Environmental enrichment during development decreases intravenous self-administration of methylphenidate at low unit doses in rats.

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Despite the efficacy and widespread use of methylphenidate (MPH) as a treatment modality for attention deficit hyperactivity disorder, clinical and preclinical findings indicate that it has abuse potential. Environmental enrichment reduces susceptibility to cocaine and amphetamine self-administration and decreases impulsive behavior, but its effects on MPH self-administration are unknown. The present experiments sought to determine the influence of environmental enrichment on MPH self-administration. Male rats were raised in an enriched condition (EC) or isolated condition (IC). They were trained to self-administer MPH (0.3 mg/kg/infusion) and then exposed to varying doses of MPH on either a fixed-ratio (experiment 1) or a progressive-ratio (experiment 2) schedule of reinforcement. EC rats earned significantly fewer infusions of MPH at low doses (0.03 and 0.056 mg/kg/infusion) compared with IC rats under both schedules; however, no differences were observed at high unit doses (0.1-1.0 mg/kg/infusion). During saline substitution at the end of MPH self-administration, EC rats also responded less for saline compared with IC rats, indicative of more rapid extinction. As with other stimulant drugs with different mechanisms of action, environmental enrichment during development protects against self-administration of MPH at low unit doses but not at high unit doses.