



Construct Validity Matters: Are CAT and 5STS Surrogates of Exercise Capacity in COPD?

[Letter]

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Dear editor

We read with interest the recent study by Yang et al, which evaluated the predictive value of the COPD Assessment Test (CAT) combined with the five-repetition sit-to-stand test (5STS) for identifying impaired exercise tolerance, using cardiopulmonary exercise testing (CPET) as the reference standard.¹ The effort to identify simple tools for use in primary care is commendable. However, we believe the interpretation of the findings is limited by a fundamental conceptual issue related to construct validity.

CPET-derived peak oxygen uptake (VO_{2peak}) represents maximal, integrative cardiopulmonary capacity, reflecting the coordinated performance of cardiovascular, ventilatory, and peripheral metabolic systems under progressive physiological stress.² In contrast, the CAT and 5STS assess entirely different domains. The CAT is a patient-reported outcome that captures perceived symptom burden and health status,³ while the 5STS primarily reflects lower-limb muscle strength, power, and functional performance during a brief, submaximal effort.⁴ Importantly, the cardiopulmonary demand imposed by the 5STS is transient and does not approach the physiological conditions required to evaluate maximal oxygen transport and utilization.

Therefore, these instruments do not share construct equivalence with VO_{2peak} . Rather than measuring the same underlying physiological phenomenon, they represent distinct but partially related dimensions of disease expression. From a measurement perspective, this distinction is critical: the use of CAT and 5STS to “predict” VO_{2peak} implies a level of interchangeability that is not physiologically justified.

In this context, the reported predictive performance of the combined model (AUC 0.759) should be interpreted with caution. The observed discrimination likely reflects shared variance driven by overall disease severity rather than true convergence of constructs. In COPD, reduced exercise capacity, increased symptom burden, and peripheral muscle dysfunction frequently coexist as manifestations of a common pathophysiological process. Consequently, CAT and 5STS may correlate with VO_{2peak} because they co-vary with disease severity, rather than reflecting maximal cardiopulmonary capacity itself.

Importantly, there are field-based assessments that are conceptually closer to CPET and specifically designed to evaluate exercise capacity, such as the six-minute walk test and the incremental shuttle walking test.⁵ These tests impose a sustained cardiopulmonary demand and have demonstrated strong physiological and clinical relevance. Moreover, they can be feasibly implemented in primary care settings, making them more appropriate alternatives when the goal is to approximate exercise capacity.⁵

This distinction has important implications. A statistical association between measures does not establish construct equivalence, and moderate discriminative ability does not imply that one measure can serve as a surrogate for another. Interpreting CAT and 5STS as proxies for VO_{2peak} risks conflates symptom perception and functional performance with physiological capacity, which are related but non-interchangeable constructs.



We suggest that the combined use of CAT and 5STS is better understood as a composite indicator of overall functional status or disease impact, rather than a surrogate for maximal exercise capacity. Clarifying this distinction would strengthen the study's conceptual framework and align its interpretation with established principles of physiological measurement.

Abbreviations

5STS, five-repetition sit-to-stand test; CAT, COPD Assessment Test; COPD, chronic obstructive pulmonary disease; CPET, cardiopulmonary exercise testing; VO_2 peak, peak oxygen uptake.

Disclosure

The authors report no conflicts of interest in this communication.

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