
Grip and Pinch Strength: Norms for 6- to 19-Year-Olds

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The purpose of this study was to establish normative data for 6- to 19-year-olds on four tests of hand strength. The Jamar dynamometer was used to measure grip strength and a pinch gauge was used to measure tip, key, and palmar pinch. A sample of 231 males and 240 females from the seven-county Milwaukee area was tested, using standardized positioning and instructions. Results of this study indicate that increases in grip and pinch strength coincide with increases in chronological age, that males are stronger than females in all age groups, and that hand dominance does not significantly affect hand strength scores. Normative data collected in this study were slightly higher than norms from previous American and Australian studies.

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The collection of reliable and valid evaluation data depends on the use of accurate test instruments that have standardized procedures for their administration. In addition, normative data assist in interpreting evaluation results and in setting realistic treatment goals. Mathiowetz, Weber, Volland, and Kashman (1984) recently developed standardized procedures for grip and pinch strength evaluations which were reported to be reliable and accurate. Grip and pinch strength norms have been collected for adults 20 to 75 years old and older (Mathiowetz, Kashman, Volland, Weber, Dowe, & Rogers, 1985), but there are no such norms for 6- to 19-year-olds that are based on these standardized procedures.

Review of the Literature

Grip Strength Evaluation

Ager, Olivett, and Johnson (1984) recently reported grip strength norms for children aged 5 to 12 years ($N = 474$). They evaluated grip strength by adjusting the Jamar dynamometer to fit the hand, allowing flexion at the metacarpophalangeal joints. Another recent study also using the Jamar dynamometer reported norms for 240 Australian children aged 5 to 12 years (Fullwood, 1986). The dynamometer was set at the smallest setting for subjects aged 5 to 8 years and at the second smallest setting for subjects aged 9 to 12 years. Kellor, Frost, Silberberg, Iverson, and Cummings (1971) also used the Jamar dynamometer in their study of 250 adults aged 20 to 84 years and adjusted it to fit the subject's hand. Previous studies have shown that grip strength varies with different handle positions (Bechtol, 1954; Fess, 1982). Norms based on several positions make it difficult for a clinician to decide which position to use and how to interpret a patient's performance. If inconsistent positions are used to assess progress in treatment, a change in grip reading may be erroneously interpreted as an advance or a decline in progress (Fess, 1984).

In the study by Ager et al. (1984), subjects were instructed to rest their forearm on a table and to exert one maximal effort first with the right hand and then with the left hand. Fullwood (1986) instructed subjects to sit with their elbow on a table but their wrist off the table. One trial was recorded for each hand. Kellor et al. (1971) gave subjects two opportunities to exert their most forceful grip with each hand, and the two highest measurements were recorded. Subjects were permitted to flex or extend their elbows provided that neither the dynamometer nor their arm touched their body. The American Society of Hand Therapists (ASHT) suggests standardized arm positioning for hand strength tests. Specifically they recommend that patients sit with their shoulder adducted