

Development of a Military-Specific Ankle Brace: Optimal Design Features from End-Users and Health Care Providers

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INTRODUCTION

Service members (SM) suffer 58.4 ankle sprains per 1,000 person-years in the US Military. Prophylactic bracing has been shown to reduce ankle sprain incidence by up to 85%. Unfortunately, adherence is poor: fit, comfort, and poor design are cited as primary barriers.

Study Objective: Compare brace design priorities between Active-duty service members and health care providers (HP) by gathering feedback from a custom designed questionnaire. Understanding end-user priorities in this specific population will guide brace design improvements and increase adoption.

Hypothesis: HP will prioritize functional features, while SM will place greater emphasis on comfort and usability.

METHODS AND MATERIALS

Participants

- 75 SM (age 34.5 ± 8.3 yrs; 71% male)
- 20 HP (age 36.2 ± 7.5 yrs; 85% physical therapists; 9.7 ± 6.6 yrs experience treating ankle injuries)
- Recruited from Naval Pacific Region

Study Design

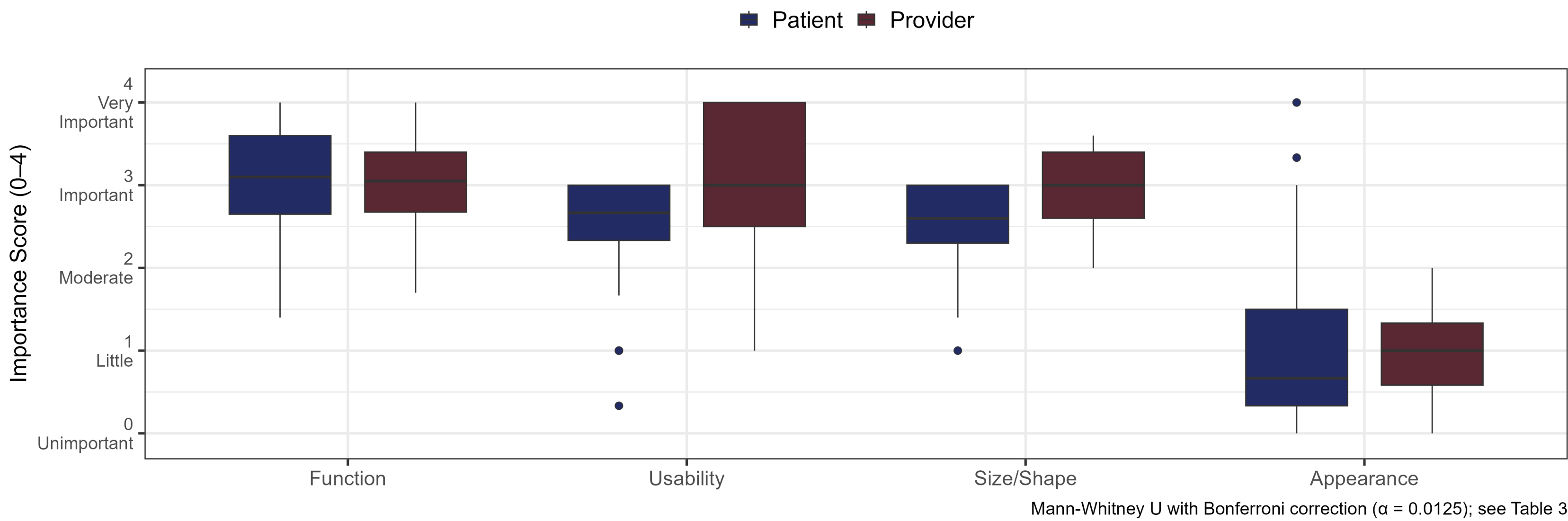
- Cross-sectional study with a custom questionnaires for patients and providers respectively
- 21 brace attributes rated 1-5 on Likert scale
- 4 domains: Size/Shape, Usability, Appearance, Function
- Also ranked top 3 most- and least-desired features

Statistics

- Mann-Whitney U test with Bonferroni correction ($\alpha = 0.0125$)
- Borda count (1st = 3, 2nd = 2, 3rd = 1)
- Spearman's rho for rank concordance

Brace Design Domain Importance Ratings

Patients (n=75) vs Providers (n=20)



RESULTS

DOMAIN RATINGS

- Function rated highest by both groups ($p = 0.46$)
- HP rated size/shape higher than SM ($p < 0.01$, $r = -0.46$)
- HP rated Usability higher than SM ($p < 0.01$, $r = -0.40$)
- Appearance rated low for both groups ($p = 0.88$)

MOST DESIRED FEATURES

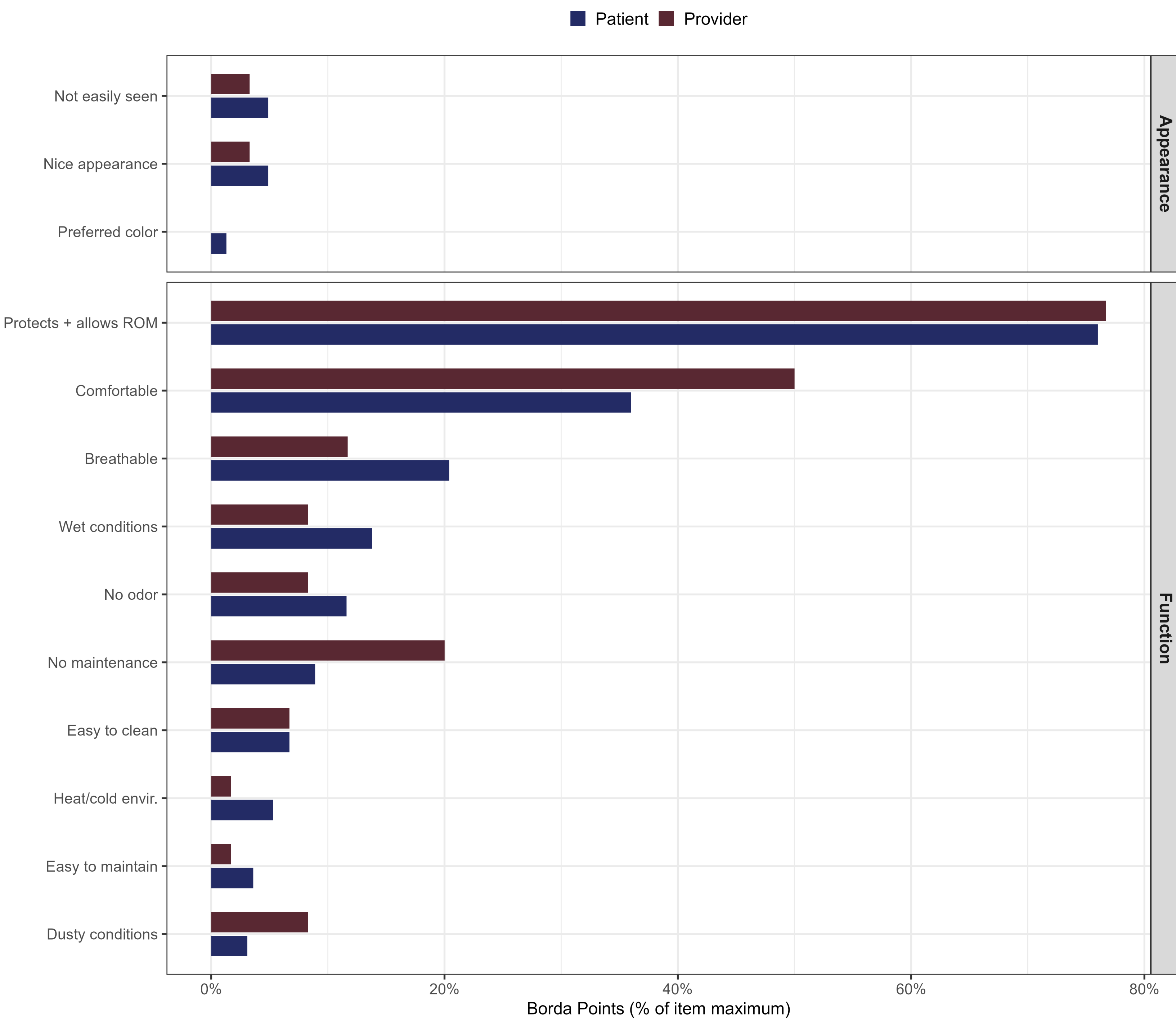
- Borda rankings revealed strong agreement on performance features ($\rho = 0.82$, $p < 0.01$)
- #1: "Protects + allows range of motion" (SM 76%; HP 77%)
- #2: "Comfortable" (SM 36%; HP 50%)

UNDESIRED FEATURES

- Borda rankings revealed strong agreement on least desired features ($\rho = 0.93$)
- #1: "Causes injury to other joint"

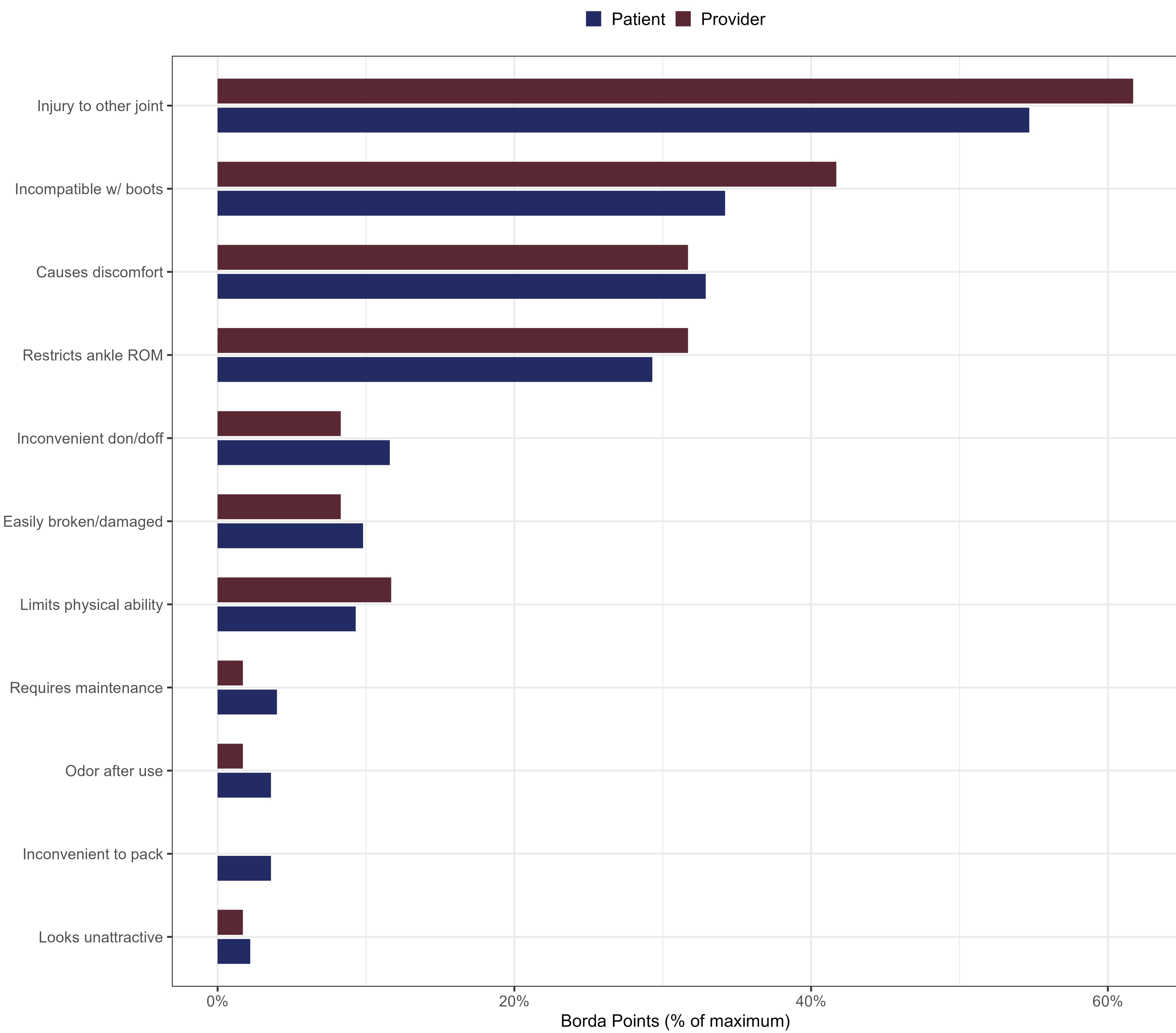
Borda Rankings — Appearance & Function Features

% of maximum possible Borda points (Rank 1=3 pts, 2=2 pts, 3=1 pt)



Borda Rankings — Most Undesired Brace Characteristics

% of maximum possible Borda points



DISCUSSION

- SM and HP strongly agree on functional priorities
- HP place greater importance on size/shape and usability
- SM define core performance requirements; HP identify constraints that determine whether braces are worn
- The difference in priority over "fits in military boots" is the clearest example of a wearability constraint that providers identify but patients don't self-prioritize

CONCLUSIONS

- SM and HP strongly agree on the functional priorities of a military specific ankle brace, but diverge on features that influence field adherence.
- Integrating both perspectives into military brace design may help close the gap between demonstrated efficacy and patient adherence.

DISCLAIMER

This work was supported by funding from HU00012320066. The view expressed in this presentation are those of the authors and do not necessarily represent the official policy or position of the Defense Health Agency, Department of Defense, the Uniformed Services University of the Health Sciences, The Henry M. Jackson Foundation for the Advancement of Military Medicine, Inc., or any other U.S. government agency. This work was prepared as part of official duties as U.S. Government employees and, therefore, is defined as U.S. Government work under Title 17 U.S.C. §101. Per Title 17 U.S.C. §105, copyright protection is not available for any work of the U.S. Government.

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