

## **The Effects of Prosthetic Leg Stiffness on Gait, Comfort, and Satisfaction: A Review of Mechanical Engineering Approaches**

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**Abstract :** One of the challenges in providing optimal prosthetic legs for lower limb amputees is to select the appropriate foot stiffness that suits their individual needs and preferences. Foot stiffness affects various aspects of walking, such as stability, comfort, and energy expenditure. However, the current prescription process is largely based on trial-and-error, manufacturer recommendations, or clinician judgment, which may not reflect the prosthesis user's subjective experience or psychophysical sensitivity. Therefore, there is a need for more scientific and technological tools to measure and understand how prosthesis users perceive and prefer different foot stiffness levels, and how this preference relates to clinical outcomes. This review covers how to measure and design lower leg prostheses based on user preference and foot stiffness. It also explores how these factors affect walking outcomes and quality of life, and identifies the current challenges and gaps in this field from a mechanical engineering standpoint.

**Keywords :** perception, preference, prosthetics, stiffness

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