

Social Isolation and Limb Preservation: The Case for the Podiatric Connection Model (PCM)

Arthur Evensen, DPM; Jaime Moore, NP

Abstract

Loneliness and social isolation are increasingly recognized as critical determinants of physical and mental health, with levels of risk comparable to major biomedical comorbidities. A growing body of research demonstrates that loneliness alters inflammatory pathways, immune regulation, pain processing, endocrine function, and health behaviors, all of which directly influence conditions commonly treated in podiatric practice, including chronic wounds, diabetes, postoperative recovery, and degenerative foot pathology. Despite this, loneliness remains an underexamined contributor to limb salvage outcomes and overall foot and ankle health.

Loneliness affects podiatric patients through multiple interconnected pathways: impaired immune function, dysregulated cortisol and catecholamines, elevated inflammatory cytokines, decreased adherence to offloading and postoperative restrictions, poorer glycemic control, reduced access to care, greater pain sensitivity, and higher use of emergency services. Physiologic mechanisms include upregulation of NF-κB–related inflammatory gene expression, HPA-axis dysregulation, glucocorticoid resistance, and increased sympathetic activity. These biologic effects intersect with behavioral barriers common in podiatric populations such as transportation challenges, low socioeconomic status, living alone, and reduced caregiver support.

Loneliness disproportionately affects rural patients, veterans, older adults, and those with chronic disease, groups frequently represented in podiatric practice. The rural Midwest, for example, demonstrates among the highest rates of social isolation in the United States. Likewise, studies show veterans are at elevated risk of loneliness, depression, functional decline, and delayed care seeking. These factors significantly influence ulcer recurrence, surgical healing, diabetic foot outcomes, and multidisciplinary coordination in wound-care and limb-salvage teams.

In this paper, we introduce the Podiatric Connection Model (PCM), a clinically actionable framework designed to operationalize the identification and management of social risk factors in foot and ankle medicine. The PCM integrates biopsychosocial assessment, structured communication strategies, caregiver and community engagement, enhanced follow-up intensity, and ongoing monitoring to mitigate the negative effects of loneliness on clinical outcomes.

Loneliness should be understood as a modifiable comorbidity in podiatric medicine. Its physiologic and behavioral influence is substantial, particularly in limb salvage, chronic disease management, and postoperative adherence. By embedding connection-focused strategies such as the PCM into daily practice, podiatric clinicians can meaningfully improve healing trajectories, reduce complications, and strengthen both patient and healthcare team resilience.

Introduction

Loneliness is increasingly understood not merely as an emotional state but as a “biopsychosocial hazard” with profound effects on physical health. A 2015 meta-analysis of over 3 million participants found that loneliness and social isolation increase the risk of early mortality by 26% and 29%, respectively, an effect size comparable to smoking, obesity, or physical inactivity (1). For podiatrists, this has direct implications: the populations most vulnerable to loneliness, older adults, individuals with diabetes, rural residents, veterans, and those with chronic illness, constitute the core of foot and ankle medical and surgical care.

Although podiatric literature extensively covers vascular disease, neuropathy, biomechanical deformities, infection, surgical techniques, biologics, and reconstruction, there remains minimal discussion of how psychosocial factors, particularly loneliness, affect outcomes. Yet clinical experience reveals its presence daily: the patient who apologizes repeatedly for “bothering” the doctor; the rural diabetic patient delaying care due to lack of transportation; the elderly widow silently struggling with offloading; the veteran who avoids appointments due to distrust and isolation; the postoperative patient with no caregiver at home; or the chronic wound patient whose world has shrunk to the radius of a wound-care chair.

This paper integrates scientific evidence, clinical application, and narrative insight to argue that loneliness functions as a hidden comorbidity in foot and ankle medicine, one that influences wound healing, postoperative recovery, glycemic control, pain perception, limb salvage success, and patient adherence. To address this gap, we introduce the Podiatric Connection Model (PCM), a structured framework designed to operationalize the identification, management, and mitigation of social risk factors within podiatric care. The PCM provides clinicians with a systematic approach for incorporating connection-based strategies into assessment, communication, surgical planning, follow-up, and long-term monitoring. By reframing loneliness as a clinically actionable variable, the model positions podiatric practice to more effectively support healing trajectories and improve outcomes in the populations most at risk.

The Clinical Burden of Loneliness in Podiatric Populations

Loneliness produces measurable physiologic changes that directly impede wound healing, immune function, and tissue repair, making it highly relevant to podiatric outcomes. Social isolation activates conserved transcriptional responses associated with threat vigilance, characterized by the upregulation of pro-inflammatory genes and downregulation of antiviral pathways (2). Lonely individuals consistently demonstrate elevated IL-6, TNF-α, CRP, and NF-κB activity, reflecting a persistent inflammatory state that interferes with tissue repair (2–5). Loneliness also disrupts regulation of the hypothalamic–pituitary–adrenal axis, leading to increased basal cortisol levels and a flattened diurnal cortisol slope (6). Chronically elevated cortisol suppresses fibroblast proliferation, impairs angiogenesis, slows granulation tissue formation, and disrupts the critical transition from inflammation to proliferation required for wound healing. Immune function is further compromised by impaired leukocyte activity, increased glucocorticoid resistance, and reduced type I interferon responses (2,7), collectively heightening vulnerability to soft-tissue and bone infections that are central concerns in diabetic foot disease and postoperative wounds. In addition, loneliness contributes to vascular dysfunction, including hypertension, decreased endothelial nitric oxide bioavailability, and impaired microvascular perfusion (8–10), which further compromise ischemic wound beds. Persistent low-grade inflammation associated with social isolation also disrupts keratinocyte migration, collagen deposition, and extracellular matrix formation, contributing to delayed repair and increased ulcer recurrence (11,12). Taken together, these mechanisms demonstrate that loneliness is not an abstract psychosocial concept but a biologically significant condition with direct pathophysiologic relevance to foot and ankle medicine.

Loneliness and Limb Salvage Outcomes

Limb salvage, perhaps more than any other subspecialty in medicine, depends on sustained adherence, consistent follow-up, and early intervention, requirements that loneliness directly undermines. Patients who live alone demonstrate reduced adherence to offloading, dressing changes, and preventive behaviors, contributing to significantly higher rates of ulcer recurrence (13,14). Loneliness also leads to delayed presentation for medical care, a pattern with serious consequences; in diabetic foot disease, delays of as little as 48–72 hours can substantially increase infection severity and elevate the risk of amputation (15). Social isolation itself has been linked to higher rates of major amputation among individuals with advanced diabetic complications, particularly when caregiver support is limited (16). Additionally, lonely patients are more likely to experience malnutrition, poor glycemic control, and inadequate engagement in routine foot inspections, factors that further compromise wound healing and elevate the likelihood of limb-salvage failure (17,18). These interconnected effects demonstrate that loneliness is not a peripheral concern but a clinically meaningful driver of outcomes in limb preservation.

Loneliness and Postoperative Adherence

Postoperative foot and ankle care is uniquely dependent on behavioral adherence, requiring strict compliance with non-weightbearing instructions, elevation, dressing protection, and timely follow-up. Social isolation significantly undermines these behaviors. A systematic review of 66 studies found that social support is a strong predictor of postoperative success, with socially isolated patients experiencing higher complication rates and poorer functional recovery (19). Individuals who live alone often struggle to maintain appropriate offloading, particularly after forefoot or midfoot reconstruction, leading to increased rates of dehiscence, infection, and hardware complications. Transportation barriers further compound these challenges, as lonely or socially disconnected patients are more likely to miss postoperative appointments, imaging, or wound checks, limiting opportunities for early intervention (20). Additionally, postoperative anxiety and depression, both of which are intensified by loneliness, are associated with pain catastrophizing and lower adherence to recovery protocols (21). These factors highlight that postoperative healing is not purely technical; it is heavily influenced by a patient’s social environment and support network.

Neurobiology of Pain and Loneliness

Loneliness intensifies pain perception through several interconnected neural pathways. Social isolation has been shown to amplify activation in the thalamus and anterior cingulate cortex during painful stimuli, a form of central sensitization that increases perceived pain in conditions common to podiatry, such as plantar fasciitis, osteoarthritis, neuropathy, and postoperative recovery (22). Additionally, lonely individuals demonstrate reduced endogenous opioid signaling, which decreases natural pain inhibition and can contribute to greater reliance on analgesics and lower pain tolerance (23). Loneliness also primes threat-vigilance neural circuits, heightening pain-related anxiety, anticipatory fear, and the overall emotional response to discomfort (24). Pain, therefore, is not solely a biomechanical phenomenon, it is significantly shaped by the presence or absence of social connection.

Diabetes, Social Determinants, and Isolation

Loneliness is strongly associated with poorer glycemic control, higher HbA1c, and reduced engagement in diabetic self-management (25–27). Transportation instability, food insecurity, limited caregiver support, and inadequate health literacy, all common among socially isolated adults, directly worsen diabetic foot outcomes. Implications for Podiatry; higher ulcer formation rates, poorer wound healing, increased Charcot progression, greater need for hospitalization, higher 30-day readmission rates

Rural Healthcare, Social Isolation, and the Midwest

Practicing in rural settings brings unique challenges. Rural Americans report significantly higher levels of social isolation, lower access to healthcare, fewer transportation options, and increased chronic disease burden (28–30). Rural patients are more likely to: live alone, lack public transportation, delay medical care, have limited home support, experience higher amputation rates. For podiatrists in rural systems, loneliness is not peripheral, it is central to daily practice.

Loneliness in Veteran Populations

Veterans experience elevated rates of loneliness, PTSD, depression, physical disability, and chronic pain (31–33). Many struggle with trust, fragmented social networks, and post-service identity shifts. For podiatric care, this translates to: delayed care seeking, poor wound-care adherence, increased chronic pain burden, higher rates of limb salvage complexity, increased reliance on interdisciplinary care. Veterans with loneliness have significantly worse functional outcomes across multiple domains.

Loneliness, Interdisciplinary Teams, and Wound Care

Wound care and limb salvage are team sports. Isolation among clinicians impairs communication, coordination, and morale. Evidence shows that psychological safety improves OR performance, connected teams reduce medical errors, and burnout correlates with interpersonal disconnection (34–36). Supporting team belonging is not about workplace culture alone, it improves clinical outcomes.

Biopsychosocial Integration for Podiatry

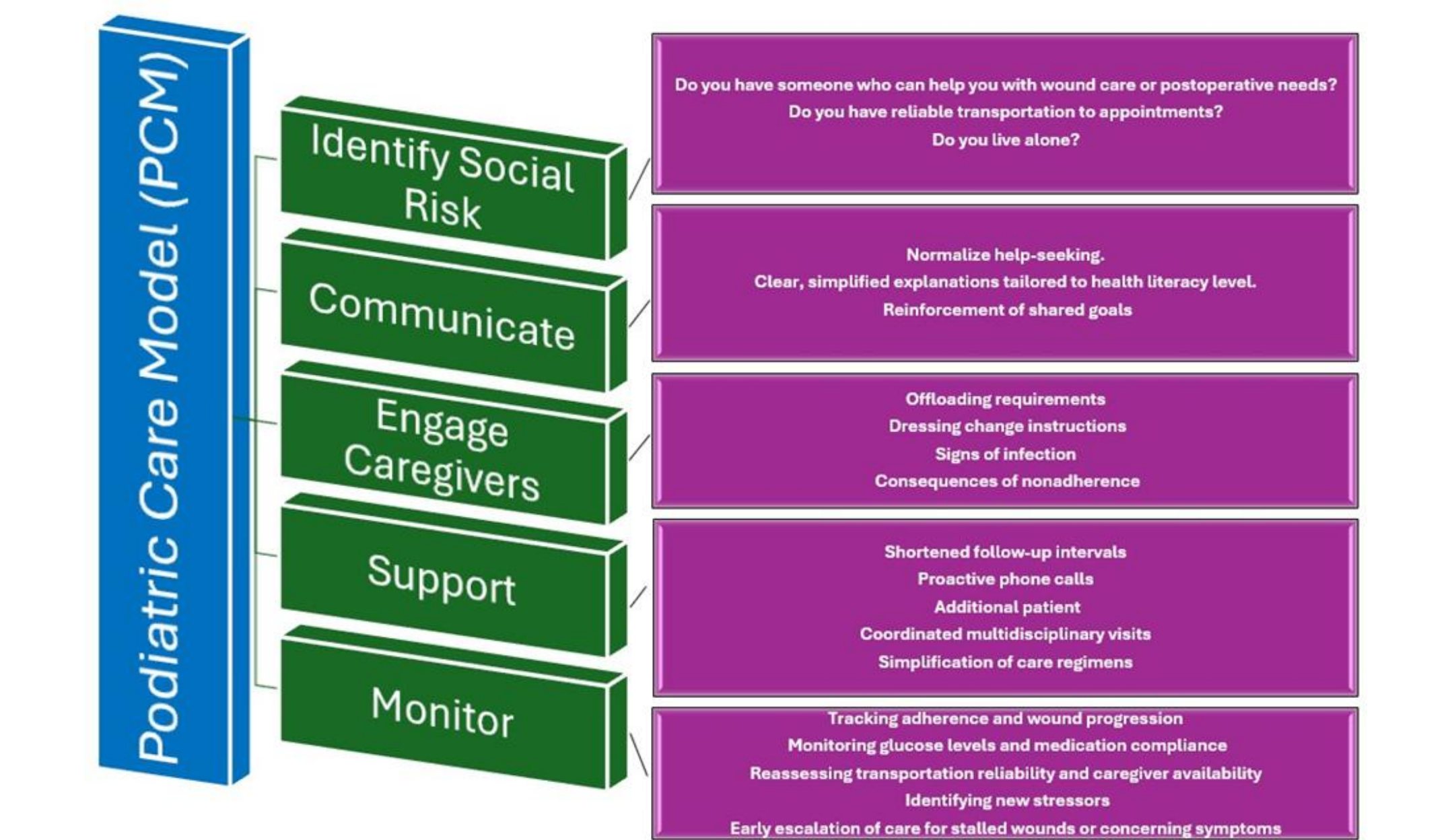
Engel’s biopsychosocial model (37) provides a strong foundation for understanding the intersection of loneliness with podiatric care. When applied to foot and ankle medicine, the biopsychosocial model illustrates how clinical outcomes arise from the interaction of biological factors such as wound healing, infection risk, and pain pathways; psychological factors including motivation, anxiety, and depression; and social factors such as loneliness, transportation barriers, and caregiver support. Recognizing these interconnected domains allows podiatrists to address not only the pathology itself but also the emotional and social conditions that determine a patient’s ability to heal. Podiatrists inherently practice within all three domains; acknowledging this explicitly strengthens care.

Evidence-Based Clinic Interventions

Several practical interventions supported by strong evidence can be readily integrated into podiatric practice to address the impact of loneliness and social risk on outcomes. Preoperative social-risk screening has been shown to improve postoperative results by identifying patients who lack support, have transportation barriers, or face other social determinants that may compromise adherence, allowing the care team to proactively plan additional follow-up and resources (19,20). Incorporating caregivers into clinic visits, particularly for patients with diabetes, has been associated with better treatment adherence, more consistent glucose monitoring, and improved engagement in daily foot-care behaviors (26). Structured follow-up phone calls after surgery or wound-care interventions further reduce postoperative complications by reinforcing instructions, identifying early warning signs, and providing a sense of ongoing connection and accountability (35). In addition, multidisciplinary, team-based care models that coordinate podiatry, endocrinology, vascular surgery, wound care, nursing, and social work have been linked to lower amputation rates and better limb-salvage outcomes, underscoring the value of collaborative, relationship-centered approaches in high-risk foot populations (13,14).

The Podiatric Connection Model (PCM)

We purpose the Podiatric Connection Model (PCM) which is an evidence-informed framework designed to integrate social connection into the clinical management of foot and ankle conditions, recognizing loneliness as a modifiable comorbidity which has been successfully implemented into my own practice.



The model begins with early identification of social risk factors through a brief intake screen that assesses caregiver support, transportation reliability, and whether the patient lives alone. Identifying these risks at the outset allows clinicians to anticipate challenges that often undermine wound healing, postoperative recovery, and adherence. Once social vulnerability is recognized, the next step focuses on communication aimed at reducing shame, building psychological safety, and establishing a strong therapeutic alliance. Many high-risk patients feel embarrassed about their limitations or worry about being a burden; addressing these emotions openly and with compassion improves understanding, cooperation, and adherence to complex care plans.

The model then emphasizes active engagement of caregivers and support networks. When family members or trusted individuals are included in discussions about offloading requirements, dressing changes, infection signs, and postoperative restrictions, adherence improves substantially. For patients without reliable supports, this phase may involve referrals to home-health services, social workers, veteran assistance programs, transportation resources, or telehealth monitoring. Following engagement, the model shifts to intensifying support by tailoring follow-up schedules and care pathways to match the patient’s social environment. Patients who are socially isolated often benefit from shorter follow-up intervals, proactive postoperative phone calls, simplified dressing regimens, and coordinated multidisciplinary appointments. In certain cases, surgical planning or immobilization strategies may be modified to reduce risk in individuals who cannot safely maintain strict postoperative restrictions at home.

The final component of the Podiatric Connection Model (PCM) is continuous monitoring, acknowledging that social circumstances and psychological states fluctuate throughout the course of treatment. Regular reassessment of adherence, wound progression, glycemic control, transportation stability, caregiver availability, and emerging stressors allows clinicians to adapt the treatment plan before setbacks evolve into complications. By integrating these steps into a unified approach, The Podiatric Connection Model (PCM) reframes loneliness and social isolation as clinically actionable variables rather than background context. In doing so, it strengthens healing trajectories, reduces complications, enhances team-based care, and elevates podiatric practice from a procedural specialty to a holistic discipline capable of addressing the full complexity of limb preservation.

The Podiatric Connection Model (PCM) reframes loneliness from an invisible background variable into a clinically actionable risk factor, allowing podiatrists to heal not only the foot, but the person attached to it.

Conclusion

Loneliness is a clinically meaningful and often overlooked comorbidity in podiatric medicine. It negatively influences wound healing, glycemic control, pain perception, postoperative adherence, and overall limb-salvage outcomes. These effects are especially pronounced among rural patients, veterans, older adults, and individuals with chronic disease, groups frequently encountered in foot and ankle practice. Recognizing loneliness as a modifiable risk factor allows podiatrists to intervene not only with scientific precision but also with greater compassion and effectiveness. Ultimately, no one sits alone in successful podiatric care, not the patient, not the provider, and not the team.

References – Scan QR Code

