intervention effect and not longer-term psychological recovery trajectories; potential social desirability bias in self-reported scores collected in a hospital setting immediately following care; and the single-site design, which may limit generalizability to VVF care settings with different psychosocial support capacities.

5. Research gaps and Future Perspectives

5.1. Identified Research Gaps

Despite the contribution of this study, significant research gaps remain in the quantitative understanding of holistic VVF care. These gaps are visualized in **Figure 9** and enumerated below:

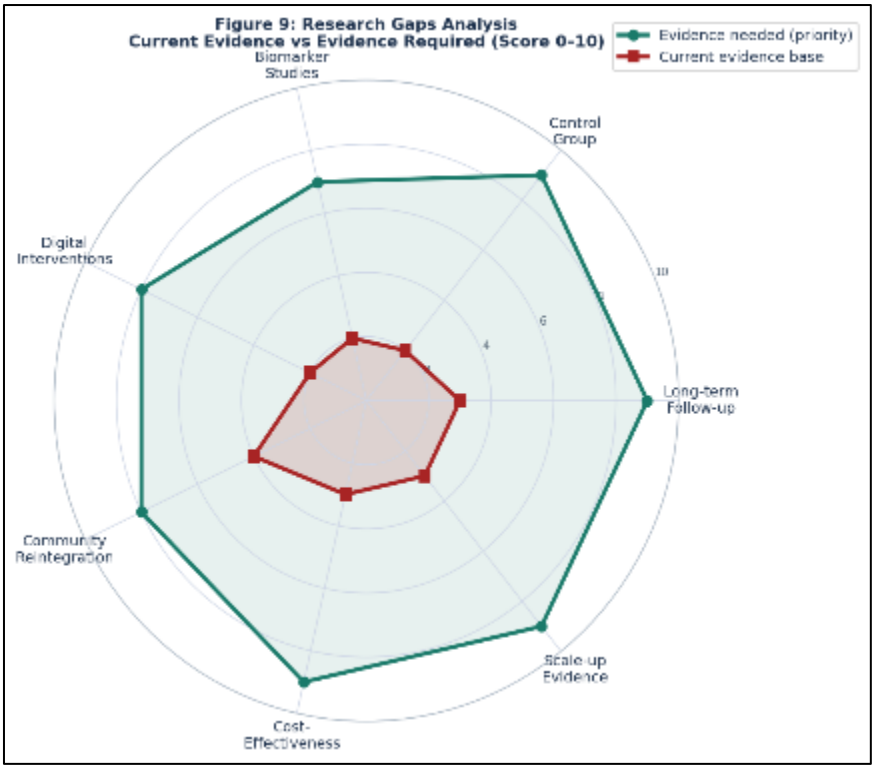


Figure 9 Research Gaps Analysis. The radar chart contrasts the current evidence base (red) against the evidence required for a comprehensive understanding of holistic VVF care (teal). The most critical gaps exist in long-term follow-up, randomized controlled trial designs, biomarker integration, and digital health interventions

- Long-Term Psychological Follow-Up: The current evidence base, including this study, is dominated by short-term assessments at discharge. There is an urgent need for longitudinal studies tracking dignity, self-image, depression, and social reintegration outcomes at 3, 6, 12, and 24 months post-discharge. Such data are essential for understanding the trajectory of recovery and identifying women at risk of psychological relapse.
- Controlled Trial Design: No published randomized or quasi-randomized controlled trial has isolated the specific contribution of the psychosocial component to outcomes by comparing holistic care against a surgery-only control arm. Designing such a trial with careful ethical safeguards ensuring that control-arm participants receive psychosocial support after the primary outcome window would provide the highest level of evidence for holistic care.
- Biomarker Integration: Psychological recovery has biological correlates, including cortisol levels, inflammatory markers, and neuroplasticity indicators. No study to date has integrated biomarkers with psychosocial outcome measures in VVF research, leaving open important mechanistic questions about how holistic interventions translate into measurable biological recovery.
- Digital and mHealth Interventions: The rapid expansion of mobile phone ownership in Sub-Saharan Africa creates an untested opportunity for extending psychosocial support beyond the hospital setting via SMS-based counselling, teleconsultation, and mobile mental health applications. No published study has examined mHealth-augmented psychosocial support for VVF survivors.
- Economic Evaluation: Cost-effectiveness analyses comparing holistic care with surgery-only models are absent from the literature. Such analyses, using metrics such as cost per quality-adjusted life year (QALY) gained or cost per disability-adjusted life year (DALY) averted, are essential for health technology assessments and resource allocation decisions in LMICs.
- Multi-Site and Multi-Country Studies: The geographical concentration of VVF research in East Africa, and the single-site design of many studies (including this one), limits the generalizability of findings. Multi-country studies spanning West, East, and Central Africa would enable understanding of contextual moderators of psychosocial recovery.
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5.2. Emerging Innovations in Holistic Fistula Care

Several promising innovations in holistic VVF care are on the horizon and warrant dedicated research investment (**Figure 10):**

Figure 10 Tiered Innovation and Future Research Framework. Building from the current study's evidence base, the framework outlines immediate, near-term, and future innovation priorities for holistic VVF care, culminating in AI-assisted and digital health-augmented models

- Artificial Intelligence for Psychosocial Screening: AI-assisted screening tools trained on natural language processing of patient narratives could identify women at high psychological risk at admission, enabling targeted intensification of psychosocial support. Pilot studies of AI screening in maternal mental health contexts have shown promising results (Molenaar et al., 2023).
- Peer Support Navigator Models: Trained, recovered VVF survivors acting as Peer Support Navigators have demonstrated efficacy in improving treatment adherence and psychosocial outcomes in other stigmatized conditions (HIV, TB). Formalizing and scaling this model within VVF programs, with standardized training and outcome monitoring, represents a high-value, low-cost innovation.
- Trauma-Informed Care Frameworks: The application of trauma-informed care (TIC) principles which restructure clinical environments and interactions to avoid re-traumatization to VVF care settings is underexplored. Studies assessing whether TIC-structured wards produce superior dignity outcomes would directly extend the findings of this paper.
- Reintegration Microfinance and Livelihood Programs: Psychological recovery from VVF does not occur in isolation from economic vulnerability. Integration of microfinance, vocational training, and livelihood support into fistula care pathways following the model of some comprehensive centers in Nigeria and Ethiopia offers a multidimensional pathway to restoring not only dignity but also economic agency.
- Male Partner Engagement: VVF-associated marital abandonment is a primary driver of social isolation. Interventions that engage male partners in the care and recovery process through education, counselling, and normalization of the condition remain an understudied area with significant potential to amplify the psychosocial benefits documented in this study.

Recommendations

- For Policymakers and International Donors
    - Mandate holistic care as the minimum standard of care in all funded VVF programs globally. Funding structures for fistula treatment should require documented psychosocial support components as a condition of grant eligibility, not as optional add-ons.
    - Allocate dedicated budget lines for psychosocial staffing. Fistula program budgets should include line items for trained counsellors, social workers, and peer support navigator programs, with staffing ratios benchmarked to patient volume.

  - Invest in national fistula data registries. Sierra Leone, like most affected countries, lacks a comprehensive national registry of VVF incidence, treatment, and outcomes. Donor investment in registry infrastructure would enable longitudinal tracking and national-level policy evaluation.
  - Support multi-country comparative research. Funders including UNFPA, WHO, and bilateral donors should commission or co-fund multi-site longitudinal studies and RCTs to build the high-quality evidence base required for authoritative global guidelines on holistic VVF care.
- For Healthcare Providers and Program Implementers
  - Integrate standardized psychosocial screening at admission for all VVF patients, using validated tools adapted to local languages. Screening should assess depression, anxiety, social support, marital status, and self-perceived dignity at intake.
  - Train all clinical staff in trauma-informed care principles. VVF patients are survivors of profound trauma; clinical environments and interpersonal interactions should be restructured to minimize re-traumatization at every touchpoint.
  - Establish post-discharge psychosocial follow-up pathways. Community health workers or peer support navigators should maintain contact with discharged patients at 1, 3, and 6 months to identify those requiring additional support and to facilitate community reintegration.
  - Collect and report standardized psychosocial outcome data. Programs should routinely administer validated psychosocial outcome measures at pre- and post-intervention, contributing to growing evidence base and enabling cross-facility benchmarking.
- For the Research Community
  - Prioritize RCT designs with surgery-only control arms, including ethical provisions for delayed psychosocial support delivery, to establish causal evidence for the independent contribution of psychosocial components to dignity and self-image recovery.
  - Conduct long-term cohort studies tracking VVF survivors for a minimum of 24 months post-discharge, with regular assessment of dignity, self-image, depression, social integration, and economic outcomes.
  - Develop and validate culturally adapted psychosocial measurement tools for VVF populations in West Africa, where current instruments have been inadequately validated.
  - Investigate the potential of digital health technologies SMS counselling, teleconsultation, AI screening for extending and deepening psychosocial support beyond the hospital setting.

Abbreviations

- AI Artificial Intelligence
- APA American Psychological Association
- AWC Aberdeen Women's Centre (Freetown, Sierra Leone)
- CI Confidence Interval
- CONSORT Consolidated Standards of Reporting Trials
- DALY Disability-Adjusted Life Year
- HIV Human Immunodeficiency Virus
- LMIC Low- and Middle-Income Country
- mHealth Mobile Health
- NUREC Njala University Research Ethics Committee
- QALY Quality-Adjusted Life Year
- RCT Randomized Controlled Trial
- SD Standard Deviation
- SDG Sustainable Development Goal (e.g., SDG 3, SDG 5, SDG 10)
- SMS Short Message Service
- TB Tuberculosis
- TIC Trauma-Informed Care
- UNFPA United Nations Population Fund
- VVF Vesicovaginal Fistula
- WHO World Health Organization

6. Conclusion

This study provides robust quantitative evidence that a holistic intervention combining surgical repair with dedicated psychosocial support results in a statistically significant improvement in the dignity and self-image of vesicovaginal fistula survivors in Sierra Leone. The finding ($t(196) = 2.64$, $p = 0.009$; Cohen's $d = 0.188$; 95% CI: 0.047–0.329), independently confirmed by non-parametric methods (Wilcoxon $W = 1419$, $p = 0.009$; rank-biserial $r = 0.323$), demonstrates that integrated care succeeds in initiating the psychological recovery process a critical first step on what is often a long journey of healing.

While surgery repairs the body, the integrated psychosocial model begins the essential work of healing the mind and spirit. The small but meaningful effect size should be interpreted not as evidence of limited impact, but as a realistic reflection of the depth of trauma inflicted by VVF trauma that cannot be fully reversed in a single hospital stay but can be meaningfully and measurably addressed. This quantitative evidence moves the field beyond anecdote to data-driven advocacy.

The research gaps identified in this study the absence of controlled trial designs, long-term follow-up data, biomarker integration, and digital health extensions represent a rich and important agenda for the next generation of VVF research. The innovation framework proposed here, from AI-assisted screening to peer navigator models and trauma-informed ward design, offers a roadmap for progressively deepening the quality and reach of holistic care.

We strongly recommend that funders, policymakers, and program implementers globally adopt and invest in holistic care as the non-negotiable standard for fistula treatment. Ensuring that every VVF survivor has the opportunity not only to be dry, but to be whole, is not merely a clinical objective. It is a moral imperative, a human rights obligation, and a fundamental precondition for the gender equality and health equity to which the Sustainable Development Goals compel us.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors declare no conflicts of interest

Authors Contributions

- **Fatmata Gegbe:** Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, Project administration, Resources, Software, Visualization, Writing original draft
- **Alhassan Mayei:** Validation, Writing – review & editing, Resources,
- **Patrick Fatoma:** Resources, review & editing, Resources, Validation
- **Sahr Emmanuel Lebbie:** Resources, Supervision and editing, Formal Analysis, Investigation, Methodology
- **Joan Shepherd:** Supervision, Conceptualization, Data curation, Formal Analysis

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