

# Understanding the Role of Built Environment in Social-Health Outcomes of Older Adults with Knee Osteoarthritis and Falls

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## Background

### Study aim

The built environment (BE) plays a crucial role in shaping opportunities for both mobility and social participation, particularly for older adults with mobility challenges<sup>1</sup>. Current literature<sup>2</sup> shows a gap in wholistically understanding the relationship between the BE, and social isolation and loneliness of older people with increasing frailty, and impact on their physical activity, participation and functional outcomes.

This study is part of the broader **Built Environment in Falls and Arthritis (BE-FIT)** project which explores the relationships between the BE and psychosocial factors on physical activity, social participation and functional outcomes in a population with mobility challenges.

### Hypotheses

Our study investigates the following:

- BE is related with social isolation and loneliness, defined respectively as the extent to which individuals experience the objective lack of social connections, and feel the lack of support and companionship<sup>2</sup>.
- More supportive BE features, stronger social networks and lower loneliness could increase levels of physical activity and life-space mobility, as well as improve functional outcomes for people with knee osteoarthritis and/or history of falls.

Addressing the complex relationship among the contextual factors, and how they shape the physical activity, functional and participation outcomes of older adults with mobility challenges is critical to inform urban design and social-health policies for inclusive, health-promoting neighbourhoods.

## Methods

Cross-sectional study with 287 adults aged  $\geq 45$  years  
Knee osteoarthritis (OA) (N=186) and/or a history of falls (N=172)  
Recruited from 3 Singapore public hospitals

Independent variables	<ul style="list-style-type: none"> <li>• BE: Age-Friendly Environment Assessment (AFEAT_BE)*</li> <li>• Social isolation: Lubben Social Network Scale</li> <li>• Loneliness: 3-Point Loneliness Scale</li> </ul>
Dependent variables	<ul style="list-style-type: none"> <li>• Physical activity: International Physical Activity Questionnaire (IPAQ)</li> <li>• Life-space mobility: University of Alabama at Birmingham Life-Space Assessment (LSA)</li> <li>• Sub-group KOA: Knee Injury and Osteoarthritis Outcome Score-12 (KOOS-12)</li> <li>• Sub-group falls: Falls Efficacy Scale - International (FES-I)</li> </ul>
Analysis	Linear regression analyses to explore relationships between independent and dependent variables adjusting for age, gender and BMI.

\*BE-related questions (AFEAT\_BE) based on walkability, safety, and availability and accessibility to amenities within the neighbourhood. Confirmatory factor analysis showed factor loading of above 0.3 and model fit indices within acceptable cutoff (RMSEA= 0.048; SRMR= 0.066; CFI= 0.921; TLI= 0.904). AFEAT\_BE observed to have composite reliability of 0.764 (95% CI: 0.703-0.825) and Cronbach alpha of 0.790.

## References

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## Results

### Overall analysis (knee OA + falls sub-groups)

BE (AFEAT\_BE) had a statistically significant association with social networks (Lubben) and loneliness.

Independent variable	Dependent variable	Coefficient (95% CI)	P-value
AFEAT_BE	Lubben	0.31 (0.19, 0.43)	<0.001
AFEAT_BE	Loneliness	-0.03 (-0.05, -0.01)	0.01

Adjusted for age, gender and BMI

BE (AFEAT\_BE) was positively associated with physical activity (IPAQ) and life-space mobility outcomes (UAB-LSA), while loneliness was negatively associated with life-space mobility.

Independent variable	Dependent variable	Coefficient (95% CI)	P-value
AFEAT_BE	IPAQ	81.34 (0.87, 161.81)	0.048
AFEAT_BE	UAB-LSA	0.70 (0.25, 1.15)	0.002
Loneliness	UAB-LSA	-5.24 (-7.60, -2.88)	<0.001

Adjusted for age, gender and BMI

### Sub-group analysis

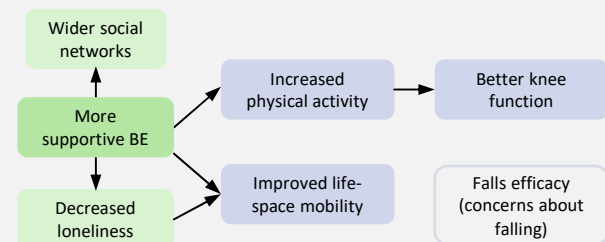
For people with knee OA, physical activity was positively related to their functional outcomes (KOOS-12), and no significant relationship was observed between life-space mobility with functional outcomes (KOOS-12). For people with falls history, no significant relationship was observed between their falls efficacy scores (FES-I) with life-space mobility and physical activity outcomes.

Independent variable	Dependent variable	Coefficient (95% CI)	P-value
IPAQ	KOOS-12	0.10 (0.03, 0.16)	0.004

## Discussion and Conclusion

Results indicate:

- **More supportive BE features could strengthen social networks and reduce loneliness.**
- **More supportive BE and decreased loneliness could support better social-health outcomes** for older people with knee OA and/or falls, by **increasing their physical activity and life-space mobility.**
- For *sub-group with knee OA*, **increased physical activity could lead to better knee function.**
- For *sub-group with falls history*, lack of direct association between actual behaviour, i.e. physical activity and participation, and fall concerns may reflect indirect and stronger influence of other factors such as sarcopenia<sup>3</sup>, adaptive behaviour, mindsets and other facilitators/barriers.



Further studies should be undertaken to identify other key influencing factors and determine the associations among related variables, to contribute toward a framework which elucidates the complex relationship between the BE and social-health outcomes of people with mobility challenges.

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