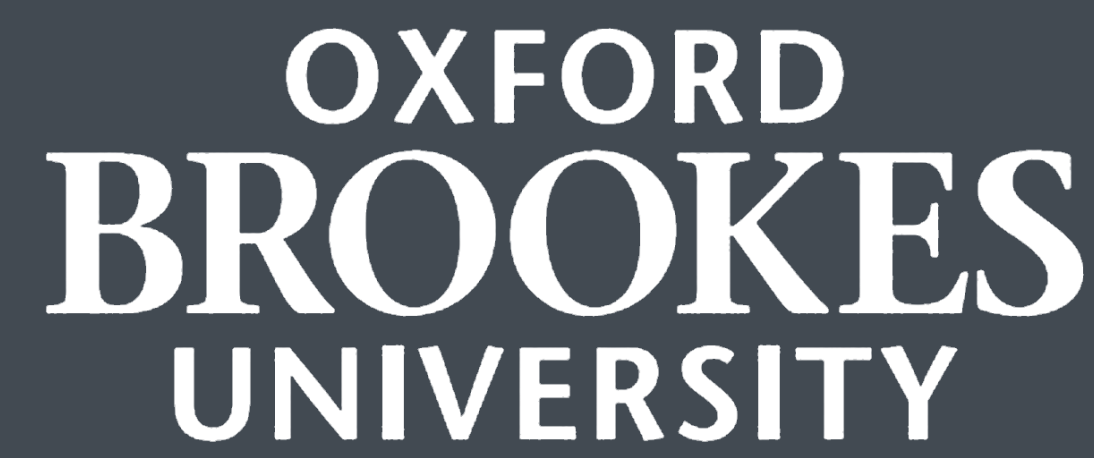


Preoperative health-related quality of life in patients undergoing lumbar spine surgery: Identifying factors associated with risk stratification in a multi-ethnic Asian cohort

Xun Li¹, Alex Teo^{2,3,4}, Annushiah Vasan Thakumar⁵, Nan Luo⁶, Hwee Weng Dennis Hey^{2,3,4}, Ling Jie Cheng^{7,8}



¹ School of Engineering, Computing, and Mathematics, Oxford Brookes University, Oxford, United Kingdom; ² Department of Orthopaedic Surgery, National University Hospital; ³ Orthopaedic Surgery, Alexandra Hospital; ⁴ Yong Loo Lin School of Medicine, National University of Singapore, Singapore; ⁵ School of Pharmacy, Faculty of Health & Medical Sciences, Taylor's University, Malaysia; ⁶ Saw Swee Hock School of Public Health, National University of Singapore, Singapore; ⁷ National Perinatal Epidemiology Unit, Nuffield Department of Women's & Reproductive Health, University of Oxford, Oxford, United Kingdom; ⁸ Alice Lee Centre for Nursing Studies, Yong Loo Lin School of Medicine, National University of Singapore, Singapore.

Among 1,194 patients awaiting lumbar spine surgery, preoperative HRQoL was substantially impaired (EQ-5D-5L: 0.43). Non-outpatient admission ($\beta=-0.37$), ethnicity, and education level were the strongest predictors, with effects varying across EQ-5D dimensions.

BACKGROUND & OBJECTIVES

Degenerative lumbar spine conditions impose a substantial disease burden globally.

Gap: Limited evidence on factors associated with EQ-5D in Asian surgical populations

Aim: Examine socio-demographic, clinical, and healthcare factors associated with preoperative HRQoL among patients undergoing lumbar spine surgery in Singapore's multi-ethnic population

- Hierarchical linear regression → EQ-5D-5L index
- Multivariable logistic regression → EQ-5D-3L dimensions

METHODS

Design: Cross-sectional, Spine PROM Surgery Registry, Singapore (2017–2022)

Participants: N = 1,194 patients
4 diagnoses: spinal stenosis (40.5%), prolapsed disc (22.9%), spondylolisthesis (19.8%), Degenerative Disc Disease (16.9%)

Outcome: EQ-5D-3L (crosswalked to EQ-5D-5L using Singapore (SG) EQ-5D-5L value set)

Analysis:

- Hierarchical regression (3 nested models): M1: Socio-demographic → M2: +Clinical → M3: +Healthcare/lifestyle
- Logistic regression per EQ-5D dimension
- Sensitivity analysis (EQ-5D-3L SG values)

TABLE 1: BASELINE CHARACTERISTICS

Characteristic	n (%) / Mean (SD)
Age, mean (SD)	58.1 (16.1)
Female sex	615 (51.5%)
Chinese / Malay / Indian / Other	839 / 103 / 145 / 107
Edu: Primary / Sec / Post-sec / Uni	308 / 237 / 376 / 273
BMI, mean (SD)	26.3 (4.7)
≥1 comorbidity	817 (68.4%)
Outpatient presentation	1,118 (93.6%)
EQ-5D-5L cw index	0.43 (0.38)
EQ-5D-3L index	0.48 (0.34)

FIGURE 1: EQ-5D-5L INDEX BY KEY SUBGROUPS

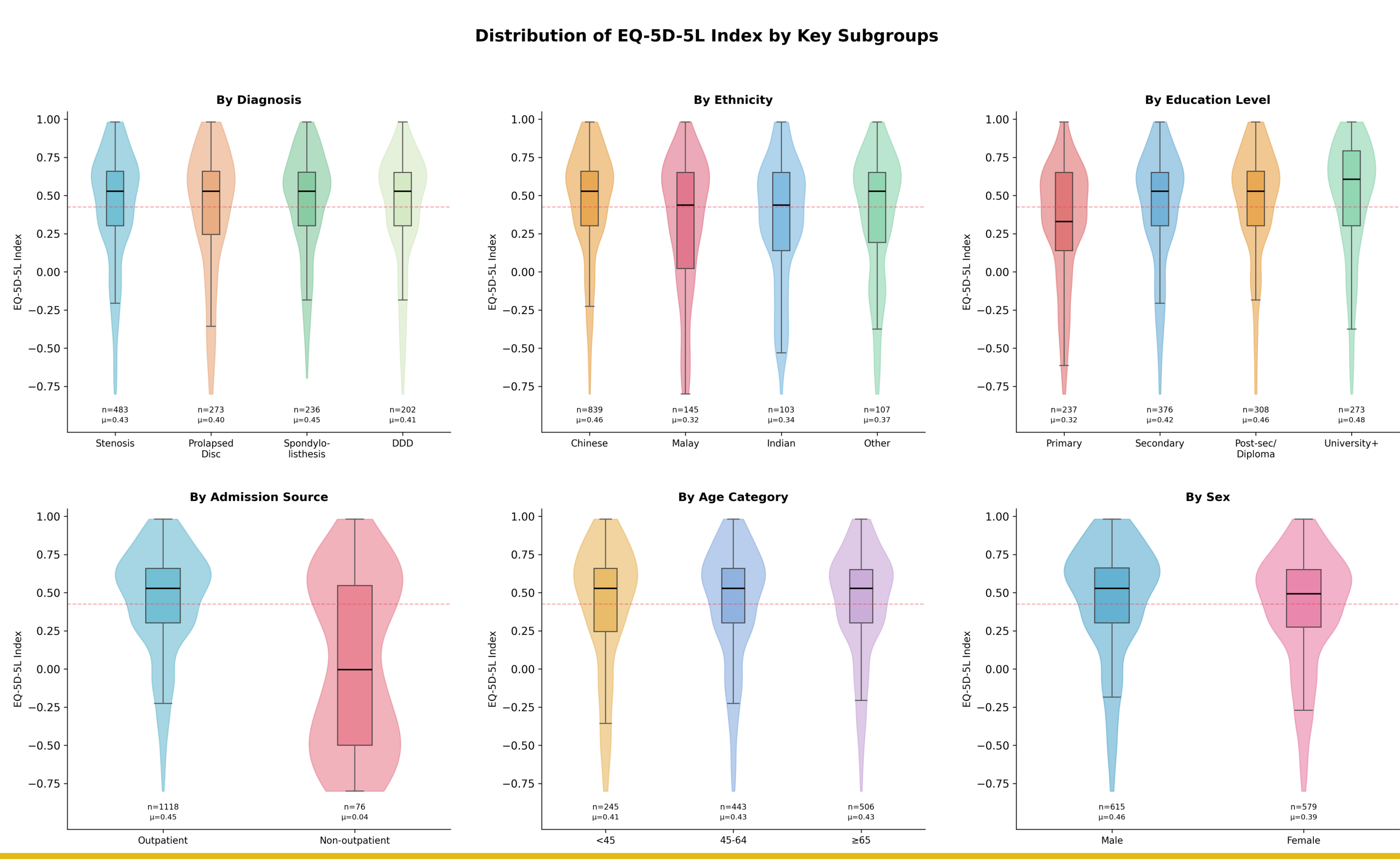


FIGURE 2: ADJUSTED ASSOCIATIONS

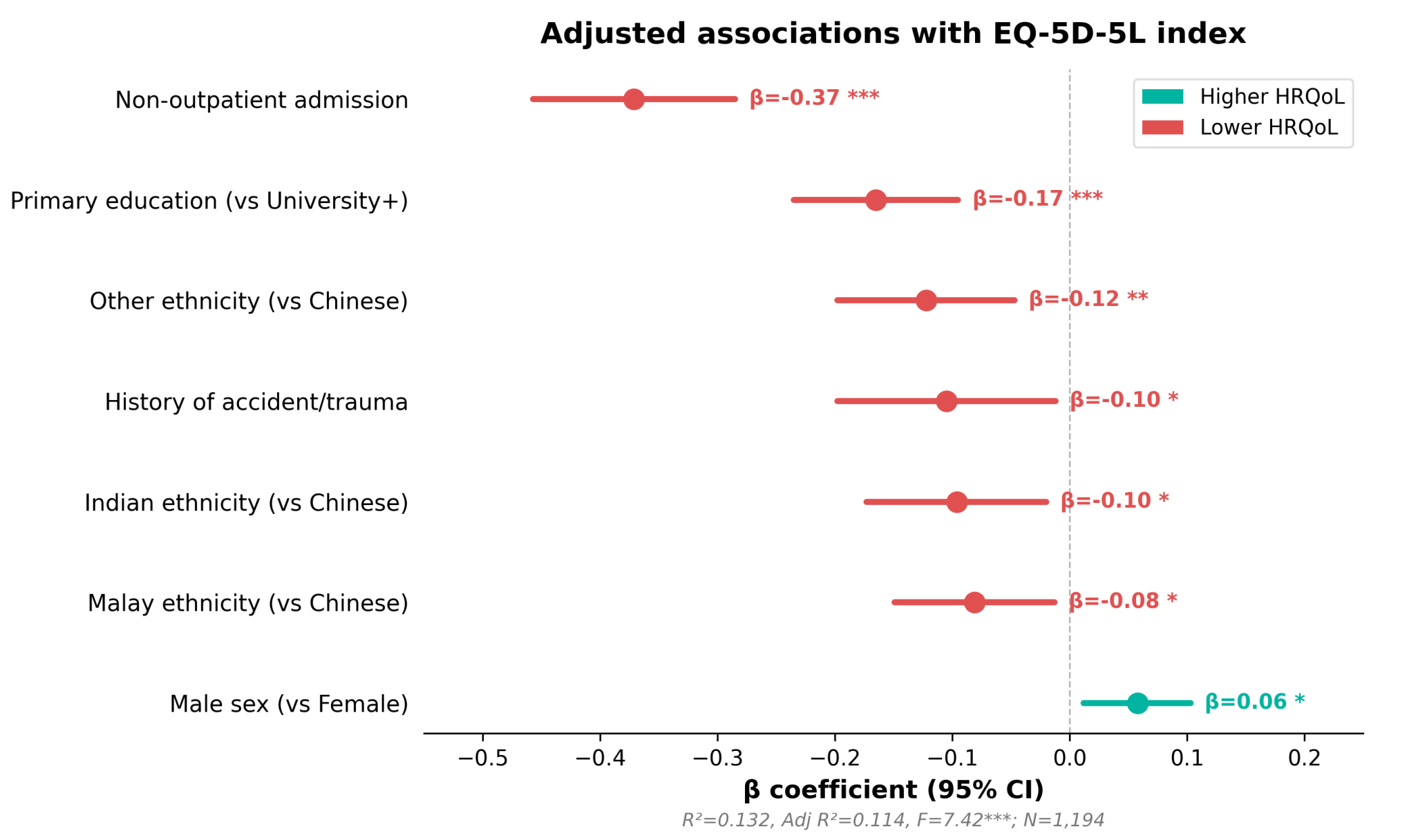


FIGURE 3: EQ-5D-3L DIMENSION PROFILES

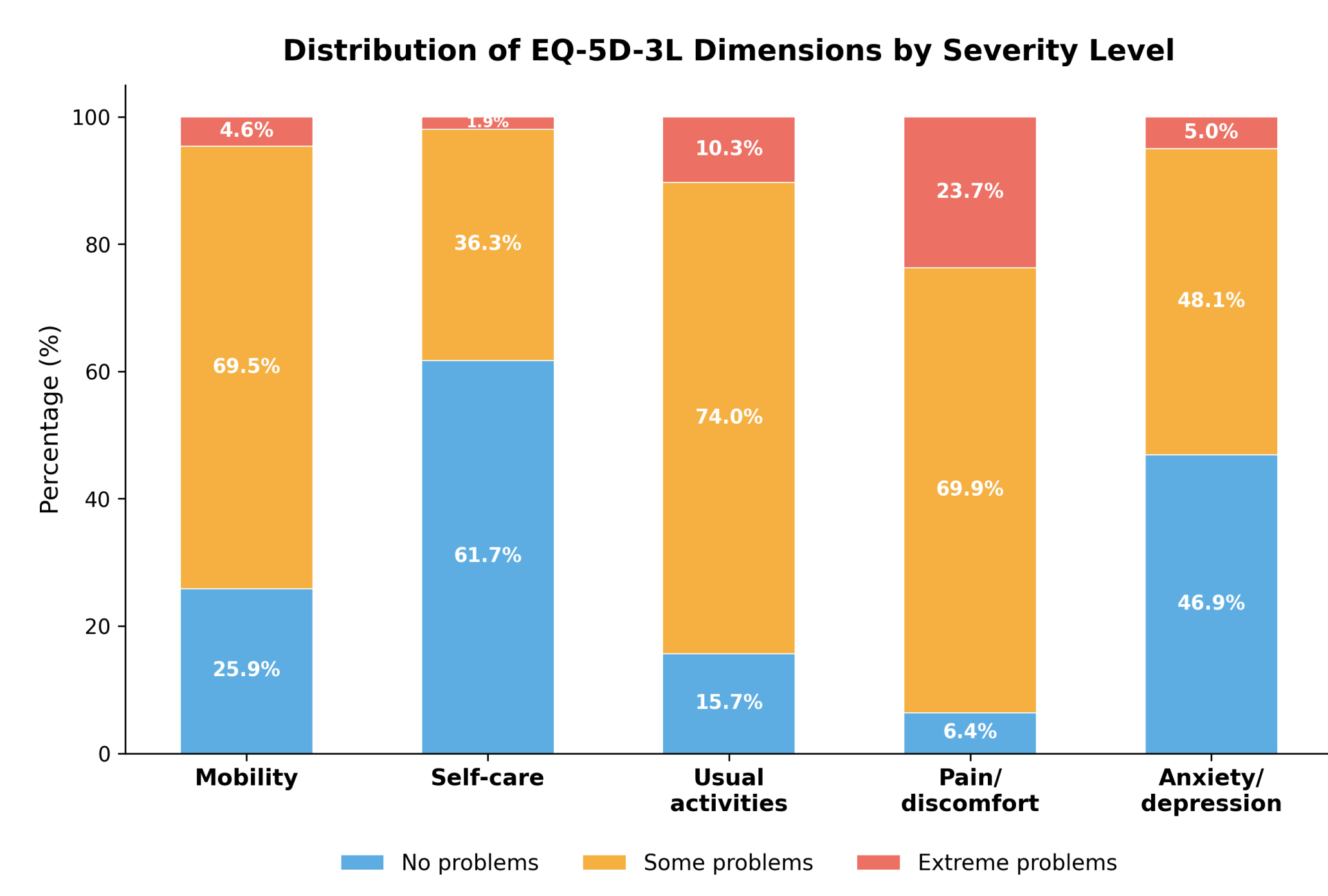
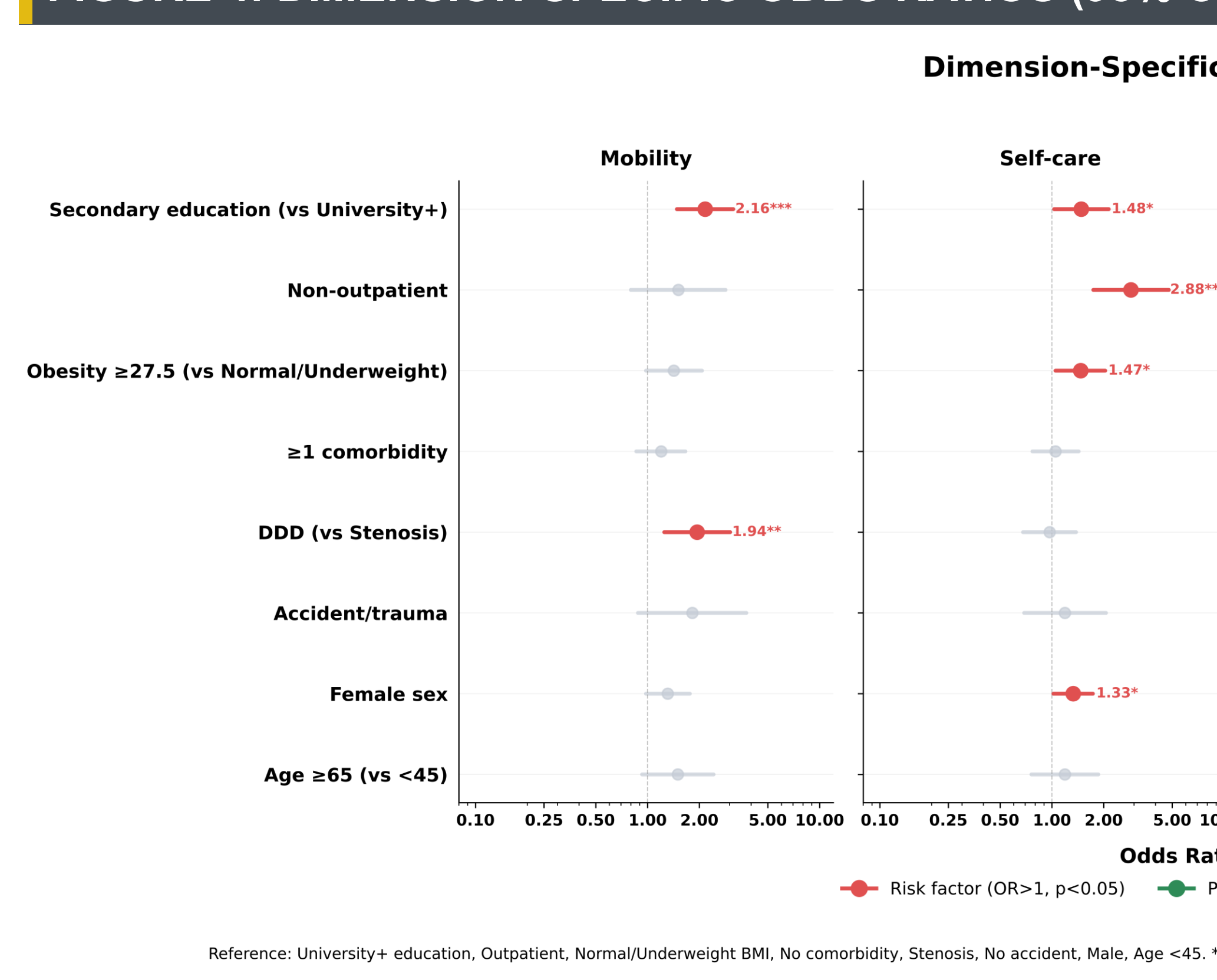


FIGURE 4: DIMENSION-SPECIFIC ODDS RATIOS (95% CI)



DISCUSSION

- Non-outpatient admission** had the largest effect ($\beta=-0.37$), patients presenting via ED/direct admission may benefit from enhanced preoperative support
- Ethnic disparities** persisted after full adjustment, non-Chinese ethnicities reported lower HRQoL, suggesting differences in pain perception, health beliefs, or unmeasured confounders → culturally tailored counselling
- Secondary education** was consistently associated with worse outcomes across multiple EQ-5D dimensions → health literacy as intervention target
- Dimension-specific variation supports targeted prehabilitation strategies

Strengths: Large registry (N=1,194), multi-ethnic, validated EQ-5D, crosswalk sensitivity analysis

Limitations: Cross-sectional; modest R² (11.5%); unmeasured confounders; single-centre

CONCLUSIONS

- Substantially impaired preoperative HRQoL, especially pain/discomfort & usual activities
- Admission source, ethnicity & education showed consistent cross-model associations
- Dimension-specific predictors support targeted prehabilitation

→ Evidence for preoperative risk stratification, culturally tailored counselling, and HTA in musculoskeletal care

CONTACTS

Lead Author: Xun Li (Ethan) (ethanlee168@outlook.com)

Corresponding Author: Dr Cheng Ling Jie (Jeremy) (cheng.lingjie@nus.edu.sg)