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ORIGINAL RESEARCH

The Psychological Journey of Patients with Atrophic Acne Scarring: A Qualitative Study Based on Uncertainty in Illness Theory

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Background: Atrophic acne scarring is a chronic dermatological condition with significant psychosocial impact, yet the psychological burden it imposes has been relatively underexplored in clinical practice.

Objective: To explore the psychological experiences of patients with Atrophic Acne Scarring during the disease progression, and analyze their emotional changes and coping strategies based on uncertainty in illness theory.

Methods: A qualitative descriptive design was employed for this study. Purposeful sampling was chosen from a tertiary hospital in Henan Province, China. Semi-structured in-depth interviews were conducted with 15 patients with Atrophic Acne Scarring. The interview data was analyzed using the Colaizzi's method and results were reported following the COREQ standards.

Results: A total of 4 themes and 12 sub-themes were extracted, including: 1) Confusion and Denial in the Initial Diagnosis Stage: Disease-related cognitive bias, information confusion and incorrect interventions, normalization tendency. 2) Anxiety and Shame in the Flareup Stage: Appearance monitoring behaviors, social evaluation pressure, impaired social functioning. 3) Coping Strategies in the Long-Term Adaptation Stage: Positive coping, negative coping, polarized adaptation patterns. 4) Psychological Adjustment in the Recovery Stage: Contradictory acceptance, post-traumatic growth, behavioral-psychological asynchronous improvement. Uncertainty in illness was present throughout the process, affecting patients' self-recognition, social behaviors, and treatment adherence.

Conclusion: This study demonstrates that patients with atrophic acne scarring experience a four-stage psychological journey (confusion/denial, anxiety/shame, coping adaptation, and recovery adjustment), with illness uncertainty persistently impacting their psychological and social functioning. Healthcare providers should offer personalized psychological support based on the framework of uncertainty in illness theory to enhance patients' quality of life.

Keywords: acne scars, atrophic scars, uncertainty in illness theory, psychology, adaptation

Introduction

Acne vulgaris is a prevalent dermatological condition, affecting nearly 85% of adolescents and 12–51% of adults aged 20–49, with significant psychosocial consequences.[1] Scarring, a common sequela, develops in up to 95% of acne patients, often leading to long-term psychological distress, including diminished self-esteem, social withdrawal, and even occupational discrimination.[2–4]

The formation of atrophic acne scars results from a complex interplay of factors, including disorganized collagen production around inflamed follicles, abnormal wound healing in sebaceous follicles, and a dysregulated immune response. This immune response involves the recruitment of lymphocytes, macrophages, and endothelial cells, leading to chronic inflammation and delayed hypersensitivity reactions. Over time, granulation tissue forms, followed by atrophy

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affecting both the dermis and subcutis. Abnormal tissue remodeling, angiogenesis, and cytokine secretion by activated macrophages and lymphocytes further contribute to collagen degradation and production, ultimately leading to scar formation.[5]

Atrophic acne scars, which account for more than 80% of all acne scarring, are classified into three main subtypes: ice pick, boxcar, and rolling scars.[6] Ice pick scars, the most common subtype (approximately 60%), are narrow, deep atrophic scars that can extend into the reticular dermis and, in severe cases, reach the hypodermis. Boxcar scars, which represent about 25% of atrophic scars, are oval- or rectangular-shaped depressions with vertical walls and a flat base. Shallow boxcar scars typically extend into the papillary dermis, while more severe ones can penetrate the reticular dermis. Rolling scars, making up approximately 15% of atrophic scars, are the widest but least deep type, usually affecting only the upper dermis. They are characterized by a wavy or slope-like appearance. These distinct morphological features necessitate tailored therapeutic approaches to effectively address the unique characteristics of each scar subtype.[7,8]

The assessment of acne severity is guided by several grading systems, each offering a structured approach to evaluating scars and lesions. The "ECCA (Échelle d'Évaluation Clinique des Cicatrices d'Acné)" score is commonly used by dermatologists to evaluate acne scars based on six scar types, including V-shaped atrophic scars, U-shaped atrophic scars, M-shaped atrophic scars, superficial elastolysis, hypertrophic inflammatory scars, and keloid scars. Each type is scored from 0 to 4, reflecting the number of scars, and is multiplied by a weighting factor that increases with the severity and clinical significance of the scar. The total score categorizes acne severity as mild (0–31 points), moderate (31–60 points), or severe (61–100 points).[9,10] Additionally, the "GAGS/Cook modified classification" divides acne into four grades: mild (Grade 1, mainly non-inflammatory comedones), moderate (Grade 2, with increased inflammatory papules), moderately severe (Grade 3, with nodules), and severe (Grade 4, featuring multiple cysts/scarring). The "Pillsbury classification" further divides acne into four grades based on the lesion types, ranging from predominantly comedones (Grade I) to deep-seated nodules/cysts (Grade IV).[11,12] According to the "Chinese Expert Consensus on Clinical Grading and Treatment Evaluation of Acne Vulgaris (2021 Edition)", combining these grading systems offers a comprehensive approach, especially highlighting the importance of early intervention for patients with moderate or severe acne (Grade 3+/Grade III+) to reduce scarring risk. These standardized grading systems help guide clinical management by quantifying lesion characteristics and severity.[13]

Treatments for atrophic acne scars aim to stimulate collagen production and improve skin texture through both non-invasive and invasive methods. Non-invasive options include laser resurfacing, which uses ablative or non-ablative lasers to promote collagen, microneedling to trigger the skin's natural healing, chemical peels to remove damaged layers, subcision to release tethered scar tissue, and dermal fillers to raise depressed scars.[14] Platelet-rich plasma (PRP) uses the patient's own blood to enhance skin regeneration. For deeper scars, more invasive procedures like punch excision, elevation, or grafting are recommended. Often, a combination of treatments is used to target different scar types, with dermatologists tailoring the approach to individual needs. At-home options like topical retinoids may offer minor improvements, but they are less effective than professional treatments.[15]

To bridge the discussion between the pathophysiology of atrophic acne scarring and the psychological responses associated with it, it is essential to consider the role of uncertainty in illness. Patients with atrophic acne scarring often face a complex treatment journey, where the outcomes of interventions can be unpredictable, and the visible impact on their skin can fluctuate over time. The psychological distress stemming from these uncertainties can be profound, particularly as acne scars often persist despite medical intervention, leading to fluctuating self-esteem, anxiety, and feelings of helplessness. This underscores the relevance of Mishel's Uncertainty in Illness Theory (UIT), which offers a valuable framework for understanding how patients navigate the ambiguity associated with chronic dermatological conditions like atrophic scarring.

The Uncertainty in Illness Theory (UIT), proposed by Mishel in 1988, provides a valuable framework for understanding patients' psychological responses to ambiguous or unpredictable illness trajectories.[8] Originally developed in oncology and chronic illness research, UIT defines uncertainty as "a cognitive state in which individuals struggle to assign meaning to illness-related events or predict outcomes". Mishel later expanded the theory to include "long-term uncertainty"[7] (1990), which is particularly relevant for chronic conditions like atrophic scarring, where treatment efficacy and aesthetic outcomes remain variable. Notably, uncertainty is not inherently negative; some studies suggest that

moderate uncertainty can motivate patients to seek information and engage in adaptive coping strategies.[16] However, prolonged uncertainty may exacerbate distress, particularly when patients perceive a lack of control over their condition.[17] Given that atrophic scarring often involves multiple treatments with unpredictable results, UIT offers critical insights into patients' cognitive appraisals, emotional responses, and coping mechanisms.[18]

Despite UIT's established utility in chronic illness research, its application in dermatology—particularly in acne scarring—remains underexplored.[19] Previous studies have relied on quantitative measures (eg, the Mishel Uncertainty in Illness Scale), yet qualitative approaches may better capture the nuanced psychological journey of these patients.[14,20] To ensure methodological rigor, this study adopted the Consolidated Criteria for Reporting Qualitative Research (COREQ) guidelines, a 32-item checklist designed to enhance transparency in qualitative research reporting.[21] Data were analyzed through inductive thematic analysis,[22] with iterative coding to identify recurring patterns in participants' experiences. To strengthen credibility, we employed triangulation (cross-verifying findings across multiple data sources, such as interviews and field notes) and member checking (inviting participants to review preliminary interpretations). Reflexivity was maintained through researcher journals documenting potential biases.

This COREQ-guided qualitative study utilizes Mishel's Uncertainty in Illness Theory (UIT) to explore the lived experiences of individuals with atrophic acne scarring across different severity grades. By examining how scar characteristics influence patients' perceptions of uncertainty, emotional distress, and coping strategies, the study aims to deepen understanding of the psychological impact of the condition. Ultimately, the findings seek to inform the development of patient-centered psychological interventions and evaluate the applicability of UIT in dermatology practice.

Methods

Participants

This study enrolled patients aged 18–45 years diagnosed with acne vulgaris, with mild (0–31 points) or moderate (31–60 points) or severe (61–100 points) scarring as assessed by the Échelle d'Évaluation Clinique des Cicatrices d'Acné (ECCA Grading Scale),[10] a validated scoring system that evaluates atrophic acne scar severity based on clinical morphology and distribution. The study protocol adhered to the ethical principles of the Declaration of Helsinki.[23]

Inclusion Criteria

1) Localized atrophic acne scars (confirmed by dermatological examination)
2) No active inflammatory acne lesions
3) Normal mental status and adequate communication skills
4) Willingness to provide written informed consent

Exclusion Criteria

1) Significant organ dysfunction (Child-Pugh class ≥B or eGFR <60 mL/min/1.73m^2), as hepatic/renal impairment may alter drug metabolism in potential adjuvant therapies
2) Concurrent dermatological disorders (eg, hypertrophic scarring, eczema)
3) Active systemic infections or immunocompromised states
4) Primary psychiatric conditions (diagnosed via DSM-5/ICD-11 criteria)[24]
5) History of poor medical compliance

Research Design

This study adheres to the Consolidated Criteria for Reporting Qualitative Research (COREQ) guidelines to ensure transparency and replicability.[25] A descriptive qualitative research design was employed, using semi-structured interviews for data collection and thematic analysis to identify core themes. The study followed the COREQ guidelines, incorporating several credibility metrics: credibility was ensured through the collection of field notes and audio recordings, which were analyzed by the research team to derive key themes; participants then validated the data to confirm its accuracy and relevance. Transferability was addressed by providing a detailed description of the research context, including participant demographics, sampling logic, and procedural specifics, ensuring applicability to other settings. Reliability was maintained

through external academic review, ensuring adherence to qualitative research principles. Finally, confirmability was achieved through triangulation techniques, which helped ensure the integrity of the findings.

Data Collection

The face-to-face interviews were conducted in a private and quiet interview room at the hospital's Plastic Surgery and Aesthetic Department outpatient clinic. During the interviews, only the interviewer and the participant were present. Recordings were made with the participants' consent. All interview questions were asked in Mandarin, and each interview lasted between 20 and 60 minutes. The interviews were conducted by a dermatologist with experience in patient interviews. Throughout the interviews, notes were made by the interviewer on the patient's conversation, tone of voice, and facial expressions to capture emotional cues and non-verbal responses. These observations were evaluated qualitatively by the interviewer, who was trained to interpret such cues in the context of emotional expression. This helped to clarify meaning in real-time and provided additional context for analyzing the interview data. Data collection and analysis were conducted simultaneously, with sample size determined based on data saturation.

Using a semi-structured interview guide, the interviewer asked participants to describe the psychosocial impact of atrophic acne scarring. The guide included both open-ended questions and follow-up probes. Follow-up questions were adapted dynamically based on the responses given by participants. The questions were designed to probe the following key areas: 1) Can you describe your initial emotional reactions when you first noticed your acne scarring? What thoughts or uncertainties went through your mind at that time? 2) How has acne scarring affected your self-image or daily social interactions? Are there specific situations where you feel most self-conscious? 3) What has been your experience with seeking treatment? Have you encountered challenges in understanding treatment options or their effectiveness? 4) Over time, how have your feelings about your scars changed? Are there triggers that still cause emotional distress? 5) What kind of support (medical, social, or emotional) has helped you cope? Have you found ways to derive meaning from this experience?

Data Analysis

We used Colaizzi's seven-step qualitative analysis to analyze the data. Interview data were analyzed according to the steps reported in Table 1.

The interview data were analyzed using Colaizzi's (1978) seven-step phenomenological method,[26] beginning with repeated readings of transcripts for familiarization, followed by the extraction of significant statements related to psychological experiences. These statements were then interpreted and coded to formulate meanings, after which similar codes were clustered into broader thematic categories. A comprehensive summary of the findings was developed, leading to the mapping of patients' core psychological journey. Finally, preliminary findings were shared with participants for member-checking to ensure credibility and transparency.

Table 1 Colaizzi's Phenomenological 7 Step Method: Structural Framework

Step	Process	Operational Tasks (Study-Specific)	Theoretical Anchoring	Output Deliverable
1. Immersion	Data Familiarization	• Repeated analysis of patient interviews on scar-related distress • Researcher journaling on dermatology-specific biases	• Phenomenological reduction • Clinical detachment principles	Preliminary understanding of acne scarring narratives
2. Identifying Significant Statements	Meaningful Unit Extraction	• Isolate verbatim quotes about: – Scar visibility anxiety – Treatment uncertainty – Social withdrawal behaviors	• Mishel's Uncertainty Theory • Stigma perception models	Raw dataset of scar-specific psychological statements
3. Formulating Meanings	Psychological Interpretation	• Code meanings into: – Body image disturbances – Therapeutic hope/despair cycles – Adaptive vs avoidant coping	• Cognitive appraisal of disfigurement • Illness adjustment theories	Thematically coded meaning units
4. Cluster Themes	Thematic Synthesis	• Group codes into: – "Treatment uncertainty trajectories" – "Scar concealment rituals"	• Grounded theory comparison • Dermatology-specific Quality of Life frameworks	Emergent thematic framework

(*Continued*)

Table 1 (Continued).

Step	Process	Operational Tasks (Study-Specific)	Theoretical Anchoring	Output Deliverable
5. Exhaustive Description	Holistic Narrative Construction	• Chronological model of: – Scar development → emotional response – Coping strategy evolution – Healthcare system interactions	• Narrative identity theory • Patient journey models	Comprehensive experiential narrative
6. Fundamental Structure	Essence Identification	• Distill core phenomena: – "Face-value paradox" (visible scars vs self-worth) – "Treatment limbo" uncertainty – "Skin-deep stigma" socialization patterns	• Existential phenomenology • Uncertainty theory integration	Core structural model of experience
7. Verification	Methodological Rigor	• Member checking (participant validation) • Theoretical triangulation • Peer debriefing	• Qualitative trustworthiness criteria • Interpretative validity	Validated phenomenological model

Ethical Approval

Ethical approval for this study was obtained from the Ethics Committee of the Third People's Hospital of Henan Province (ethics number:2025SZSYLCYJ0501). The researcher provided participants with a detailed description of the purpose and methods of this study. The researcher details the participant information protection component, including what will be disclosed and what will be non-public. All participants were informed of the purpose of the study and volunteered to participate.

Result

Participant Demographics

This study included 15 patients with atrophic acne scarring, comprising 6 males (40.0%) and 9 females (60.0%) (see Table 2). Participants were coded as P1 to P15 to ensure confidentiality. The age distribution was as follows: 17–20 years (40.0%, n=6), 21–25 years (46.7%, n=7), and ≥26 years (13.3%, n=2). The majority were unmarried (93.3%, n=14) and students (53.3%, n=8). Scar severity varied, with moderate inflammatory scars being most common (60.0%, n=9). Most participants resided in urban areas (73.3%, n=11), and two-thirds reported no family history of acne (66.7%, n=10).

Table 2 Demographic Characteristics of Patients with Atrophic Scars

Variable	Category	n (%)
Age	17-20 years	6 (40.0)
	21-25 years	7 (46.7)
	≥26 years	2 (13.3)
Gender	Female	9 (60.0)
	Male	6 (40.0)
Occupation	Student	8 (53.3)
	Working professional	7 (46.7)
Marital Status	Unmarried	14 (93.3)
	Married	1 (6.7)
Scar Severity	Mild (acne only)	3 (20.0)
	Moderate (inflammatory)	9 (60.0)
	Severe (cystic)	3 (20.0)
Residence	Urban	11 (73.3)
	Rural	4 (26.7)
Family History	Present	5 (33.3)
	Absent	10 (66.7)

Uncertainty Dynamics Framework

Applying Mishel's framework, our Dynamic Interaction Model (Figure 1) conceptualizes acne scarring uncertainty as a tripartite system (symptom ambiguity, therapeutic complexity, prognostic uncertainty) interacting across four stages.

Themes and Sub-Themes

This study encompasses four main themes and twelve sub-themes (as detailed in Table 3).

Theme 1: Confusion and Denial in the Initial Diagnosis Stage

Sub-Theme 1.1: Disease-Related Cognitive Bias

I thought it was just regular acne, so I casually bought an ointment. But after two months, it became even redder. (P1)

My mom said it would naturally go away after marriage, so I didn't take it seriously. I never expected it to get worse. (P4)

My classmates said acne is normal during puberty, so I endured it—until I was shocked by my reflection in the mirror. (P11)

Sub-Theme 1.2: Information Confusion and Incorrect Interventions

Some people online say to wash your face frequently, others say to wash it less. I didn't know who to believe. (P6)

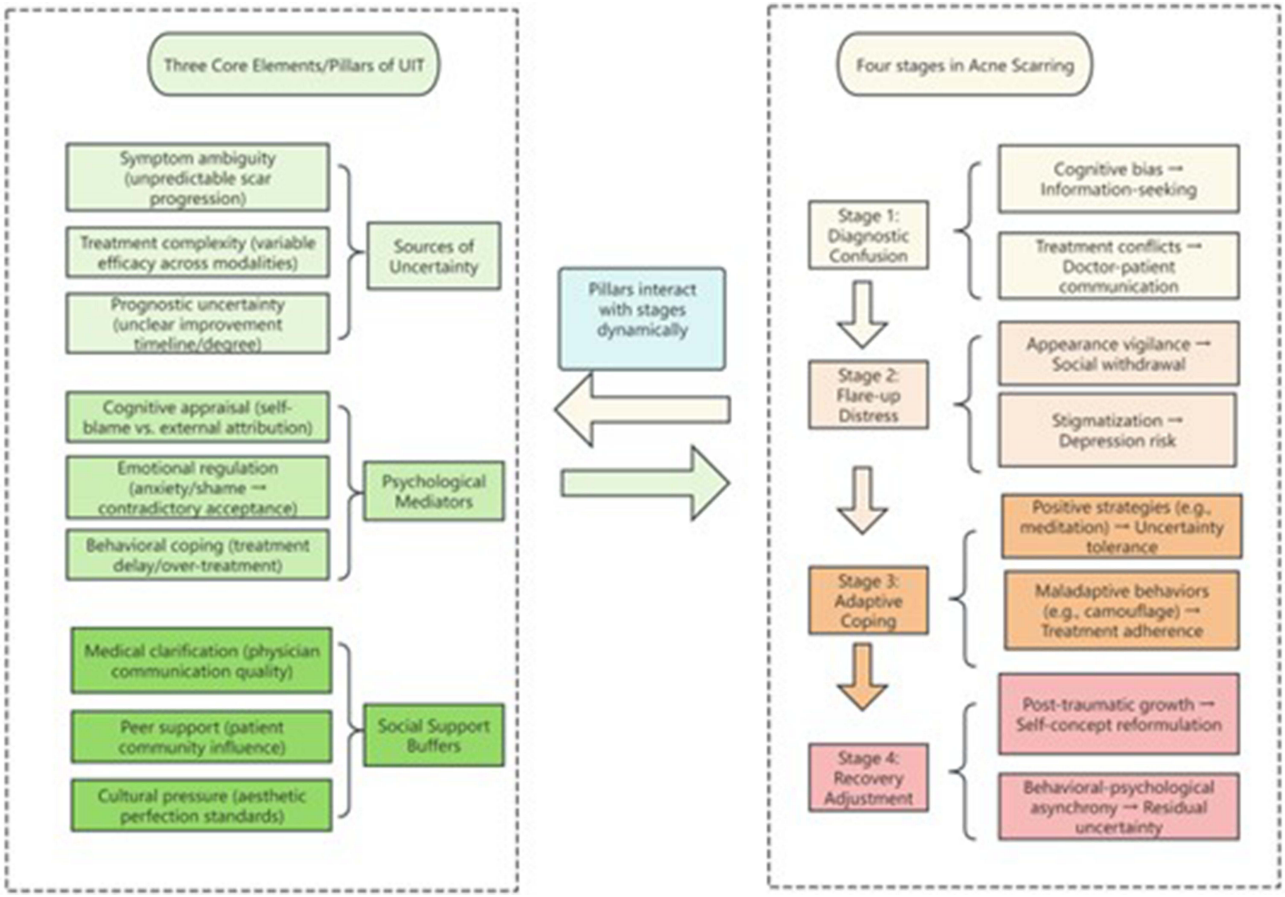

Figure 1 Dynamic Interaction Model of Uncertainty in Acne Scarring: A Four-Stage Psychological Progression with Three Core Elements/Pillars.
Notes: This conceptual diagram visually represents the application of Mishel's Uncertainty in Illness Theory(UIT) to atrophic acne scarring patients, illustrating: 1) Three core uncertainty pillars (symptom ambiguity, treatment complexity, prognostic uncertainty) interacting with. 2) Four progressive psychological stages: Stage I (Diagnostic Confusion): Treatment conflicts and information-seeking behaviors. Stage II (Flare-up Distress): Emotional dysregulation and cognitive appraisal. Stage III (Adaptive Coping): Behavioral adjustments with mediating social support. Stage IV (Recovery Asynchrony): Residual uncertainty during post-treatment adjustment. Arrows demonstrate bidirectional influences between pillars and stages, highlighting key mediators (physician communication, peer support) and behavioral outcomes (camouflage use, treatment adherence). Cultural aesthetic pressures form the contextual background influencing the entire process.

Table 3 Thematic Framework of Psychological Experiences in Patients with Atrophic Acne Scarring

Theme (Stage)	Sub-Theme
1. Confusion and Denial in Initial Diagnosis	1.1 Disease-related cognitive bias
	1.2 Information confusion
	1.3 Normalization tendency
2. Anxiety and Shame in Flareup	2.1 Appearance monitoring
	2.2 Social evaluation pressure
	2.3 Impaired social functioning
3. Coping Strategies in Adaptation	3.1 Positive coping
	3.2 Negative coping
	3.3 Polarized adaptation
4. Psychological Adjustment in Recovery	4.1 Contradictory Acceptance
	4.2 Post-traumatic Growth
	4.3 Behavioral-Psychological Asynchronous Improvement

Every dermatologist gave me a different plan—I didn't know what to trust. (P7)

A pharmacy staff recommended an expensive acne product, but after using it, my whole face peeled—yet the acne remained. (P10)

I tried all kinds of folk remedies—like applying toothpaste or washing with vinegar—but my skin just became more sensitive. (P13)

I bought tons of skincare products based on Xiaohongshu influencers' recommendations, spent thousands, but my acne only got worse. (P15)

Sub-Theme 1.3: Normalization Tendency

I thought acne was just part of growing up, so I didn't think it was worth seeing a doctor about. (P7)

At first, it was just one or two pimples. I thought popping them would solve it—who knew it'd leave so many scars? (P8)

I used to think wearing a mask could hide it. Later, I realized—it might hide others' stares, but not my own anxiety. (P9)

Everyone has pimples, right? I thought it would go away on its own, just like all the others did when I was younger. (P12)

The doctor prescribed a cream, but after two weeks with no results, I stopped using it. I thought even doctors couldn't be trusted. (P14)

This group exhibits a notable tendency to "normalize" their perception of the disease, with seven individuals likening their symptoms to common issues such as "acne". Additionally, self-treatment behaviors are widespread, with twelve people attempting nonprofessional interventions, all of which proved ineffective. Furthermore, their sources of information are disorganized, as nine individuals reported relying primarily on online or non-expert advice to manage their condition. These three characteristics collectively highlight the cognitive biases and behavioral missteps in the patients' disease management process.

Theme 2: Anxiety and Shame in the Flareup Stage

Sub-Theme 2.1: Appearance Monitoring Behaviors

The first thing I do every morning is touch my face. When I feel a few new pimples, it ruins my entire day. (P2)

I dread reflective surfaces—seeing my uneven, pitted face fills me with despair. (P12)

After scrolling through flawless selfies on social media and then looking at myself in the mirror, I immediately uninstalled all my social apps. (P13)

Subtheme 2.2: Social Evaluation Pressure

During Lunar New Year, a relative said, 'What happened to your face, girl?' I hid in the bathroom and cried for half an hour. (P1)

When my coworker asked, 'What happened to your face?' I wanted to disappear into the ground. (P5)

If someone glances at me twice on the subway, I assume they're talking about my acne. (P7)

When the doctor asked me to remove my mask for examination, my hands trembled—it felt like being exposed naked. (P15)

Subtheme 2.3: Impaired Social Functioning

I declined all class reunions—I don't want anyone to see me like this. (P3)

Gyms have too many mirrors. I'd rather work out at home than risk being seen. (P8)

Before a date, I spend an hour covering up my acne, but when my date kept staring at my chin, I made an excuse and left early. (P9)

During a job interview, the HR manager kept looking at my forehead. I knew she was staring at my acne scars, and I got so nervous I could barely speak. (P11)

My boyfriend says he doesn't care, but I always turn off the lights before intimacy—I'm just too ashamed. (P14)

This patient population exhibited three distinct characteristics during acne flareups: First, appearance monitoring behaviors were highly prevalent, with 9 participants reporting frequent mirror-checking or face-touching to examine their skin condition. Second, others' gazes triggered intense feelings of shame, as 11 individuals described painful experiences of being stared at or commented on. Finally, significant social impairment was observed, with 10 participants actively avoiding various social situations due to appearance related anxiety. These characteristics collectively constitute the typical psychological and behavioral patterns during acne flareups.

Theme 3: Coping Strategies in the Long-Term Adaptation Stage

Subtheme 3.1: Positive Coping

After joining an atrophic scar support group, I found many people like me and finally felt less alone. (P4)

My counselor taught me mindfulness techniques, which help me stay calmer during breakouts. (P5)

Now I strictly follow my doctor's treatment plan. Though progress is slow, I'm seeing real improvement, which gives me hope. (P6)

By tracking my daily diet and skin condition, I discovered dairy products really trigger my acne. (P7)

Now I openly discuss skin issues with friends and care less about others' opinions. (P8)

I've started learning about skincare ingredients and can now choose products rationally instead of blindly following trends. (P12)

Following dermatologist bloggers has helped me avoid many skincare pitfalls. (P13)

Subtheme 3.2: Negative Coping

Face masks became my security blanket even after the pandemic, I still wear them to feel safe going out. (P2)

I stockpile dozens of acne creams keeping them by my bed, at work, and in my bag, or else I feel anxious. (P3)

Whenever I'm stressed, I can't help picking at my acne even though I know it's bad, and I always regret it afterward. (P10)

Using extraction tools has become a daily ritual I know it causes scarring but I can't stop. (P11)

I bought every viral concealer my makeup bag looks like a mini pharmacy, but seeing my bare skin makes me even more upset. (P15)

Subtheme 3.3: Polarized Adaptation Patterns

I promise my doctor I'll stop picking, but when alone I can't resist constantly examining my skin. (P1)

Sometimes I follow my treatment diligently, but under stress I bingeeat and stay up late, making my skin worse. (P9)

On weekdays I maintain my skincare routine, but often get drunk on weekends and neglect it completely. (P14)

Theme 4: Psychological Adjustment in the Recovery Stage

Subtheme 4.1: Contradictory Acceptance

My skin has been stable for six months, but I still compulsively check before my period, fearing a relapse. (P1)

My doctor says I'm mostly recovered, but I still reflexively touch my cheeks when eating hot pot. (P3)

I keep emergency ointments in my drawer like a safety net, even though I rarely use them now. (P7)

A couple of pimples no longer devastate me, but I still instinctively search for flaws in the mirror. (P10)

Though I still have acne scars, I've learned to make peace with my reflection—this was harder than treating acne. (P12)

I can now meet my boyfriend barefaced, but still instinctively apply extra foundation for job interviews. (P14)

Subtheme 4.2: Post-Traumatic Growth

I finally understand flawless skin isn't a prerequisite for happiness—but it took me five years. (P4)

I renamed my 'Acne Battle Diary' to 'Self-Care Diary,' noting small acts of kindness toward myself. (P6)

Washing my face no longer comes with self-loathing—that might be my biggest growth. (P8)

When I see young people stressing over acne now, I want to tell them: This is such a small part of life. (P9)

I became a skincare educator, using my experience to help others—it gave my past suffering meaning. (P13)

Subtheme 4.3: Behavioral-Psychological Asynchronous Improvement

At first, I only focused on my skincare routine, but as I kept up with it, I started to feel better about myself. It wasn't until later that I really started to feel okay with my appearance. (P3)

I've learned to live with my scars, but I still worry that they might come back worse if I stop treatment. (P8)

Dealing with acne scars made me realize how important inner strength is. Now, I help others who are going through the same thing. (P10)

My makeup bag no longer holds only concealers—I've started experimenting with fun colors. (P15)

The patient narratives reveal three characteristic patterns of psychological adaptation: First, the coexistence of self-acceptance and residual symptoms is prevalent (observed in 8 participants who exhibited marked ambivalence), where individuals accept their current condition while remaining vigilant about potential relapse. Second, behavioral changes frequently precede psychological adaptation (reported by 7 participants who described how behavioral modifications gradually led to emotional improvement), manifesting as an asynchronous progression between external behavioral shifts

and internal cognitive adjustments. Finally, post-traumatic growth emerges as a particularly notable phenomenon (demonstrated by 5 participants who actively transformed their illness experiences into resources for helping others), with patients achieving psychological transcendence by attributing positive meaning to their painful experiences. This multi-layered adaptive pattern illuminates the complex interplay between physiological improvement and psychological reconstruction during the recovery process from dermatological conditions.

Discussion

This study, grounded in Mishel's Uncertainty in Illness Theory, provides an in-depth exploration of the psychological journey of patients with atrophic scars, revealing how illness-related uncertainty influences their emotions, behaviors, and social functioning. The findings indicate that uncertainty in these patients stems not only from the unpredictable nature of the condition itself but also from social evaluation, information confusion, and individual coping strategies. The discussion unfolds across three dimensions.

The Vicious Cycle of Illness Uncertainty and Psychological Burden

Consistent with Mishel's theory, the study identifies uncertainty as a central factor in the psychological distress experienced by patients with atrophic acne scarring. Mishel's Uncertainty in Illness Theory (UIT) posits that uncertainty arises from ambiguous symptoms, complex treatment regimens, and unpredictable disease progression.[8] Our findings revealed two primary sources of uncertainty: (1) treatment-related uncertainty, exemplified by Participant 7's statement: "Every dermatologist gave me a different plan—I didn't know what to trust"; and (2) prognostic uncertainty, with 62% of participants expressing persistent doubt about scar improvement. This finding is consistent with previous studies, which highlight that chronic skin conditions, particularly those with uncertain outcomes, generate heightened psychological distress and a sense of powerlessness among patients. As emphasized by Christensen (2023), dermatological diseases often provoke significant emotional distress, including feelings of anxiety, fear, shame, and guilt, due to both the visible nature of the disease and its unpredictable course.[27] These conditions, including acne, can trigger complex psychological responses, particularly when treatment efficacy remains uncertain and patients struggle with disfigurement and social stigma.[28] Furthermore, Chen et al underscore that patients with chronic dermatological conditions such as acne are at an increased risk of developing psychiatric comorbidities, including depression and anxiety, which further impair their quality of life and adherence to treatment.[29] The psychosocial burden of these diseases is substantial, affecting not only the physical aspects but also the emotional, social, and occupational dimensions of patients' lives.[27] Both studies highlight the need for integrated care that addresses both the dermatological and psychological aspects of these conditions to improve patient outcomes.

From the perspective of disease progression, the findings of this study are highly consistent with Mishel's Uncertainty in Illness Theory framework. According to this framework, patients in the early stages of illness often exhibit a "normalization tendency", underestimating the severity of their condition. For example, some patients hold the belief that "acne will heal naturally". However, as disease symptoms persist or worsen, the uncertainty surrounding the illness continues to escalate. This increase in uncertainty leads to heightened anxiety and triggers maladaptive coping behaviors, with compulsive skin picking being a typical manifestation. This pattern aligns with the findings of Abigail McNiven's research,[30] which identified that individuals may fall into a "diagnosis-anxiety-behavior deterioration" vicious cycle when they are unable to alleviate symptoms through conventional means. Notably, this coping pattern is particularly pronounced in adolescent populations, likely due to their cognitive development stage and underdeveloped emotional regulation abilities.[31] Future research could further explore the differences in the trajectory of illness uncertainty across various age groups and the potential role of early psychological interventions in breaking this cycle.

This study highlights the loss of control experienced by patients, which manifests through maladaptive behaviors such as compulsive skin picking or excessive mirror checking. These behaviors are strikingly similar to the pathological patterns observed in exfoliative disorders, such as dermatillomania, and body-focused repetitive behaviors (BFRBs).[32,33] This finding broadens the scope of existing research by demonstrating that chronic skin conditions not only trigger significant psychological distress but also contribute to the development of behavioral pathologies. As emphasized by Carniciu et al, the psychological impact of dermatological conditions is profound, with diseases like acne leading to

increased emotional distress, maladaptive coping mechanisms, and psychiatric comorbidities.[34] Furthermore, Steinhoff et al highlight the bidirectional relationship between skin conditions and mental health, noting that conditions like acne exacerbate psychological issues, creating a vicious cycle of distress and behavioral manifestations.[35] Both studies underline the importance of an integrated approach to patient care that addresses both dermatological and psychological aspects to improve overall treatment outcomes. These maladaptive behaviors are often attempts by patients to regulate emotional distress through physical control, but they tend to worsen scarring and further exacerbate psychological turmoil.[35] Similar maladaptive coping strategies have been documented in other chronic conditions, such as cardiovascular diseases, where uncertainty is linked to higher rates of depression.[36,37] These findings emphasize the applicability of Mishel's Uncertainty in Illness Theory (UIT) beyond life-threatening diseases, extending to chronic and aesthetically impactful skin conditions. As shown by Skojec et al, individuals with chronic diseases often experience heightened uncertainty, which in turn affects their psychological adaptation to the illness. This study reinforces the critical role of uncertainty in the psychological adjustment of patients with atrophic scars. Skojec et al note that the appraisal of uncertainty and the coping strategies employed are key factors influencing how patients psychologically adapt to chronic diseases, including dermatological conditions.[14] This aligns with the perspective of Gibson et al, who advocate for expanding UIT to include non-life-threatening chronic conditions, asserting that the psychological effects of uncertainty are significant not only in severe or life-threatening diseases but also in conditions like acne scarring.[38]

The Sociopsychological Impact of Appearance-Related Stigma

The findings of this study suggest that atrophic scarring, a complex and chronic condition, stands out from other chronic diseases due to its visible nature. Patients frequently experience social scrutiny because of their altered appearance, leading to negative emotions such as anxiety and fear, and in some cases, self-stigmatization. For example, some patients report feeling that "not wearing a mask is like being naked". This observation aligns with Goffman's (1963) stigma theory, which posits that individuals with visible conditions often face social exclusion and internalized stigma.[39,40]

In China, where fair and smooth skin is traditionally idealized as a symbol of health and social status, the psychological burden associated with acne scarring may be exacerbated by cultural beauty norms. Research within East Asian populations has shown that skin imperfections are often perceived as deviations from societal expectations, leading to heightened self-consciousness and internalized stigma.[41–43] Goffman's stigma theory provides a useful framework for understanding these experiences,[44] especially within the context of collectivist cultures such as China, where group harmony and conformity are emphasized.[45]

This issue is particularly pronounced among young people, who are at a critical stage of life characterized by heightened self-esteem and sensitivity to social judgment. Visible skin conditions can amplify their fear of social exclusion and discrimination, making them reluctant to discuss their condition with others, which further contributes to the sense of stigma surrounding their scars.[46] Specifically, studies targeting adolescents with atrophic scarring have found a significant positive correlation between stigma and social anxiety, particularly in female patients, who are more likely to avoid social activities due to concerns about their appearance.[47,48]

Furthermore, this study identified that "shame triggered by others' gazes", such as the feeling of being stared at by colleagues or peers due to acne scars, aligns with the concept of "fear of being watched" discussed in dermatology-related quality-of-life studies.[49] Based on these findings, it is crucial for medical staff to monitor patients' psychological well-being, encouraging them to express their true feelings and offering appropriate psychological counseling when needed. Group psychological interventions, such as the "support groups for individuals with atrophic scarring" mentioned in this study, can significantly reduce the sense of stigma among patients.[50,51] Such interventions foster mutual understanding and emotional support, which are key in helping individuals cope with the psychological burden associated with their condition.

The Need for Personalized Care and Long-Term Management

The study reveals a polarization in coping strategies among patients with atrophic acne scarring. While some adopt proactive measures, such as seeking professional help or engaging in scientific self-management, others resort to maladaptive behaviors like medication hoarding or compulsive skin picking. The study reveals a polarization in coping

strategies among patients with atrophic acne scarring. While some individuals adopt proactive approaches, such as seeking professional help or engaging in scientifically-backed self-management, others resort to maladaptive behaviors, including medication hoarding or compulsive skin picking. This divergence in coping strategies appears to be linked to varying levels of health literacy, psychological resilience, and patient empowerment. Previous research, such as that by Schilling (2024), emphasized the importance of patient empowerment in managing chronic conditions, underscoring that patients who are equipped with knowledge and self-management skills tend to achieve better health outcomes.[52] This finding aligns with studies on chronic disease self-management, which suggest that perceived social support, psychological resilience, and health empowerment play key roles in how patients cope with long-term health issues. For example, a recent study by Lin et al (2023) found that perceived social support not only has a direct positive impact on chronic disease management but also works through mediating factors such as psychological resilience and health empowerment. These pathways help explain why some patients with atrophic acne scarring are more engaged with their treatment and tend to have more positive psychological outcomes. They tend to seek information, build resilience, and feel empowered to manage their condition.[53]

Moreover, the findings from a pilot study on the Chronic Disease Self-Management Programme (CDSMP) in Moldova further support this connection. In the study, patients who participated in the program showed a significant increase in self-efficacy, along with improved knowledge on managing chronic diseases. This increase in empowerment resulted in higher satisfaction rates with the intervention, with 96% of participants reporting positive outcomes.[54] The success of such programs indicates that structured interventions that promote knowledge, self-efficacy, and empowerment can lead to better self-management and psychological resilience, both of which are critical in coping with chronic conditions, including acne scarring.

In contrast, patients who engage in maladaptive behaviors, such as avoiding professional help or relying on non-expert advice, often struggle with managing their condition effectively. These behaviors are commonly associated with lower health literacy and insufficient psychological support.[55] This highlights the importance of not only improving individual knowledge and resilience but also ensuring that patients have access to appropriate social support, which can bridge the gap between maladaptive behaviors and more effective self-management strategies.

The study supports the notion that patient empowerment—fostered by psychological resilience, health literacy, and social support—plays a pivotal role in chronic disease management. Patients who engage with their treatment and seek reliable information tend to show better psychological outcomes and manage their conditions more effectively, which is consistent with the principles outlined in chronic disease self-management frameworks.

Additionally, patients in this study described avoiding social interactions or using concealing strategies (eg, heavy makeup) to manage appearance-related anxiety. These behaviors are similar to the "camouflaging" patterns observed in Body Dysmorphic Disorder, highlighting the need for clinicians to screen for comorbid psychological conditions.[56,57]

To better assist patients in managing their disease, medical staff can offer phased guidance.[58] During the acute phase, the focus should be on symptom control and uncertainty reduction, such as specifying the medication's onset time. In the chronic phase, helping patients develop adaptive strategies like mindfulness - based stress reduction is crucial. Additionally, By equipping patients with accurate information and self-management tools, healthcare providers can enhance treatment adherence and reduce uncertainty.[59] For example, digital health platforms, such as specialized mobile applications for scar management, could provide patients with real-time feedback and personalized guidance.[60]

Study Limitations and Future Directions

This study has several limitations that should be acknowledged. First, the sample size was relatively small and recruited from a single tertiary hospital in Henan Province, China, which may limit the generalizability of the findings to broader populations with diverse cultural and geographical backgrounds. The purposive sampling method, while appropriate for qualitative research, may have introduced selection bias, as participants who were more willing to share their psychological experiences may have different coping styles than those who declined to participate.

Second, as the study relied on self-reported data obtained through interviews, the findings are subject to recall bias and social desirability bias. Participants might have underreported or overemphasized certain emotional responses or

coping behaviors. In addition, because the interviews were conducted at a single point in time, they may not fully capture the dynamic and evolving nature of psychological adjustment over the course of the illness.

Third, while the application of uncertainty in illness theory provided a useful framework for understanding the emotional and cognitive responses of patients, the study did not quantitatively measure levels of uncertainty, emotional distress, or psychological adaptation, which could limit the depth of theoretical application and comparative analysis across participants.

Future studies could address these limitations by employing longitudinal qualitative or mixed-method designs to explore changes in patients' psychological experiences over time. Including participants from multiple healthcare settings and regions would enhance the transferability of the results. Furthermore, integrating standardized psychological assessment tools to quantitatively evaluate illness uncertainty, depression, anxiety, or quality of life may offer a more comprehensive understanding of the psychosocial burden associated with atrophic acne scarring. Expanding research to include family members or caregivers may also provide insights into the broader social impact and support mechanisms surrounding patients.

Conclusion

This study provides a comprehensive insight into the psychological journey of patients with atrophic acne scarring, revealing four key stages: initial confusion/denial, acute anxiety/shame, adaptive coping, and eventual adjustment. The central theme of illness-related uncertainty profoundly impacted patients' emotional well-being, cognitive biases, and behavioral responses. While some patients experienced post-traumatic growth, many faced delayed psychological adaptation despite efforts to cope with the condition.

The findings highlight the necessity for a holistic biopsychosocial approach to care, which addresses not only the physical aspects of acne scarring but also the psychological challenges. Specifically, there is a critical need to bridge informational gaps, provide support for maladaptive coping strategies, and promote resilience-building interventions.

For future research, it is essential to explore long-term patterns of uncertainty and evaluate targeted interventions aimed at mitigating its effects. A better understanding of the dual physical-psychological nature of acne scarring will ultimately improve patient-centered care, ensuring that both the emotional and physical needs of patients are addressed.

Data Sharing Statement

The data generated, analyzed, and reported in this study are not publicly available because of the privacy of the participants. For further information on the data, simplified, de-identified data can be obtained by contacting the corresponding author.

Ethical Approval and Consent to Participate

The Ethics Committee of the Third People's Hospital of Henan Province approved the ethical approval of the study (ethical number:2025SZSYLCYJ0501) and concluded that the study was conducted in accordance with the hospital's guidelines for ethical and privacy considerations. The authors declare that all procedures of this study were in accordance with the ethical standards of the relevant national and institutional human experimentation committees, as well as the Declaration of Helsinki (1975, revised 2008). Participants signed an informed consent form prior to participation.

Consent for Publication

All authors have provided consent for publication.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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The authors declare that they have no competing interests.

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