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TITLE: Grip Strength and Lung Function Associations: A Middle Childhood Twin Study

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ABSTRACT:

**Objective:** While grip strength and lung function assessments have been related to each other later in life, much is unknown about their associations in childhood. This study examined: 1) genetic, shared environmental, and non-shared environmental influences on lung function (i.e., FEV1, PEF) and grip strength, and 2) whether the covariance between grip strength and lung function is due to genetic and/or environmental influences.

**Methods:** A subset of 333 families (663 twins; 31% MZ, 35% same-sex DZ, 35% opposite-sex DZ twins) from the Arizona Twin Project (Lemery-Chalfant et al., 2019, *Twin Research & Human Genetics*, 22,681-685) were included in this study. At approximately 9 years ( $M=9.70$ ,  $SD=0.88$ ), twins (50% female; 58.8% non-Hispanic White, 29.3% Hispanic) completed physical health assessments during a home visit including grip strength, lung function, and height/weight measurements.

**Results:** Univariate ACE models indicated strong genetic influences on grip strength (78%) and FEV1 (74%) and moderate genetic influences on PEF (58%). Bivariate Cholesky decompositions revealed that the covariance between grip strength and both

FEV1 (full model:  $r_A=0.29$ ,  $r_D=0.49$ ,  $r_E=0.00$ ) and PEF (full model:  $r_A=0.39$ ,  $r_D=0.05$ ,  $r_E=0.19$ ) was genetic. Additive genetic and non-shared environmental influences explained the covariance between FEV1 and PEF (full model:  $r_A=0.77$ ,  $r_C=0.00$ ,  $r_E=0.58$ ). Models accounted for child sex, age, height, and waist circumference.

**Conclusions:** Findings from this study suggest a genetic commonality between grip strength and lung function and the need to focus on shared and unique risk factors when promoting muscular strength and pulmonary health in childhood with implications for overall health (e.g., cardiorespiratory fitness).

**GRANT SUPPORT:**

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