

# Fitness to Drive of Psychiatric Patients

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**Background:** Driving a motor vehicle could be central to the functional autonomy of patients with psychiatric illnesses. For patients, a driver's license could mean independence, the ability to care for themselves, and the freedom to travel when they wish. However, both psychiatric disorders and psychiatric drug treatments can produce changes in perception, information processing and integration, and psychomotor activity that can disturb and/or interfere with the ability to drive safely.

**Objective:** To assess the fitness to drive of psychiatric outpatients in a sample representative of current clinical practice.

**Method:** Cognitive functioning and psychomotor performance of 208 consecutive psychiatric outpatients treated in a community mental health center in the Canary Islands (Spain) were assessed in different clinical situations. The LNDETER 100 battery, an electronic assessment unit-based measurement that consists of 5 screen-based tests, was used to assess concentrated attention and resistance to monotony, multiple discriminative reactions and their correctness, anticipation of speed, bimanual coordination, and the decision making process and tendency to assume risk. The study was conducted from July 2007 to September 2007.

**Results:** Of 208 patients, only 33 had scores compatible with the requirements of a driver's license, and 84% failed at least 1 of the required tests. Of patients with a driver's license who drive almost every day, 79.5% registered scores that would not allow obtaining or renewal of the license. None of the driving patients studied notified the traffic authorities that they had a psychiatric condition that may affect safe driving. No patient stopped driving, although 10% of them recognized that their ability to drive was somehow damaged.

**Conclusion:** Guidance on how best to formulate and deliver recommendations on driving fitness in stable psychiatric patients is lacking and much needed.

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Driving is a complex skill that requires adequate information processing, sustained attention or vigilance, concentration, and a good memory. Drivers must have control over impulse and risk-taking, and their judgment should be mature and unimpaired, with the ability to anticipate the actions of other road users. Problem-solving ability and hazard perception are necessary throughout the drive.<sup>1</sup> It can be appreciated, therefore, that many psychiatric disorders may present problems with driving.<sup>2</sup> Decisions regarding fitness to drive on psychiatric grounds, including behavior disorders and drug abuse, can be difficult because of the subjective nature of the symptoms and difficulty in prediction of disturbed behavior. Moreover, psychiatric drug treatments can produce changes in perception, information processing and integration, and psychomotor activity that can disturb and/or interfere with the ability to drive safely.<sup>3,4</sup>

Directive 91/439/EEC<sup>5</sup> marked the start of what the European Economic Community driver's license will be like at some time in the future. However, differences currently exist with regard to the driver license eligibility requirements and renewal periods among the different countries integrating into the European Union. Spanish law follows the European Union requirements both in their strict criteria as well as in other recommendations that are put into force in Spanish legislation (RD 772/97).<sup>6</sup>

The law should prevent a person who does not meet the medical standards from holding a driver's license. As defined by Directive 91/439/EEC,<sup>5</sup> a Prospective Disability is any medical condition that, because of its progressive or intermittent nature, may cause the driver to have a Prescribed or Relevant Disability over the course of time.<sup>1</sup> Such a driver will hold a restricted license, subject to medical review at appropriate intervals. This restricted license will apply to most people who have a severe but stable mental disorder.<sup>1</sup> However, the law on fitness to

drive remains vague in most European countries. It is the license holder's legal responsibility to notify the authorities if he or she has a medical condition that may affect safe driving; failure to do so and giving false information constitute an offense. In addition, there are insurance implications.

The aim of this study was to assess the impact of mental illness and current psychiatric drug treatments on the cognitive functioning and psychomotor skills that determine fitness to drive through the study of a sample of psychiatric outpatients treated in a community mental health center.

## METHOD

Fitness to drive of 208 consecutive psychiatric outpatients treated in a community mental health center in the Canary Islands (Spain) was assessed in different clinical situations. The study was conducted from July 2007 to September 2007. The inclusion criteria were as follows: patient of Canary Islands Health Service, able to give informed consent, and age over 18 years. The exclusion criteria were age over 75 years, dementia, and chronic illness with marked cognitive impairment (mainly schizophrenic and bipolar patients).

Table 1 shows the sample distribution according to sex, age, diagnosis, clinical global impression, and psychotropic drugs used. The diagnoses were registered by the attending psychiatrist according to ICD-10<sup>7</sup> and grouped into the main ICD-10 chapter V (mental and behavioral disorders) diagnostic categories, which include mental and behavioral disorders due to psychoactive substance abuse (F1); schizophrenia, schizotypal, and delusional disorders (F2); mood (affective) disorders (F3); neurotic, stress-related, and somatoform disorders (F4); and disorders of the adult personality and behavior (F6). The severity of the patient's illness was rated according to the Clinical Global Impressions-Severity of Illness scale (CGI-S).<sup>8</sup> The Severity of Illness index requires the clinician to rate the severity of the patient's illness at the time of assessment, relative to the clinician's past experience with patients who have the same diagnosis, according to the following ratings: normal (not ill at all), borderline mentally ill, mildly ill, moderately ill, markedly ill, severely ill, or extremely ill.

### LNDETER 100 Battery

Cognitive functioning and psychomotor performance were assessed using the LNDETER 100 battery (LNDeter; Madrid, Spain),<sup>9</sup> an electronic assessment unit-based measurement that consists of 5 tests and requires 25 minutes for administration. The battery of tests taps into the competencies required for fitness to drive and has been accredited by the Standardization Tests Commission of the Spanish Traffic Authorities according to the Directive

**Table 1. Sociodemographic and Clinical Characteristics of the Sample Studied**

Variable	N	%
Age <sup>a</sup>		
< 25 y	11	5.3
25–45 y	109	52.4
46–65 y	79	38.0
> 65 y	9	4.3
Gender		
Male	80	38.5
Female	128	61.5
ICD-10 diagnosis		
Substance-induced disorders	21	10.1
Schizophrenic disorders	28	13.5
Depressive disorders	88	42.3
Anxiety disorders	67	32.2
Personality disorders	4	1.9
CGI-S rating		
Normal or borderline	115	55.3
Mildly ill	69	33.2
Moderately ill	23	11.1
Markedly ill	1	0.5
No. of psychotropic drugs <sup>b</sup>		
None	37	17.8
1	68	32.7
2	80	38.5
3	13	6.3
≥ 4	10	4.8
Treatment		
Antidepressants		
Tricyclics	5	2.4
SSRIs	42	20.2
SNRIs	65	31.3
Benzodiazepines	108	51.9
Antipsychotics		
Conventional	15	7.2
Atypical	33	15.9
Anticonvulsants		
Antiparkinsonians	20	9.6
	9	4.3
Driver's license		
No	81	38.9
Yes	127	61.1
Motorcycle		
	2	1.0
Car	114	54.8
Truck	5	2.4
Bus	6	2.8

<sup>a</sup>Mean ± SD age = 43.9 ± 12.5 years; range, 18–75 years.

<sup>b</sup>Mean ± SD number of drugs = 1.5 ± 1.1; range, 0–5. Polypharmacy used by 52.3%.

Abbreviations: CGI-S = Clinical Global Impressions-Severity of Illness scale, SNRI = serotonin-norepinephrine reuptake inhibitor, SSRI = selective serotonin reuptake inhibitor.

91/439/EEC of the European Union.<sup>5</sup> Spanish law fulfills and exceeds the requirements reflected in this Community Directive; some requirements considered to be minimum requisites in the Directive are considered rigid requisites under Spanish law.

All tests included in the battery are first explained verbally to the test taker, and this explanation is followed by a practice phase before the actual evaluation takes place. All tasks are objective and fair and do not discriminate against subjects from any culture.

The complete LNDETER battery is screen based, and all tasks are visually displayed for the candidate. Scoring

is automatic, and the final results of the evaluation are displayed on a screen, eliminating error-prone and lengthy scoring procedures. The results can also be printed for records.

The competencies under assessment consist of 5 basic tests evaluating the following areas of subject skill.

***Concentrated attention and resistance to monotony.***

The candidate is to provide simple motor responses using hands and feet when faced with a series of visual stimuli (colors and figures) and sounds in a fixed sequence. The percentage of confused, omitted, or invalid responses versus correct responses is indicative of the appropriateness of a subject's behavior in repetitive, monotonous conditions. Two results of the test were used in the study: average time to answer and "confusion when faced with stimulus."

***Multiple discriminative reactions and their correctness.*** The candidate is required to provide numerous motor responses using hands and feet when faced with a series of visual stimuli (colors and figures) and sounds in a fixed sequence. The range of stimuli presented is increased from the previous test. Discrimination of correct stimuli and correct allocation of responses to stimuli faced are evaluated. This assessment evaluates the candidate's ability to act appropriately when faced with specific situations, used as a measurement of basic decision making ability. The results of this domain were average time to answer and confusion when faced with stimulus.

***Anticipation of speed.*** The subject's ability to judge distance/speed is considered, as well as his or her possible tendencies toward impulsivity. Impulsive responses, i.e., responses without insight, indicate a candidate's tendency to revert to standard responses without considering the context of the situation. The absolute deviation average (absolute mean [unsigned] of the deviations of all tests valid) was the result analyzed.

***Bimanual coordination.*** The subject's task is to coordinate and dissociate movement of each hand while interacting with a continuously moving stimulus. The candidate's ability to simultaneously coordinate separate tasks is judged according to the extent to which the subject is able to correct or modify his or her reactions to achieve an appropriate result. The number of errors and the time to correction of error were the results studied.

***Decision making process.*** This test is an evaluation of the candidate's tendency toward the transgression of norms (risk). The acceptance or assumption of risk is controlled by the option, provided in the test, of not answering those items that present doubts. We used the results "risk assumption" and "average reaction time."

The first 4 tests are those accredited and required by the Standardization Tests Commission of the Spanish Traffic Authorities for the issuance and renewal of the driver's license, whereas the decision making process test corresponds to the exigencies for obtaining permission to

keep and bear arms. The latter test was included in the study since we consider that its results can supply relevant information complementing the results of the required tests. The results of this test will be described but not taken into consideration when eligibility to drive is considered.

**Data Analysis**

Continuous variables were reported as mean, standard deviation, and range; categorical variables were reported as sample size and corresponding percentages. Univariate analyses were performed using Student t test for continuous variables (or Mann-Whitney U test as appropriate) and  $\chi^2$  statistics for categorical variables (or Fisher exact test as appropriate). Multivariate analyses were also performed using a regression model to predict the aptitude/competence to drive on the basis of continuous and/or categorical independent variables considered and to determine the percentage of variance in the dependent variable explained by the independent variables. The following independent variables were inserted into the model: gender, age (as continuous variable), psychiatric drugs used (selective serotonin reuptake inhibitors, serotonin-norepinephrine reuptake inhibitors, tricyclic antidepressants, benzodiazepines, conventional antipsychotics, atypical antipsychotics, anticonvulsants, and antiparkinsonian agents), diagnosis (considering the main ICD-10 categories), and severity of illness (according to CGI-S).

**RESULTS**

The sample comprised 208 psychiatric outpatients (61.5% women, 38.5% men). The mean age was 43.9  $\pm$  12.5 years (range, 18–75 years). One hundred twenty-seven patients (61.1%) had a driver's license and drove on a daily basis. Ten patients were professional drivers (trucks and buses). In the 6 months previous to the test, only 3 of the patients were involved in car accidents. All 3 patients were diagnosed with "substance abuse disorders" and were abusing different substances at the time. None of the other psychiatric outpatients had any driving problems (accidents or fines) in the 6 months previous to the test. No patient refused to perform the tests after being given adequate information and the assurance of the complete confidentiality of the individual results. Results of the tests were given to each individual personally. Depressive disorders (42.3%) and anxiety disorders (33.2%) were the most prevalent diagnoses in the sample. The mean number of psychotropic drugs used by the patients was 1.5 (SD, 1.1; range, 0–5). Only 32.7% of the patients were receiving monotherapy treatment, whereas 38.5% received 2 drugs, 6.3% received 3 drugs, and 4.8% received 4 or more drugs. Benzodiazepine tranquilizers were the most frequent medications, as they were used by 51.9% of the patients, followed by SNRI antidepressants,

**Table 2. Results of the Different Tests Used and Competence to Drive and Logistic Regression Analysis**

Test	Patients in Stanine 1 or 2 (%) <sup>a</sup>		Variables in the Equation	p Value	$\beta$	95% Confidence Interval	
	All Patients	License Holders				Lower	Upper
Concentrated attention							
Average time to answer	60.6	54.3	Age	.001	0.238	0.498	1.777
			Severity of illness	.003	0.668	11.51	56.43
			Driver's license	.001	-0.253	-43.89	-16.17
Confusions when faced with stimulus	31.7	22.0	Age	.001	0.340	0.154	0.374
			Severity of illness	.050	0.463	-0.040	7.693
			Driver's license	.017	-0.151	-5.38	-0.529
Multiple discriminative reactions							
Average time to answer	47.2	40.2	Age	.001	0.301	0.639	1.760
			Severity of illness	.003	0.719	10.87	50.27
			Driver's license	.007	-0.171	-28.98	-4.64
Confusions when faced with stimulus	34.1	25.2	Age	.001	0.442	0.147	0.277
			Severity of illness	.009	0.597	0.765	5.331
			Driver's license	.001	-0.202	-3.85	-1.002
Anticipation speed—Absolute deviations average	20.7	15.0	Driver's license	.001	-0.239	-21.42	-5.81
Bimanual coordination							
No. of errors	13.4	10.1	Age	.001	-0.422	-1.41	-0.716
			Driver's license	.001	0.311	12.21	26.89
Time to correction of error	39.4	24.4	Age	.001	0.396	55.79	111.9
			Driver's license	.001	-0.327	-23.57	-11.57
Decision making process							
Risk assumption	24.5	20.5	Age	.012	0.183	0.014	0.108
			Driver's license	.035	-0.147	-2.374	-0.087
Average reaction time	45.2	45.0	Age	.024	0.169	0.075	1.0
Ineligible to obtain or renew the driver's license	84.1	79.5	...	...	...	...	...

<sup>a</sup>Stanine scores of 1 or 2 are interpreted to mean that someone is "considerably below average and very poor" and according to present regulations (Spanish Medical and Psychotechnical Exam Model within the Context of Second Directive-91/439/EEC) imply ineligibility for a driver's license.

which were used by 31.3% of patients. Most of the patients (55.3%) were clinically stable, with a CGI-S rating of normal or borderline mentally ill.

The raw score of a patient's test would not be interpretable if we did not refer it to the contents of the test or to the corresponding scores of the normative group. Stanine (STANDARD NINE) is a method of scaling test scores on a 9-point standard scale with a mean of 5 and a standard deviation of 2. Typically, a person is said to be "average" (i.e., near the mean) if his/her stanine score is 4, 5, or 6. Stanine scores of 7 or 8 are usually interpreted as indicating "above average" performance, and a stanine score of 9 is normally considered to reflect "outstanding" performance. Stanine scores of 1 or 2 are interpreted to mean that someone is "considerably below average and very poor," and according to present Spanish regulations,<sup>10</sup> imply ineligibility to have a driver's license. There are no published data on the results of these tests in the general population. These tests were only validated when they were introduced, and the stanines were developed after statistical calculations. In any case, stanines 1 and 2 fall short of a normal distribution.

Table 2 shows the results of the different tests used and the subjects' competence to drive based on the current regulations. According to the Spanish law and the European Union directive, failing, i.e., having a stanine score of 1 or 2 on one of the required tests, implies ineligibility for the driver's license. Of 208 psychiatric outpatients,

only 33 had scores (tests 1 to 4) compatible with the requirements of a driver's license, and 84.1% failed at least 1 of the required tests. The results for patients with a driver's license were slightly better, although the vast majority registered scores that would not allow them to renew their licenses. Ten of those patients were professional drivers, and only 2 of them completed the tests correctly. None of the driving patients studied notified the traffic authorities that they had a psychiatric condition that may affect safe driving. No patient stopped driving, although 10% of them recognized that their ability to drive was somehow damaged.

The majority of the patients failed the concentrated attention test, since only 35.1% provided adequate simple motor responses using the hands and feet when faced with a series of visual stimuli and sounds in a fixed sequence. The average time to answer was responsible for the majority of test failures.

More than half of the patients (55.8%) failed the multiple discriminative reactions test, showing an inadequate discrimination of correct stimuli and correct allocation of responses to stimuli faced. Again, the average time to answer results were responsible for the majority of test failures registered.

The anticipation speed test was failed by only 20.7% of the patients, indicating that the patients' ability to judge distance and speed as well as their level of impulsivity were adequate.



On the bimanual coordination test, almost half of the patients (49.5%) failed in coordination and dissociation of movement of each hand while interacting with a continuously moving stimulus. Although the number of errors was not high, the time that patients spent in error was responsible for most of the test failures.

Only 38.9% of patients passed the decision making process test, with the average reaction time being responsible for the majority of the test failures. More than half of the patients showed an unacceptable tendency toward the transgression of norms (risk).

The results of the driving patients were better in all tests carried out (Table 2), demonstrating the influence of experience on driving test performance.

Stepwise multiple logistic regression analysis identified age, severity of illness, and holding a driver's license as statistically relevant explanatory covariates that significantly contributed to overcome concentrated attention and multiple discriminative reaction tests. Considering the anticipation speed test, only holding a driver's license showed a statistically positive correlation in the regression analysis. Age and holding a driver's license were the independent factors related to adequate results in bimanual coordination and decision making process tests according to the multiple regression analysis.

## DISCUSSION

This study found that most of the psychiatric outpatients treated in a community mental health center had some cognitive impairment that implies ineligibility to have a driver's license. According to Gibbons,<sup>11</sup> most mental illnesses tend to reduce activity and interest, and therefore possibly the use of a car. However, in our study, the majority of the psychiatric patients studied had a driver's license and were driving daily, and 79.5% of them failed to pass the required tests. The most worrisome finding is that 10 of those who were driving were professional drivers (and only 2 of them passed the tests). According to current regulations, it is the license holders' legal responsibility to notify the authorities if they have a psychiatric condition that may affect safe driving; however, none of the driving patients studied notified the traffic authorities that they had a psychiatric condition that may affect safe driving. No patient stopped driving, although 10% of them recognized that their ability to drive was somehow damaged.

Several studies have assessed psychomotor functioning with antipsychotics<sup>12,13</sup> and antidepressants<sup>14</sup> in inpatients. The comparisons with drugs not generally currently used (haloperidol, tricyclic antidepressants) and the use of selected samples and monotherapy in these studies give them value but reduce their generalizability. The sample we evaluated included stable, polymedicated outpatients, representing current clinical practice. At present,

and taking into account the design of our study, we cannot discriminate whether medication (and what kind of drugs) or disease (and what kind of mental illnesses) is responsible for the inability of patients to drive. However, in the future, this information may be available, since patients in the sample are still taking part in tests in various clinical situations including changes in their drug treatments and changes in their clinical status.

It has been estimated that 25% of drivers involved in accidents are impaired owing to alcohol, drugs, illness, or emotional disorder.<sup>15</sup> Despite differences in research methods and time-window, there is a common pattern in the developed societies toward elevated use of psychotropic medications in the general population. Recent published surveys indicate that around 10% of the general population is taking at least 1 such medication daily (6.4% for some European countries,<sup>16</sup> 7.2% for Canada,<sup>17</sup> and 10.6% for Australia<sup>18</sup>). It has been estimated that the cost of traffic accidents in Europe attributable to impairment from medications is 6.3 billion Euros each year.<sup>19</sup>

It is clear that a person who is acutely psychiatrically ill is likely to be a source of danger while driving because of the impairment that their state of mind produces.<sup>20</sup> When recovered, that person will be well enough physically and mentally to drive. However, there is usually a risk of relapse.<sup>1</sup>

In light of the results of this study, the question arises as to whether the procedure used for the assessment of the ability to drive is valid and reliable, despite being homologated and probably being the assessment most used in the Spanish psychotechnical examination centers. At the present time, no single measurement used can best predict driving performance. Neuropsychological tests, simulators, or on-the-road tests can be used to assess cognitive function and driving performance. Nevertheless, in terms of predicting driving performance, a poor correlation exists between on- or off-road driving tests and neuropsychological tests.<sup>21,22</sup> The variability in outcome among the studies can be accounted for by different experimental designs (on- vs. off-road testing), variable outcomes of interest, study size, heterogeneity of study groups, degree of premorbid functional impairment, and type of predictive test (on- or off-road, simulators, neuropsychological tests). There are also methodological differences in the type of test used for evaluating the ability to drive. Is it compulsory to analyze individual driving performance in the natural environment, using on-the-road tests such as the 100-km driving test, or can driving performance be just as accurately inferred by testing several psychomotor skills related to driving, such as the tests used in our study? If actual driving performance is tested on the road, what critical variables should be studied? These questions remain to be clearly answered.<sup>23</sup>

The Spanish model of assessment of fitness to drive is based in homologated medical and psychotechnical

examination centers that assess medical and psychotechnical aptitude, determine the capacity of the drivers, and, according to it, establish the necessary restrictions, adaptations, or limitations that allow safer driving conditions. In this context, psychologists assess perceptual motor processes or cognitive ability (movement estimation, visual-motor coordination, reaction time, and practical intelligence) needed for safe driving but also must screen for the presence of psychiatric disorders, including the abuse and dependence of substances and the presence of behavioral disorders that suppose a risk for driving. Psychotechnical examinations involve a double assessment: quantitative evaluation through the use of standardized tests and qualitative assessment of the attitude and behavior of the candidate during the tests.<sup>10</sup> The battery of tests used in our study, LNDETER 100, is the most extensively used test in Spanish psychotechnical examination centers, following the European Union regulations.

The role of primary care physicians in ensuring road safety through the identification of patients with psychiatric conditions that make it unsafe for them to drive is an important one. It is generally recognized to be the duty of physicians to report psychiatrically unfit drivers, although it is the motor-vehicle licensing authority that makes the actual decision to revoke a driving license. Primary care physicians therefore can face an ethical dilemma when they consider reporting a patient to the licensing authorities: the report will help ensure that neither the patient nor others on the road are endangered, but may damage the patient-physician relationship, since driving restrictions may be perceived by the patient as unnecessary, even punitive. At the present time, it is not always clear what professionals should be advising; for example, whether a patient should cease driving immediately or not. Some professionals may even decide that it is not in a particular patient's best interests to discuss driving, as it may interfere with the therapeutic relationship and/or compliance with treatment. However, many professionals are worried about the possible legal consequences of giving incorrect or inadequate advice about driving.<sup>24</sup> Authors such as Niveau and Kelley-Puskas<sup>25</sup> consider that the breach of medical confidentiality by doctors in reporting to authorities patients who are allegedly at risk is ethically questionable as long as the evaluation of driving performance does not rely on objective bases.

Hollister<sup>26</sup> wrote that the psychiatric profession feels little responsibility to determine fitness to drive and that it might still be prudent to err on the side of conservatism, since operating a motor vehicle is deemed by most people as a right to be abrogated only under the most stringent circumstances. Moreover, driving a motor vehicle could be central to the functional autonomy of patients with psychiatric illnesses, and we need to know more about the effects of factors such as the need to drive and the availability of a substitute driver when considering what to do.

For patients, a driver's license could mean independence, the ability to care for themselves, and the freedom to travel when they wish. However, for the general public, the issues are safety and risk assessment.

Psychiatric patients who drive and whose results on these types of tests indicate impaired psychomotor performance should be individually assessed by their psychiatrist or general practitioner. The decision about for whom and when to forbid driving is a difficult matter of judgment because little is known, not only generally about the actual risks, but also particularly about individual limitations, and the decision must remain a clinical and professional judgment within the medical encounter. There is not enough evidence to state that psychomotor tests alone should drive the recommendations.

**Drug name:** haloperidol (Haldol and others).

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