

05: METAANALYSIS OF REACTION TIME IN PSYCHOMETRIC PERFORMANCE TEST FOLLOW PSYCHOACTIVE DRUGS

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Reaction time responses are inherent in many of the skilled activities used in daily life which often require rapid but coordinated responses. As a result, measurement of reaction time is a popular test frequently incorporated into psychopharmacological study designs. The objective of this review was to analyze the properties of reaction time in different aspects of performance: sensory, motor, attention, and memory to assess whether they represent distinct, independent measures of cognitive ability or whether they share common characteristics and as such should be considered as one single measurement. Four separate placebo-controlled, randomized, double-blind, crossover studies of four different psychoactive drugs: pregabalin, alcohol, alprazolam, and lorazepam (the latter two used as positive controls) in healthy volunteers are presented in this metaanalysis. The psychometric tests that contained a measure of reaction time included the choice reaction time task (CRT; test of sensory and motor reaction time), compensatory tracking task (CTT; test of divided attention to peripheral stimuli), and Sternberg memory scanning task (STM; test of working memory). The response measures were determined as an overall reaction time score (pooled reaction time of all psychometric tests) and individual reaction time score (reaction time of each psychometric test). An informative comparison of the results of five independent studies was made using an effect size analysis which quantifies the 'strength' of each drug effect in each performance test as compared to a placebo control as a standardized 'd' value (1). The 'd' value scores are graded as low (less than 0.400) medium (between 0.400 to 0.700), high (between 0.700 to 1.000), and very high (more than 1.000) levels. Pregabalin showed a medium 'd' value on the overall score but exhibited a low 'd' value in STM, medium 'd' value in CRT, and high 'd' value in CTT. Alcohol exhibited a high 'd' value on the overall score but exhibited medium to high 'd' value on individual test scores except STM that showed a low 'd' value. Interestingly, alprazolam and lorazepam produced a very high 'd' value on the overall score and showed considerably high to very high 'd' values in most of the tests in each study. This supports the view that the benzodiazepines lorazepam and alprazolam induce an overall sedative effect and are therefore useful to be used as positive controls for studying psychoactive drugs on performance. The overall results support the concept that reaction time in general is a very useful index to detect the impairing effect of psychoactive drugs, however the different modality performance tests are able to detect subtle differences in cognitive impairment. It is therefore important that a multi-assessment approach is undertaken to optimize the detection of the effects of psychoactive drugs.

Reference

1. Cohen J. (1988) Statistical power analysis for the behavioral sciences (2nd ed.). L. Erlbaum Associates, Hillsdale N.J.