Reviewer's report

Title: Reference values for the 6-minute walk test in healthy children and adolescents in Central Europe.

Version: 1 Date: 8 April 2013

Reviewer: Erik Henricson

Reviewer's report:

Scientific Merit and Utility:

This is an investigator-initiated study of performance on a modified ATS 6-minute walk test (6MWT) in 496 typically-developing male and female children and adolescents aged 5-17 years in a central European population. Normative data on 6MWT performance is necessary to develop estimates of percent-predicted 6MWT distance scores in pediatric disease populations for both clinical and research endpoint applications. This study presents regression equations necessary to calculate percent-predicted scores for pre- and post-pubescent males and females. Presented results will be useful for numerous ongoing research programs, and adds to the growing body of normative pediatric data using this evaluation.

Reviewer Comments:

This study is nicely done from the methodological and statistical standpoint. Authors should take care to avoid statements such as posted on lines 76-79 suggesting that no previous calculations or reference equations exist for central European populations though this may be the case for specific methodological adaptations of the 6MWT. It will be useful, however to have 6MWT reference values using nearly standard ATS testing guidelines in addition to values that have been obtained using methods adapted to account for younger ages / developmental abilities in pediatric populations. One interesting item that should be addressed by the authors is the issue of reliability of their testing routine vs. more adaptive methods such as those published by Geiger et al in 2007 (Austrian population).

Authors should also describe their reasoning for providing verbal feedback at only the five-minute mark in testing rather than at every minute mark, as well as their impressions of whether the less frequent feedback impacted level of effort at different ages. In the results section, they note (line 156) that observed 6MWT distances “increased until puberty and then flattened”. Authors should comment on whether this is a biomechanical or behavioral effect? If behavioral, was there an impact of their minimalist testing methodology, and how does this contrast with prior studies giving immediate "far and fast as possible" or verbal feedback? They should discuss implications for using their results as comparison data in children with disease. For instance, do their normative results reflect
biomechanical capacity, which is likely to be important in studies of pathology? How does this data compare to a projected 6MWD using stride length / cadence-based estimates of maximal achievable distance?

Please also note what seems to be a sentence fragment on line 161.

Starting at line 203 discussing changes due in part to pubertal developmental stage, how was "average" age at puberty decided in this cohort since pubertal status was not measured? Was there a population reference? Given the continuation of linear growth but stabilization of 6MWD, does this suggest that puberty is associated with changing behavioral / motivational factors that could be impacted by testing methodology?

On line 224, authors note that physical activity scores only correlated with 6MWD in males. Again, could this be a behavioral effect? Might more "competitive" adolescents involved in more sport and exercise be more internally motivated to excel in exercise tests? Could this help to explain sex differences from a biopsychosocial standpoint, especially if there is less social pressure to excel physically in females in many societies? This would be interesting to discuss, as it could be impacted again by testing methodology.

Reviewer Recommendation:

This is a nicely done study that will be of benefit to both clinical and research communities across pediatric disciplines, and can be recommended for publication. No major compulsory revisions are necessary. In minor essential revisions, the authors should address their methods and results relative to other published studies (Li 2007, Geiger 2007, Preisnitz 2009, Ben Saad 2009) that provide specific regression estimates. Applicability of their normative data in young children, those with developmental delays and/or behavioral challenges should be addressed. Authors should also comment on their observations that 6MWT performance begins to plateau despite continuing linear growth and address whether this plateau is biomechanical or behavioral in nature. Discretionary revisions might include a discussion of younger children’s (under age 6 or 7 years) performance on their specific methods. From a behavioral vs. biomechanical perspective, this would be interesting relative to literature describing young (or developmentally young) children’s performance on pulmonary function test measures such as forced vital capacity testing. Based on this discussion, perhaps they can make recommendations about populations for whom their normative data would be most applicable.

Level of interest: An article whose findings are important to those with closely related research interests

Quality of written English: Acceptable

Statistical review: No, the manuscript does not need to be seen by a statistician.
Declaration of competing interests:

I declare that I have no competing interests.