Traffic-specific Performance of Opiod-dependent Persons in Substitution Therapy

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Relevant background information

- In Austria (total population of about 8 million inhabitants) about 4 million persons are holding a driving license.
- In the year 2002

  - 5.857 persons were registered for substitution therapy, the number of those taking part in driving is unknown;

  - 649 drugged drivers have been registered for conviction, 153 were opiate positive and 29 methadone positive (Statistics of the Federal Ministry of Interior);

  - For comparison: 2.736 alcohol-related accidents with personal injury registered (Road Traffic Accident Statistics of the Austrian Road Safety Board).

Legal position regarding substitution therapy and driving in Austria

According to the Driving License Health Act a driving license will neither be issued nor left to persons being addicted to drugs or medicaments (FSG-GV, §14, par.1).

- Yet, according to an Administrative Court decision in 1997, substitution patients can not generally be classified as unfit to drive. Exceptionally an individual can be evaluated positive if this is justified by particular circumstances.
- Therefore in the course of (re)granting of driving license, driving fitness of opioid dependent clients in maintenance therapy is a case by case evaluation. The person has to undergo a medical assessment carried out by a medical specialist approved by the Ministry of Transport (BMVIT).
- The result of this assessment is forwarded to the public health officer of the licensing authority who has to compose the medical expertise regarding the fitness to drive of the individual substitution client. Based on this expertise, the final decision is done by the licensing department.

Initial situation for the research study

Inconsistent findings regarding traffic relevant performance of patients in replacement therapy in 3 studies carried out at the outpatient clinic of the University Hospital of Vienna separately.

- This is in line with other recent research studies showing partly poorer traffic relevant performance of persons in maintenance therapy (methadone) compared to matched control groups (e.g. Dittert, Naber & Soyka, 1999; Hauri-Bionda et al., 1998; Berghaus et al., 1993), partly no differences (e.g.Kubitzki 1997, Gerhard-Choi 1990, Presslich et al., 1990).
- Prevalence studies reveal additional drug consumption of traffic offenders in methadone therapy in the majority of the cases (e.g. Augsburger & Rivier, 1997; Musshoff et al., 2001; Morland et al., 2002).
- Epidemiological studies show low involvement in traffic offences of substitution clients (e.g. Möller & Hartung, 1995), but also a high recidivism rate of methadone substituted driving offenders was found (Haag et al. 1999).
- De Gier (2003) reported that general conclusions on the impairment effect of replacement therapy on driving performance can not be drawn at the moment.

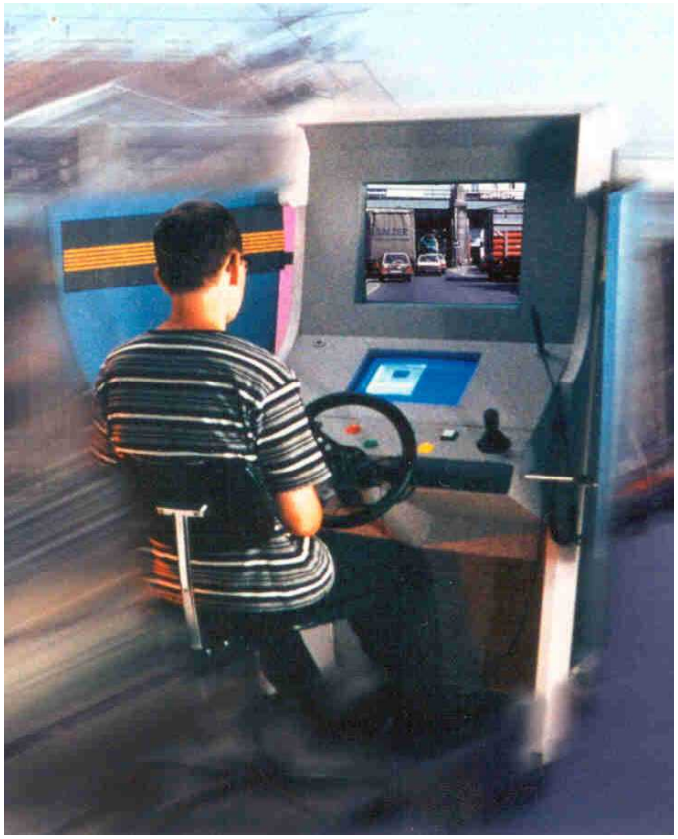
Aim of the research study

A re- and meta-analysis of the three separate studies with substitution clients recruited from the Vienna Hospital's drug-addiction outpatient clinic was carried out

- in order to analyze the problem of inconsistent traffic related performance of patients in maintenance therapy with a much bigger sample
- in order to identify possible moderators from socio-demographic, driving-related, medical-psychiatric and clinical psychological fields that might explain these performance differences.

This research approach was possible because in all three studies the traffic related performance of opioid dependent clients in maintenance therapy had been examined by means of the ART2020 test system under standardized test conditions.

ART2020 - Assessment of traffic related performance



VISUAL PERCEPTION	**Tests**
- structuring ability	LL5
- traffic specific overview	TT15
- peripheral perception	PVT
CONCENTRATION/ATTENTION	
- concentration under monotony	Q1
- flexibility of attention	FAT
REACTION BEHAVIOR	
- reaction capacity under load	RST3
- decision/reaction in a dynamic driving environment	DR2
COORDINATION	
- eye-hand-foot coordination	SENSO
INTELLIGENCE	
- logical reasoning	MAT

Description of sample

Sample size	108
Age (years)	27,9 MV (Min =17, Max =57)
Gender	31 (28,7%) female, 77 (71,3%) male
Education	48 (44,5%) no/primary school 53 (49,1%) vocational training 7 (6,5%) A-levels / university degree
Valid driving license	33 (30,4%) = yes 75 (69,4%) = no
Driving status	54 (50%) = can drive 27 (25%) = cannot drive 27 (25%) = status unknown

Description of sample

Opioid dependence	5.7 years (MV)
Maintenance therapy	
Duration	9.0 month (MV)
Substance	Methadone n = 54 (50.0%) Buprenorphine n = 25 (23.1%) Slow released morphine n = 29 (26.9%)
Dose	Methadonene = 66.7 mg (MV, Min 21/Max 100) Bupronorphine = 12.1 mg (MV, Min 12/Max 20) Slow released morphine = 612.4 mg (MV, Min 320/Max 800)
Additional drug consumption	yes n =44 (40.7%) no n = 64 (59.3%)

Comparison of traffic specific performance

Composition of a matched "artificial" control group:

For each of the 108 substitution patients a twin was composed out of the ART2020 test norm data bank of up to 33.988 drivers:

1. A minimum of 20 parallel persons regarding age, gender and intelligence (MAT results) was identified.
2. Out of this minimum of 20 drivers with same age/gender/intelligence score, a random sample of 7 persons were drawn.
3. The median values of this random sample of 7 persons composed the individual "artificial" twin.

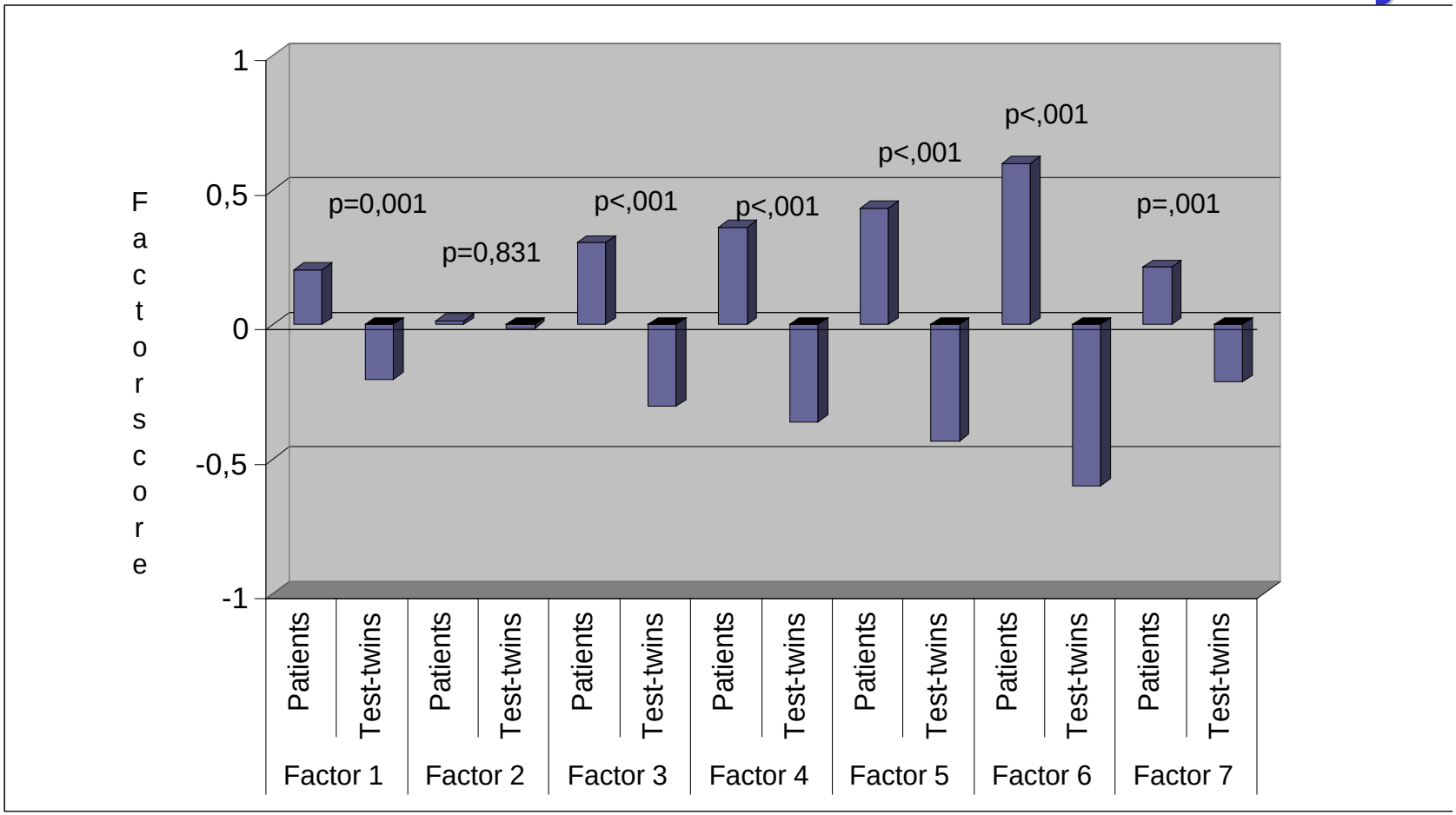
Analyses on different levels:

1. Group comparisons for each ART2020 performance test
2. Group comparisons for all ART2020 performance tests resulted from a factor analysis (7 factor solution with 64,7% explained variance).

Performance differences on the individual test level

Dimension/ tests	Group differences	Substitution group compared to control group
Concentration/attention		
Q1	yes	quantity more / quality worse
FAT	yes	quantity more / quality worse
Visual perception		
LL5	partly	quantity no difference quality worse
TT15	yes	quality worse
PVT	partly	quantity no difference quality worse
Reaction		
DR2	yes	quantity and quality worse
RST3	yes	quantity and quality worse
Coordination		
SENSO	yes	quantity more / quality worse

Performance differences based on factor analysis



Except factor 2, persons in substitution therapy show in all other factors highly significant differences in the sense of worse results.

Description of performance deficit factors

Factor 1 : Delayed reaction and concentration (Delayed reactions in all RST3-stages, few total as well as few correct in FAT and Q1)

Factor 2 : Slowed peripheral perception speed (PVT) - NO DIFFERENCES

Factor 3 : Reduced reactive stress tolerance and visual structuring under enhanced time pressure (Errors, omissions, few correct in RST3 stage 2 & 3, less correct in LL5)

Factor 4 : Gross dysfunction regarding visomotoric capacity (Errors, few correct and in-time in RST3 stage 1; big tracking errors and countersteerings in SENSO stage 2, less correct in LL5 and TT15)

Factor 5 : Reactive and concentrative overload (Errors/multiple errors in RST3 stage 2 and 3, less correct, more incorrect and omitted in DR2, incorrect in Q1 and FAT)

Factor 6 : Inadequate balance of coordination speed and accuracy (Reduced time and many steering errors in SENSO stage 1 & 3 with free choice of speed)

Factor 7 : Delayed decision and reaction time (Prolonged reaction & decision time in DR2)

Moderator influence on performance differences between substitution and control group

The influence of the following moderator groups was analyzed:

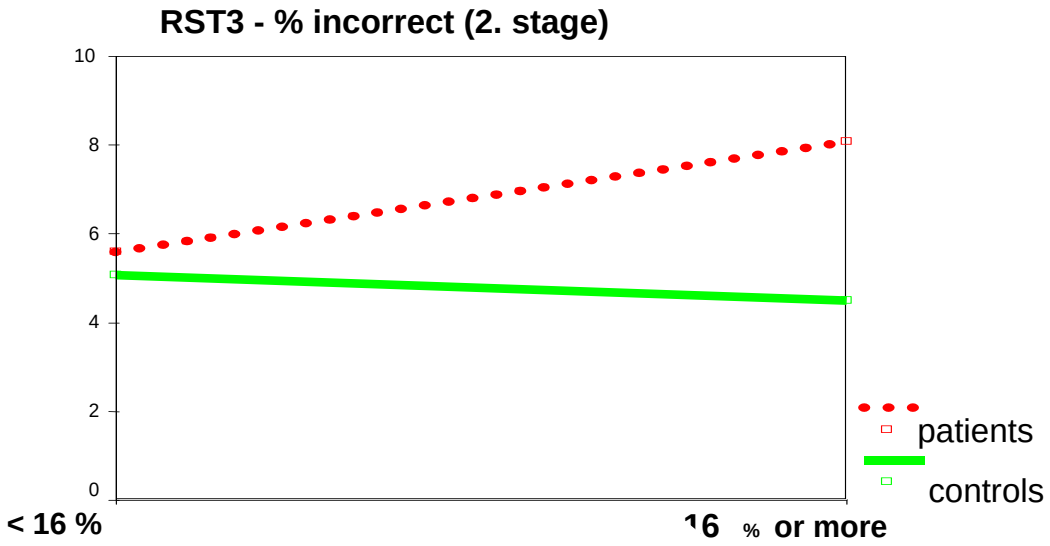
1. Demographic and driving related data (age, gender, education, driving status)
2. Medical-psychiatric data (polytoxicomania, duration of replacement therapy, duration of opioid-dependency, age of first consumption, substitution substance, additional drug consumption)
3. Clinical-psychological data (depression, fear, anger, concentration disorder/ hallucination, suicide attempts, coping type, locus of control, subjective discomfort and impairment, basis performance regarding vigilance and reaction time)

Analyses on various levels:

1. Influence of each moderator on group differences in each single performance test
2. Influence of each moderator on the group differences in the performance factors
3. Simultaneous influence of selected moderators on the group differences in the performance deficit factors by means of path analysis

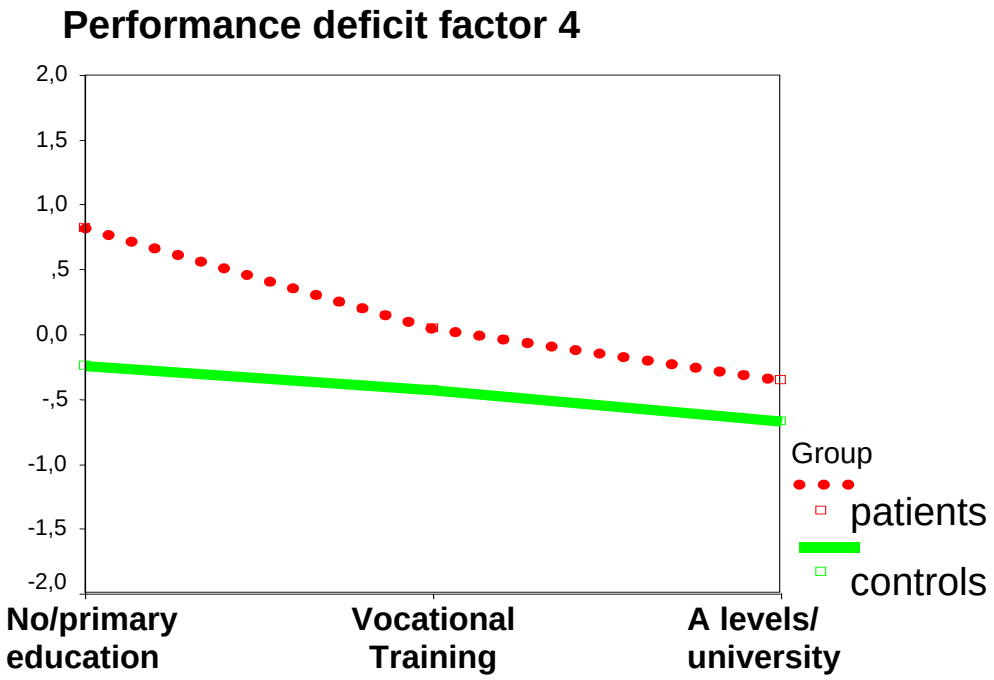
Influence of duration of opioid dependency on performance differences in reaction test - example

Patients having been addicted for 16% or more of their life show more reaction errors under time pressure compared to those with a shorter addiction period in relation to the driver group.

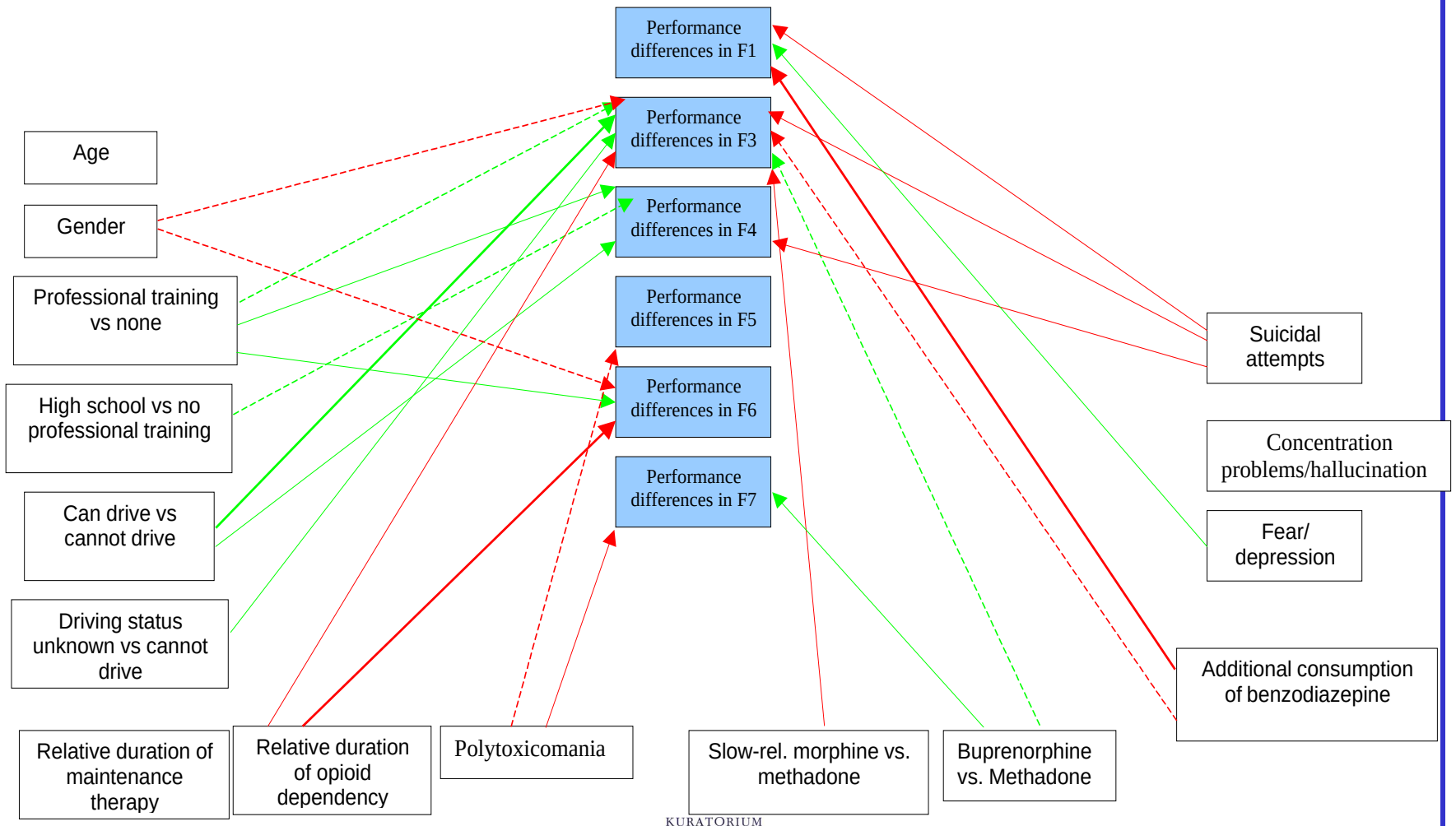


Influence of education level on performance differences in factor 4 - example

- Patients having no or only finished primary school show more gross visomotoric dysfunction problems whereas the performance of substitution clients with a professional training or higher education do not differ that much from the driver group.



Simultaneous influence of moderators on differences in performance factors



Summary of results

Moderator	Specification	Direction of effect
Methodically well confirmed		
Vocational training	Finished	Better performance
Driving status	Can drive	Better performance
Rel. duration of opioid dependence	More than 16% of patients life	Worse performance
Substitution substance	Buprenorphine Slow-released morphines Methadone	Mostly better performance Mostly worst performance In-between both other substances
Additional drug consumption, above all benzodiazepine	Yes	Worse performance
Methodically confirmed with restrictions		
Rel. duration maintenance therapy	More than .5% of patients life	Worse performance
Polytoxicomania	Yes	Predominantly worse performance
Suicide attempts	One or more	Worse performance
Vigilance (VT test)	Above average motor time	Worse performance
Mental fatigue (ALS)	Stronger decline over time	Worse performance
Internal locus of control (FKKI-I)	Below average	Worse performance
Anger-trait (STAXI-T)	Above average sum score	Worse performance
Subjective impairments (SCL)	Above average sum score	Worse performance

Conclusions

- On all levels of analysis performance deficits of the substitution sample were confirmed, yet their amount and direction can vary due to the presence/non-presence of relevant moderators.
- The influence of moderators from socio-demographic, driving related, medical-psychiatric and clinical-psychological fields on the performance differences of substitution clients and a control group of drivers provide an explanation for the inconsistent research findings.
- Due to the multidimensional set of problems which opioid dependent clients in substitution therapy are characterized by, a multidisciplinary assessment (medical-psychiatric/clinical-psychological and traffic psychological) in a step-wise procedure is recommendable in order to evaluate the driving fitness in the individual case.

Influence of driving experience on performance differences (Factor 3)

- Persons without a driving license show more deficits in Factor 3, whereas persons, who possess a driving license or having an unknown status do not differ from the driver group.