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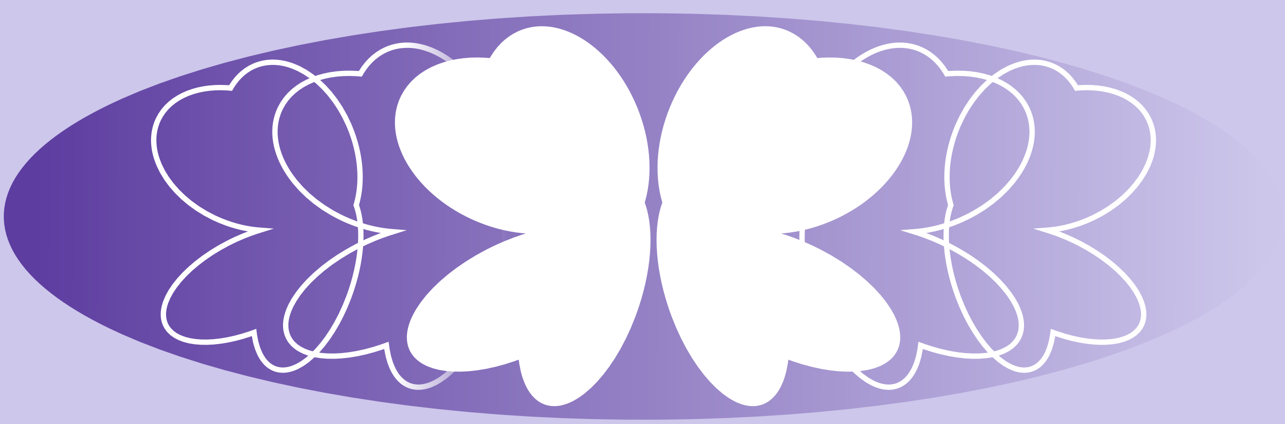
The Role of AI in Chronic Illness Care:

Designing a Companion for Women with Lupus in Latin America



Master Thesis
School of Design
Msc. in Digital and Interaction Design

Author: Lina Useche
Supervisor: Prof. Marzia Mortati
Matriculation: 216245 | ID: 10878509
Academic year: 2024-2025

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Abstract EN

Systemic lupus erythematosus (SLE) disproportionately affects women and presents complex psychosocial and clinical challenges worldwide. In Latin America, as in many regions, patients often navigate heterogeneous healthcare systems, varying levels of specialist access, and cultural attitudes that can influence how illness is perceived and managed. This thesis investigates how an AI-driven conversational companion—Aliada—can foster emotional resilience, self-efficacy, and informed decision-making for Latin American women living with lupus, even when ethical guidelines and privacy protections called for an indirect research approach without involving patients directly. Grounded in indirect research methods, expert interviews, and co-design workshops with clinicians, psychologists, and patient-advocates, the study blends behavioral science frameworks (Theory of Planned Behavior, Narrative Theory, Transactional Model of Stress and Coping) with speculative design to prototype an empathetic, culturally attuned digital ally. The resulting design principles emphasize proxy-based empathy, bias mitigation, language equity, and privacy-preserving on-device AI. By articulating a replicable methodology and an ethical AI design framework, this work contributes to the broader discourse on inclusive digital health, demonstrating that meaningful, patient-centered innovation is possible even in contexts of limited direct access to end users.

Abstract IT

Il lupus eritematoso sistemico (LES) colpisce in modo sproporzionato le donne e presenta sfide psicosociali e cliniche complesse a livello globale. In America Latina, come in molte altre regioni, le pazienti si confrontano con sistemi sanitari eterogenei, diversi livelli di accesso agli specialisti e atteggiamenti culturali che possono influenzare la percezione e la gestione della malattia. Questa tesi esplora come un compagno conversazionale basato su intelligenza artificiale—Aliada—possa promuovere resilienza emotiva, auto-efficacia e decisioni informate per le donne latinoamericane affette da lupus, anche quando linee guida etiche e norme sulla protezione dei dati richiedono un approccio di ricerca indiretto senza coinvolgimento diretto delle pazienti. Attraverso metodi di ricerca indiretti, interviste a esperti e workshop di co-design con medici, psicologi e attivisti, lo studio integra modelli delle scienze comportamentali (Teoria del Comportamento Pianificato, Teoria Narrativa, Modello Transazionale di Stress e Coping) con il design speculativo, per prototipare un alleato digitale empatico e culturalmente sensibile. I principi progettuali emersi enfatizzano l'empatia mediata da proxy, la mitigazione dei bias, l'equità linguistica e la tutela della privacy tramite intelligenza artificiale locale (on-device). Articolando una metodologia replicabile e un quadro etico per il design di AI, questo lavoro contribuisce al dibattito sull'healthcare digitale inclusivo, dimostrando che è possibile innovare in modo significativo e centrato sulla persona anche in contesti con accesso diretto limitato agli utenti finali.

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INTRODUCTION

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People's perceptions of time, identity, and care are significantly altered by chronic illness. These changes are made more difficult for Latin American women with lupus by disparities in access to diagnosis and treatment, social stigma, and healthcare disparities. The lived realities of these women are frequently overlooked in the design of digital health tools, despite the growing awareness of the need for patient-centered and culturally sensitive healthcare interventions. Without requiring continuous access to clinical infrastructure or direct patient data, this thesis investigates how artificial intelligence (AI) might promote emotional resilience, self-efficacy, and agency in the treatment of chronic illnesses.

The motivation behind this research emerges from an ethical and logistical constraint: the inability to engage directly with patients due to legal and institutional barriers. Rather than viewing this as a limitation, the thesis embraces it as an opportunity to reimagine how designers can empathize and intervene through proxies—by listening to experts, reviewing adjacent patient narratives, and grounding design in behavioral science frameworks. It aims to generate a meaningful contribution to both the fields of digital health and AI design by centering a group that is often left at the margins of both: Latin American women living with autoimmune diseases.

Specifically, this thesis focuses on systemic lupus erythematosus (SLE), a chronic autoimmune condition that disproportionately affects women and presents complex physical and emotional challenges. In Latin America, limited awareness of the disease and fragmented care systems result in delayed diagnoses, emotional distress, and poor continuity of care. By exploring how AI might act not just as a tool, but as a companion or ally—offering conversational support, personalized insights, or emotional scaffolding—this work proposes an intervention rooted in empathy, agency, and accessibility.

The core research question guiding this project is:

How can we design AI-driven interventions that support emotional resilience, perceived control, and self-efficacy in Latin American women living with lupus, while addressing ethical barriers to direct participation?

To explore this question, the thesis sets out to:

» Investigate indirect research methods and proxy-based empathy as valid tools in chronic illness design.

» Apply behavioral science frameworks (such as the Theory of Planned Behavior and Narrative Theory) to AI-driven health interventions.

» Conduct expert interviews and co-design sessions to identify core needs, values, and concerns related to lupus care.

» Prototype an AI companion that embodies ethical sensitivity, emotional intelligence, and cultural grounding.

Rather than proposing a definitive product, this thesis develops a speculative yet practical framework for designing with care, distance, and dignity. In doing so, it aims to contribute to the growing discourse on AI for health, particularly for underserved populations navigating invisible illness in resource-constrained contexts.

AUTOIMMUNE DISEASE, MENTAL HEALTH AND AI-BASED SOLUTIONS: A LITERATURE REVIEW

2

2.1. Introduction

Autoimmune diseases occur when the immune system attacks healthy cells, tissues, or organs, mistaking them for foreign threats. Currently, these diseases are estimated to affect between 8% (Conrad et al., 2023; Fairweather & Rose, 2004) and 20% of the global population (Cervera, 2001), with projections indicating significant increases in prevalence due to factors such as population growth, aging, and enhanced diagnostic tools.

Historically, diagnosing autoimmune diseases has been complex and time-consuming, often taking several years due to their diverse manifestations across types of diseases and from patient to patient. This lengthy diagnostic process can severely impact patients' quality of life and delay necessary treatment. However, recent advancements in classification methods, a deeper understanding of autoimmune conditions, and the integration of artificial intelligence (AI) into diagnostic practices are beginning to change this landscape (Davenport & Kalakota, 2019).

Despite these improvements, challenges persist, particularly for patients who face diagnosis delays, many questions, and uncertainty regarding their diagnoses and management (Kodali et al., 2024). This literature review aims to explore the relationship between autoimmune diseases and mental health surrounding the diagnostic process. Specifically, it seeks to identify current gaps and opportunities for integrating AI-assisted products and services to support newly diagnosed autoimmune patients. The review will also focus on the interplay between autoimmune diseases, mental health, and demographic disparities.

2.2. Thematic Sections

The following are common themes identified during the literature review, articulating topics of interest for the present research. The topics are presented from a broader perspective regarding autoimmune disease and mental helath to a narrower one, reaching literature about AI application on healthcare and current design solutions in healthcare relevant to this research.

2.2.1. Incidence and Global Challenges in Autoimmune Disorders

Understanding the global incidence of autoimmune diseases is a complex task, mostly due to varying healthcare access across regions and cultures. Back in 2000, Cervera found that more than 20% of the world's population is affected by autoimmune diseases, with similar prevalence across different economies. However, they pointed out that a big limitation in studying these diseases was the lack of robust diagnostic tools, especially in less developed healthcare systems.

Fast forward to 2021, a study by Barber et al. (2021) on Systemic Lupus Erythematosus (SLE) highlighted significant differences in how common SLE is depending on factors like population demographics, environmental factors, and economic conditions. This study emphasized the need for public health approaches that are tailored to the unique challenges faced by different populations when diagnosing and managing SLE. Interestingly, from 2016 to 2021, several studies consulted by Barber et al. (2021) found a direct link between better care and lower mortality rates in SLE patients, showing that quality healthcare management is a critical factor in improving outcomes.

In recent years, increasing research has focused on improving diagnosis and treatment, which remain key challenges in managing autoimmune diseases worldwide. Miller (2022) and Rowland (2023) propose that a collaborative approach involving multiple healthcare professionals is needed to better understand and manage these conditions. They also emphasize the importance of diagnostic innovation and personalized treatment tailored to each patient's needs.

However, significant gaps remain, particularly in regions such as Africa and Australasia, where autoimmune diseases are still underreported (Barber et al., 2021). Furthermore, there is a persistent lack of research linking lifestyle and environmental factors to autoimmune conditions. Gender and ethnic disparities continue to be pressing issues, with women being disproportionately affected (Rowland, 2023), and the prevalence of autoimmunity varying substantially across regions (Tian et al., 2022).

The Role of AI in Autoimmune Disease Diagnosis

In recent years, artificial intelligence (AI) has started playing a significant role in improving how we diagnose and manage autoimmune diseases. AI models are helping predict the likelihood of developing conditions like SLE by analyzing genetic and clinical data, and personalizing treatment based on individual patient profiles. According to recent studies from 2020 to 2024, these AI systems are becoming more efficient at diagnosing earlier and providing more tailored care. AI is also helping to identify disease subtypes and optimize (Stafford et al., 2020; Sattar et al., 2024).

2.2.2 Autoimmune Diseases and Mental Health in Patients

Although the connection between mental health and autoimmune diseases has been underreported for years, more recent research is starting to focus on this relationship. In 2016, Pryce and Fontana (2016) opened the discussion on the correlation between autoimmunity and mental health issues, finding that over 50% of autoimmune patients experience symptoms of depression, which significantly impacts their quality of life. They also suggested that this might be due to an increase in cytokines, autoantibodies, and complement factors that could affect neuronal activity, potentially explaining fatigue and depression-like symptoms.

More recent studies have identified genetic predispositions and environmental triggers, such as infections, that can increase the risk of mental health disorders in individuals with autoimmune conditions (Ankur et al., 2024; Orlovska-Waast & Benros, 2020). In particular, Orlovska-Waast & Benros note that the relationship between infections, autoimmune diseases, and mental health is bidirectional. In other words, while autoimmune diseases and infections can lead to mental health issues, pre-existing cognitive disorders may also heighten the risk of developing physical health conditions.

Ankur et al. (2024) further highlight that the immunological pathways involved in autoimmune diseases may influence psychotic disorders, particularly in conditions like multiple sclerosis and lupus, where neuropsychiatric symptoms—including psychosis—are more common compared to healthy individuals. This connection is vital for understanding the comorbidity between autoimmune and mental health disorders, stressing the importance of including mental health as part of treatment plans (Ankur et al., 2024).

According to the National Institute of Environmental Health Sciences (n.d.), more than 80 autoimmune diseases are currently recognized. However, research efforts remain disproportionately focused on conditions like rheumatoid arthritis, systemic lupus erythematosus (SLE), psoriasis, and multiple sclerosis, leaving other autoimmune disorders understudied.

Nevertheless, the incidence of mental health issues among autoimmune patients remains consistently high across different conditions. For example, SLE is one of the most well-documented autoimmune diseases with psychiatric consequences, with research dating back to 1993 (Wekking, 1993). Recent studies indicate that up to 39% of SLE patients experience symptoms of depression, and 24% deal with anxiety disorders (Meszaros et al., 2012).

Notably, the psychological reaction of patients to living with a chronic illness has been identified as another factor contributing to anxiety and depression, beyond the purely biological causes (Meszaros et al., 2012). This highlights that the mental health of SLE patients is not only affected by biological factors but also by their emotional responses to coping with their illness. These symptoms are prevalent across all age groups, with 20% of pediatric SLE patients showing signs of depression and 22% exhibiting anxiety symptoms (Knight et al., 2014). This raises concerns about the need for more tailored treatment approaches, especially for vulnerable groups like children.

A recurring finding in several studies is the negative impact of depressive symptoms on SLE patients' ability to stick to their treatment plans (Heiman et al., 2018). Treatment adherence is influenced by multiple factors, including age, gender, and race, which can either improve or hinder consistency. This topic will be explored further in section 2.3. Knight et al. (2014) note that only 24% of patients have been involved in mental health consultations or screenings, highlighting a significant gap in treatment (Heiman et al., 2018). This is echoed by Heiman et al. (2018) who emphasize the need for integrated care models that combine mental health support with chronic disease management.

While these studies offer several hypotheses about the link between autoimmune diseases and mental health, much remains unknown about this relationship. Moving forward, the focus needs to shift towards healthcare programs that address both physical and mental health challenges, which could lead to a better understanding of the connection between autoimmune and psychological disorders.

2.2.3 Gender and Racial Disparities in Autoimmune Diseases

Disparities in health and healthcare access, according to Davis et al. (2021) are "health differences linked with economic, social, and environmental disadvantage" which in the current context represent one of the crucial limiting factors for providing equal and fair treatments, especially in complex diseases. Some theories, that will be presented in the following paragraphs, explain that it might not be a biologically-specific reason for disparities in the autoimmune diseases group, but it might be a multilevel issue.

Gender disparities in autoimmune patients have been recognized for nearly two decades. In 2004, Feather and Rose reported that autoimmune diseases are significantly more prevalent in women, with estimates indicating that approximately 78.8% of individuals affected by these conditions are female. This statistic highlights the substantial gender imbalance in the incidence of autoimmune diseases (Fairweather & Rose, 2004). Two years later, in 2006, Lockshin explored the varying female-to-male ratios in autoimmune diseases, ranging from 10:1 to 1:3. This finding demonstrates the complexity of sex differences in disease prevalence and severity (Lockshin, 2006). While women are more frequently affected, both studies suggests that the severity of these diseases doesn't significantly differ between sexes, where, in some cases, men experience a more intense manifestation of diseases.

Several hypotheses are trying to articulate the reasons for the prevalence of autoimmunity in females. In some cases, the prevalence is explained by hormonal factors where sex hormones, such as estrogen and progesterone, could be crucial for explaining the immune response difference among genders (Fairweather & Rose, 2004). Other approaches are multifactoral, in which hormonal and environmental factors in conjunction with life stages and specific vulnerabilities during these periods, could create a scenario where autoimmune disorders can onset and progress (Lockshin, 2006).

Some recent studies addressing the different disparities related to health and healthcare access have also noted the multifactoral and intersectional character of these issues. Davis et al. note that health disparities affect groups that have faced systemic obstacles to health, such as racial minorities. Under this scenario, the authors propose concrete actions to tackle disparities such as improving specialty care through telemedicine, implementing cross-cultural training to reduce bias, include underserved patients in research processes and recruiting healthcare provider from underrepresented groups (Davis et al., 2021).

As explained in previous chapters, the intrinsic variability of autoimmune disorders makes it challenging to obtain a comprehensive overview of their disparities. However, in 2021, Amezcua et al. established a relationship between Social Determinants of Health (SDH) and Multiple Sclerosis (MS) prevalence in African American males. Their research indicates that Black individuals have a higher risk of developing MS and neuromyelitis optica spectrum disorder (NMOSD) compared to their White counterparts. This increased risk represents a critical aspect of health disparities that needs addressing (Amezcua et al., 2021).

Social determinants of health—such as income, education, and health literacy—significantly influence health outcomes. The review highlights that these factors contribute to the disparities observed in MS among Black individuals. For instance, lower income and education levels are associated with greater health disparities in MS. Moreover, the review notes that individuals with lower health literacy and negative perceptions of their illness experience worse health outcomes. This suggests that SDH not only affects access to care but also shapes how individuals understand and manage their health conditions, further exacerbating disparities in MS in this specific study (Amezcua et al., 2021).

Outlining the connection between autoimmune disease prevalence, ethnic groups, and social inequities that exacerbate disparities remains challenging. This relationship becomes even more complex when considering belief systems and moral values. Kumar et al.'s 2009 study, "Challenges of ethnicity in SLE," extensively documented how patients' ethnic backgrounds significantly influence their beliefs and perceptions about SLE and its treatment. Understanding these beliefs is crucial for improving patient adherence and overall outcomes (Kumar et al., 2009).

The authors highlight that medication adherence varies among ethnic groups. For example, studies have shown that African Americans may have lower adherence rates compared to their white counterparts, suggesting that cultural factors play a role in treatment compliance. The paper also explores how socioeconomic factors and healthcare access can affect SLE outcomes across different ethnic groups. It proposes that equal access to education and healthcare could help mitigate some of the observed disparities in disease outcomes.

A 2020 study by Sun et al. (2020) provided further insights into racial disparities in medication adherence among SLE patients. The research revealed that African American patients had notably lower adherence rates (30%) compared to their Caucasian counterparts (51%). The study explored various contributing factors, finding that for African Americans, low adherence was associated with perceived negative healthcare provider interactions and higher levels of anxiety. In contrast, Caucasians' low adherence was primarily linked to medication burden and fibromyalgia pain scores.

The study's robust methodology, which included cross-sectional data collection and comprehensive adherence measurements, lends credibility to its findings. These results have important implications for interventions, suggesting that strategies to improve medication adherence should be tailored by race. For instance, focusing on enhancing patient-provider interactions and addressing mental health issues could be particularly effective for African American patients (Sun et al., 2020).

By identifying and analyzing these disparities, the study makes a valuable contribution to the broader discourse on health equity. It underscores the need for targeted strategies to address the unique challenges faced by different racial groups in managing chronic conditions like SLE, ultimately aiming to improve health outcomes for all patients.

[Here I'd like to also include a study I found about autoimmune diseases in transgender people that initiate hormonal treatment]

2.2.4 AI in Healthcare: Solutions and Approaches

Over the past couple of years, there has been an exponential increase in the number of studies and reviews on the application of Artificial Intelligence in the healthcare field. Just in 2024 alone, there has been published more than 1500 studies in this field. Artificial Intelligence (AI) is transforming the healthcare landscape, bringing significant improvements in diagnostics and treatment planning. In diagnostics, AI has started to play a key role by enhancing imaging and pathology techniques, leading to earlier and more accurate detection of diseases (Kalra et al., 2024; Shang et al., 2024). Machine learning algorithms are also utilized to analyze Electronic Health Records (EHR), assisting clinicians with data-driven decision-making, which helps in optimizing patient care (Kalra et al., 2024).

AI's impact extends to surgical innovations, where robotic systems driven by AI are revolutionizing procedures by increasing precision and improving patient outcomes (Shang et al., 2024). In emergency care, AI applications include real-time predictive models that identify clinical deterioration, along with symptom checkers that aid in urgent care situations (Kachman et al., 2024). The potential for AI in healthcare is immense, with the market projected to grow to $188 billion by 2030, contributing significantly to economies like India's (Kalra et al., 2024). As AI continues to evolve, generative AI is expected to unlock new possibilities in diagnosis and treatment through advanced data insights (Moulaei et al., 2024).

However, the integration of AI in healthcare isn't without its challenges. Concerns around data privacy, ethical implications, and the reliability of AI-generated outcomes need to be addressed to ensure the technology can be effectively and safely implemented in healthcare settings (Shang et al., 2024; Kachman et al., 2024). Overcoming these hurdles is crucial for AI to fully realize its potential in improving patient care and enhancing the efficiency of healthcare systems.

More specifically, Artificial Intelligence (AI) applications have been explored in the autoimmune field, primarily focusing on diagnosis and healthcare professional support. Regarding autoimmune disorders, AI is offering significant advancements in diagnosis, treatment, and clinical decision support. Machine learning (ML) techniques have been particularly impactful, as stated in the studies by Stafford et al. (2020), where ML models, such as support vector machines and random forests, can identify patterns in clinical and genetic data, enhancing diagnostic accuracy for conditions like multiple sclerosis (MS), rheumatoid arthritis (RA), and inflammatory bowel disease (IBD). These models show promise in improving personalized care, helping clinicians predict patient outcomes based on individual data (Stafford et al., 2020). Another review highlights state-of-the-art AI applications for diagnosing autoimmune diseases like systemic lupus erythematosus (SLE) and RA, where AI systems can distinguish between overlapping conditions and aid in early diagnosis (Danieli et al., 2024).

Despite these advances, current AI applications in autoimmune care face limitations. A key challenge is the need for external validation and consistent access to diverse, high-quality datasets. Many studies need help with cross-validation, and only some combine clinical and genetic data for comprehensive analysis. Moreover, most AI solutions are designed to support clinicians, focusing on diagnostics and treatment planning, rather than being patient-facing systems (Stafford et al., 2020)(Danieli et al., 2024). This highlights a significant gap in AI-driven tools designed to directly assist autoimmune patients in managing their conditions, such as symptom tracking, self-management, or improving treatment adherence.

Recent studies on chatbots in healthcare highlight their emerging role in assisting healthcare professionals. In a study done by Daza et al. (2024), in autoimmune liver diseases, chatbots like Claude show potential as decision-support tools for primary care physicians, guiding them through complex diagnostic and therapeutic questions, especially in regions with limited access to specialists. However, chatbots have limitations, including occasional inaccuracies when recommending treatments or interpreting clinical guidelines. Real-time data-enabled chatbots like Microsoft Copilot and Google Bard did not outperform pre-trained models, suggesting that even chatbots need refinement to provide context-specific, accurate advice. While chatbots excel in clinician support, their potential as patient-facing tools remains underdeveloped, reinforcing the lack of AI systems that directly benefit autoimmune patients.

A major research gap is the need for AI tools tailored for patient empowerment and treatment management in autoimmune disease control. Current AI applications predominantly serve clinicians by improving diagnostics, surgical precision, or administrative efficiency, as outlined in the review by Davenport and Kalakota (2019). However, there is a clear need for AI solutions that enable patients to take a more active role in managing their health. This could include AI-powered chatbots that help patients monitor symptoms, manage medication schedules, or access personalized health information. Addressing this gap would not only improve patient engagement, based on relevant gaps identified in the previous sections, but also contribute to better health outcomes by supporting treatment adherence and fostering timely communication between patients and healthcare providers (Davenport and Kalakota, 2019).

2.2.5 Product/Service Design in Healthcare: Existing solutions or technologies for patient support

In recent years, Artificial Intelligence (AI) has seen widespread application in healthcare, particularly for diagnostic support, treatment planning, and operational efficiency. However, the use of AI specifically to support patient self-management and personalized care, especially for chronic and autoimmune conditions, remains limited. Haleem et al. (2024) highlight the potential of AI-driven systems like ChatGPT to improve patient interactions and satisfaction through personalized, round-the-clock communication. This technology helps alleviate the burden on healthcare providers by addressing patient inquiries directly, improving access to information, and enhancing patient satisfaction. Despite these advances, current AI solutions still lack specificity and accuracy in real-world healthcare scenarios, as many chatbot applications struggle to offer detailed, context-sensitive guidance(Haleem et al. 2024).

Furthermore, Negash and Calahorrano (2023) emphasize the role of smart product-service systems (PSS) in managing chronic health conditions. Their study highlights the integration of wearable technology and mobile applications that collect patient data to support self-management. Although these tools are promising for continuous monitoring and real-time insights, the authors note that existing applications focus more on data collection and less on direct, actionable feedback for patients, limiting their effectiveness as self-management tools. This gap suggests a need for AI-driven PSS that provide personalized, real-time recommendations to help patients manage complex chronic conditions autonomously (Negash & Calahorrano, 2023).

Another dimension in patient-centered AI tools is the emphasis on patient-generated health data (PGHD), as noted by Folkvord et al. (2024). Their research suggests that PGHD has the potential to transform healthcare by centering the patient's role in monitoring and managing their own health. However, while PGHD applications are being integrated into value-based healthcare, there remains a gap in developing AI systems that can actively analyze and provide individualized feedback to patients based on their generated health data. This limitation underscores a broader issue: most current AI solutions still prioritize clinical utility over patient-facing applications that could support autonomy in managing chronic or autoimmune conditions(Folkvord et al. 2024).

In the market, several products address patient needs with varying levels of AI integration, though gaps remain in fully patient-centric AI applications. **Somethings** is a tele-behavioral health platform aimed at teenagers, offering access to mental health resources through telehealth. Although it does not employ AI, its design prioritizes patient-centered care by connecting teens with mentors and clinical providers. This platform demonstrates a commitment to tailored, accessible healthcare, though the absence of AI limits scalability and adaptability.

Conversely, **Superpower** is a beta-phase healthcare service aiming to use AI to provide accurate, personalized healthcare. The platform's focus on integrating with existing healthcare systems could enhance accessibility and user engagement, particularly by offering holistic health insights. However, as Superpower is still in development, its real-world efficacy and patient-centric application of AI are yet to be fully validated.

Prealize Health employs AI-driven predictive analytics primarily for healthcare providers, aiming to shift care from reactive to proactive. While impactful in preventive health, its application is provider-focused rather than directly empowering patients. Similarly, **Omada Health** provides AI-supported, virtual-first care for chronic diseases like diabetes and hypertension. Although Omada combines behavior science with clinical protocols for long-term health improvements, its design prioritizes outcomes like cost reduction and clinical efficacy rather than active patient autonomy.

AI products focused on healthcare infrastructure, such as **Suki.ai** and **Klara.com**, further illustrate this trend. These platforms streamline patient interactions and communications to enhance clinical workflows, yet they leave the question of patient empowerment largely unaddressed. **Curai Health**, on the other hand, delivers primary care through AI-driven virtual clinics, bridging patient care and cost efficiency. Curai Health's model, combining clinical expertise with AI support, represents a step toward accessible, continuous patient engagement, though it remains heavily reliant on specialist input rather than enabling patient self-management.

Overall, while these solutions showcase AI's transformative potential in healthcare, they underscore a key gap: a lack of fully autonomous, patient-centered

AI tools designed specifically for chronic and autoimmune conditions. This gap may stem from ethical and regulatory concerns, as developing patient-facing AI involves balancing accuracy with the need for transparency and user agency. Addressing this could be essential to advancing AI in healthcare, moving beyond provider-centric applications to support empowered, proactive patient roles in chronic disease management.

2.3.Gaps in Research and Design Opportunities

The review reveals several gaps in the current research landscape of AI-based solutions for healthcare, particularly in patient-centered applications for chronic and autoimmune conditions. Firstly, while AI tools excel in supporting healthcare professionals with diagnosis, predictive analytics, and operational efficiencies, there needs to be more AI applications directly aimed at empowering patients to self-manage their health. Current tools predominantly focus on improving diagnostics, care pathways, and clinical support, with few solutions designed to assist patients independently in monitoring symptoms, managing medication adherence, or accessing personalized health insights. The gap remains relevant, especially for solutions integrating attention to physical and mental health, since the literature points out the need to start developing patient-centric care focused on enhancing mental health treatments in chronically ill patients.

Furthermore, disparities related to gender, race, and socioeconomic status exacerbate the limitations in AI-driven healthcare solutions. Studies show that autoimmune diseases disproportionately affect women and, in some cases, racial minorities. However, AI applications have not yet adequately addressed these disparities. Few AI models consider social determinants of health (SDH), such as income, access to care, and educational background, which directly impact health outcomes. Moreover, intersectional approaches that examine how factors like gender and race influence both disease presentation and patient experiences with healthcare are largely absent. Addressing these disparities within AI design—by including diverse datasets and adjusting for sociocultural factors—could create more equitable healthcare solutions.

Mental health considerations present another gap, especially as autoimmune diseases are strongly linked to psychological impacts, including anxiety, depression, and treatment adherence challenges. Current AI solutions rarely incorporate mental health as a central component, even though studies emphasize the importance of comprehensive care that includes mental and emotional well-being. Tools like chatbots, while promising, are primarily designed to support healthcare professionals rather than offering direct mental health support to patients. Developing AI tools that integrate mental health support alongside chronic disease management would improve quality of life and enhance adherence to treatments.

Another significant gap is the lack of integration between AI-driven patient support tools and existing healthcare systems. Although some emerging platforms, like Superpower and Curai Health, are making strides towards holistic care models that combine clinical expertise with AI-driven support, these solutions are still largely in development or heavily reliant on healthcare providers for direct implementation. This limited integration restricts patients' ability to independently access, understand, and apply health information, a gap that is particularly impactful for those managing chronic conditions requiring consistent self-care.

Ethical and regulatory considerations may further contribute to this gap. The challenges surrounding data privacy, transparency, and the potential biases in AI algorithms complicate the deployment of patient-centric AI solutions, especially in managing sensitive conditions like autoimmune diseases. Without clear frameworks for addressing these concerns, the implementation of autonomous, patient-centered AI systems remains a challenge. Addressing these limitations by advancing research on transparent, ethical, and privacy-compliant AI models for patient use could drive meaningful innovation in chronic disease management.

2.4.Design Principles for Healthcare: Theoretical foundations and design models relevant to chronic illness care

Designing effective healthcare solutions for chronic illness management requires a deep understanding of both theoretical design foundations and practical healthcare models. Theories such as Human-Centered Design (HCD) and participatory design emphasize the importance of integrating patient needs, lived experiences, and usability considerations into the development of healthcare interventions. These approaches have been instrumental in improving healthcare accessibility, adherence to treatment plans, and overall patient outcomes.

Additionally, behavioral theories such as the Health Belief Model, Social Cognitive Theory, and the Transtheoretical Model provide valuable frameworks for understanding patient motivation, adherence, and engagement with healthcare interventions. Ciccone et al. (2019) propose a systemic techno-behavioral approach, highlighting the need to integrate three key aspects: the current healthcare system, technological opportunities, and the behaviors of individuals involved in healthcare processes. This approach aligns with ecological models of health behavior, which emphasize the interaction between individual, social, and systemic factors in chronic illness management.

From a technological perspective, advancements in AI-driven tools have created opportunities for more personalized and adaptive patient support. However, as noted by research on smart health technologies (Cutler & McClellan, 2001; Patou & Maier, 2017), technology alone is insufficient in improving health outcomes. Instead, technology must be integrated within patient-centered frameworks that consider behavioral, psychological, and systemic factors to ensure effective and sustainable interventions.

However, existing healthcare design models primarily focus on clinician-oriented solutions rather than patient-centered innovations. Chronic illness management necessitates tools that empower patients, facilitating self-monitoring, symptom tracking, and mental health support. AI-driven tools have the potential to bridge this gap by offering personalized, adaptive, and culturally relevant interventions. Nonetheless, current AI solutions remain underdeveloped in addressing mental health support and gender- and culture-specific disparities within autoimmune disease care.

Given these gaps, this study seeks to explore how AI-assisted product and service design can be leveraged to support Latin American women with lupus. By focusing on patient empowerment, mental health integration, and culturally sensitive care, this research aims to propose an alternative approach to AI-driven chronic illness management that prioritizes user needs. This leads to the central research question: **How might AI-assisted product and service design support Latin American women with lupus in managing the physical and mental health challenges associated with the disease?**

2.5. Conclusions

This literature review highlights AI's potential in healthcare, showcasing its growing role in diagnostics, surgical support, predictive analytics, and, to a lesser extent, patient support. For autoimmune patients, AI has demonstrated efficacy in improving diagnostic accuracy and assisting healthcare providers with treatment planning. However, the review underscores a critical gap in the development of AI-driven tools tailored for patient empowerment and autonomous self-management. Existing solutions largely focus on clinical support rather than enabling patients to actively participate in managing their health.

In addition to the scarcity of patient-centered solutions, disparities in AI applications further hinder equitable healthcare delivery. Women and racial minorities, who are disproportionately affected by autoimmune diseases, often face unique barriers to diagnosis, treatment, and mental health support. Developing AI models that account for these disparities—by incorporating diverse data and focusing on social determinants of health—can promote a more inclusive healthcare system. Additionally, integrating mental health features into AI tools would address the psychological impacts associated with chronic illness, ultimately supporting better health outcomes.

Furthermore, this review highlights the importance of systemic techno-behavioral approaches in designing effective patient-centered interventions. As Ciccone et al. (2019) emphasize, healthcare solutions must account for the interplay between healthcare systems, technological advancements, and patient behavior. The integration of ecological models of health behavior further reinforces the need for holistic approaches that consider individual, social, and systemic factors in chronic illness management. AI-driven healthcare tools must be designed within this broader framework to ensure they support long-term patient engagement and well-being.

In summary, Incorporating more patient-centered AI solutions into the healthcare ecosystem could enhance autonomy and improve health outcomes, especially for chronic illness management. The current absence of such tools reflects both technological and regulatory challenges, emphasizing the need for research and development that prioritizes ethical considerations and patient privacy. Moving forward, developing robust, patient-facing AI tools that integrate with healthcare providers may help to bridge these gaps, ultimately contributing to a more holistic, patient-empowered healthcare model for chronic and autoimmune conditions.

METHODOLOGY

3

3.1. Introduction

This chapter outlines the methodological approach underpinning this research, which explores AI-driven interventions for chronic illness care with a specific focus on Latin American women diagnosed with lupus. Given the sensitivity, complexity, and ethical implications of chronic illness research—especially within underserved populations—this study adopts a hybrid methodology grounded in indirect research methods, behavioral science frameworks, and participatory design. Rather than relying solely on traditional fieldwork with patients, this approach leverages proxy perspectives (caregivers, advocates, and healthcare professionals), a synthesis of behavioral theories, and co-design processes to develop and evaluate a more inclusive and context-aware AI system.

The methodology is structured to reconcile the practical constraints of working with vulnerable populations while remaining deeply participatory and theory-informed. It integrates indirect data collection methods with human-centered design strategies and behavioral health models to better understand, design for, and ultimately support the real-world experiences of those managing long-term, complex conditions like lupus.

3.2. Indirect Research Approach: Navigating Access & Ethics

3.2.1 Challenges in Direct Patient Research

Researching chronic illness populations presents significant methodological and ethical challenges. For individuals living with autoimmune conditions like lupus, participation in traditional, in-person research can impose emotional and physical burdens that exacerbate health risks or interrupt treatment routines (Charmaz, 1991; Frank, 1995). Fluctuating symptoms, hospitalization cycles, and structural inequalities—particularly across Latin American health systems—further complicate sustained engagement (Jolly et al., 2014; Homedes & Ugalde, 2005). Ethical review boards often emphasize minimizing participant burden, necessitating alternative pathways to gather meaningful insight without compromising well-being (CIOMS, 2016).

These challenges are magnified by the episodic and unpredictable nature of autoimmune diseases like lupus, which can cause severe fatigue, pain, and cognitive impairment. Participation in fieldwork or longitudinal research studies may place undue stress on patients and risk triggering flares or disruptions in treatment. As a result, traditional research paradigms can unintentionally exclude the most vulnerable participants, leading to gaps in both data and impact.

3.2.2 Indirect Participant Sampling & Rationale

In response to these limitations, this study centers voices adjacent to the patient experience. Interviews and workshops were conducted with lupus caregivers, mental health professionals, advocates, and designers who specialize in chronic care. While these professionals often work across a range of conditions—including chronic pain, palliative care, and oncology—rheumatologists provided focused, disease-specific insight on lupus. Their input was instrumental in refining our framing of needs and challenges particular to autoimmune care, while others contributed broader cross-condition expertise on psychosocial care and health system navigation.

These participants provided critical, layered perspectives on emotional labor, medical trauma, and sociocultural dynamics—elements that patients themselves may struggle to articulate, especially when negotiating systemic distrust or precarious access to care. This choice is supported by participatory design and health humanities literature, which recognizes that those within a patient's care ecosystem are not only credible informants but also co-creators of care infrastructure (Greenhalgh et al., 2016; Asad & Fox, 2022). Their insights helped shape both the problem framing and the development of supportive tools.

3.2.3 Validity of Proxy Perspectives

While indirect, this method aligns with ethical and epistemological commitments in both design and healthcare research. Proxy perspectives can illuminate patterns of need and opportunity that may remain inaccessible or unsafe to explore through direct inquiry. Indirect methods also have precedent in feminist research methodologies, which emphasize relational knowledge and challenge hierarchical notions of expertise. In this way, the study maintains methodological rigor while prioritizing participant safety and inclusivity.

Through their proximity and long-term involvement, these intermediaries can provide behavioral, emotional, and logistical observations essential for designing AI-driven tools that feel supportive, intuitive, and attuned to the real complexities of patient life. These contributions go beyond anecdotal input—they help surface systemic patterns often invisible in clinical data. In parallel, this research integrates insights from behavioral science frameworks and evidence-based intervention models that have proven effective in chronic disease contexts. These theoretical foundations help compensate for the lack of direct patient involvement by grounding the study in validated, systemic understandings of patient motivation, psychological resilience, and behavior change. When combined with user-centered design methods and participatory design tools, the result is a multifactorial, patient-centric research process—even without continuous access to patients themselves.

3.3. Multi-Disciplinary Foundations

3.3.1 Behavioral Science in Chronic Illness Care

Behavioral science offers a critical lens for understanding the lived realities of chronic illness. Chronic conditions are deeply behavioral in nature—management relies on daily routines, long-term motivation, and complex decision-making often shaped by fluctuating symptoms and emotional states. For populations dealing with both medical and social precarity, behavioral models can surface key tensions between ideal care protocols and real-world capacities.

3.3.2 Why AI Needs Behavioral Grounding

Emerging AI applications in healthcare—particularly those intended for symptom tracking, care coordination, or emotional support—risk irrelevance or harm when built without an understanding of the behavioral contexts in which they operate. This is especially true in Latin America, where mobile-first health experiences intersect with infrastructural limitations and cultural specificities. By embedding behavioral science early in the AI design process, this research seeks to create systems that adapt meaningfully to patients' realities rather than impose technocratic assumptions.

3.3.3 Role of Design Research

Design research, especially when grounded in participatory and co-design methods, offers tools to bridge the gap between behavioral insight and technological implementation. It enables the translation of complex needs into usable, empathetic, and context-aware systems. In this project, design research methods such as workshops, speculative prototyping, and iterative sprints were used not only to co-create with stakeholders, but also to test behavioral hypotheses in situated ways.

3.4. Behavioral Science Frameworks for AI-Driven Chronic Illness Care

This section identifies key behavioral science frameworks that inform the development of AI-driven interventions tailored for lupus care. They also offer essential insights into patient behavior, motivation, emotional well-being, and systemic influences—components that are foundational to designing empathetic, culturally sensitive, and effective AI tools.

3.4.1 The Need for Integrated, Behaviorally-Informed AI Solutions

In recent years, there has been increasing interest in mobile health (mHealth) technologies that are immediate, adaptive, and patient-centric. As Deepthi et al. (2024) note, "managing chronic illnesses requires open communication between patients and healthcare providers, regular monitoring, medication adherence, and lifestyle adjustments." These processes are complex and long-term, and thus require solutions that can evolve alongside patients' journeys with their chronic conditions.

Mobile-first interventions are especially relevant in Latin America, where mobile usage is not only widespread but central to how people access health-related information and services. With 98% mobile signal coverage, 74% projected mobile penetration by 2025, and smartphones serving as the primary means of internet access across the region, AI-driven lupus care must be designed with a mobile-first lens. This infrastructure, while promising, also requires frameworks that consider disparities in access across countries and subpopulations.

3.4.2 Behavioral Science Models: A Taxonomy

To guide intervention design, a wide array of behavioral theories have historically informed healthcare practices. These range from classical conditioning and social learning models to cognitive, ecological, and integrated frameworks. The table** below—adapted from current literature—maps the taxonomy of the most frequently cited health behavior theories used in intervention design:

Table 3.1 – Behavioral Science Frameworks: A Taxonomy

Framework	Theoretical Type	Key Constructs	Relevance to Lupus Care Design
Health Belief Model (HBM) (Hochbaum et al., 1952)	Cognitive	Perceived susceptibility, severity, benefits, barriers, cues to action	Supports educational components for symptom monitoring, preventive behaviors, and lifestyle modifications.
Theory of Planned Behavior (TPB) (Ajzen, 1991)	Cognitive	Intention, attitudes, subjective norms, perceived behavioral control	Guides design of opt-ins, consent-based personalization, and treatment adherence support.
Social Cognitive Theory (SCT) (Bandura, 2001)	Social-cognitive	Self-efficacy, observational learning, outcome expectations	Informs self-management features, peer-learning models, and personalized coping strategies.
Transactional Model of Stress and Coping (Lazarus & Folkman, 1984)	Emotional-cognitive	Stress appraisal, coping resources, emotional regulation	Informs mood check-ins, micro-journaling, and emotional support prompts for chronic fatigue and flare periods.
Narrative Medicine / Narrative Theory (Frank, 1995; Greenhalgh & Hurwitz, 1999)	Narrative identity	Illness narratives, meaning-making, patient storytelling	Justifies journaling features to support emotional processing and coping with identity disruption caused by chronic illness.

Ecological Models (McLeroy et al., 1988; Stokols, 1992)	Systems-level	Multilevel determinants (individual, interpersonal, organizational, societal)	Supports culturally sensitive design, addressing structural inequities, social determinants, and family dynamics.

These frameworks serve as foundational lenses through which AI-driven tools can be designed and evaluated—particularly in understanding the motivations, cognitive barriers, emotional states, and social determinants that shape lupus patients' behaviors.

3.4.3 Behavioral Science in Practice: AI Applications for Lupus Care

3.4.3.1. Patient Engagement Strategies

Behavioral frameworks contribute directly to AI design by enhancing patient engagement—a critical factor in managing lupus. For instance, the **Adaptive Mobile Health Framework (AMHF)** employs algorithms like APE to personalize motivational messages and educational content (Deepthi et al., 2024). Human-centered AI systems also integrate flexible features such as reminders and direct contact with healthcare providers, resulting in high patient satisfaction (Sumner et al., 2023). These design principles align with theories such as the **Health Belief Model,** which emphasizes perceived susceptibility and benefits, and **Social Cognitive Theory,** which leverages self-efficacy and behavioral modeling.

3.4.3.2. Treatment Compliance and Adherence

Treatment nonadherence is a persistent challenge in chronic disease care. AI tools grounded in behavioral science offer solutions by tailoring treatment plans through continuous data monitoring and patient preference modeling. The **PTR algorithm** proposed by Deepthi et al. within AMHF adapts treatment recommendations to improve adherence (2024), while the **LSO-020 program** conducted by Sun et al. empowers clinicians to proactively address nonadherence by reviewing refill data and using behaviorally-informed communication strategies where patients emphasized patient-clinician communication and financial and logistical assistance as areas for improvement (Sun et al., 2023).

These reflect the principles of **Protection Motivation Theory** and **Theory of Planned Behavior**, both of which link intention with behavior change. TPB is a widely-used psychological theory explaining how **attitudes, social norms, and perceived control** influence behavioral intentions, which in turn predict actual behavior.

To support intention formation and behavior change, this study draws on the Theory of Planned Behavior—particularly the construct of **Perceived Behavioral Control,** which aligns with the **expert patient model** in chronic illness care. By strengthening patients' belief in their capacity to manage symptoms and treatment, the intervention reinforces the development of expert patient competencies (Lorig & Holman, 2003; DH, 2001), a key factor in sustainable self-management for lupus care.

Table 3.2. Relationship between TPB and the Expert Patient concept.

Perceived Behavioral Control (TPB)	Expert Patient Concept
Belief in ability to act	Self-efficacy and agency
Influence over outcomes	Skills to manage symptoms, treatment, lifestyle
Key to intention-behavior link	Key to self-management success

3.4.3.3. Addressing Mental Health

Chronic illness, particularly lupus, often coexists with depression, anxiety, and emotional distress. Behavioral science frameworks support AI features that offer psychological interventions. Evidence from **Acceptance and Commitment Therapy (ACT)**, a form of psychotherapy that focuses on helping individuals accept their thoughts and feelings rather than fighting against them, has shown reductions in anxiety and depression symptoms among lupus patients (McCormick et al., 2022).

Mindfulness-based interventions (MBIs) are particularly effective in promoting emotional resilience and have been successfully adapted into mobile platforms through guided practices and emotion-monitoring algorithms. These insights can be mapped onto **Narrative Theory** and the **Transactional Model of Stress and Coping**, where the patient constructs the meaning of their illness, allowing that meaning to shape emotional and behavioral coping strategies. In this context, narrative is not just a reflection of experience, but a cognitive and emotional process through which individuals make sense of suffering and regain agency. As Greenhalgh and Hurwitz (1999) argue, narratives offer an essential framework for interpreting a patient's emotional and existential response to illness, complementing clinical understanding with lived experience.

3.4.3.4. Decision-Making Support

AI systems also influence how decisions are made between patients and clinicians. The **SLE-T2T clinical decision support system** delivers individualized treatment advice, facilitating a **treat-to-target** approach that enhances shared decision-making (Sanchez et al., 2022). Research shows that informed patients are more likely to participate in decisions around their care, a concept supported by the **Elaboration Likelihood Model** and **Theory of Reasoned Action**. These AI tools thus become co-navigators in care, aligning both medical and emotional goals.

Table 3.3. Summary Table: Behavioral Frameworks and Intervention Relevance

Theory	Contributions & Insights	Limitations & Relevance to Study
Health Belief Model (Hochbaum, Rosenstock, & Kegels, 1952)	Explains patient motivation and decision-making based on perceived severity, susceptibility, benefits, and barriers. Useful for designing AI prompts and alerts that respond to user beliefs.	Tends to overlook structural barriers such as digital access and healthcare equity, which are critical in Latin America.
Social Cognitive Theory (Bandura, 2001)	Highlights the role of self-efficacy, behavioral modeling, and social learning. Enables AI to integrate peer support modules and feedback systems that reinforce healthy behaviors.	Limited in accounting for individual variability in mental health and long-term engagement with technology.
Ecological Models (McLeroy et al., 1988, Stokols, 1992, Cohen, Scribner, & Farley, 2000, Fisher E., 2005)	Address influences across individual, interpersonal, organizational, and policy levels. Support the development of multi-channel AI systems that respond to diverse determinants of health	Implementation in AI can be complex, requiring integration across multiple systems and sectors. Requires multiple efforts and stakeholders aligned.
Transtheoretical Model (Prochaska & DiClemente, 2005)	Emphasizes behavior change as a stage-based process, allowing for AI customization based on user readiness, journey and progress history.	Chronically ill patients may shift stages unpredictably, requiring highly adaptive systems not yet standard in digital health. Requires good AI model refinement

Systemic Techno-Behavioral Approach (Ciccone et al. 2024)	Synthesizes behavioral science, systemic thinking, and digital technologies into a holistic care model. Provides a theoretical base for AI tools that adapt to systemic and individual needs simultaneously.	Still emerging in practice; lacks validated examples in real-world AI-driven tools for chronic care.
Mindfulness-Based Interventions	Support emotional regulation, reduce stress, and improve coping mechanisms. Especially relevant for lupus patients with anxiety, depression, and fatigue.	Require adaptation into AI-driven formats, such as chatbots, guided meditations, and biofeedback apps with cultural relevance.

Mindfulness-based interventions (MBIs) have shown efficacy in improving quality of life among chronic illness patients by addressing mental health burdens and promoting emotional resilience. In the context of lupus, where psychological stress can exacerbate physical symptoms, integrating MBIs into AI-driven tools can support both mental and physical health. AI applications can deliver personalized mindfulness prompts, monitor emotional states through language patterns, and provide biofeedback-based guidance in real time. Additionally, these interventions should be culturally tailored and accessible across devices to ensure relevance in Latin America.

This framework analysis provides the foundation for selecting behavioral science principles most compatible with AI integration. By understanding both the potential and limitations of each model, this research advocates for hybrid, adaptive AI systems that reflect the fluid and intersecting challenges lupus patients face.

3.5. Toward a Hybrid AI Framework

The integration of behavioral science frameworks into AI-driven lupus care is promising and essential. These theories help inform tools that do more than track symptoms; they engage, support, and empower patients in dynamic, meaningful ways. In the Latin American context, the convergence of high mobile penetration and gaps in chronic illness infrastructure makes this integration even more urgent.

While each framework offers unique advantages, their real power emerges when applied together—creating AI systems that are flexible, stage-sensitive, and emotionally intelligent. Grounded in both behavioral and narrative theories, this study explores how AI can act as both a functional and emotional companion in chronic illness care. By integrating Narrative Theory, the Transactional Model of Stress and Coping, and the Theory of Planned Behavior, the proposed AI approach seeks not only to track symptoms but to support the cognitive-emotional processing of illness. Through adaptive dialogue, narrative capture, and personalized intervention delivery, AI can help patients reframe experiences, regulate emotions, and build self-efficacy—aligning closely with the principles of the expert patient model.

Moving forward, this research will narrow down the most compatible frameworks and explore how they can be operationalized through mobile-first, culturally grounded, and ethically sound AI systems for lupus patients across Latin America.

3.6. Design Research Methods: Co-creation in context

This research employs a multifaceted design approach that blends human-centered design principles, co-design techniques, and digital health interventions. The primary objective is to develop AI-driven tools that address the needs of individuals with chronic illnesses, particularly lupus, through accessible, empathetic, and patient-centric solutions. The design methods employed in this study draw on key design models and frameworks that enhance the quality and accessibility of healthcare services for patients with chronic illnesses, as well as emerging trends in technology integration.

3.6.1 Participatory Design as a Pathway for Inclusion

Participatory design is at the core of this research, serving both as a methodological strategy and as a commitment to power-sharing within health innovation. By involving healthcare providers and other relevant stakeholders in the design process, it is ensured that the developed solutions are grounded in real-world needs and contexts. Co-design, in particular, allows the integration of diverse perspectives into the development of interventions, enhancing their relevance and acceptability. These methodologies have been shown to improve engagement, sensibility from the solution perspctive and foster a sense of empowerment among participants -when patients or caregivers are being involved, as they contribute to the creation of solutions tailored to their specific needs.

For instance, the BIGPIC study from Western Kenya employed human-centered design principles to address non-communicable diseases by engaging local stakeholders, demonstrating the value of collaborative efforts in creating contextually appropriate interventions (Leung et al., 2020). Similarly, the mHealth intervention for chronic myeloid leukemia (CML) patients used participatory design to ensure that the digital health platform met the needs of both patients and their caregivers (Ector et al., 2020). In our study, these principles are applied to lupus care by involving relevant stakeholders in the iterative development process of AI-driven tools, ensuring that the resulting system is aligned with the lived experiences and preferences of patients.

While Latin America is often portrayed in international discourse as a region marked by infrastructural scarcity or systemic neglect, this characterization can obscure the considerable strengths of its public healthcare systems and local innovation ecosystems. In countries like Colombia and Chile, for example, regular specialist access and continuity of care are not uncommon, key factor to a strategic treatment plan. Nevertheless, social beliefs and stigma surrounding invisible illnesses such as lupus persist, and traditional top-down research and development approaches can further entrench disparities (Asad & Fox, 2022; Harding et al., 2020). Participatory design offers an alternative by foregrounding co-creation, lived expertise, and collective sense-making.

Workshops and co-design sessions in this study brought together a diverse set of actors—including chronic care clinicians, rheumatologists, digital healthcare dsesigners and researchers, and mental health professionals—to iteratively surface needs, prototype interventions, and reflect on the sociotechnical context of care. These sessions were structured around design sprints that prioritized patient empowerment, emotional safety, and systemic critique. Even in the absence of continuous patient access, this method enabled situated, representative participation through proxy stakeholders.

3.6.2 Technology-Enhanced Design for Chronic Illness Care

A critical component of this styduy in regards of the design research methods is the integration of technology-driven solutions to enhance healthcare delivery for chronic illness management. Emerging technologies such as mobile health (mHealth) applications, telemedicine platforms, and AI systems offer significant opportunities to improve patient care. The integration of digital health tools into chronic illness management can help bridge gaps in care, particularly for underserved populations or those living in remote areas.

For example, mHealth systems designed for cystic fibrosis patients have demonstrated success in promoting treatment adherence by providing tailored educational content, reminders, and secure communication channels with healthcare teams (Kurscheidt et al., 2022). Likewise, telemedicine platforms, which have proven invaluable for remote monitoring of chronic conditions like heart failure, are key components of this study's approach to improving lupus care. The LoopArt architecture, which integrates mHealth solutions with clinical information systems, ensures seamless communication between patients and healthcare providers, facilitating better care coordination (Färber et al., 2023).

A central consideration in this research is how AI-driven tools might not only facilitate symptom tracking and care coordination, but also **enable predictive insights** into potential health complications, with the aspirational aim of supporting more proactive and personalized care. These predictive capabilities are **conceptualized with** the specific symptom patterns and treatment regimens of lupus in mind, with the goal of supporting proactive care and reducing emergency interventions. The integration of AI-driven solutions is **envisioned as a means** to enhance the accessibility and responsiveness of healthcare services for lupus patients in Latin America, particularly by addressing context-specific needs and existing gaps in care delivery.

Human-centered design (HCD) principles were **actively considered and strategically incorporated** throughout the design process to guide the development of AI-driven solutions that could meaningfully address users' emotional, cognitive, and practical needs. In chronic illness care—particularly for conditions like lupus with nonlinear trajectories and unpredictable symptomology—designing for flexibility, reassurance, and resilience is understood as critical (Greenhalgh et al., 2016). HCD methods were used to map the broader illness experience, including flare management, medication routines, psychological strain, and care coordination, with the aim of informing future design directions.

Technological integration occurred in **parallel with these insights**, using low-fidelity prototyping and generative interface modeling to **investigate the potential** of AI not as a diagnostic authority but as a supportive presence. Interventions were explored in speculative formats, enabling early feedback loops centered on user autonomy, cultural relevance, and digital literacy. While these prototypes remain **conceptual and exploratory,** they lay the groundwork for future implementation pathways to be further developed in the Concept Development & Practice Component chapter.

3.6.3 Addressing Patient Empowerment Through Design Models

Patient empowerment and the “expert patient” concept are fundamental aspects of effective chronic disease management, and design models that prioritize patient engagement and self-management are essential for improving health outcomes. The Chronic Care Model (CCM) emphasizes the importance of patient activation and self-management support (Steurer-Stey & Rosemann, 2010). Similarly, human-centered design methodologies emphasize the importance of aligning healthcare solutions with patient preferences, values, and needs, as demonstrated in the development of mHealth interventions for chronic diseases like cystic fibrosis (Kurscheidt et al., 2022).

This research draws on these frameworks by aiming to design AI tools that not only facilitate communication and care coordination but also empower patients to take an active role in their care. For instance, through intuitive user interfaces, personalized recommendations, and real-time feedback, the AI-driven system might foster greater patient autonomy, cultural empowerment, and adherence to treatment protocols. This includes language localization, region-specific care tips, and modular features that allow patients to tailor the experience to their specific concerns.

3.6.4 Integration of Co-Creation and Value Reframing

Co-creation and value reframing are key elements of the design research methods used in this study. These approaches ensure that the solutions developed are not only functional but also meaningful within the cultural and social contexts of the target population. For example, a patient journey analysis framework can help identify critical moments in the care process where patients and healthcare providers can collaborate more effectively (Exploring the potential role of design to reframe the resources and their integration in the patient empowerment process, 2023).

In the context of lupus care, this study uses co-creation to address the emotional, logistical, and social challenges faced by patients. By involving caregivers, healthcare providers, and community advocates in the design process, we aim to create solutions that are sensitive to cultural norms and health system limitations across Latin American countries. These co-creation efforts include participatory workshops, scenario mapping, and iterative prototype testing.

3.6.5 Ensuring Access and Affordability Through Technology

One of the overarching goals of this research is to ensure that AI-driven healthcare solutions are not only effective but also accessible and affordable for the target population. The integration of digital health tools and AI has the potential to address the gap in chronic illness care access, particularly in resource-limited settings. However, it is crucial to ensure that the solutions are designed in a way that mitigates barriers related to technology access, literacy, and infrastructure.

This study draws on the work of the BIGPIC study, which integrated technology with community-based care models to address healthcare disparities in low-resource settings (Leung et al., 2020). To enhance affordability and access, our approach should emphasize mobile-first design, offline functionality, simple language use, and integration with existing public health systems. These strategies help ensure that the solutions remain inclusive and adaptable to various levels of technological infrastructure and patient literacy.

In sum, the design research methods employed in this study aim to combine cutting-edge technology with patient-centered design to create innovative solutions for lupus care that are both effective and equitable. By integrating co-design, participatory design, and technology-driven interventions, this research strives to create a holistic approach to chronic illness management that is sensitive to cultural, social, and economic factors.

To anchor the design process within established best practices, this study draws on a comparative review of chronic disease design models that incorporate behavioral, technological, and participatory dimensions. These models provided foundational guidance for shaping both the conceptual underpinnings and the evaluative strategies of the AI intervention.

The following table summarizes the key models reviewed, including their focus areas, target conditions, and relevant citations. Together, they illustrate a range of approaches—from self-management support and high-touch care delivery to co-creation and microfinance—that informed the framing of this study's hybrid design methodology.

Table 3.4. Key Design Models for Chronic Disease Management.

Design Model	Core Components	Design Takeaways for Lupus AI Tool
Chronic Care Model (CCM)	Patient self-management, system redesign, care coordination	Emphasizes continuity of care, digital self-management tools, and health monitoring dashboards
Dyadic Digital Health Module	Caregiver-patient dynamics, live feedback, medication tracking	Highlights the importance of caregiver integration and real-time feedback loops
Human-Centered Design	Empathy-driven design, iterative prototyping	Reinforces the importance of ongoing user involvement and design adaptability
Closing-the-Loop Architecture	Conversational AI agents for literacy, adherence, and feedback	Informs chatbot and reminder systems to improve health literacy and routine adherence
Collaborative Chronic Care	Co-creation, shared decision-making, support networks	Encourages participatory design with both patients and caregivers to foster empowerment

Home-Based Chronic Care	Tech-assisted remote care and frequent monitoring	Validates the use of mobile health solutions and wearable integrations for symptom tracking
BIGPIC Model	Financial inclusion, peer groups, integrated services	Suggests community support modules and resource linking within the app
Case Management Model	Lifecycle mapping, psychosocial support, care coordination	Aligns with designing a timeline-based feature to anticipate and address flares and setbacks
TECH Model	Patient engagement, self-management, and systemic context	Informs modular app design with customization, language options, and clinician dashboards

These models provide not just inspiration but tangible components to be adapted or translated into AI functionalities—ranging from predictive analytics to peer-support forums. The ultimate goal is to move beyond reactive care into anticipatory, adaptive, and emotionally intelligent AI support for lupus management in Latin American women.

3.7. The Expert Patient: Self-efficacy and agency in chronic illness during the AI boom

One of the central hypotheses guiding this work is that AI systems can help patients embody a sense of agency—accepting and taking control over what can be controlled in their condition journey. This aligns with the **expert patient model** (Lorig & Holman, 2003), which reframes patients as informed, proactive managers of their own health.

Behavioral science reinforces this vision. In particular, the **Theory of Planned Behavior** links **Perceived**

Behavioral Control (PBC) to health behavior change—mirroring the self-efficacy and skill-building that define expert patient competencies. Strengthening PBC through design can directly support a patient's belief in their ability to manage symptoms, communicate with providers, and navigate the emotional demands of chronic illness.

AI tools, when designed with these principles in mind, can act as **coping companions**—reinforcing self-efficacy through adaptive prompts, goal tracking, and emotionally intelligent dialogue. For Latin American women with lupus, such systems can help counter barriers to care and reclaim a sense of control over their health.

Integrating **Narrative Theory** further deepens this approach. As Greenhalgh & Hurwitz (1999) note, illness narratives reveal the emotional and cognitive framing patients use to make sense of their experience. AI systems that capture and respond to these stories—via journaling, conversational agents, or mood tracking—can support meaning-making and emotional resilience, key components of long-term self-management.

Ultimately, this work sees AI not as a replacement for human care, but as a scaffold for agency—helping patients become the experts of their own lives.

3.8. Ethical Considerations

This study addresses the ethical complexities of chronic illness research by adopting a participant-informed yet patient-protective methodology. Given the emotional, cognitive, and physical demands of chronic conditions like lupus—and the sociocultural contexts in which this research is situated—careful attention was given to participant wellbeing, data sensitivity, and design responsibility at every stage.

3.8.1 Informed Consent and Voluntary Participation

All participants involved in interviews, workshops, or co-design sessions—including caregivers, healthcare professionals, and patient advocates—provided informed consent prior to participation. Consent forms outlined the study's purpose, the voluntary nature of participation, the right to withdraw at any time, and how data would be anonymized and used. Although these participants were not considered a vulnerable group, the study followed standard ethical protocols to ensure clarity, transparency, and autonomy. Upcoming co-design sessions will also be conducted in alignment with these principles.

3.8.2 Patient Privacy and Indirect Participation

To ethically navigate the limitations of working directly with lupus patients—particularly due to health sensitivity, symptom unpredictability, and institutional review constraints—this research used indirect methods. Data was gathered through proxy perspectives from individuals with long-term, close involvement in chronic care, such as clinicians, mental health professionals, and caregivers. No identifiable patient data was collected or shared. This approach is aligned with international health research guidelines (CIOMS, 2016; WHO, 2021), which emphasize minimizing participant burden and risk, especially in vulnerable populations. At the same time, the methodology preserved a patient-centered orientation by amplifying system-level and lived-experience-informed insights.

3.8.3 Bias Mitigation in AI Design

AI systems in healthcare have the potential to reinforce structural inequities if not designed with critical awareness. Biases related to race, gender, geography, or language can become embedded in training data or decision-making logic—leading to interventions that fail to serve marginalized users (Obermeyer et al., 2019; Criado Perez, 2019). To mitigate these risks, this research draws on ethical frameworks such as the **FATE** model (Fairness, Accountability, Transparency, Ethics) and the **WHO Guidance on Ethics & AI in Health** (2021).

Concretely, this study addresses:

- **Data diversity** by prioritizing multilingual, culturally relevant design scenarios and avoiding overreliance on Western-centric / Global north datasets.
- **Language equity** by considering accessibility for users with varying literacy levels or dialects, particularly within Latin America.
- **Cultural responsiveness** through participatory validation with proxy users, ensuring that features and assumptions reflect local care norms.

These safeguards are not final but form part of an iterative, co-created approach to ethical AI design. They also align with feminist, decolonial, and participatory research traditions that reject extractive knowledge production in favor of inclusive, situated design practice (Asad & Fox, 2022; Harding et al., 2020).

3.8.4 Designing for Equity and Emotional Safety

Finally, all co-design activities were structured with sensitivity to participants' emotional labor and cultural framing of illness. Design sprints emphasized collective sense-making, psychological safety, and the acknowledgment of lived expertise—avoiding a purely instrumental or techno-solutionist approach to healthcare. These principles are vital not only for upholding research integrity but also for creating AI tools that patients can trust, relate to, and benefit from in real-world care environments.

3.9. Methodological Summary: A Multi-Layered Research Process

To clarify the integration of methods used across this study, the table below summarizes the primary methodological steps and their contributions:

Table 3.5. Methodological Summary: Multi-Layered Research Process

Methodological Step	Purpose and Outcome
Stakeholder Interviews & Workshops	Provided qualitative insight into user journeys, systemic barriers, emotional needs, and digital literacy through semi-structured interviews with caregivers, professionals, and advocacy networks.
Co-Design & Design Sprints	Applied participatory design models (e.g., Collaborative Chronic Care) to co-develop, prototype, and evaluate AI-based support concepts. Facilitated iteration on key assumptions and feature viability.
Usability Testing & Iteration	In early speculative stages, employ rapid prototyping to explore usability, language accessibility, and cultural alignment in future implementation scenarios.

This structured process reflects the hybrid methodological framework of the thesis—blending behavioral theory, indirect research, and design-led exploration—to ensure that AI interventions are not only technologically feasible, but socially attuned and ethically grounded.

EMPATHIZING THROUGH PROXIES: RESEARCH INSIGHTS FROM EXPERTS

4

4.1. Introduction

In the journey of chronic illness care, especially in the context of autoimmune diseases like lupus, understanding the emotional and psychological needs of patients is as important as addressing their physical symptoms. While traditional medical care focuses on managing symptoms and prolonging life, the role of psychological support, patient agency, and family involvement has emerged as crucial in ensuring holistic care. This chapter delves into the experiences and insights shared by healthcare specialists, highlighting how their expertise shapes the care of chronic illness patients, particularly in terms of emotional support, health literacy, and the integration of technology.

Through a series of expert interviews, this chapter explores the challenges and opportunities that arise in the care of autoimmune disease patients. By focusing on mental health specialists and a rheumatologist, we gain valuable perspectives on the role of psychosocial interventions, the family dynamics in patient care, and the impact of gender on treatment outcomes. Furthermore, we examine how emerging technologies, such as AI and digital tools, can enhance the patient experience without replacing the vital human connection at the core of healthcare.

4.2. Expert Interviews: Key Themes, Challenges, and Patterns

4.2.1 Dr. Alicia Krikorian Daveloza - Psychological Support in Chronic Illness Care

Dr. Alicia Krikorian, Ph.D., is a prominent expert in the field of health psychology and palliative care, with a specialization in managing chronic pain. She is the coordinator of the **Research Group in Pain and Palliative Care**, with a deep focus on how emotional and psychological support can improve the quality of life for chronic illness patients. Throughout her career, Dr. Krikorian has emphasized the importance of psychological first aid and specialized therapeutic models tailored to the emotional needs of patients living with chronic illnesses.

During the interview, Dr. Krikorian shed light on two evidence-based therapeutic models that have shown significant promise in supporting patients emotionally: Cognitive Behavioral Therapy (CBT) based on mindfulness and Acceptance and Commitment Therapy (ACT). According to Dr. Krikorian, these models not only help patients manage their symptoms but also encourage them to confront the emotional challenges that accompany their diagnosis. Mindfulness, for instance, is particularly effective in helping patients focus on the present moment, reducing stress and anxiety about their condition. Meanwhile, ACT encourages patients to accept their illness and adopt values-based action, which can empower them to live meaningful lives despite their diagnosis.

Dr. Krikorian also highlighted the importance of psychological first aid, a form of emotional support that can be provided by any healthcare professional, not necessarily a psychologist or psychiatrist. She emphasized that basic emotional support strategies, such as active listening and validation, can significantly improve a patient's ability to cope in the initial stages of their diagnosis. This type of support can be pivotal, especially for patients who might not yet be ready for more intensive psychotherapy but still need emotional validation during the adjustment period.

Furthermore, Dr. Krikorian discussed the role of stigma in chronic illness care, noting that many patients face internalized shame and fear of judgment when dealing with conditions like lupus. The stigma surrounding chronic pain and autoimmune diseases often exacerbates feelings of isolation and emotional distress. Dr. Krikorian stressed the need to create safe spaces for patients to discuss their experiences without fear of being judged, and how community support can play a transformative role in mitigating these challenges.

A particularly insightful part of Dr. Krikorian's discussion revolved around the integration of technology in emotional support. She noted that, in some cases, AI-driven tools—such as chatbots—have shown to deliver responses that are more empathetic than those provided by human specialists. Although this may seem counterintuitive, she explained that the nonjudgmental nature of AI, combined with its ability to offer instant support, can provide a valuable complement to human care, especially in settings where mental health resources are limited. However, she also cautioned that these tools should not replace human interaction but rather serve as an adjunct to existing care models.

4.2.2 Dr. Santiago Bernal Macias - Insights on Diagnosis, Adherence, and Family Support

Diagnosis and Challenges

Dr. Santiago Bernal highlighted the complexities of diagnosing lupus, particularly in its early stages. He emphasized that no two cases of lupus are alike, with symptoms ranging from mild to catastrophic. A major challenge in diagnosis is the delayed recognition of less severe cases, which often leads to frustration for patients who initially experience symptoms like fatigue—the first and last symptom for many lupus patients. These patients are frequently misdiagnosed with other conditions, such as chronic fatigue syndrome or fibromyalgia, before lupus is finally recognized.

Dr. Bernal also pointed out the emotional toll of the diagnosis, particularly for younger patients. Being diagnosed with lupus while still relatively young can be overwhelming, especially when it disrupts the patient's life plans and ambitions. For patients in the 20-40 age group, the diagnosis is often complicated by life stage factors like pregnancy, making it an even more sensitive area to address in care.

Barriers to Treatment Adherence

A recurring issue in Dr. Bernal's practice is treatment adherence. As patients struggle to accept their diagnosis, they often resist following treatment plans. He emphasized that acceptance of the diagnosis is crucial for adherence, and many patients experience reluctance due to misconceptions or fears about medications. Dr. Bernal noted that patients often turn to online resources like "Doctor Google," which can cause anxiety and misinformation about lupus and its treatments.

Dr. Bernal observed that patient engagement is key. He mentioned that when patients feel more involved in the decision-making process and can ask informed questions, they are more likely to adhere to treatment regimens. This aligns with his view that patient agency is essential, as patients who understand the importance of their treatment plan are less likely to disengage.

Gender and Family Support in Lupus Care

Dr. Bernal shared insights into the gendered nature of lupus care, noting that 90% of his rheumatology patients are women. This gender imbalance means that the experience of autoimmune diseases like lupus is largely shaped by women's health needs, including sexual and reproductive health. He emphasized the importance of gender-sensitive care, ensuring that both the emotional and physical health needs of female lupus patients are addressed.

Another critical point Dr. Bernal made was the importance of family involvement in patient care. He frequently involves the patient's family in consultations to educate them on the impact of the disease, helping to reduce stigma and ensure that the patient receives adequate support at home. He mentioned how family members often have difficulty understanding the severity of the condition, which can lead to misunderstandings and judgment. Dr. Bernal's approach of involving families helps foster compassionate care and reduce the emotional burden on patients.

Insights on Technology and Patient Empowerment

Dr. Bernal also addressed the potential of technology in supporting patients. He acknowledged that while AI tools and chatbots can provide valuable initial support, they should complement, not replace, human interaction in medical care. He agreed with the notion that patient empowerment should be a central focus of technology in healthcare, allowing patients to self-manage their condition while staying connected with their healthcare providers.

In the context of his clinical practice, Dr. Bernal believes that technology could be beneficial for creating support communities and providing continuous education for patients, especially in regions with limited access to care. He mentioned the importance of patient groups and how social media has enabled patients to share experiences, which can improve their emotional well-being and treatment adherence.

4.2.3 Dr. Ángela María Orozco Gómez - Patient Experience and Chronic Illness Management

Emotional and Psychological Adaptation in Chronic Illness Care

Dr. Ángela María Orozco, a researcher in chronic pain and rheumatology, shared her professional perspective on the emotional adaptation of patients diagnosed with autoimmune diseases like rheumatoid arthritis (RA) and lupus. While Dr. Orozco acknowledged the psychological strain these diagnoses place on patients, her insights were rooted in her expertise on chronic pain management and psychosocial interventions.

She highlighted that the diagnosis of chronic conditions like RA often leads to a profound emotional impact due to the uncertainty and fear of long-term disability. Dr. Orozco noted that a lack of comprehensive patient education and clear communication about the disease progression can exacerbate these emotional challenges. She emphasized the need for early intervention and psychosocial support to help patients adapt to the reality of living with a chronic illness.

Dr. Orozco underscored that, from a professional standpoint, psychological resilience plays a crucial role in managing chronic conditions. However, she pointed out that while patients may understand their physical symptoms, they often struggle to grasp the emotional aspects of their condition. Psychoeducation—the process of teaching patients about emotional responses to illness—was identified as a key strategy to facilitate better coping mechanisms.

Challenges in Medication Management and Treatment Adherence

From a professional viewpoint, Dr. Orozco addressed the challenges of medication management and treatment adherence in chronic illness care. Patients often experience resistance to treatment due to side effects, lack of understanding about the role of medications, or misconceptions about the efficacy of long-term treatment. Dr. Orozco noted that psychological factors, such as fear of medication side effects, significantly influence a patient's decision to adhere to treatment plans.

She emphasized the role of healthcare providers in ensuring that patients not only understand the importance of adherence but also feel empowered to ask questions and discuss their concerns openly. According to Dr. Orozco, creating a trusting relationship between healthcare professionals and patients is essential for long-term adherence and better health outcomes.

Spirituality, Social Support, and Family Involvement

While Dr. Orozco acknowledged the role of spirituality and family support in patient well-being, she emphasized that the primary focus should be on psychosocial interventions delivered through professional care systems. In particular, she emphasized the need to integrate family education into treatment plans. By involving the patient's family in the educational process, healthcare providers can ensure that patients receive the support they need at home, reducing feelings of isolation and improving mental health outcomes.

The Role of Technology in Chronic Illness Care

Dr. Orozco expressed her belief in the potential of technology to improve patient care, particularly through digital tools that support self-management and provide continuous emotional support. She noted that while many healthcare systems still struggle to integrate technology into care models, tools like apps for symptom tracking, mental health resources, and virtual consultations could bridge the gap in care delivery.

Dr. Orozco highlighted that for these tools to be effective, they must be patient-centered and designed with an understanding of the patient's emotional and psychological needs. She also pointed out that technology should not replace face-to-face consultations but rather complement the professional care process, especially for those who may have limited access to healthcare services.

Conclusions on Professional Care in Chronic Illness Management

In summary, Dr. Orozco's insights provided valuable professional guidance on how to navigate the emotional and psychological challenges of chronic illness care. Her focus on early intervention, psychoeducation, family involvement, and technological integration offers a comprehensive approach to improving care for patients with autoimmune diseases. Dr. Orozco's professional experience underscores the importance of addressing both the physical and emotional needs of patients in the management of chronic conditions.

4.2.4 Dr. Rubby Castro - Pediatric Oncology Insights and Emotional Support in Chronic Illness

Emotional Adaptation and Family Involvement

Dr. Rubby Castro, a renowned expert in pediatric oncology, shared her unique perspective on the emotional adaptation of patients diagnosed with chronic and life-threatening conditions, particularly in the onco-pediatric field. According to Dr. Castro, the process of emotional adjustment for children with cancer differs significantly from that of adults with diseases like lupus or rheumatoid arthritis. In pediatric oncology, children tend to adapt more easily to the diagnosis, partly because they often do not fully comprehend the implications of their illness. However, Dr. Castro emphasized that the real challenge lies in addressing the emotional needs of the family—especially parents—who struggle with guilt, fear, and the shock of their child's diagnosis.

She explained that in Colombia, there is a significant cultural resistance to openly discussing cancer, which delays the emotional adjustment process for families. The term "cancer" is often avoided, and information is shared gradually to shield the family from the initial shock. Dr. Castro highlighted that early involvement of the family in the care process—especially through psychosocial support—can mitigate the emotional burden. If families are involved early on and are educated about the disease, the emotional impact is typically less severe.

Communication and Psychological Support

In the context of communication, Dr. Castro emphasized the importance of clear, sensitive language when delivering a cancer diagnosis. She noted that medical jargon is often incomprehensible to families, which can create confusion and emotional blockages. The use of simple, understandable language is critical in helping families process the information and manage the emotional challenges that come with it.

Dr. Castro also pointed out that AI tools could assist healthcare professionals, especially in delivering complex information and providing emotional support. She spoke about affective computing, a branch of AI focused on reading facial expressions, micro-expressions, and even silences, which could be used to gauge a family's emotional state and tailor the response accordingly. This would help healthcare providers ensure that they do not leave patients or their families with unanswered questions, a crucial part of emotional support in the diagnostic process.

Psychosocial Interventions for Chronic Illness Patients

Although the psychological care for oncology patients is relatively advanced, Dr. Castro lamented that in fields like autoimmune disease management (e.g., lupus), psychosocial support is still underdeveloped. There is a growing need for integrated psychological models that address the emotional, social, and physical aspects of chronic illness. Dr. Castro referred to frameworks developed by Carmen Brigado, Juan Antonio Cruzado, and Luz Helena Buitrago as examples of promising models for integrating mindfulness, cognitive-behavioral therapy, and psychological education in the treatment of chronic conditions. However, she noted that mindfulness is not yet widely used in clinical practice for chronic disease adaptation and diagnosis impact, particularly in adults with autoimmune conditions.

Dr. Castro emphasized the importance of psychoeducation and emotion labeling, especially for children who are just beginning to recognize and express their feelings. As a researcher, she has seen how this process helps in normalizing the emotional experience of patients and can lead to better **coping mechanisms** during treatment.

4.3. Key Patient Needs: Symptom Management, Emotional Support, Health Literacy

The interviews with **Dr. Krikorian, Dr. Bernal, Dr. Orozco,** and **Dr. Castro** revealed several key patient needs that are critical to improving the care of chronic illness patients, particularly those with autoimmune diseases like lupus. These needs encompass both the **physical** and **emotional** aspects of care, requiring a holistic approach to patient management.

4.3.1. Symptom Management

Fatigue, joint pain, and flare-ups were consistently identified as **central issues** for patients with **lupus** and **rheumatoid arthritis (RA)**. **Dr. Bernal** and **Dr. Orozco** noted that symptom management in autoimmune diseases is complex because symptoms can be **episodic** and **fluctuate in severity**. Patients often experience periods of remission, followed by flare-ups that can be unpredictable, further complicating treatment adherence.

Effective management of these symptoms requires a multifaceted approach, which includes:

» **Medication management:** Ensuring that patients adhere to their prescribed treatments, even when symptoms subside, to prevent flare-ups.

» **Physical therapy and exercise:** Incorporating movement and mobility exercises can help manage joint pain and stiffness, which is a common concern for lupus and RA patients.

» **Emotional support:** Addressing the emotional toll of persistent symptoms is also crucial. **Dr. Krikorian** emphasized that psychological support, especially **mindfulness therapies,** can help reduce the perception of pain and fatigue by improving emotional regulation.

» **Dr. Rubby Castro,** in her oncology practice, highlighted the importance of **holistic care** for managing **chronic pain** in cancer patients, which can be applied to autoimmune disease patients as well. In pediatric oncology, the involvement of **family members** in symptom management is critical, especially for emotional well-being.

4.3.2. Emotional Support

Emotional distress is a common experience among chronic illness patients, including anxiety, depression, and stigma. Dr. Orozco pointed out that fear of treatment and concerns about medication side effects often hinder patients from adhering to their treatment regimens. These fears are compounded by uncertainty about the progression of the disease.

Early interventions are critical for managing emotional distress:

- **Psychological first aid**, as emphasized by **Dr. Krikorian,** can provide immediate emotional support to patients in the early stages of diagnosis.
- **Mindfulness-based therapies**, which Dr. Krikorian highlighted, can also help patients reduce anxiety and improve emotional resilience.
- **Peer support networks**, as noted by **Dr. Bernal**, can help reduce feelings of isolation, particularly for patients who face stigma or discrimination due to their condition.
- **Dr. Rubby Castro** also highlighted the importance of **psychosocial support** in oncology care, especially for families. Early involvement in **psychosocial care** for families can significantly reduce the emotional impact of a cancer diagnosis, which parallels the emotional needs of chronic illness patients.

Providing mental health support from the outset helps alleviate the emotional burden, improving both **treatment adherence** and **quality of life** for patients.

4.3.3. Health Literacy

Health literacy—the ability to understand and use health information—was a central theme across all interviews. Dr. Krikorian, Dr. Bernal, and Dr. Orozco all emphasized that empowering patients with knowledge about their condition and treatment options is key to improving health outcomes.

» **Patient education** should be an ongoing process, where patients are provided with **clear, understandable** information about their disease and its management.

» **Dr. Bernal** suggested that empowering patients with the ability to ask **informed questions** and be active participants in their care plan is crucial for improving treatment adherence.

» **Dr. Orozco** highlighted that **psychoeducation**, particularly for those with chronic pain or autoimmune conditions, can help patients recognize the emotional aspects of their illness and better manage them.

» **Dr. Rubby Castro,** from her experience in oncology, underscored the need for **family education** alongside patient education, particularly for children and their caregivers. Educating families is equally important in chronic illness care to ensure that patients receive the appropriate emotional and practical support.

A well-informed patient is more likely to engage with their healthcare providers, follow treatment protocols, and experience better outcomes.

4.4. Insights from Comparable Chronic Illness Interventions

The insights gathered from these experts align with broader trends in the management of chronic illnesses. Diseases like cancer, fibromyalgia, and heart disease also involve similar emotional and psychological challenges that could benefit from innovative care models. These diseases share common features with autoimmune conditions like lupus, such as uncertainty, stigma, and symptom management.

One notable trend is the growing use of technology-driven solutions to support chronic illness care:

- **AI tools** like **chatbots** have shown potential in providing **immediate emotional support** and delivering **educational resources.**
- **Self-management apps,** which allow patients to track symptoms and access **mental health resources,** are increasingly being integrated into chronic illness care.
- **Peer support platforms** and **online communities** provide opportunities for patients to connect with others facing similar challenges, reducing isolation.

These tools complement traditional care by providing ongoing support, education, and emotional resilience, particularly for patients who may have limited access to healthcare professionals or support networks. By integrating technology with **face-to-face care**, these interventions can improve both **symptom management** and **patient engagement.**

4.5. Gender Perspective: A Talk with Specialists

Dr. Santiago Bernal's emphasis on the gendered nature of chronic illness care underscores the unique challenges faced by women, especially in the context of autoimmune diseases like lupus. He noted that 90% of his patients in rheumatology are women, and this gender imbalance influences the healthcare experience significantly.

Dr. Bernal highlighted the importance of a gender-sensitive approach in healthcare, particularly regarding issues like sexual and reproductive health for women with lupus. His insights align with Dr. Orozco's experiences, where gendered expectations and family dynamics often shape the patient experience. For example, women with lupus frequently face additional societal pressures related to healthcare and family roles, which can impact their treatment adherence and emotional well-being.

The gendered experience of illness also ties into patient agency. Dr. Bernal stressed the need to focus on empowering female patients to take ownership of their health decisions, especially as they navigate the challenges of managing both their disease and family expectations.

Table 4.1 — Gender-Sensitive Issues in Chronic Illness Care

Specialist	Key Themes	Patient Needs	Insights on Technology
Dr. Alicia Krikorian	Psychological support (CBT, ACT), Stigma, Emotional well-being	Emotional resilience, Early intervention	AI-driven tools (e.g., chatbots) complement human care
Dr. Santiago Bernal	Family involvement, Gendered healthcare, Patient agency	Education, Motivational engagement, Family support	Digital tools for patient education and engagement
Dr. Ángela Orozco	Emotional adaptation, Fear of treatment, Health literacy	Fear management, Health education, Emotional support	Apps for self-management, Support through technology
Dr. Rubby Castro	Family involvement, Psychosocial care, Oncology experience	Early involvement, Emotional support for families	Technology to support families and psychosocial care in chronic illness

4.6. Extending Empathy Through Co-Design: Exploring Patient-AI Relationships

4.6.1. Motivation and Setup of Sessions

The motivation behind the co-design sessions stemmed from two primary sources: findings from the literature review and my personal commitment to a human-centered design approach. Throughout the literature, a persistent gap became evident—the limited integration of patient voices in the development of technological interventions for healthcare. While these solutions often claim to be “patient-centered,” few actually embed lived experiences or consider the emotional and contextual realities of chronic illness.

From a design research perspective, it became essential to enrich the thesis with perspectives that approximate the patient experience. Due to ethical constraints that prevented direct work with patients, I extended this through conversations with experts who regularly accompany patients in their journeys—either as clinicians or researchers. These included two mental health specialists and one rheumatologist who had already participated in previous interview stages. The goal was to explore how AI-driven technologies could better align with the psychological, emotional, and contextual needs of patients—particularly women with lupus in Latin America.

4.6.2. Key Emerging Themes

One of the most resonant ideas came from Dr. Ángela María Orozco, who envisioned a solution that “feels like a friend.” Rather than assigning tasks or offering rigid directives, this system would gently suggest, check in, and adapt—mirroring the relational dynamics of a real friendship. Over time, it would come to understand the user’s preferences, rhythms, and emotional tone.

Similarly, Dr. Alicia Krikorian emphasized a paradoxical quality of AI-based tools: in certain moments, they might feel more empathetic than human practitioners. Unlike humans, who can have bad days or experience emotional fatigue, large language models (LLMs) can maintain a consistent tone of care. While this does not replace the nuance of human connection, it presents an interesting opportunity to explore AI as a source of stable emotional support.

Accessibility also emerged as a critical theme, especially from Dr. Santiago Bernal. Mental health care, particularly in Latin America, suffers from systemic constraints. Patients often receive only short, infrequent therapy sessions through their public or private healthcare plans, typically 20–30 minutes long. Those who require more comprehensive support are often forced to seek private care, which remains financially inaccessible for most. Chronic illness patients face an additional burden: the need for ongoing emotional support over the course of years, if not a lifetime.

Finally, a strong gender perspective was consistently emphasized. Given that most lupus patients are women, the solution must address gendered topics such as sexual and reproductive health, work-life balance, domestic responsibilities, pregnancy, and menopause. While access to digital tools in Colombia and other Latin American countries is relatively strong, content relevance and inclusive interaction design are equally crucial.

4.6.3. Tensions and Contradictions

A major tension lies in resisting the reductive solutionism that has emerged from the current AI hype. While conversational agents are often proposed as go-to interventions, there's a risk in defaulting to "chatbot logic" without addressing deeper structural and emotional needs. Several participants expressed skepticism toward overly scripted or generic interactions that fail to acknowledge patient complexity. For example, a chatbot might deliver a reminder that, while well-meaning, comes across as patronizing or poorly timed—ultimately discouraging continued use.

There's also the issue of taboo and stigma surrounding mental health. While this research doesn't aim to solve those challenges directly, they must be acknowledged as background limitations. Interestingly, this tension opens a design opportunity: embedding soft educational content within the solution itself—normalizing emotional care, promoting psychological literacy, and creating a more welcoming entry point for patients who may be new to these topics.

4.6.4. Transition to Design Implications

From these conversations, several design opportunities emerged—many of which go beyond traditional functionality and focus instead on emotional nuance, personalization, and context-awareness. Below is a synthesis of the most relevant design directions and features:

Table 4.4 — Co-Design Insights: Design Opportunities for AI Companion

Design Opportunity	Why It Matters
Gentle, emotion-driven reminders	Promotes self-care through encouraging micro-actions (e.g., "go for a short walk," "listen to music"), reinforcing self-worth and emotional grounding.
Framing AI as a caring companion	The system builds trust over time by responding to the user's state, rhythms, and preferences—encouraging continuity of use and deeper engagement.
Support for real-life transitions (e.g., work routines, weekends)	Provides context-aware prompts that reflect the patient's daily schedule and emotional bandwidth.
Avoidance of obligation-based language	Prioritizes kindness over pressure, avoiding "should" and "must" language to reduce feelings of failure or inadequacy.

Personalization of tone and voice	Lets users adjust how they want to be spoken to—gentle, informative, playful, etc.—making the system feel truly theirs.
Narrative-based onboarding and symptom journaling	Offers patients tools to reflect on what their diagnosis means and how it evolves over time, supporting both newcomers and experienced patients. Supports reflection on diagnosis and disease evolution through narrative.
Soft educational content embedded in flow	Reduces stigma and builds emotional literacy without overwhelming the user.
Multiple interaction styles (text, audio, visual)	Adapts tone and guidance for newly diagnosed vs. long-term patients.
Reflection prompts tailored to disease stages	Adapts tone and guidance for newly diagnosed vs. long-term patients.
Inclusive language settings	Encourages culturally and gender-sensitive dialogue styles.

The co-design sessions complemented the expert interviews by translating theoretical and clinical insights into emotional, lived-in perspectives—highlighting how AI solutions must feel relational, adaptive, and rooted in patient reality.

4.7. Conclusion and Insights

This chapter has explored the expert perspectives on managing chronic illness care, particularly focusing on autoimmune diseases like lupus. The insights gathered from Dr. Alicia Krikorian, Dr. Santiago Bernal, Dr. Ángela María Orozco, and Dr. Rubby Castro have provided a holistic view of the multifaceted needs of chronic illness patients, underscoring the importance of integrating psychological support, patient education, and family involvement into care models.

Building on these interviews, co-design sessions with these same specialists extended the inquiry into how AI might respond to the emotional, contextual, and gender-specific realities of patients—particularly women in Latin America. These sessions revealed both practical needs and deeper psychological tensions, offering direction for how emotionally attuned, culturally sensitive technologies might be envisioned in future care models.

4.7.1. Key Insights

1. **Symptom Management:** The interviews revealed that symptom management in chronic illnesses requires a multidisciplinary approach, addressing not only the physical symptoms but also the emotional toll of the disease. Effective management includes medication, physical therapy, and emotional support through therapies like mindfulness and psychological first aid.
2. **Emotional Support:** Emotional well-being is critical for chronic illness patients, and early psychological interventions are essential for reducing anxiety, depression, and stigma. Both family support and peer support networks play an important role in helping patients cope with the psychological challenges of their condition.
3. **Health Literacy:** Empowering patients with clear, understandable information about their condition improves treatment adherence and patient agency. Educating patients continuously throughout their treatment journey ensures they are active participants in their care.
4. **Gender Sensitivity:** The importance of a gender-sensitive approach in healthcare, particularly for women with autoimmune diseases, was highlighted by Dr. Bernal. This approach con-

siders the unique challenges faced by women, including family roles and reproductive health, and ensures that these factors are addressed in treatment plans.

5. **Role of Technology:** All experts recognized the growing potential of technology—particularly AI tools, self-management apps, and digital health platforms—in providing emotional support, education, and peer connection for patients. These tools complement traditional face-to-face care, enhancing both patient engagement and symptom management.

4.7.2. Final Thoughts

The interviews and co-design conversations presented in this chapter have reinforced the need for a holistic, patient-centered approach to chronic illness care—one that does not separate the emotional from the clinical. They suggest that emotional nuance, personalization, and empathy must be designed into future AI-driven tools, especially in underrepresented contexts like Latin America.

Moving forward, these insights underscore the importance of continued collaboration between medical professionals, patients, and technological innovations in developing care models that are not only effective but also compassionate and inclusive. This chapter sets the foundation for the design principles and speculative concepts developed in the next stages of this research.

DESIGN PRINCIPLES & ETHICAL FRAMEWORK

5

5.1. Introduction: From Insights to Design Commitments

The preceding chapters explored expert knowledge and co-design insights that illuminated the multifaceted needs of patients living with autoimmune diseases—particularly women navigating lupus in Latin America. These findings are not simply research outcomes; they are calls to action that must be translated into tangible commitments within the design process.

This chapter outlines a set of core design principles and accompanying ethical frameworks that guide the development of AI-driven health interventions. These principles stem from both literature and lived-experience proxies, especially the concept of AI as a friend—an emotionally attuned, nonjudgmental presence embedded within daily health routines.

By foregrounding accessibility, emotional safety, cultural sensitivity, and gender inclusivity, the goal is not to design another clinical tool—but to imagine a relational companion that is respectful, responsive, and grounded in patients' real-world contexts.

5.2. Core Design Principles

Accessibility

Design must account for structural inequities in digital and healthcare access. While mobile device usage in Latin America is widespread, economic barriers, regional disparities, and healthcare fragmentation remain major obstacles. An AI health companion must work across bandwidths, offer asynchronous options, and prioritize usability regardless of tech literacy.

Gender-Inclusive Design

Given that lupus disproportionately affects women, the system must support conversations and self-management around sexual health, reproduction, hormonal changes, and domestic labor stressors. Gender sensitivity must go beyond cisnormative assumptions—recognizing diverse identities, bodies, and healthcare needs—while also addressing the layered social expectations placed on women in caregiving roles.

Transparency in AI Use

Users must understand when they are engaging with AI, what data is being collected, and how it is used. Explainability is not only a technical concern—it is a matter of trust and psychological safety, especially for populations with historically limited access to empathetic care.

Transparency is not simply about disclosing that "this is an AI." For chronically ill users—especially those navigating emotional vulnerabilities, health anxiety, or systemic mistrust—transparency must be empathetic, contextual, and continuous. It is a foundational aspect of user trust, psychological safety, and agency.

From a UX perspective, transparency should be:

1. Clear About the AI's Role and Limitations

Users should always know when they are interacting with an AI system—and what that system can and cannot do. The companion should never simulate being a human nor suggest it can offer medical advice. This can be communicated through:

- a friendly onboarding flow explaining "what I am and how I can support you"
- use of metaphors like "I'm a tool to support your journey—not a doctor or therapist"

- micro-disclaimers during sensitive moments (e.g., "Remember, I'm not a human. I'm here to guide, not to diagnose")

2. Transparent About Data Use

Even if using only local storage or anonymized data, the interface should still:

- give users control over what is saved or deleted
- explain what data the system is learning from (e.g., "I adapt to how you describe your energy levels to offer better suggestions over time")
- offer a privacy settings section written in accessible, non-legal language

3. Reinforce Consent Over Time

Transparency should not be a one-time event during setup. It should be:

- renewed gently (e.g., "Would you like me to keep remembering this?")
- supported with easily accessible summaries ("What this companion knows about me")
- paired with reassurance options like pausing tracking or resetting personalizations

4. Designed with Emotional Tone in Mind

Explainability must not feel cold or corporate. It can be:

- embedded with warm, respectful language
- visually integrated in ways that match the tone of the companion (soft prompts, color-coded confidence levels, or friendly icons)

5. Linked to Safety and Clinical Escalation

As emphasized by Dr. Alicia Krikorian, transparency should also serve a protective function in critical emotional moments. A well-designed companion can identify when a user appears to be entering a psychological crisis or heightened stress phase—based on language patterns, mood logging, or skipped routines—and respond with:

- Gentle but clear alerts to the user, suggesting they seek professional support
- Integrated prompts to contact healthcare providers, especially for mental health concerns
- In future iterations: automatic signal pathways to notify trusted clinicians (with prior consent)

This reinforces the idea that emotional AI is not a closed loop—but a supportive node within a larger care ecosystem. This function becomes especially vital in contexts where timely access to professional care is limited, positioning the companion as a bridge—not a substitute—for early mental health intervention.

Culturally Sensitive Interaction

Language, tone, and pacing should reflect local norms and values. The AI should communicate with warmth, without jargon or condescension. This includes allowing users to personalize tone and voice, accommodating both formal and informal preferences across Spanish dialects, and acknowledging regional emotional vocabularies.

Patient Emotional Safety

Inspired by the co-design metaphor of “AI as a friend,” the system must avoid triggering guilt, shame, or overwhelm. Rather than issue demands or prescriptions, it should invite reflection, offer micro-supports, and respect the emotional variability of chronic illness. This includes avoiding “should” statements, offering gentle opt-ins, and recognizing when to say less.

5.3 Bias Mitigation Strategies

Ethical AI in healthcare demands proactive, continuous scrutiny. The following strategies aim to reduce the risk of reinforcing existing inequalities:

Dataset Considerations

Whenever possible, training data should be representative of the target demographic: women in Latin America living with chronic illness. If direct data is not available, the system should flag its limitations and avoid overconfident predictions or generic content. Data documentation strategies like Data Sheets for Datasets (Gebru et al., 2018) and Model Cards (Mitchell et al., 2019) should be adopted as standards.

Local Model Deployment for Privacy Preservation

While current iterations of the prototype would rely on third-party LLMs such as those offered by OpenAI, which introduces known ethical risks related to data handling and user privacy, these concerns are acknowledged as limitations of this phase. Importantly, no testing with real patients has been conducted, and no sensitive data is being processed through these systems at this stage.

During conversations about the prototype’s feasibility, Henry Hermel Andrade Caicedo, a biomedical engineer from Universidad Pontificia Bolivariana in Medellín, emphasized a promising alternative: the use of locally deployed models on user devices. This approach allows AI systems to run directly on a user’s smartphone or tablet without transmitting data to external servers. By doing so, it ensures that all personal and health-related interactions remain entirely on the device, significantly reducing the risk of data exposure and enhancing compliance with privacy regulations such as GDPR or HIPAA (Brundage et al., 2020; Voigt & Von dem Bussche, 2017; U.S. Department of Health & Human Services, 2013).

This direction, while still in development across many platforms, offers a compelling future path for ensuring user autonomy and privacy—especially in health-related applications where emotional safety and data control are paramount.

Avoiding Automation of Existing Inequities

Automating care decisions based on biased input risks silently scaling existing exclusions. Biases can be embedded in both training datasets and interface logic, often in ways that are difficult to detect without intentional scrutiny. To counter this, design and data strategies must incorporate intersectional variables such as gender, language, literacy level, regional context, and caregiving responsibilities—factors particularly relevant for women with chronic illnesses in Latin America.

Participatory Data Practices should be embedded into future testing phases to ensure that design assumptions are validated against real-world complexity. This means engaging patients or patient proxies in identifying where automated suggestions might fall short or misinterpret context—especially in emotionally or culturally sensitive situations.

Design Transparency and Auditability

In alignment with FAT/ML (Fairness, Accountability, Transparency in Machine Learning) principles, the system should offer both user-facing and internal transparency. This includes clear interface disclosures—such as “This suggestion is based on patterns in your journaling history”—and access to personal data summaries that show what the system has learned or adapted.

On the backend, the design team should maintain traceable documentation (e.g., model cards or decision logs) to track how outputs are generated, what assumptions they are based on, and when they are updated. This is particularly important in healthcare contexts, where changes in algorithmic behavior—such as how stress or fatigue is interpreted—must be accountable to both ethical review boards and users.

For example, if the AI begins recommending reduced activity due to detected fatigue patterns, users should be able to review why those suggestions were made and whether they wish to continue receiving them. Likewise, any emotional state labeling (e.g., "you seem overwhelmed") must be tied to transparent, opt-in logic that can be questioned or turned off.This table links core literature gaps to how they are addressed in both methodology and the design concept.

Table 5.1 — Translating Literature Gaps into Patient-Centered Design Strategies

Literature Gap	How It's Addressed in Methodology	How It's Addressed in Design
Lack of tools tailored to women with lupus in LatAm	Gendered analysis of expert interviews and co-design with specialists	Gender-sensitive features and tone personalization; inclusion of reproductive health topics
Limited mental health support for chronic fatigue	Integration of mindfulness and psychoeducation frameworks	Emotionally safe journaling and mood check-ins, inspired by "AI as a friend"
Low continuity of emotional care in public health systems	Specialist testimony on session time limits and systemic gaps	Micro-supports and daily nudges for emotional self-care beyond clinical settings
Technology viewed as cold or directive	Co-design metaphor of relational, adaptive AI	Companion-style prompts, opt-in suggestions, tone adjustability

One-size-fits-all design logic	Attention to user variability across education, access, and disease stage	Onboarding paths based on user familiarity and experience with chronic illness
Lack of transparency and explainability in AI tools	UX-centered ethical analysis; consultation with AI developers and healthcare specialists	Onboarding that explains AI role and limits, data privacy settings, tone personalization, and crisis-triggered alerts to guide toward human care

5.4 Conclusion: Design Ethics for AI in Autoimmune Care

Designing for chronic illness care is not a neutral task—it is a political, emotional, and ethical undertaking. The principles outlined in this chapter are not just technical guidelines but **commitments to relational, inclusive, and context-aware design.**

The co-design sessions were critical in grounding these ideas in the emotional realities of care. They moved the conversation from abstract functionality to lived emotional texture—revealing the need for a system that is not only effective, but gentle, familiar, and trustworthy.

As we move toward concept development, these principles form the foundation for a system that listens before it speaks, supports without prescribing, and adapts with empathy rather than dictates with rigidity.

CONCEPT DEVELOPMENT & PRACTICE COMPONENT

6

6.1 From Research to Concept: The Emergence of an AI Companion

The research process revealed a recurring, emotionally resonant need: the desire for a supportive system that could accompany patients through the ups and downs of living with a chronic illness. Rather than another clinical app or symptom tracker, participants imagined something more relational—something that could feel like a friend.

Expert interviews and co-design sessions, especially with mental health specialists, revealed a shared theme: emotional support tools are most effective when they are gentle, consistent, and adaptable to the user's state of mind. This idea gave rise to the guiding concept of this thesis: AI as a Friend.

The concept envisions a digital companion that doesn't instruct, diagnose, or overwhelm—but rather listens, encourages, and reflects. It is shaped by behavioral frameworks such as the Theory of Planned Behavior, which emphasizes perceived control and emotional readiness, and the Transactional Model of Stress and Coping, which highlights the role of narrative, emotion, and reframing in chronic illness adaptation.

Importantly, this concept does not aim to replace therapists or doctors. Instead, it positions the AI as a soft, supportive presence—a steady companion between appointments, during quiet emotional moments, or in contexts where traditional care is inaccessible. The companion becomes a form of self-care scaffolding: gentle, private, and always available.

Framed through a gender and cultural lens, the AI companion also seeks to address the realities faced by women with lupus in Latin America—recognizing their lived contexts, emotional burdens, and caregiving roles. The result is a design direction that is not just useful, but human: grounded in empathy, shaped by real needs, and attentive to emotional nuance.

6.2 Proposed Concept: A Companion for Emotional Support and Symptom Reflection

Working Title: Aliada (Spanish for “ally” or “trusted supporter”)

Aliada is a mobile-first, AI-powered companion designed to support women living with lupus in Latin America. Rather than tracking metrics or issuing medical reminders, the app centers emotional wellness: offering mood check-ins, narrative journaling, and gentle prompts that encourage reflection, regulation, and agency.

This concept emerged directly from conversations with specialists who work closely with patients navigating chronic illness. Their input revealed not just what patients need, but how they want to feel: seen, supported, and not alone. Aliada is designed to meet those emotional needs—without demanding too much in return.

Key Attributes:

» Narrative-centered.

The app aims to invite users to reflect on their lived experience through writing or voice notes—capturing emotional and contextual insights that are often left out of clinical conversations.

» Relational.

The system aspires to build a sense of companionship over time by adapting to the user’s tone, rhythm, and language. Rather than act as an authority, it behaves like a thoughtful presence that listens and adjusts.

» Emotionally attuned.

Users are encouraged to choose how they'd like the companion to "speak" to them—gentle, informative, or playful—fostering comfort and emotional resonance in moments of uncertainty or fatigue.

» Stage-sensitive.

The onboarding experience aims to be adaptive, offering different guidance depending on whether the user is newly diagnosed or experienced in managing their illness. This avoids reductive or patronizing content.

» Privacy-conscious.

While this first iteration does not process real user data, the long-term vision includes exploring locally deployed AI to keep personal information on-device—ensuring greater privacy, especially in emotionally sensitive contexts.

» Culturally grounded.

The app aims to reflect the realities of women in Latin America, with prompts that acknowledge caregiving roles, reproductive health, family expectations, and social stigma—all in language that feels familiar and affirming.

» Reflective Progress (Emotional Trace)

In future versions, the app may offer users an optional, gentle way to revisit meaningful reflections or emotional states. Rather than present data as metrics or goals, the feature would surface "moments that mattered"—journals, check-ins, or mood entries that show patterns of resilience or recurring themes. For instance:

"You felt a sense of comfort three times this week" or "A year ago today, you reflected on acceptance."

This feature would be completely opt-in, allowing users to review or disengage at any point. Its purpose is not to quantify healing but to reinforce self-recognition, narrative continuity, and emotional validation.

Rather than acting as a therapist or medical advisor, Aliada behaves more like a friend with good boundaries: available when needed, non-intrusive, and respectful of emotional space. It helps users process what they're experiencing—not by fixing, but by accompanying.

6.3 Defining a Proxy Persona

Due to ethical limitations that prevented direct engagement with patients, this project relied on expert interviews and co-design sessions with mental health specialists, rheumatologists, and researchers familiar with the lived experience of chronic illness. While these sessions did not capture patient voices directly, they revealed emotionally consistent patterns across stories of care, adaptation, and struggle.

To bring the concept into clearer focus, a proxy persona was developed as a synthesis of these recurring themes. This persona does not represent a real individual, but serves as a design lens to test emotional resonance, tone, and context relevance in the proposed concept.

Proxy Persona: María (35)

Living with lupus in Medellín, Colombia

Background

María is a 35-year-old woman diagnosed with lupus two years ago. She lives in Medellín and works part-time in a school administration office. Her energy levels fluctuate unpredictably due to flare-ups, and she's in the process of adjusting her routines and relationships to accommodate the emotional and physical demands of her condition.

Health Context

She is enrolled in a public health insurance plan, which offers limited access to mental health services—just one 30-minute session per month. While she appreciates her rheumatologist, the time constraints and clinical focus of appointments often leave her emotional needs unaddressed. She sometimes turns to online forums or voice notes to friends, but doesn't always feel safe being vulnerable.

Tech Habits

María is digitally literate. She uses WhatsApp regularly, relies on reminders for medications, and prefers voice input when she's too tired to type. She values tone, simplicity, and personalization in any app she uses.

Emotional Needs

María doesn't want a system that lectures or tracks her like a patient. She wants something gentler—something that asks how she's doing, not just what she's doing. She wants to journal or talk through feelings, but doesn't want to feel exposed or judged. She's open to using an app, but only if it feels friendly, safe, and culturally familiar.

Empathy Map: A Day in María's Mind

Says	"I'm tired, but I'm managing." "I don't want to explain everything again."
Thinks	"Am I doing enough to stay healthy?" "I wish someone would just listen."
Feels	Emotionally drained, occasionally invisible, grateful but overwhelmed
Does	Skips journaling when flaring; sends voice notes to close friends; reads health info on Instagram, Facebook groups; cancels social plans when fatigued

This proxy persona and empathy map serve not as stand-ins for patient research, but as ethical approximations—grounded in clinical insight and emotional patterns shared by those who care for chronically ill patients daily. They inform the tone, priorities, and relational dynamics of the AI companion prototype, ensuring that design decisions are always tethered to a believable human reality.

6.4 Feature Roadmap: Prioritizing for Phase 1

To balance ethical responsibility with project feasibility, the concept is organized into three tiers:

1. Prototyped features — developed as part of the thesis prototype
2. Designed but not prototyped — included in user flows but not interactive
3. Future-phase features — high-impact ideas intended for later implementation

This phased strategy communicates a realistic thesis scope while demonstrating design depth and future scalability.

Table 6.1 — Feature Roadmap: Phased Development Strategy for Aliada

Feature	Status	Rationale
Onboarding flow	Prototyped ☑	Central to user trust and engagement; introduces tone, consent, and AI framing
Tone/style personalization	Prototyped ☑	Key to emotional safety; easy to prototype within onboarding

AI role and limitations explanation	Prototyped ☑	Supports transparency, reduces confusion, and establishes boundaries
Mood check-in + light journaling	Prototyped ☑	Foundational to emotional support; low complexity, high resonance
Crisis-mode opt-in ("Would you like me to suggest professional help if needed?")	Designed only ⊛	Ethically sensitive; presented as an onboarding setting but not functional
User data control ("Reset what I know", delete logs)	Designed only ⊛	Demonstrates autonomy; shown as a design element, not built-in functionality
Reflective Progress / Emotional Trace View	Future phase ⏩	Powerful for narrative self-awareness; requires emotional data patterns
Emotion detection from language	Future phase ⏩	Technically and ethically complex; out of scope for MVP
Local model deployment	Future phase ⏩	Important for privacy; technically ambitious and unfeasible short-term
Escalation signal to healthcare providers	Future phase ⏩	Requires clinical oversight and integration; deferred for future exploration

☑ Prototyped = will be built and included in the thesis deliverable

⧆ Designed only = shown in user flows or static screens (e.g., Figma), but not interactive

⏩ Future phase = part of long-term vision, not included in thesis deliverable

6.5 Prototyping Approach

The prototype focuses on one emotionally rich, cohesive user journey: the onboarding experience. This journey reflects the core values of the concept—emotional attunement, cultural sensitivity, and user agency—through a sequence that introduces the AI companion, invites mood reflection, and sets the tone for future interactions.

Prototype Includes:

» *Onboarding flow*

A gentle introduction that explains what the AI is (and isn't), setting the foundation for transparency and emotional safety.

» *Tone personalization interaction*

Users can select their preferred interaction tone—gentle, informative, or playful—setting the emotional atmosphere for future exchanges.

» *Mood check-in + short journaling*

A low-pressure, open-ended moment for users to check in with themselves emotionally—modeled after practices in mindfulness and behavioral coping.

» *Consent and opt-in settings*

Users are invited to activate or defer two sensitive features:

- Crisis-mode suggestions (e.g., gentle reminders to seek help)

- Data memory and reset options (e.g., "What Aliada remembers about me")

These interactions are designed not as technical proofs, but as experiential expressions of care, clarity, and emotional relevance.

Tools and Methods

» *Lovable prototyping environment*

The prototype was developed directly in AI-augmented design tools such as Lovable, allowing for rapid iteration using large language models. Prompts were crafted to reflect emotional tone, behavioral framing, and culturally grounded UX patterns.

» *AI-generated UI with shadcn components*

The interface structure was scaffolded using modern, accessible UI libraries such as shadcn, ensuring consistency and design system integration without reinventing core components.

» *Cultural references and tone modeling*

Cultural references—including the film Her—were incorporated into visual and prompt design to guide both aesthetic and interactional tone. These references helped set the tone for a familiar and emotionally resonant companion.

» *Scripted dialogue*

Interaction copy and quick replies were informed by themes drawn from co-design sessions and expert interviews. These scripts simulate the AI's conversational behavior and tone.

» *Peer testing and feedback loops*

Ongoing copy and tone reviews were conducted with UX collaborators to ensure emotional clarity, pacing, and cultural fit. The prototype is walkthrough-ready for feedback from specialists, design peers, and developers.

While the prototype does not include live AI logic, backend integration, or real user data handling, it offers a high-fidelity conceptual experience. It allows reviewers to explore and assess the emotional, ethical, and narrative integrity of the proposed system—within the responsible bounds of this research phase.

6.6 Proxy-Based Testing: Early Insights from Prototype Evaluation

6.6.1 Evaluation Setup

To obtain early, proxy-based feedback without breaching ethical constraints, the high-fidelity onboarding prototype was shared with two of the specialists who had already contributed to the research:

Participant	Role & Background	Session Format
Dr. Alicia Krikorian	Clinical psychologist & palliative-care researcher	Remote, self-guided navigation + 15-min debrief
Dr. Ángela María Orozco	Psychologist specializing in chronic pain, rheumatic arthritis and mental health	Remote, self-guided navigation + 15-min debrief

Each session was free-exploration: the doctors could tap, speak, or select any quick reply. The goals were to assess:

1. Clarity & flow of the onboarding steps
2. Tone perception (voice, wording, emotional warmth)
3. Perceived usefulness & future opportunities

Expectation constraint: Even after clarifying that the build was a simulation, both experts expected ChatGPT-level conversation depth. This mismatch surfaced an important design insight: **realistic conversational behaviour—or a very explicit demo disclaimer—will be critical in future tests.**

6.6.2 Key Findings

Table 6.2 — Key Findings from Proxy-Based Testing Sessions

Theme	Observation	Implication / Opportunity
Ease of navigation	Both doctors completed onboarding without confusion.	Core flow is intuitive—no major structural changes needed.
Tone-setting step	Dr. Orozco and most pilot users chose "Alegre y optimista"; indicates preference for positive emotional framing.	Keep this tone but refine wording to avoid forced cheerfulness during bad days.
Voice expectations	Dr. Krikorian assumed the tone selector would also change the audio voice; current robotic TTS felt "too synthetic".	Long-term: personalise TTS (gender, softness). Short-term: add label clarifying "esto afecta el estilo, no la voz" (This affects tone style, not voice).
Audio privacy control	Both experts requested an on/off toggle for spoken responses—useful for public spaces and privacy.	Add quick mute toggle in header; default to off if no headphones detected.
Quick reply usefulness	Dr. Orozco used quick replies almost exclusively; helped her keep momentum.	Good signal to keep and expand topic chips—especially for sensitive subjects and senior audiences.

Conversation depth limit	Prototype “stopped” after 2-3 exchanges, causing frustration.	Future pilots need Wizard-of-Oz or minimal live LLM to meet user expectations.
Suggested topics list	Positive reception; topics felt relevant and culturally grounded.	Consider rotating suggestions and adding “ver más temas”.

6.6.3 Behavioural Analytics (Hotjar Heatmaps)

- High click density on quick-reply chips and mood slider → confirms discoverability.
- Mis-click cluster on system message bubbles → users tapping them expecting context menu (copy / expand).
- Mobile engagement much higher than desktop (consistent with mobile-first assumption).

Action: Redesign chat bubbles to afford tap responses or remove hover-like affordance on mobile to reduce false taps.

Fig. 6-1 ***Welcome / Privacy Disclosure***

6.6.4 Limitations

1. Sample size = 2 specialists; no direct patient insight yet.
2. Simulation gap created inflated expectations for live conversation.
3. No audio-environment testing (e.g., noisy settings, low-connectivity scenarios).

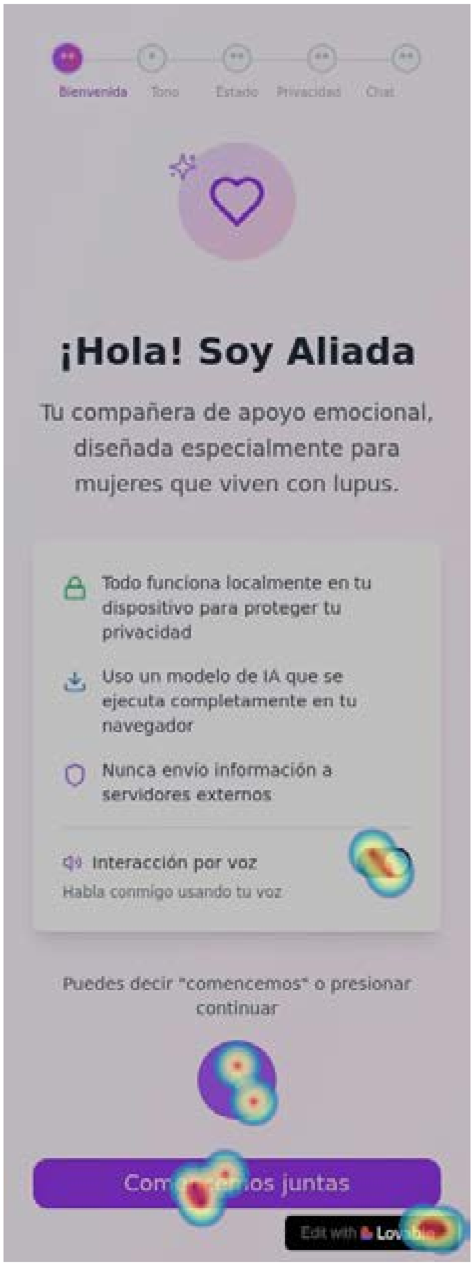

Fig. 6-1 ***Welcome / Privacy Disclosure*** — First onboarding step introducing Aliada and local-model privacy; heat-map shows concentrated curiosity on the “voice toggle” and primary “Comencemos juntas” CTA.

Fig. 6-2 ***Tone Selection Step*** — Three tone cards ('Suave y cálida', 'Clara y directa', 'Alegre y optimista'); click density peaks on the cheerful/ optimistic option, reinforcing preference for a positive emotional frame.

Fig. 6-3 ***Mood Check-In Slide*** — Heat-map clusters on some emotion tags (esperanzada/ agradecida/ preocupada) and the emotional slider indicate users experiment with both granular and categorical mood inputs

Fig. 6-4 ***Privacy & Opt-Ins*** —— Users interact most with crisis-reminder and memory switches, validating the importance of visible autonomy controls in sensitive health contexts.

Fig. 6-5 ***Companion Greeting (mobile)*** — Initial mobile greeting ("Estoy aquí para acompañarte…") with topic chips; heat-spots confirm high engagement on quick-reply chips, validating low-effort entry points.

6.6.5 Next Evaluation Steps

1. Add Wizard-of-Oz back-channel or lightweight LLM to sustain 5–6 conversational turns.
2. Implement voice toggle & clarify tone selector before next test cycle.
3. Recruit a broader proxy panel (e.g., nurses, patient advocates) to diversify feedback on language simplicity and emotional safety.
4. Integrate Hotjar click-stream findings into UI tweaks (chat bubble affordance, tap targets).

These refinements will position Aliada for a more robust pilot once ethical clearance and technical capacity allow direct patient involvement.

6.7 Reflections on Concept Feasibility and Ethical Boundaries

This concept began with a provocation: What would it look like to design an emotionally attuned AI companion for women with lupus—not as a tool for monitoring, but as a friend for reflecting?

Through expert interviews, co-design sessions, and proxy-informed prototyping, a rich conceptual framework has taken shape. However, it is essential to acknowledge the ethical boundaries and practical constraints that define the scope of this phase.

Feasibility Reflections

The current prototype demonstrates that a relational, emotionally grounded AI interface is not only conceptually viable—it is also prototypable using existing design tools and AI-supportive development environments. The use of platforms like Lovable and Cursor, along with open component libraries like shadcn, allowed for rapid iteration of emotionally complex UX without requiring full-stack development or live AI integration.

However, several features outlined in the roadmap—such as emotion detection, local model deployment, and clinical escalation—require not only technical capacity but also ethical clearance and long-term testing. These elements remain aspirational until meaningful patient collaboration, institutional backing, and real-world testing environments are secured.

Ethical Considerations and Constraints

The ethical approach in this phase is characterized by intentional restraint. Out of respect for patient privacy, emotional vulnerability, and institutional ethics, no real data was collected and no clinical claims were made.

Key ethical boundaries included:

» Avoiding the simulation of diagnosis or emotional judgment

» Not building any backend data handling or prediction systems

» Using proxy personas and expert input instead of direct patient testing

» Ensuring that consent, clarity, and opt-in framing are embedded throughout the experience

This approach allowed for a conceptual deep dive without compromising ethical integrity. It models how emotional design can evolve even within constraints, and how speculative care systems can be both hopeful and responsible.

A Framework for Future Development

While limited in scope, this phase sets the groundwork for a longer-term research and development strategy, guided by the following principles:

» Co-development with patients in future phases, once ethical approvals are in place

» Continued alignment with behavioral science and narrative-based care models

» Gradual integration of more complex features, such as reflection timelines and emotion-sensitive feedback loops

» Ongoing auditing of language, bias, and accessibility—especially across Spanish-speaking regions

6.8. Closing Thoughts

This chapter reflects a speculative-yet-grounded approach to designing with care. By starting small—with tone, mood, and micro-interactions—the concept of Aliada illustrates how AI can be shaped into a relational companion rather than an extractive tool.

It offers a model not just for what could be built, but for how we might build with empathy, cultural respect, and emotional clarity at the center.

CONCLUSION & FUTURE DIRECTIONS

7

7.1. Summary of Findings

Core needs re-stated

Across literature, proxy interviews, and co-design, four recurring needs emerged for Latin-American women with lupus:

1. Timely, comprehensible diagnosis—autoimmune identification still averages years of delay and creates “diagnostic trauma”.
2. Continuous emotional scaffolding—>50 % of autoimmune patients develop anxiety or depression, yet only 24 % ever receive psychological screening.
3. Gender- & culture-specific guidance—lupus intersects with reproductive decisions, family care labour, and workplace stigma; existing digital tools seldom address these nuances.
4. Self-efficacy support—Treatment adherence dips when fatigue, pain, or health-literacy gaps erode perceived behavioural control (TPB construct).

7.1.1. Insights from Indirect Research

From global evidence to local realities.

The literature review highlighted critical gaps specifically related to existing AI-driven chronic-care tools: they remain predominantly clinician-oriented, rarely integrate mental health systematically, and consistently overlook gender and socio-cultural determinants despite their profound impact on care outcomes.

7.1.2. Behavioural frameworks informing concrete design.

The methodological approach directly translated key frameworks—Theory of Planned Behavior (TPB), Transactional Model of Stress and Coping, Narrative Theory, and Mindfulness-based Interventions—into actionable and nuanced design features. This translation included implementing consent-based interactions (opt-ins) to foster perceived behavioural control, integrating reflective mood check-ins to aid in emotional processing, and leveraging journaling prompts to help users articulate their illness experiences clearly and meaningfully.

7.1.3. Specific insights from proxy-based co-design.

Due to ethical constraints limiting direct patient interaction, proxy participants—including clinicians and mental-health specialists—provided rich, contextual insights not captured by quantitative clinical data. Notably, they highlighted systemic issues like insufficient time (20-minute sessions in public healthcare systems) for meaningful emotional dialogue and identified culturally specific behavioural patterns such as the tendency among women patients to downplay pain or emotional distress to fulfil familial and societal caregiving expectations. These nuanced insights shaped the design direction, resulting in careful attention to empathetic tone, targeted conversational prompts for emotionally complex topics, and robust privacy considerations in voice-interaction designs.

7.1.4. Contributions

Table 7.1 — Summary of Contributions

Contribution	Detail
Multi-layer methodology	Hybrid of literature synthesis, behavioural science mapping, and co-design with proxies—offering a replicable path when patient access is restricted.
Design-ethics framework w(Ch. 5)	Five core principles—Accessibility, Gender Inclusivity, Transparency, Cultural Sensitivity, Emotional Safety—with explicit bias-mitigation tactics.
Speculative artefact: Aliada	A mobile onboarding prototype that embodies narrative journaling, tone personalisation, and privacy-first voice interaction.
Behavioural integration	TPB, Transactional Stress–Coping, and Narrative Theory operationalised into micro-copy, mood check-ins, and optional "Emotional Trace."
Early proxy validation	Specialist sessions showed onboarding clarity and tone appeal, but flagged expectations for deeper AI dialogue—surfacing a realistic feasibility gap.

7.2 Limitations

Table 7.2 — Summary of Limitations

Limitation	Consequence
Ethical restrictions—no direct patient involvement	Emotional resonance inferred; some lived realities may be missing or romanticised.
Prototype ≠ live AI	Testers expected ChatGPT-level depth and voiced frustration; future tests need Wizard-of-Oz or lightweight model.
Sample size (n = 2 specialists)	Findings are illustrative, not statistically generalisable.
Regional generalisability	Study focuses on urban Colombian context; rural or non-Spanish-speaking populations remain untested.

7.3 Future Work

1. Co-design with patients

Secure IRB clearance to involve 8-10 women across urban/rural sites; run diary studies to refine tone, privacy toggles, and quick-reply chips.

2. Conversational depth

Prototype a Wizard-of-Oz back-end to sustain ≥6 turns; evaluate emotional validity and distress-trigger thresholds.

3. Voice personalisation & privacy controls

Offer soft vs. energetic voices; default to mute in shared spaces; test acceptance.

4. Cross-cultural adaptation

Translate prompts for Mexican Spanish and Brazilian Portuguese; run cognitive-debriefing to catch dialect bias.

5. On-device LLM exploration

Pilot a Tiny-LLM build to keep data local, reducing GDPR/HIPAA risk.

6. Clinical-escalation pathway

Co-author a consent protocol with rheumatology clinics for optional "notify my provider" feature.

7.4 Closing Reflection

This thesis demonstrates that—even under strict research constraints—AI support for chronic-illness care can be imagined, framed, and partially experienced in ways that honour narrative, gender, and culture.

> *Progress in lupus care is seldom linear; it unfolds through stories, small renegotiations of control, and gentle reminders that fatigue does not erase worth. Designing an AI companion to witness and accompany those moments is not just a technical task—it is a human one.*

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APPENDIX

Appendix A: Design Prompt Used for Prototyping

Tool: Lovable

Prompt (excerpt):

Design a mobile-first onboarding flow for Aliada, an AI-driven emotional support companion for women living with lupus in Latin America. The prototype should include:

- A soft, culturally grounded welcome screen
- A clear explanation of the AI's role (not medical, not human)
- Tone personalization (gentle, informative, playful)
- A lightweight mood check-in with optional journaling
- Consent-based settings for:
  - Mood-based crisis suggestions
  - Data memory reset or opt-out
  - Use warm, non-instructional tone and prioritize emotional safety over metrics. Visual design should feel calm, familiar, and minimal.

Appendix B: Emotional Tone Matrix (Simulated AI Response Guide)

User Mood	Tone: Gentle	Tone: Informative	Tone: Playful
"I feel overwhelmed"	"It's okay to feel this way. I'm here when you're ready."	"Stress can show up in many ways. Would you like to reflect on that today?"	"Ugh days happen. Want to brain-dump it out with me?"
"I'm doing okay"	"I'm really glad to hear that. Let's hold onto this feeling."	"That's great. Would you like to log a quick check-in?"	"Look at you, cruising today! Let's give that mood a name."
No input / hesitation	"Take your time—there's no rush here."	"You don't need to respond right away. I'll be here."	"Not sure what to say? Tap a vibe or skip for now."

Appendix C: Visual & Cultural References

Reference	Use
Her (2013 film)	Inspired the minimalist, emotionally aware interface language and companion tone
Colombian WhatsApp conventions	Testers expected ChatGPT-level depth and voiced frustration; future tests need Wizard-of-Oz or lightweight model.
Figma UI screenshots	Findings are illustrative, not statistically generalisable.
AI design libraries (shadcn/ui)	Study focuses on urban Colombian context; rural or non-Spanish-speaking populations remain untested.

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To my mom, who has taught me how to love and serve, how to see and listen, how to rest, reflect, and articulate ideas. Thank you for your unwavering support and immense love.

And last but not least, to all the brave women across the world who have ever felt alone and misunderstood, stigmatized or dismissed, dehumanized or ignored—because their pain was deep and invisible.

This work was born with the intention of shedding light on how to design with empathy, compassion, and care. On how to truly see other people's experiences—and serve their needs.

To all women living with chronic pain: we, as designers, must always listen and care.

Agradecimientos

Probablemente esta sección no hará justicia al conjunto de esfuerzos que hicieron posible este trabajo. Escribir e investigar sobre temas sensibles siempre es un reto. En primer lugar, quiero agradecer a la profesora Marzia Mortati por confiar en este tema desde el comienzo y por apoyar mi idea de transformar una experiencia personal en algo significativo para una comunidad poco escuchada y representada. Gracias por fomentar la valentía necesaria para investigar un tema tan complejo y poco explorado como este.

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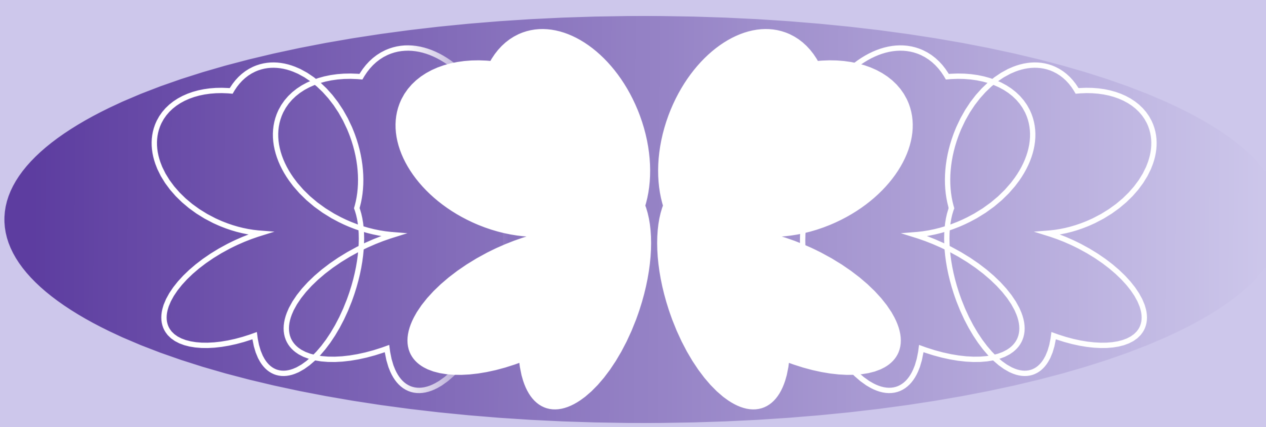
Este trabajo nació con la intención de traer algo de luz sobre cómo diseñar con empatía, compasión y cuidado. Sobre cómo ver realmente las experiencias de otras personas, y cómo responder a sus necesidades.

A todas las mujeres que viven con dolor crónico: como diseñadorxs, debemos escuchar y cuidar.

Siempre.



Lina Useche

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