Title: Age-Related Differences on The Virtual Reality Functional Capacity Assessment Tool (VRFCAT) in HIV Infected (HIV+) and/or Methamphetamine Dependent (METH+) Adults

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INTRODUCTION: The Virtual Reality Functional Capacity Assessment Tool (VRFCAT) is a novel, ecologically valid, computerized measure of functional capacity that evaluates an individual's ability to complete tasks related to planning, household management, finances, and transportation. The VRFCAT is sensitive to functional impairment in individuals with schizophrenia and in healthy older adults, and has been validated with standard measures of functional capacity (e.g., UCSD Performance-Based Skills Assessment [UPSA]) and neurocognitive performance. However, the utility of the VRFCAT in other populations has not been extensively studied. This pilot study examined the sensitivity of the VRFCAT in adults with HIV infection and/or lifetime methamphetamine (METH) dependence. Given research suggesting strong age-related differences in VRFCAT outcomes, we also explored whether performance in our HIV and/or METH groups differed in younger versus older individuals.

METHOD: Participants (n=95) were classified by HIV status and METH dependence into four groups: HIV-/METH- (n=22), HIV-/METH+ (n=22), HIV+/METH- (n=30), and HIV+/METH+ (n=21). Those with severe psychiatric illness, neurological disease, or significant head injury were excluded. Groups were comparable for age and ethnicity, though the HIV+ groups had fewer females and the METH+ groups had lower education relative to the other groups (*p*s<0.05). Participants completed the VRFCAT, a comprehensive neuropsychological battery, and the UPSA-2. The primary outcome for the VRFCAT included total time to complete the task and total number of errors.

RESULTS: No significant differences were observed across the four groups on either VRFCAT outcome. However, consistent with prior research, we found significant age-related differences on both VRFCAT outcomes, such that older (≥50) participants (n=42) took significantly longer to complete the VRFCAT and committed more errors than younger (<50) participants (n=53; *p*s<0.01). Within the older group, there were no significant differences between the four HIV/METH study groups. However, significant differences for both total time and errors across the HIV/METH risk groups were observed in the younger group. Specifically, all younger risk groups (HIV-/METH+, HIV+/METH-, and HIV+/METH+) took longer to complete the VRFCAT than younger controls (mean Cohen's d=0.87), though only the difference between controls and the dual risk group (HIV+/METH+) reached statistical significance (*p*=0.025; Cohen's d=1.21). Both of the younger METH+ risk groups committed significantly more errors than controls, albeit at a trend level (*p*s<0.10; Cohen's ds=0.85 and 0.86). Within our whole sample (n=95),

VRFCAT performance correlated significantly with the UPSA-2 total score and with cognitive performance. Regression analyses revealed that global neurocognitive impairment was a strong independent predictor of poorer VRFCAT performance (time and errors; *ps*<0.05), even while accounting for potential confounds (e.g., depression).

DISCUSSION: Results provide preliminary support for the VRFCAT as a potentially sensitive measure of age-related functional changes in HIV/METH populations, and possibly HIV and METH-associated functional changes in younger adults where they appear to be more impactful in the absence of the prominent age effects. Future work using larger sample sizes examining the sensitivity of the VRFCAT to functional changes over time and problems in other domains of everyday functioning (e.g., employment) may improve the detection and remediation of functional impairment in these populations.