

# Relationship between physical fragility and socio-demographical and clinical factors of elderly performing driving license testing

*Relação entre fragilidade física e fatores sociodemográficos e clínicos dos idosos que realizam teste para habilitação veicular*

*Relación entre la fragilidad física y los factores sociodemográficos y clínicos de pacientes ancianos sometidos a la prueba para obtención de la licencia vehicular*

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## ABSTRACT

**Objective:** To investigate the association between the condition of the physical fragility and the socio-demographic and clinical characteristics of elders performing driving license testing. **Methods:** This is a transversal quantitative study, performed in traffic medicine clinics. Criteria of inclusion of elders: age equal or higher to 60 years old; scheduled to driving license testing, and suitable cognitive and physical capacity to perform the tests. The sample was composed by 172 seniors from January to July 2015. Tests were used to evaluate the physical fragility, together with a socio-demographic and clinical questionnaire. **Results:** 56.4% of the candidates are considered pre-fragile, and there was a significant association between fragility and marital status ( $p = 0.0327$ ) and use of alcohol ( $p = 0.0417$ ). **Conclusion:** The prevalence of pre-fragility demonstrates a necessity to manage this public, aiming to attenuate functional decay, and as a consequence, to contribute to safer driving conditions.

**Keywords:** Fragile elder; Physical aptitude; Driving license exam; Demographic data; Pathology.

## RESUMO

**Objetivo:** Investigar a associação entre a condição da fragilidade física e características sociodemográficas e clínicas de idosos que se submetem ao teste de habilitação veicular. **Métodos:** Estudo quantitativo transversal, realizado nas clínicas de medicina de trânsito. Critérios de inclusão do idoso: ter idade igual ou superior a 60 anos; estar agendado para os testes de habilitação e apresentar capacidade cognitiva e física para a realização dos testes. A amostra foi constituída por 172 idosos no período amostral de janeiro a julho de 2015. Foram aplicados testes para avaliação da fragilidade física e questionário sociodemográfico e clínico. **Resultados:** 56,4% dos candidatos são pré-frágeis e houve associação significativa entre fragilidade física e estado civil ( $p = 0,0327$ ) e uso de bebidas alcólicas ( $p = 0,0417$ ). **Conclusão:** A prevalência de pré-fragilidade evidencia a necessidade de sua gestão, com o objetivo de atenuar o declínio funcional e consequentemente contribuir para uma direção veicular mais segura.

**Palavras-chave:** Idoso fragilizado; Aptidão física; Exame para habilitação de motoristas; Dados demográficos; Patologia.

## RESUMEN

**Objetivo:** Investigar la asociación entre la fragilidad física y las características sociodemográficas y clínicas de ancianos sometidos a la prueba para obtención de la licencia vehicular. **Métodos:** Estudio cuantitativo transversal, realizado en clínicas de medicina de tránsito. Criterios de inclusión del anciano: tener edad igual o superior a 60 años; estar programado para los exámenes y presentar capacidad cognitiva y física para la realización de las pruebas. Participaron 172 ancianos entre enero y julio de 2015. Fueron aplicadas pruebas para evaluación de la fragilidad física y cuestionario sociodemográfico y clínico. **Resultados:** El 56,4% de los candidatos son pre-frágiles y hubo asociación significativa entre fragilidad física y estado civil ( $p = 0,0327$ ) y uso de bebidas alcohólicas ( $p = 0,0417$ ). **Conclusión:** La prevalencia de pre-fragilidad evidencia la necesidad de una gestión, con el objetivo de atenuar el déficit funcional y, consecuentemente, contribuir para una conducción más segura del auto.

**Palabras clave:** Anciano Debilitado; Aptitud Física; Examen para Licencia Vehicular; Datos Demográficos; Patología.

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Submitted on 05/30/2016.

Accepted on 09/07/2016.

DOI: 10.5935/1414-8145.20160097

## INTRODUCTION

Driving a vehicle is a complex task that requires the full capacity to perform a series of movements, whichever are weather and track conditions, in a continuous environment<sup>1</sup>. There are countless medical conditions that influence driving skills, being the physical fragility an important issue to be evaluated, specially in elder people.

Researchers define fragility in different formats. Many of these definitions are based on strength and physical impairment of the senior person<sup>2,3</sup>; others, when associated to chronic diseases, renal illnesses, stroke, cardiac insufficiency, hip and knee osteoarthritis, and depression<sup>4,5</sup>.

This present study deals with the physical fragility defined as a medical syndrome with multiple causes and determinants, which is observed by the lack of strength and resistance, and by the reduction of physiological function, increasing the vulnerability of the individuals, having higher dependency and/or risk of death<sup>6</sup>.

The evaluation of fragility proposed by Fried et al. consists in the measurement of five biological characteristics of the elders, which include the decrease of walking speed and handgrip, non-intentional weight loss, reduction of physical activity and self-reported state of fatigue/exhaustion. The elder who presented three or more of these characteristics is considered fragile, and those who present one or two are considered in a previous stage (pre-fragility); the ones that do not present any of the components is defined as non-fragile<sup>2</sup>.

The phenotype for fragility was operated by the Cardiovascular Health Study (CHS), who studied 5,317 elders above the age of 65, with annual evaluations and observations of the the following elements: illnesses, hospitalizations, falling, inability, and mortality. The study demonstrated that 6.9% of the studied population was fragile<sup>2</sup>.

Brazilian and international literature did not show any association to physical fragility and driving, a justification to perform the study of this medical syndrome within the mentioned context, in order to optimize the opportunities to the elders, and to guarantee a general safer driving conditions. The professionals from geriatrics and gerontology can work in multi-professional teams, assuming an important role identifying pre-fragile and fragile elders, working in prevention, in stabilization, or even in the reversal of the fragile status.

Fragility is usually associated to some socio-demographical characteristics, such as: advanced age<sup>7</sup>, low schooling<sup>7</sup>, low income<sup>8</sup>, being a female<sup>9</sup>, lack of social support<sup>10</sup>, and unfavorable socio-economical and health conditions<sup>11</sup>, which, many times, are ignored by health teams and traffic physicians. It is also associated to clinical facts, such as falling<sup>12</sup>, hospitalizations<sup>13</sup>, number of illnesses<sup>14</sup>, and use of medication<sup>15</sup>, being the last two able to also compromising driving skills.

Many pathologies affect driving skills, harming the individual's subsystems: vision (cataract, diabetic retinopathy, macular degeneration, glaucoma), cardiovascular (angina pectoris,

heart failure), respiratory (sleep apnea, chronic obstructive pulmonary disease), neurological (cognitive deficits, dementia, Parkinson), psychiatric (depression, psychosis), metabolic, and musculoskeletal<sup>16</sup>.

Based on the observations build, this study aims to investigate the association between the physical fragility and the socio-demographical and clinical characteristics of elders during driving license testing.

## METHODS

This is a quantitative cross-section study, with a sample built from January 31<sup>st</sup> to July 31<sup>st</sup> 2015. The research took place on traffic clinics, the place where the tests of physical and mental fitness and/or psychological evaluation for driving licenses take place, in the municipality of Curitiba, Brazil. The criteria of inclusion of the clinics were: they must be accredited to perform the mentioned exams; they must have adequate physical space to perform those tests.

During the stage of project design, there were 54 regularly accredited clinics, which were placed in order by a simple draft (random selection). In order to proceed, the name and the directions for the clinic were written down in pieces of paper, and then they were drafted. After this procedure, the clinics were classified with letters and crescent numbers, from C1 to C54, and in this sequence, they were evaluated based on the criteria of inclusion.

Considering the inexistence of data related to the number of elders supported by the clinic, and the impartial and equitable distribution of the elders among the clinics, it was defined a standard number of individuals (35 elders) to be interviewed and collected in each clinic. The data collection started in the clinics C1, C3, C4, C5, and C6 having no more than 35 candidates per clinic. Clinic C2 was excluded because it was not observed an adequate physical environment to perform the tests.

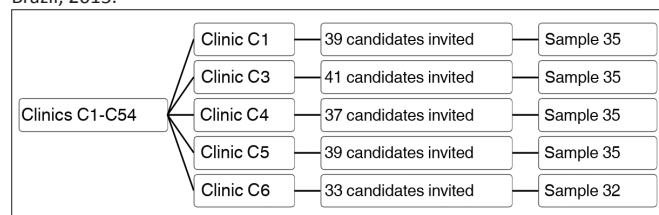
When the data gathered from 35 elders was reached in one clinic, the process then moved to the following clinic on the drafted list. More than 35 elders were asked to participate in every clinic, but not all accepted to be part of the research. In the last clinic, due to the end of the sample period, only 32 elders participated in the study. In total, 189 elders were invited to participate, and from those, 17 denied participation, resulting a sample of 172 elders.

The flowchart of the stages to compose the sample of elders can be seen in the Figure 1.

The criteria of inclusion of elders were: to be 60 years old or higher; to be scheduled to a driving license test; to be able to answer the study's questionnaire. In regards to the criteria of exclusion: to present physical illnesses, issues or symptoms that, by any reason, impede the individual to answer the questionnaire or to perform the tests.

As a first moment, the scheduling system of the clinics was used to observe the age of the users and to select potential participants of the study. Data collection was performed in two

**Figure 1.** Flowchart of the stages to compose the sample, by clinics. Curitiba, Brazil, 2015.



stages: the application of an instrument with the following variables: socio-economic characteristics (gender, age, schooling, people residing together with the elder, financial situation, working conditions), and clinical characteristics (health issues, records for falling, dizziness, use of alcohol, use of tobacco, use of supportive technologies - crutch, walker, cane -, use of medication, and number of hospitalizations).

On the second stage, there were tests related to the cognitive evaluation of the individual and fragility syndrome. In regards to the evaluation of the phenotype for physical fragility, the test used the following components: handgrip was measured with a hydraulic dynamometer from *Jamar*<sup>®</sup>. The fragile individuals in this item, after considering gender and body mass index the results found in the lowest quintile<sup>2</sup>. To evaluate the walking speed, the participant had to walk through a straight line of 4.6 meters, with his regular stepping speed, while time (in seconds) was taken by the researcher. After adjustments for gender and height, the values found in the lowest quintile were considered fragile<sup>2</sup>.

Weight loss was found in the answers to two questions: (1) "Have you lost some weight in the past 12 months?", and (2) "How many kilograms?". Elders were considered fragile if declared weight loss  $\geq 4.5$  kilograms (kg) in the past 12 months<sup>2</sup>.

The component fatigue/exhaustion was evaluated through the items 7 and 20 of the CES-D Depression Scale. The answers were defined between 0 and 3, according to the frequency. A response "2" or "3" to any of the questions would consider the elder as fragile in this component<sup>2</sup>.

The investigation of the level of physical activity was produced using the Minnesota Leisure Activity Questionnaire. After adjusting the results according to gender and height, the lowest quintile values were considered signs of fragility<sup>2</sup>.

Previously to applying the tests, there were theoretical and empirical training sessions with the researchers, with the objective to standardize data collection and to make sure the internal reliability of the information gathered.

The data were organized and analyzed using the Excel<sup>®</sup> 2015 and the *Statistical Package for Social Sciences* (SPSS) version 20.0 softwares. Descriptive statistics, nonparametric chi-square, and Cochran tests were used to evaluate the association between the interest variables and physical fragility. The statistical significance value was set  $p < 0.05$ .

The research was approved by the Committee of Ethics in Research in Human Beings, from the Health Sciences Sector, under protocol CAAE 34689914.8.0000.0102, approval CEP/SD

833460. The ethical principals of volunteered and consented participation of each individual and clinic were observed, according to the guidelines present on the Resolution 466, of the Brazilian National Health Council, from December 12<sup>th</sup> 2012.

The access to the accredited clinics, as well to the Brazilian National Registry of Qualified Drivers (Renach, in Portuguese) was granted after the circular letters #2383/2014 COOHA/DIMP and #5103.2014 COOHA/SEME, which was sent to the clinics and to the institution that regulates them.

## RESULTS

189 elders were invited to participate in the research, however 17 of them refused to take part. Hence, the sample produced had 172 elders, an average age of  $67.73 \pm 6.55$  years, being  $n=120$  (70.67%) males; and  $n = 52$  (29.23%), females. None of them was considered fragile ( $n = 0$ ; 0%); the pre-fragile were  $n = 97$  (56.40%); and  $n = 75$  (43.60%) were seen as non-fragile. The age of the sample was homogeneous, with a coefficient of variation of 9.68%, a concentration ratio between 60 and 72 years old, in approximately 75% of the sample. There was no association between physical fragility and age ( $p = 0.0765$ ).

It is possible to observe on Table 1 that there is a significant percentage of elders who are married or having a partner  $n = 118$  (68.60%), living with the partner with/without children  $n = 117$  (68.02%), Caucasian  $n = 152$  (88.37%), and high level of schooling (above High School education)  $n = 103$  (46.33%). The variable individual income was predominantly between 1 to 5 minim wages  $n = 89$  (51.74%). The permanence of these individuals in the labor market, in formal and/or informal positions, was observed in  $n = 90$  (52.32%). In the present study, the association of fragility and socio-demographic characteristics was significant only regarding the marital status ( $p = 0.0327$ ).

On Table 2, it is possible to observe a high percentage of individuals that declares illnesses  $n = 117$  (66.67%). Among the non-transmissible chronic diseases, the most prevalent were Systemic Arterial Hypertension (SAH), *Diabetes Mellitus* (DM) and the dyslipidemia in both subgroups, in proportions of 46.39%, 16.49%, and 14.43% among the pre-fragile, and 36%, 16%, and 14.67% among the non-fragile, respectively. There was no association between physical fragility, diseases, and life styles, except for the use of alcohol ( $p = 0.0417$ ).

On Table 3, it is possible to confirm a prevalence of falling, dizziness, and the use of assistive technologies, thus with no association between fragility and these variables.

In Table 4, it is seen that 43.3% of the pre-fragile elders use 2 to 4 drugs regularly, a number that is above the non-fragile (40%). In all subgroups, there is a numerical superiority on the frequency in which medication is taken by the pre-fragile. Polypharmacy was observed in 5.34% of the non-fragile; 6.19% of the pre-fragile demonstrated the same status. When associated to the amount of medications taken to physical fragility, there was no statistical significance ( $p = 0.7516$ ).

**Table 1.** Association between the level of physical fragility of elders and socio-demographic characteristics. Curitiba, Brazil, 2015

Variable	Classification	Pre-fragile	%	Non-fragile	%	Total	p-value
Gender	Male	67	69.07	53	70.67	120	0.8214*
	Female	30	30.93	22	29.33	52	
Marital Status	Married	64	65.98	51	68	115	<b>0.0327**</b>
	Divorced	7	7.22	14	18.67	21	
	Single	6	6.19	3	4	9	
	Widow(er)	17	17.53	7	9.33	24	
	Living with Partner	3	3.09	0	0	3	
	Partner and grandchildren	7	7.22	1	1.33	8	
Living with	Partner	35	36.08	36	48	71	0.2326**
	Partner and children	27	27.84	19	25.33	46	
	By himself	18	18.56	11	14.67	29	
	Children	10	10.31	8	10.67	18	
Schooling	Illiterate/Incomplete Elementary	11	1.03	6	0	17	0.6598*
	Complete Elementary/Incomplete Middle	16	11.34	12	12	28	
	Complete Middle/Incomplete High	12	10.31	12	14.67	24	
	Complete High/Incomplete College	29	23.71	17	16	46	
	Complete College	29	29.90	28	37.33	57	
Income	No income	7	7.22	5	6.67	12	0.9687*
	> 0 MWto ≤ 1 MW	10	10.31	5	6.67	15	
	> 1 MWto ≤ 3 MW	33	34.02	28	37.33	61	
	> 3 MWto ≤ 5 MW	15	15.46	13	17.33	28	
	> 5 MWto ≤ 10 MW	18	18.56	13	17.33	31	
	> 10 WM	14	14.43	11	14.67	25	
Ethnicity	Caucasian	87	89.69	65	86.67	152	0.7142**
	Mixed	5	5.15	5	6.67	10	
	Afro-descendent	4	4.12	2	2.67	6	
	Asian	1	1.03	3	4	4	
Working Conditions	Yes	47	48.45	43	57.33	90	0.5079*
	No	50	51.55	32	42.67	82	
Retirement	Yes	70	72.16	53	70.67	123	0.8291*
	No	27	27.84	22	29.33	49	
Pension	Yes	18	18.56	8	10.67	143	0.2151*
	No	77	79.38	66	88	26	0.3147**
	NR	2	2.06	1	1.33	3	

\* Chi-Square test,  $p < 0.05$ ; \*\* Cochran test - G test,  $p < 0.05$ ; <sup>a</sup> Indicated G test  $p$ -value 0.3147 - first value for  $p$  tested only valid answers (Yes and No); this  $p$ -value also tested the NR category; Bold: significant variables.

## DISCUSSION

The absence of fragile elders diverges from other studies<sup>17,18</sup> in seniors in the same community, which demonstrated percent values of 4.9% and 15.3%. The lack of these seniors in this study is justified by the clinical characteristics and by the reason that lead them to the studied clinics, which is the renewal of driving licenses.

Besides there was no presence of fragile elders, the prevalence of pre-fragility was 56.40%, a significant higher value when compared to international studies<sup>17-20</sup>, which presented percentage values of 42.3%, 47.6%, 40%, and 45.5%.

When comparing the results of the pre-fragile elders group to other Brazilian studies, the results are approximate. In a study

**Table 2.** Association between the level of physical fragility of elders and the diseases and self-reported habits. Curitiba, Brazil, 2015

Variable	Classification	Pre-fragile	%	Non-fragile	%	Total	p-value
Diseases	Yes	67	69.07	50	66.67	117	0.7373*
	No	30	30.93	25	33.33	55	
Heart Attack	Yes	6	6.19	1	1.33	7	0.0888**
	No	91	93.81	74	98.67	165	
Angina	Yes	2	2.06	0	0	2	0.1286**
	No	95	97.94	75	100	170	
Congestive heart failure	Yes	1	1.03	1	1.33	2	0.8550**
	No	96	98.97	74	98.67	170	
Peripheral vascular disease	Yes	0	0	1	1.33	1	0.1966**
	No	97	100	74	98.67	171	
Chronic emphysema	Yes	2	2.06	2	2.67	4	0.7949**
	No	95	97.94	73	97.33	168	
Atrite	Yes	6	6.19	4	5.33	10	0.8121**
	No	91	93.81	71	94.67	162	
Cancer	Yes	4	4.12	5	6.67	9	0.4600**
	No	93	95.88	70	93.33	163	
Diabetes	Yes	16	16.49	12	16	28	0.9305*
	No	81	83.51	63	84	144	
Hypertension	Yes	45	46.39	27	36.00	72	0.1707*
	No	52	53.61	48	64.00	100	
Hypothyroidism	Yes	14	14.43	8	10.67	22	0.4633*
	No	83	85.57	67	89.33	150	
Dyslipidemia	Yes	14	14.43	11	14.67	25	0.9656*
	No	83	85.57	64	85.33	147	
Use of alcohol	Yes	11	11.34	17	22.67	29	0.0417**
	No	86	88.66	57	76.00	143	
Smoking	Yes	6	6.19	9	12	15	0.1802*
	No	91	93.81	66	88	157	
Used to smoke	Yes	18	18.56	16	21.33	34	0.6502*
	No	79	81.44	59	78.67	138	

\* Chi-square test,  $p < 0.05$ ; \*\* Cochran test - G test,  $p < 0.05$ 

regarding the Fragility of Brazilian Elders (Estudo Fíbra)<sup>9</sup>, at the Unicamp campus, pre-fragility varied from 47.7% in Ivoti, to 55.5% in Paraíba. Yet, a study produced in Belo Horizonte<sup>8</sup>, with the objective to investigate the aspects associated to fragility found 46.3% of pre-fragile elders; and another research in Curitiba<sup>21</sup> evaluated the quality of life in elders in Primary Health Care, finding 56.7% of pre-fragile individuals.

Some other Brazilian studies also found pre-fragile rates above this research, such as: the Fíbra (Santa Cruz)<sup>22</sup>, which investigated the characteristics, prevalence, and factors

associated to the fragility in 391 elders, finding 60.1% pre-fragile individuals; and the research conducted in Lafaiete Coutinho<sup>23</sup>, a municipality with low Human Development Index (HDI), evaluating the fragility in 316 elders enrolled in the Family Health Strategy program, finding 58.7% elders in pre-fragility condition.

The expressive percentage value of elders in pre-fragile situation identified in the present study demonstrates the importance of interventions in this stage, aiming to higher possibility and effectiveness to interrupt and/or to revert the state, and consequently, having a safer driving condition for longer.



**Table 3.** Association between physical fragility and variables observed. Curitiba, Brazil, 2015

Variables	Classification	Pre-fragile	%	Non-fragile	%	Total	p-value
Falling	Yes	4	4.12	8	10.67	12	0.0949*
	No	93	95.88	67	89.33	160	
Dizziness	Yes	1	1.03	1	1.33	2	0.8550**
	No	96	98.97	74	98.67	170	
Assistive Tech.	Yes	2	2.06	1	1.33	3	0.7074***
	No	94	96.91	74	98.67	168	
	NR	1	1.03	0	0	1	

\* Chi-square test,  $p < 0.05$ ; \*\* Cochran test - G test,  $p < 0.05$ ; \* Found G test  $p$ -value 0.7074 - the first  $p$ -value only analyzed valid answers (Yes or No); the second  $p$ -value included the NR category.

**Table 4.** Association between physical fragility of elders and the number of medications taken. Curitiba, Brazil, 2015

Number of medications	Pre-fragile	%	Non-fragile	%	Total	p-value
Does not take any	25	25.77	25	33.33	50	0.7516
Take 1 medication	24	24.74	16	21.33	40	
Take from 2 to 4 medications	42	43.30	30	40.00	72	
Polypharmacy (5 or more medications)	6	6.19	4	5.34	10	

\* Cochran test - G test,  $p < 0.05$ .

Identifying those cases during the driving license exams could generate more frequent evaluations, which could set shorter validity of the license in order to force the individual to be more present. Furthermore, some authors point out that pre-fragile elders tend to respond better to intervention actions than the fragile ones<sup>24</sup>.

The management of physical fragility encompasses four interventions done by a multi-professional team, which are only together to perform the required actions, such as: the use of exercises (resistance and aerobics); caloric and protein support; use of vitamin D; and the reduction of polypharmacy<sup>6</sup>.

The age of elders is frequently related to physical fragility, however in this research it was not observed a relationship between these items ( $p = 0.0765$ ). In a systematic review, aimed to highlight the prevalence of fragility in elders in a community of individuals of 65 years old or higher, it was found a significant association between age and fragility (value for  $p < 0.001$ )<sup>25</sup>. A study that took place in the City of Mexico, with 1,933 elders of the community found association between age and fragility ( $p < 0.001$ )<sup>9</sup>. There was also a significant association ( $p < 0.01$ ) between these elements in a large population study, with 7,439 seniors, in the United States of America<sup>18</sup>.

Besides the deficit of Brazilian studies in the topic, two researches showed similar results to the international ones. The study Fibra demonstrated a significant association between fragility and age ( $p = 0.027$ )<sup>9</sup>. Another research<sup>21</sup>, with a sample size of 203 individuals, who were users of the Basic Health Care program also demonstrated a correlation with a result of the value of  $p < 0.01$ .

The present study showed that 66.86% of the elders are early-elders, with ages varying from 60 to 69 years old, being the average  $67.73 \pm 6.55$  years old. From these, the majority was married and/or lived with a partner, which there was a statistical association between physical fragility and marital status ( $p = 0.0327$ ). This is an information to be investigated in the future, as this research uses a cross-section methodology and it does not provide arguments to infer about the finding. The result corroborates with a study performed in the Limburg province, south of Holland, with 8,684 participants above 65 years old, which found 68.8% of elders who were married or living with a partner<sup>26</sup>.

In this study, it is seen that the prevalence of widow(er)s is 9.33% among the non-fragile, and 17.53% of pre-fragile individuals, numbers similar to the findings of the previously mentioned study<sup>26</sup>, with a prevalence of 17.5% among the non-fragile, against 37.7% of the fragile. Another study<sup>27</sup>, performed in Spain, with 640 elders, aimed to evaluate the prevalence of fragility and associated factors, shows widowhood associated to fragility.

The non-transmissible chronic diseases (NTCD) were present in 68.02% of the elders, being the majority found with Systemic Arterial Hypertension (SAH) 41.86% and *Diabetes Mellitus* (DM) 16.27%. There was no significant level of relationship between physical fragility and SAH ( $p = 0.1707$ ). Similar data was found in Barueri and Cuiabá, in a study with 761 elders of those communities, in which  $p = 0.115$ <sup>28</sup>.

The Cardiovascular Health Study (CHS) demonstrated frequency distributions similar to the ones found: 42.9% for SAH and 15.8% for DM, and showed a statistical association between these two components and fragility ( $p < 0.001$ )<sup>2</sup>. A longitudinal

study<sup>18</sup> performed in the USA with 7,439 elder patients with  $\geq 65$  years old, found percentage values above: 64.1% SAH and 23.8% DM, with statistical association between these pathologies and physical fragility.

Due to the high incidence of SAH in elders, this element is considered a condition of risk to safe driving. Due to this fact, the institute responsible to evaluate drives certain driving procedures to individuals according to their own blood pressure levels. The guidelines follow the consensus built by the Brazilian Association of Traffic Medicine (Abramet, in Portuguese)<sup>29</sup>.

Despite there is no significant level of relationship between DM and physical fragility in this research ( $p = 0.9305$ ), opposite to other studies<sup>2,28</sup>, it is necessary to discuss the issue, once 16.27% of the evaluated individuals self-reported DM, and it is an element of risk to safe driving, specially the type I.

The variable "use of medication" ( $p = 0.8948$ ) did not present significant association to physical fragility, however it was seen that 70.94% used some sort of medication; and 5.81%, the polypharmacy. The closes value found in literature was an epidemiological study<sup>30</sup> based on the population regarding the use of medication in the Metropolitan Area of Belo Horizonte, with 1,598 elders. It was seen that 72.1% used medication, and among them, 14.3% of polypharmacy. Similar data were found in a study with 811 elders 60 years old or older in a municipality in the south of Brazil, which found 72.3% used some sort of medication; 13.9% of polypharmacy<sup>31</sup>.

The study Sabe<sup>32</sup>, in the municipality of São Paulo found higher numbers when evaluating 1,115 elders  $\geq 65$  years old: 89% of the participants used medication, and polypharmacy was found in 36% of the individuals. These data corroborate to a study performed among seniors in the municipality of Rio de Janeiro<sup>33</sup>, which pointed out 85% of the elders used medication, being polypharmacy found in 32.7% of them.

In regards to polypharmacy, the results found in the present study are justified due to the lowest age average of the studied population, and by the omission from the candidates, once polypharmacy can influence in the judgment of the traffic physician during the driving license test.

The prevalence of falling was 6.97%, being 4.12% in the group of non-fragile elders; and 10.67% among the pre-fragile ones, a significantly lower result when compared to other studies about fragility. In the present study there was no significant statistical association between these elements ( $p = 0.0949$ ). The prevalence of falling in a population study<sup>18</sup> in the United States of America with 7,439 elders  $\geq 65$  years old was 30.5%, being 18.1% among the non-fragile, and 32.9% in the pre-fragile ones, with a statistical significance of  $p < 0.001$ . In the SABE study<sup>32</sup>, in the municipality of São Paulo, almost half (49.7%) of the elders mentioned falling in the past 12 months.

The results related to dizziness also demonstrated a considerably low result (1.16%), contrary to the literature. The symptom was found in 24% of 1,087 North-American elders aged 72 years old or older in New Haven/Connecticut<sup>34</sup>. In another research<sup>35</sup>, with 620 elders (ages  $> 65$  years old) recruited

randomly in a registry office and analyzed for two years, there was the result of 29.2% of seniors mentioning dizziness in the past 6 months, increasing the results according to the age. The frequency was 27% in elders who were 70 years old; 54% among the 90 year-old or older individuals.

The presence of dizziness is observed in the clinical evaluation of traffic medicine through a specific question, and in the case of a positive answer, the examiner is required to ask for an otoneurological exam to evaluate the safety condition of the prospect driver<sup>36</sup>, reason enough to justify the low prevalence over the analyzed population.

In regards to life habits, it was seen that the frequency of non-fragile elders who use alcohol was twice the amount of pre-fragile individuals,  $n = 22.67\%$  and  $n = 11.34\%$ , respectively. There was a significant association ( $p = 0.0417$ ) between the consumption of alcohol and physical fragility. In a research in Spain, with 2,086 participants, evaluated the association between fragility and use of alcohol, which found that the consumption of alcohol only during meals and under the Mediterranean standard of alcohol consumption leads to a lower risk of physical fragility<sup>37</sup>.

## CONCLUSION

Concluding, physical fragility was not found in this research. However, 56.4% of the candidates to the driving license were in a previous condition (pre-fragility). There was a significant association between physical fragility and marital status, and use of alcohol.

The high prevalence of pre-fragile signs the necessity of an effective management of the medical syndrome, which must start at least during the test for physical and mental fitness for the driving license exams, in order to ensure the specific driving skills and ideal driving performance. The management of physical fragility will only be reached through the integration of services and professionals aimed to work in an interdisciplinary format.

The understanding of some of the cause-and-effect relationships among the variables observed is more complex due to the nature of the cross-section research, thus longitudinal studies can better explore these relationships and demonstrate the evolution of elders to fragility and safe driving.

It is important to mention that the omission of data by the participants may interfere in the accuracy of the results to evaluate their physical fragility. Despite that, it is expected that the findings of the present study reduce the lack of investigations in the topic, bringing to a new light the understandings of factors related to physical fragility and safe driving practices.

## ACKNOWLEDGMENTS

To Coordination for the Improvement of Higher Education Personnel (CAPES; doctoral scholarship: Maria Angélica Binotto and Nathalia Hammerschmidt Kolb Carneiro) and the Araucaria Foundation for Supporting Scientific and Technological Development of Paraná (Notice 09/2015, Protocol 45784, Senior Scholarship Program: Maria Helena Lenard).

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