

Background Existing research has documented inconsistent findings for the associations among breakfast frequency, physical activity (PA), and sedentary time in children. The primary aim of this study was to examine the associations among breakfast frequency and objectively-measured PA and sedentary time in a sample of children from 12 countries representing a wide range of human development, economic development and inequality. The secondary aim was to examine interactions of these associations between study sites. Methods This multinational, cross-sectional study included 6228 children aged 9–11 years from the 12 International Study of Childhood Obesity, Lifestyle and the Environment sites. Multilevel statistical models were used to examine associations between self-reported habitual breakfast frequency defined using three categories (breakfast consumed 0 to 2 days/week [rare], 3 to 5 days/week [occasional] or 6 to 7 days/week [frequent]) or two categories (breakfast consumed less than daily or daily) and accelerometry-derived PA and sedentary time during the morning (wake time to 1200 h) and afternoon (1200 h to bed time) with study site included as an interaction term. Model covariates included age, sex, highest parental education, body mass index z-score, and accelerometer waking wear time. Results Participants averaged 60 (s.d. 25) min/day in moderate-to-vigorous PA (MVPA), 315 (s.d. 53) min/day in light PA and 513 (s.d. 69) min/day sedentary. Controlling for covariates, breakfast frequency was not significantly associated with total daily or afternoon PA and sedentary time. For the morning, frequent breakfast consumption was associated with a higher proportion of time in MVPA (0.3%), higher proportion of time in light PA (1.0%) and lower min/day and proportion of time sedentary (3.4 min/day and 1.3%) than rare breakfast consumption (all  $p \leq 0.05$ ). No significant associations were found when comparing occasional with rare or frequent breakfast consumption, or daily with less than daily breakfast consumption. Very few significant interactions with study site were found. Conclusions In this multinational sample of children, frequent breakfast consumption was associated with higher MVPA and light PA time and lower sedentary time in the morning when compared with rare breakfast consumption, although the small magnitude of the associations may lack clinical relevance.