Heterogeneity in Motor Skills and Physical Fitness in Adults with Down Syndrome

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Résumé

Introduction

Less than 10% of adults with Down syndrome (DS) meet physical activity (PA) recommendations, and all exhibit high levels of sedentary behavior (SB; Oreskovic et al., 2020). Limited data on the relationships between sex, age, physical fitness, and PA or SB in adults with DS impedes tailored PA-based interventions (Agiovlasitis et al., 2020). The impact of common comorbidities like sleep apnea (SA) on SB, PA and exercise capacity remains understudied (Nguyen et al., 2023).

This study characterizes physical performance, PA, and SB profiles in adults with DS. It lays the groundwork for a follow-up analysis incorporating SA effects.

Methods

Cross-sectional analysis of a prospective cohort study (NCT03445962). Forty adults with DS (age: 29.7±7.5 years; 40% women) were included. Physical performances were assessed using six motor tests from EUROFIT and MAB-C batteries, and aerobic capacity via maximal treadmill test (VOpeak).PA and SB levels were objectively measured using accelerometry (Actigraph GT9X®) over seven consecutive days and subjectively reported through the Global Physical Activity Questionnaire (GPAQ). Principal component analysis and hierarchical agglomerative clustering identified profile clusters.

Results

Women were more flexible ($p < 0.05$), but had lower VOpeak and isometric strength than men ($p < 0.01$).

Three clusters emerged. Cluster 1 (n=14; 50% male) showed significantly reduced VOpeak, strength, and balance. It included older, higher-BMI individuals compared to Cluster 2 (n=19; 58% male) and 3 (n=7; 71% male). Clusters 2 and 3 differed only in balance, lower in Cluster 3 ($p < 0.05$).

*Intervenant

Accelerometry showed no significant cluster differences; however, GPAQ score were lower in Cluster 1 than Clusters 2 and 3, which also differed significantly ($p < 0.05$).

Discussion

Results show a clear sex effect on physical performance but not PA or SB, aligning with findings in children with DS (Agiovlasitis et al., 2020). Clustering revealed distinct motor profiles, with one older, higher-BMI group most at risk of physical deconditioning and furthest from PA recommendations. Despite this, accelerometer showed no differences, indicating PA and SB alone are insufficient for tailoring interventions. Age, sex, and fitness matter (Agiovlasitis et al., 2020). Two clusters neared the 30min/day PA threshold, showing inactivity is not universal with proper support. GPAQ differences question self-report validity but highlight perceived activity value.

Conclusion / Outlook

Data reveal low PA levels and high SB in adults with DS, despite variability in physical performance and a significant sex effect. An older, higher-BMI subgroup is most at risk of deconditioning and inactivity or SB. Interventions must address heterogeneity through tailored strategies requiring systematic fitness and anthropometric assessments (Covain et al., 2023).

In a subsample of this study (n=28, excluding smokers, diabetes, or congenital heart disease), we showed that moderate-to-severe SA impaired sympathetic vascular tone during a sympathoexcitatory stressor other than exercise (Covain et al., 2025). An ongoing study (NCT06061562), with preliminary results forthcoming, combines echocardiography, maximal exercise testing, polysomnography, and PA assessment to explore links between SA, cardiac structure/control, PA levels, and physical performance in adults with DS.

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