

## Multilevel analysis of habitual physical activity facilities and cognitive impairment: a population-based study in Taiwan

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**Background:** The built environmental features can shape individual physical activity and has been linked to physical and mental health. In Taiwan, one of the most densely populated countries worldwide, the boundary between residential and commercial areas becomes blurred along with rapid urbanization, and individual households have insufficient space for habitual physical activity.

**Aims & Objectives:** This study aimed to examine the association between the availability of facilities for habitual physical activity in the community and cognitive impairment in Taiwan.

**Methods:** This study included 28,595 individuals larger than 60 years old from 143 districts in Taiwan. Facilities for habitual physical activity included schools, activity centers, and parks, and the density of such facilities was categorized into tertiles. Cognitive impairment was defined as Mini-Mental State Examination (MMSE) score  $\leq 24$ . Multilevel logistic regression models were applied to examine the association of the availability of facilities for habitual physical activity with cognitive impairment with adjustment for individual demographics and lifestyle factors and district-level social economic characteristics. Multilevel linear regression models were applied to examine the association for continuous MMSE score.

**Results:** For cognitive impairment and MMSE score, the addition of the district-level variables to the model including individual-level variables led to a further reduction of 14% and 7%, respectively, in the variance. Using the lowest facilities density as the reference, the odds ratio (95% confidence interval, CI) of cognitive impairment for middle and highest density was 0.92 (0.81-1.04) and 0.84 (0.73-0.98), respectively, with the trend test reaching significance ( $p=0.02$ ); the MMSE score was higher in individuals living in middle facilities density ( $\beta=0.11$ , 95% CI: -0.04,0.26) and highest facilities density ( $\beta=0.21$ , 95% CI: 0.03,0.39), with the trend test reaching significance ( $p=0.006$ ).

**Discussion & Conclusion:** Greater availability of facilities for habitual physical activity in the community was associated with a lower risk of cognitive impairment among its elderly residents.