

Driving Under the Influence of Non-Alcohol Drugs — An Update. Part II: Experimental Studies

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Driving Under the Influence of Non-Alcohol Drugs — An Update. Part II: Experimental Studies

REFERENCE: Strand MC, Gjerde H, Mørland J: Driving under the influence of non-alcohol drugs — An update. Part II: Experiential studies; *Forensic Sci Rev* 28:79; 2016.

ABSTRACT: Experimental studies on the impairing effects of drugs of relevance to driving-related performance published between 1998 and 2015 were reviewed. Studies with on-the-road driving, driving simulators, and performance tests were included for benzodiazepines and related drugs, cannabis, opioids, stimulants, GHB, ketamine, antihistamines, and antidepressants. The findings in these experimental studies were briefly discussed in relation to a review of epidemiological studies published recently. The studies mainly concluded that there may be a significant psychomotor impairment after using benzodiazepines or related drugs, cannabis, opioids, GHB, or ketamine. Low doses of central stimulants did not seem to cause impairment of driving behavior.

KEYWORDS: Amphetamines, benzodiazepines, cannabis, cocaine, drugged driving, DUID, experimental, hypnotics, impairment, impaired driving, opioids.

INTRODUCTION

A review article on the effect of non-alcohol drug use on traffic safety was published in this journal in 2000 [68]. The article included experimental and epidemiological studies published before 1998 for the following drug groups: benzodiazepines and related drugs, cannabis, opioids, amphetamine and related drugs, antihistamines, and antidepressants. Many investigations have been performed since then. We have presented an update of epidemiological studies in a recent issue of this journal [34]. In the present article, experimental studies on the acute effects of drugs on psychomotor and cognitive performance as well as actual and simulated driving performance published between 1998 and 2015 are reviewed.

Experimental studies are most commonly performed for medicinal drugs using healthy individuals taking relatively small drug doses and can be used to determine whether a drug may impair several driving-related functions. In many countries it is impossible to perform experimental studies on illicit drugs in humans for ethical reasons. In countries where such studies are allowed, the doses given and drug exposure times are often lower than those used by problem-drug users and may therefore not reflect the actual risks posed by illicit drug users in regular road traffic.

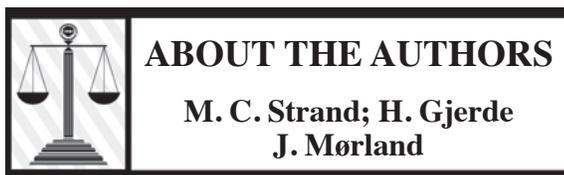
There are, however, a number of advantages with experimental investigations compared with epidemiological studies. First, several factors that may interfere with drug-related effects can be controlled for or excluded, such as age, gender, driving experience, health, exhaustion or sleepiness, the concomitant use of other psychoactive substances, previous or current drug abuse problems,

risk-taking personality, criminal behavior, etc.; second, several types of cognitive and psychomotor functions that are relevant for safe driving may be studied, such as automative behavior (i.e., well-learned, automatic action patterns), control behavior (controlled action patterns), and executive planning behavior (interaction with ongoing traffic); third, well-documented, validated standardized tests may be used so that findings can be compared with other, similar studies [84]. Recommendations for experimental research on drugs and driving have been published [112].

Another type of study, which may be regarded as “semi-experimental”, (see section I-E) is the study of psychomotor performance by drug users who have recently been taking a psychoactive drug *ad libitum*, either for therapeutic or recreational purposes, usually after previous drug use for an uncontrolled length of time, and therefore have varying experience and degree of tolerance to the drug in question. Such studies are, for example, those where drivers suspected of impaired driving are subjected to an examination by a neutral observer (e.g., a physician) at the time when a blood sample is drawn for drug analysis. In some countries this is standard procedure, and some publications have emerged on the relation between blood drug concentration and observed impairment. This type of studies has been included in the present review as they have some similarities to experimental studies of acute drug effects.

The present article is an update of a previous review of studies performed before 1998 [68]. We have therefore included experimental studies published during 1998–2015 for different psychoactive drugs.

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