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Avoidance and personal and occupational quality of life in French people with driving anxiety

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Abstract

30

31 Driving anxiety can have a significant impact on one's quality of life, particularly for those
32 who experience intense levels. However, to date there are limited data about the perceived
33 impact of driving anxiety on occupational life, and driving anxiety remains under-researched
34 in France. To address this gap, an online survey assessing self-reported driving anxiety, how
35 it manifests and its links with some aspects of personal and occupational life was designed.
36 The survey was administered in France to respondents who identified as experiencing driving
37 anxiety. Responses were obtained from 304 people aged 18 years or older. In the sample,
38 32.2%, 44.7% and 23% respectively reported mild, moderate and extreme levels of driving
39 anxiety. In the extremely anxious group, males were under-represented, whereas people aged
40 35-44 and unlicensed drivers were over-represented. People who were unemployed
41 (excluding students and retired people), reported that their anxiety had been a barrier to
42 getting a job and a high percentage of these respondents had also previously considered
43 leaving a position because of their anxiety. Respondents also reported their anxiety had a
44 negative impact on their perceived quality of life in general. People who categorised as
45 extremely anxious reported a negative impact four times higher than those in the mildly
46 anxious group.

47 The results highlight for the first time the perceived impact of driving anxiety on daily and
48 occupational life in a French population. Further, the results demonstrate the importance of
49 distinguishing between moderately and extremely anxious drivers as the intensity level has
50 differential impacts on personal and work life quality.

51

Keywords:

53 driving anxiety, avoidance, automobile, cognition, well-being

54 **Avoidance and personal and occupational quality of life in French people with** 55 **driving anxiety**

56

57 **1. Introduction**

58

59 Driving anxiety is a phenomenon that can manifest in a variety of ways. This ranges
60 from apprehension of specific driving situations, or of general driving, to a phobia of driving
61 either as a driver or as a passenger. Driving anxiety was first examined from a clinical
62 perspective, understanding the longer term consequences of motor vehicle crash involvement
63 (for example, Hickling & Blanchard, 1992; Taylor & Koch, 1995). In these studies, post-
64 traumatic stress disorder was examined and driving phobia was assessed through the
65 Diagnostic and Statistical Manual criteria of mental disorders for specific phobia (DSM4,
66 APA, 1994). This research has considerably improved the understanding of the psychological
67 consequences of road crashes. However, researchers have now shown that it is not necessary
68 to have been involved in a crash to develop a level of driving anxiety that can impact daily
69 life (Taylor & Deane, 2000). Some individuals experiencing driving anxiety report a panic
70 attack as the source of their anxiety. For others, it can be the fear of being judged and some
71 have no memory of a specific event triggering this anxiety (Ehlers, Taylor, Ehrling, Hofmann,
72 Deane, Roth et al., 2007). Thus, people who have never been involved in a motor vehicle
73 crash, neither as a driver nor a passenger, may report levels of driving anxiety such that they
74 avoid driving in specific situations or completely avoid driving or riding in a car (Taylor &
75 Deane, 2000).

76 Driving anxiety can vary in its intensity. In a population study conducted in New-
77 Zealand, Taylor (2018) asked people to estimate the intensity of their driving anxiety on a
78 scale from 0 to 10. Half of the population reported experiencing mild driving anxiety (scoring
79 between 2 and 4) and a sixth reported moderate to severe anxiety (scoring between 5 and 10).
80 However, people who tend to higher levels of driving anxiety also tend to have lower levels
81 of mental health and quality of life (Hempel, Taylor, Connolly, Alpass & Stephens, 2017).
82 The diversity of sources from which anxiety can originate and the different intensity levels
83 one can experience suggest that the consequences of driving anxiety could vary across
84 individuals.

85 In addition, specific driving concerns also differ across individuals and their anxiety
86 levels. Three main types of concerns have been identified for anxious drivers: panic related
87 concerns, crash related concerns and social concerns (Ehlers, Hofmann, Herda & Roth,
88 1994). Drivers with higher anxiety levels tend to have a higher frequency of these concerns
89 (Stephens, Collette, Hidalgo-Munoz, Fort, Evennou & Jallais, 2020; Taylor, 2018).
90 Therefore, it is important to investigate how these concerns differ from one person to another,
91 to understand how to address them. For instance, a recent Australian study suggested that
92 individuals with extreme driving anxiety are more concerned by the potential for crash
93 involvement when compared to individuals with mild or moderate anxiety (Stephens et al.,
94 2020). Thus, targeting crash-related worries may be more effective for more anxious drivers
95 compared to those with only mild anxiety.

96 Another key consequence of driving anxiety is avoidance (Stewart & St Peter, 2004).
97 This may be partial avoidance, when only specific driving situations are avoided, like dense
98 traffic or highways, or total avoidance when driving is completely avoided. Higher levels of
99 driving anxiety are associated with greater avoidance (Ehlers et al., 2007; Stephens et al.,
100 2020; Taylor, 2018). Even if some alternatives to driving may exist (public transport, home
101 service, cycling, etc.), avoidance can be very detrimental in particular in areas with poor or
102 no public transport services (Marottoli, de Leon, Glass, Williams, Cooney & Berkman,
103 2000). This restriction on mobility can have a significant impact extending beyond mobility.
104 This impact not only makes it more difficult for social interactions, or potential caring
105 responsibilities, but, at the professional level, it also makes it difficult to carry out certain
106 work-related activities (Costa, Carvalho, Cantini, Freire & Nardi, 2014). While previous
107 research has investigated the impacts on quality of life for those experiencing driving anxiety,
108 the potential impacts on work, and perceived quality of work life, have scarcely been studied.
109 However, there is evidence to suggest these relationships exist. For example, Taylor, Alpass,
110 Stephens & Towers (2011) reported that within a population of “young older” drivers (55-72
111 years old), 2.4% claimed that their usual activities or work had been affected due to driving
112 anxiety for, at least, one day in the previous month.

113 Thus, while driving anxiety may affect mobility, and in-turn influence one’s decisions
114 regarding occupation, there are only limited data about the link between driving anxiety and
115 work. In addition, it is known that anxiety traits can affect all areas of life: decision making
116 (Hartley & Phelps, 2012), procrastination (Zhang, Chen, Xu & Zhang, 2020), work (Nordahl

117 & Wells, 2019). Likewise, driving anxiety may have repercussions outside the driving
118 activity itself, in daily life, and potentially in occupational life as well.

119 These potential outcomes of driving anxiety are under-researched in France. In
120 addition, and as mentioned above, limited data are available concerning the potential
121 repercussions of driving anxiety in the occupational domain. To address these gaps, we
122 designed an online survey to determine the manifestations of driving anxiety in terms of
123 concerns, avoidance and some aspect of personal and occupational life, in a French
124 population. The survey focussed on individuals experiencing driving anxiety across varying
125 intensities, from mild to extreme anxiety. Information was sought regarding driving history
126 and the perceived consequences of driving anxiety on personal and occupational life. Two
127 questionnaires were also used: a French translation of the Driving Cognitions Questionnaire,
128 to collect information about what drivers feel and think while driving; and a French
129 translation of the Driving and Riding Avoidance Scale designed to understand avoidance
130 behaviours related to driving anxiety.

131
132

133 **2. Method**

134

135 ***2.1 Participants***

136

137 A large advertising campaign was conducted to recruit participants experiencing
138 driving anxiety through social networks and associations dealing with driving education or
139 with driving anxiety. Potential participants were approached through the following
140 advertisement: “Are you anxious when you drive a car? Are you worried about finding
141 yourself in certain driving situations? You do not drive or almost not drive because of this
142 anxiety? Although there are relatively few data available on this discomfort while driving,
143 which can range from simple discomfort to a real phobia (sometimes referred to as
144 amaxophobia), it seems to be quite common and affects a large number of people. We are
145 interested in your opinion, even if you do not have a driver's license or you never drive.”
146 Participants were eligible to take part in the study if they were 18 years or older, currently
147 resided in France and experienced driving anxiety.

148

149 **2.2 Procedure**

150

151 Ethical approval was obtained from IFSTTAR Ethics committee. The online survey
152 was hosted using *Limesurvey* online platform (www.limesurvey.org). The first three
153 questions asked for age, country of residence and consent to participate to the survey. If all
154 three inclusion criteria were met, then the survey could start. The survey took approximately
155 30 minutes to complete.

156

157 **2.3 Measures**

158

159 **2.3.1 Demographic information.** Questions about demographic information included
160 year of birth, gender, French residence district, driver's licence status, annual mileage and
161 whether participants lived in an urban area or rural area. Participants also provided
162 information regarding their occupation, distance living from work and method of commuting
163 to and from work.

164

165 **2.3.2 Driving Cognitions Questionnaire (DCQ).** The DCQ measures the frequency
166 of anxiety related thoughts that drivers may experience while driving (Ehlers et al., 1994,
167 2007). The original DCQ includes 20-items that can be classified in three categories: panic-
168 related items (e.g. I will not be able to think clearly), crash related items (e.g. I will be
169 injured), thoughts and social concerns items (e.g. People I care about will criticise me), with
170 internal consistencies assessed through Cronbach's coefficient α of .93, .92 and .89,
171 respectively (Ehlers et al., 2007). Participants respond to each item on a 5-point Likert scale
172 from 0 (Never) to 4 (Always) indicating the frequency of each thought while driving. Scores
173 for each item are averaged across each factor. Higher scores indicate a higher frequency of
174 concern. To our knowledge, this was the first time this questionnaire was used in a French
175 study. Therefore, we translated the questionnaire into French. We also conducted a Principal
176 Component Analysis (PCA) in order to test for the replicability of the three-factor structure.

177

178 **2.3.3 Driving and Riding Avoidance Scale (DRAS).** The DRAS (Stewart and St
179 Peter, 2004) is a questionnaire used to measure avoidance behaviours for driving or riding in
180 a vehicle. It contains 20-items describing various driving and riding situations. Participants
181 indicate how often they have avoided each situation due to anxiety over the past seven days

182 (Sullman & Taylor, 2010). Participants respond using a four-point Likert scale from 0 (avoid
183 rarely or none of the time) to 3 (most or all of the time). Stewart & St Peter (2004) identified
184 four factors in this questionnaire: general avoidance, traffic avoidance, weather avoidance
185 and riding avoidance, with internal consistencies (Cronbach's coefficient α) of .82, .85, .86,
186 .82, respectively. Scores are summed for each factor. Higher scores indicate higher avoidance
187 level. The DRAS was translated into French² and a PCA was used in order to test the four-
188 factor structure.

189

190 **2.3.4 Anxiety level and relationship with quality of life and work.** Participants
191 rated their level of driving anxiety on an 11-point scale (from 0 = none to 10 = extreme) as
192 done in previous studies (Taylor et al., 2011; Taylor, 2018). Participants also reported on an
193 11-point scale (from 0 = not at all to 10 = very much) the extent to which their driving
194 anxiety has: 1) determined the choice of their place of residence; 2) affected their daily
195 activities and 3) affected their quality of life in the last month. Quality of life was defined as
196 "your sense of physical and psychological well-being, your autonomy, your social
197 relationships and your relationships at work and with your family and friends". To determine
198 the importance of the social part of driving anxiety, participants also reported how ashamed
199 they are of their driving anxiety on an 11-point scale (0 = not at all; 10 = very strongly).

200 Regarding their occupation, participants reported 1) how much their career choice was
201 determined by driving anxiety (from 0 = not at all to 10 = very much); 2) whether driver
202 anxiety has been a barrier to getting a job (Yes/No); 3), if they had ever considered leaving a
203 position due to this anxiety (Yes/No); and 4) if they had ever been late to work, or absent
204 from work due to driving anxiety (Yes/No; number if any).

205

206 **2.4 Data analysis**

207

208 The self-reported intensity of driving anxiety was categorised across three levels: mild
209 (1-5), moderate (6-8) and extreme (9-10) (Collette, 2019). This segmentation into three levels

² Note that because of a technical issue, one item is missing in our survey ("I avoided driving in a car on a motorway"). Consequently, the total score is 57 instead of 60.

210 was chosen to bring precision to the analysis conducted about the perceived impact of driving
211 anxiety according to its intensity. Indeed, apart from its statistical relevance in terms of group
212 size, this categorisation allowed separating the extremely anxious people (9-10) from the
213 moderately anxious ones (6-8) which previously have been grouped together (for instance
214 Taylor et al., 2011; Taylor, 2018 but see also Collette, 2019 and Stephens et al. 2020 for same
215 classification). This classification is expected to highlight the likely differences between the
216 two higher levels of anxiety on driving avoidance and performance. Cases with 0 on this
217 scale were removed from the analysis (37 cases). Age was categorised into six groups: 18-24;
218 25-34; 35-44; 45-54; 55-64; 65+.

219 Data analyses were conducted with SPSS v.26 for Windows. Relationships for
220 categorical data were examined using Chi-Square independence tests. In cases where there
221 were 20% of the cells with an expected count less than five (e.g. gender) Fisher's Exact Test
222 p value was reported. Effect sizes were interpreted using Cramer's V (ϕc) with values up to
223 0.10, 0.30 and 0.50 indicating small, medium and large effects respectively (Cohen, 1988).
224 One-way ANOVAs were conducted to assess relationships between anxiety group and
225 continuous variables. Bonferroni post hoc tests were used to determine significant differences
226 between each group while adjusting for multiple comparisons. As mentioned, two Principal
227 Component Analyses (PCA) were conducted on the scores of DCQ and DRAS respectively
228 and Varimax rotations were used. For each PCA adequacy of the factorial solution was given
229 by the Kaiser-Meyer-Olkin index (Results are given in supplementary materials). In addition,
230 the mean scores for each item were examined for the entire sample and then, separately for
231 each anxiety group.

232

233 **3. Results**

234

235 **3.1 Final dataset**

236

237 A total of 2,879 persons visited the survey website. Participants were included in the
238 dataset if they met the following criteria: i) three inclusion criteria; ii) level of anxiety
239 superior or equal to 1; and iii) all items of the questionnaire completed. Eventually, responses
240 from 304 participants were included in the final dataset for analysis (see Table 1, first
241 column). The majority of participants were women (79.9%; males = 20.1%). They ranged in

242 age from 18 to 77 years ($M = 36.96; \pm 13.56$). Most of them held a driver's licence (92%).
 243 Among those not holding a licence, 37.5% indicated they were currently learning to drive.
 244 The mean anxiety intensity score was 6.45 (± 2.63) on the 11-point scale.

245

246 *3.2 Sample characteristics according to three levels of driving anxiety*

247

248 The sample distribution according to three levels of anxiety (mild from 1 to 5,
 249 moderate from 6 to 8, and extreme from 9 to 10) is shown in Table 1: 32.2% of the sample
 250 were classified as mildly anxious, 44.7% were moderately anxious and 23% were extremely
 251 anxious.

252 A significant difference in the levels of driving anxiety was observed according to
 253 gender ($\chi^2 (2) = 10.90, p = .0043, \phi_c = .189$), due to an over-representation of males among
 254 the mildly anxious, and an under-representation among extremely anxious drivers. A
 255 significant difference was also found across age group ($\chi^2 (8) = 37.38, p < .0001, \phi_c = .248$),
 256 due to an over-representation of the 18-24 years old and an under-representation of the 35-44
 257 years old among the mildly anxious group as well as an under-representation of the 18-24
 258 years old and an over-representation of the 35-44 years old among the extremely anxious.

259 Holding a driver's licence or not was significantly related to anxiety level ($\chi^2 (2) =$
 260 $9.82, p < .007, \phi_c = .180$): those without a licence were under-represented in the mildly
 261 anxious group and over-represented in both other groups. Finally, there was a significant
 262 relationship between place of residence (urban or rural) and level of anxiety ($\chi^2 (2) = 8.01, p$
 263 $= .0182, \phi_c = .162$). People living in rural areas were over-represented within the mildly
 264 anxious group and under-represented within the extremely anxious group.

265

266 Table 1.

267 Repartition of the sample according to age, gender, licence, place of residence and according
 268 to driving anxiety.

	Total ($N = 304$) %	Mild ($n = 98$) %	Moderate ($n = 136$) %	Extreme ($n = 70$) %
Sample	100	32.2	44.7	23.0
<i>Sex**</i>				
Males	20.1	30.6	16.9	11.4
Females	79.9	69.4	83.1	88.6

<i>Age (years)***</i>				
18 – 24	20.4	34.7	17.7	5.7
25 – 34	28.3	21.4	31.6	31.4
35 – 44	23.0	10.2	24.3	38.6
45 – 54	14.8	17.4	12.5	15.7
+ 55	13.5	16.3	14.0	8.6
<i>Licence**</i>				
Yes	92.1	99	89.7	87.1
No	7.9	1	10.3	12.9
<i>Place of residence*</i>				
Urban	74	66.3	73.5	85.7
Rural	26	33.7	26.5	14.3

269 *Note.* Significant relationship between driving anxiety level and the variables at $*p < .05$; $**p$
 270 $< .01$; $***p < .001$. Anxiety group columns sum to 100% for each variable. Value in bold
 271 represents the ones, which make the largest contribution to the overall chi-square statistic.

272

273 *3.3 Driving Cognitions Questionnaire results: Negative thoughts while driving*

274

275 The main negative thoughts linked to driving were assessed through the Driving
 276 Cognitions Questionnaire. This questionnaire was only administered to the participants who
 277 reporting driving ($n = 250$), excluding people without their drivers licence and those who did
 278 not drive anymore.

279 The PCA conducted on DCQ scores resulted in four factors (eigenvalues greater than
 280 1) and a cumulative explained variance percentage of 71.8% (see supplementary material for
 281 further details). Two of these factors corresponded to the panic-related and to the social
 282 concern items identified by Ehlers et al. (1994, 2007). The two last factors corresponded to
 283 the crash related items but split into two categories depending on whether it is a fear for
 284 oneself (e.g. I will be injured) or for others (e.g. I will injure someone). The Kaiser-Meyer-
 285 Olkin measure of sampling adequacy was 0.911, indicating suitability of the data for this
 286 analysis. In addition, the questionnaire demonstrated good internal consistency ($\alpha = 0.94$) for
 287 the total score and for each of these four factors (See Table 2 for Cronbach alphas).

288

289 Table 2.

290 DCQ mean score (*SD*) for each of the four factors identified by the PCA in all respondents
 291 who reporting driving ($n = 250$) and across anxiety groups.

	All	Mild	Moderate	Extreme
--	-----	------	----------	---------

	(n = 250)	(n = 97)	(n = 117)	(n = 36)
Panic-related items ($\alpha = .92$)	0.96 (1.04)	0.34 (.41)	1.04 (.95)	2.36 (1.07)
Social concerns items ($\alpha = .88$)	1.32 (1.11)	0.78 (.74)	1.44 (1.09)	2.43 (1.11)
Crash related items: fear for oneself ($\alpha = .78$)	1.35 (1.04)	0.90 (.69)	1.45 (1.03)	2.27 (1.20)
Crash related items: fear for others ($\alpha = .82$)	1.40 (.99)	0.82 (.61)	1.60 (.94)	2.32 (1.07)

292 *Note.* α = Cronbach coefficient alpha on the current data

293

294 As illustrated in Table 2, significant statistical differences were observed among the
 295 mildly, moderately and extremely anxious groups regarding each of the four factors: panic
 296 ($F(2,247) = 83.48, p < .001$); social concerns ($F(2,247) = 39.94, p < .001$); fear for oneself
 297 ($F(2,247) = 28.82, p < .001$) and fear for others ($F(2,247) = 47.07, p < .001$). Post-hoc
 298 analysis revealed that for each factor, scores of the extremely anxious group were
 299 significantly higher than those of the moderately and mildly anxious groups ($p < .001$), and
 300 scores of the moderately anxious group were significantly higher than those of the mildly
 301 anxious group ($p < .001$).

302 To better understand the respondents' main concerns while driving s, the scores for
 303 each item were examined (see Table 3) for the entire sample and for each anxiety group. In
 304 the whole sample, the four most common thoughts were: 1) "I cannot control whether other
 305 cars will hit me"; 2) "I will hold up traffic / people will be angry"; 3) "I will not react fast
 306 enough" and 4) "People will think I am a bad driver". The three most common for whole
 307 sample were also the most commonly reported by the mildly and moderately anxious groups.
 308 The fourth most common thought for the mildly anxious group was "People I care about will
 309 criticise me" and for the moderately anxious group was "I will cause an accident".

310 The four most common thoughts while driving differed for the extremely anxious
 311 group. For this group, the main concern was "I will lose control of myself and act stupidly or
 312 dangerously", followed by "I will hold up traffic / people will be angry" and "I will not be
 313 able to think clearly". With the same score, the fourth most frequent thought of this group
 314 was "People will think I am a bad driver" and "I will tremble and not be able to steer". In
 315 particular, this last concern was very specific to the extremely anxious group as it only
 316 emerged in the 17th position for mildly and moderately anxious groups.

317

318 Table 3.

319 DCQ mean item scores (*SD*) in all respondents who reporting driving ($n = 250$) and
 320 separately for each anxiety groups.

		All ($n = 250$)	Mild ($n = 97$)	Moderate ($n = 117$)	Extreme ($n = 36$)
4	I cannot control whether other cars will hit me	2.91 (1.37)	2.47 (1.15)	3.03 (1.40)	3.67 (1.45)
15	I will hold up traffic / people will be angry	2.57 (1.45)	1.98 (1.05)	2.67 (1.51)	3.86 (1.25)
1	I will not react fast enough	2.56 (1.17)	2.09 (0.78)	2.70 (1.19)	3.39 (1.42)
8	People will think I am a bad driver	2.50 (1.36)	1.87 (0.87)	2.63 (1.39)	3.75 (1.38)
13	I will cause an accident	2.44 (1.28)	1.73 (0.73)	2.71 (1.29)	3.50 (1.34)
9	I will injure someone	2.41 (1.25)	1.78 (0.88)	2.60 (1.22)	3.50 (1.30)
20	I will lose control of myself and will act stupidly or dangerously	2.38 (1.42)	1.58 (0.83)	2.58 (1.40)	3.89 (1.30)
2	People I care about will criticise me	2.26 (1.21)	2.05 (1.00)	2.26 (1.24)	2.83 (1.46)
5	Other people will notice that I am anxious	2.22 (1.25)	1.46 (0.76)	2.44 (1.33)	3.56 (1.36)
10	I will not be able to think clearly	2.21 (1.36)	1.45 (0.80)	2.34 (1.27)	3.83 (1.30)
19	People riding with me will be hurt	2.19 (1.23)	1.68 (0.91)	2.38 (1.22)	2.92 (1.44)
14	I will be stranded	2.18 (1.34)	1.60 (0.87)	2.23 (1.33)	3.56 (1.42)
11	I will die in an accident	2.12 (1.26)	1.61 (0.73)	2.24 (1.34)	3.08 (1.48)
17	People will laugh at me	2.07 (1.33)	1.54 (0.94)	2.18 (1.40)	3.14 (1.31)
12	I will be trapped	2.06 (1.37)	1.41 (0.69)	2.12 (1.40)	3.61 (1.42)
7	I will be injured	2.04 (1.12)	1.62 (0.80)	2.08 (1.04)	3.06 (1.39)
6	I will tremble and not be able to steer	1.94 (1.34)	1.24 (0.54)	1.97 (1.28)	3.75 (1.34)
18	I will be unable to move	1.74 (1.27)	1.14 (0.38)	1.76 (1.22)	3.25 (1.65)
3	I will be unable to catch my breath	1.63 (1.04)	1.23 (0.57)	1.69 (1.00)	2.53 (1.50)
16	My heart will stop beating	1.54 (1.12)	1.10 (0.31)	1.61 (1.19)	2.50 (1.58)
	Mean	1.20 (0.87)	0.63 (0.43)	1.31 (0.75)	2.36 (0.82)

321 *Note.* In each column, the values in bold correspond to the four items with the highest scores.

322

323 3.4 Avoidance of driving or riding by anxiety groups

324

325 Avoidance related to driving anxiety was explored through total avoidance and the
326 DRAS factors representing different situations avoided.

327

328 **3.4.1 Total avoidance.** Among licenced drivers ($n = 280$), 10.7% ($n = 30$) reported
329 never driving because of driving anxiety. Among unlicensed drivers ($n = 24$), 58.3% ($n = 14$)
330 reported this was due to driving anxiety. Of the 44 people who never drive, none were
331 classified as the mildly anxious, 14 (31.8%) were moderately anxious (which corresponds to
332 10.3% of the group) and 30 (68.2%) were extremely anxious (which corresponds to 42.9% of
333 this group).

334

335 **3.4.2 Main avoided situations.** Similar to the DCQ, the DRAS results were obtained
336 only from driving licence holders ($n = 280$). The PCA showed a 4-factor solution: general
337 avoidance, traffic avoidance, weather/darkness avoidance and riding avoidance (Table 4; see
338 supplementary material for further details). The Kaiser-Meyer-Olkin test was 0.924,
339 demonstrating good suitability of the data for the PCA. The questionnaire demonstrated good
340 internal consistency ($\alpha = 0.93$) for the total score and for each of the four factors (See Table 4
341 for Cronbach alphas).

342

343 Table 4.

344 DRAS mean scores (*SD*) for each of the four factors identified through the PCA, for all the
345 licenced drivers ($n = 280$) and separately for each anxiety group.

	All ($n = 280$)	Mild ($n = 97$)	Moderate ($n = 122$)	Extreme ($n = 61$)
General avoidance ($\alpha = .88$)	1.03 (1.0)	0.40 (.54)	1.11 (.91)	1.87 (1.07)
Traffic avoidance ($\alpha = .90$)	0.82 (.98)	0.37 (.55)	0.78 (.87)	1.63 (1.20)
Weather/darkness avoidance ($\alpha = .88$)	0.76 (.97)	0.44 (.69)	0.69 (.89)	1.41 (1.19)
Riding avoidance ($\alpha = .89$)	0.36 (.68)	0.21 (.46)	0.28 (.51)	0.77 (1.03)

346 *Note.* α = Cronbach coefficient alpha.

347

348 As illustrated in Table 4, there were some significant differences in the scores
 349 obtained for the four factors across anxiety groups: general avoidance ($F(2,277) = 57.31, p <$
 350 $.0001, \eta^2 = 0.293$), traffic avoidance ($F(2,277) = 39.57, p < .0001, \eta^2 = 0.222$),
 351 weather/darkness avoidance ($F(2,277) = 21.94, p < .0001, \eta^2 = 0.137$) and riding avoidance
 352 ($F(2,277) = 15.93, p < .0001, \eta^2 = 0.103$). Extremely anxious people reported higher levels of
 353 all four avoidance types, across the past seven days, which were almost twice as high as
 354 moderately anxious people ($p < .001$). In addition, moderately anxious people reported more
 355 general avoidance ($p < .001$) and traffic avoidance ($p < .002$) than mildly anxious people.

356 Table 5 shows the mean scores for each DRAS item across anxiety groups. The four
 357 main avoidance behaviours are reported for the whole sample and also for each group. The
 358 same two behaviours were rated as most frequent across all groups. These were: 1) “avoiding
 359 driving a car “and 2) “riding a bus to avoid driving in the car”. The mildly anxious group
 360 reported more “rescheduling making a drive in the car to avoid traffic”, and “avoiding driving
 361 the car because the weather was bad (e.g., fog, rain, or ice)”; the moderately anxious group
 362 reported more “avoiding driving on busy city streets” and “avoiding activities that required
 363 using a car”; and the extremely anxious group also reported more “rescheduling making a
 364 drive in the car to avoid traffic” and “avoided activities that required using a car”.

365

366 Table 5.

367 DRAS mean item scores (*SD*) across all the licenced drivers ($n = 280$) and separately for each
 368 anxiety group.

DRAS Items		All ($n = 280$)	Mild ($n = 97$)	Moderate ($n = 122$)	Extreme ($n = 61$)
3	I avoided driving a car if I could	1.36 (1.25)	0.69 (0.95)	1.46 (1.19)	2.23 (1.20)
19	I chose to ride a bus someplace to avoid driving in the car	1.17 (1.27)	0.57 (0.92)	1.26 (1.25)	1.92 (1.32)
6	I avoided driving on busy city streets	1.02 (1.24)	0.49 (0.88)	1.01 (1.17)	1.87 (1.41)
9	I rescheduled making a drive in the car to avoid traffic	0.98 (1.22)	0.54 (0.90)	0.85 (1.12)	1.93 (1.34)
2	I chose to walk or ride a bicycle someplace to avoid driving in the car	0.93 (1.19)	0.8 (0.74)	0.98 (1.17)	1.72 (1.34)
20	I avoided activities that required using a car	0.93 (1.20)	0.18 (0.50)	1.02 (1.14)	1.95 (1.29)
11	I avoided driving the car after dark	0.88 (1.16)	0.46 (0.79)	0.83 (1.10)	1.62 (1.39)

7	I travelled a longer distance to avoid driving through heavy traffic or busy streets	0.85 (1.16)	0.33 (0.67)	0.93 (1.16)	1.54 (1.38)
10	I avoided driving the car because the weather was bad (e.g., fog, rain, or ice)	0.83 (1.10)	0.51 (0.79)	0.70 (0.99)	1.61 (1.35)
8	I avoided driving through busy intersections	0.80 (1.16)	0.36 (0.78)	0.74 (1.09)	1.64 (1.38)
1	I put off a brief trip or errand that required driving the car	0.75 (1.14)	0.19 (0.50)	0.83 (1.17)	1.48 (1.34)
17	I rescheduled making a drive in the car to avoid bad weather (e.g., fog, rain, or ice)	0.58 (0.98)	0.36 (0.72)	0.54 (0.92)	1.00 (1.28)
5	I avoided driving on residential streets	0.46 (0.96)	0.13 (0.42)	0.39 (0.88)	1.15 (1.35)
16	I avoided riding in a car on a motorway	0.43 (0.96)	0.23 (0.63)	0.35 (0.92)	0.90 (1.26)
12	I avoided riding in a car because the weather was bad (e.g., fog, rain, or ice)	0.39 (0.86)	0.15 (0.36)	0.26 (0.68)	0.79 (1.23)
14	I avoided riding in a car if I knew the traffic was heavy	0.38 (0.85)	0.24 (0.64)	0.31 (0.76)	0.74 (1.15)
13	I avoided riding in a car after dark	0.35 (0.81)	0.19 (0.60)	0.28 (0.71)	0.74 (1.12)
18	I put off a brief trip or errand that required riding in a car	0.33 (0.81)	0.13 (0.49)	0.28 (0.73)	0.75 (1.16)
4	I avoided riding in a car if I could	0.31 (0.79)	0.20 (0.60)	0.19 (0.63)	0.72 (1.14)
	Mean	0.72 (0.75)	0.34 (0.45)	0.69 (0.60)	1.39 (0.94)

369 *Note.* In each column, the values in bold correspond to the four items with the highest scores.

370

371 **3.5 Reported impact of driving anxiety on general quality of life**

372

373 To further explore the perceived impact of driving anxiety, we investigated the
374 perceived consequences on different aspects of personal and occupational life.

375

376 **3.5.1 Driving anxiety and personal life.** The self-reported impact of driving anxiety
377 was assessed on four aspects of personal life and revealed significant differences on choice of
378 residence ($F(2,301) = 56.26, p < .0001$), daily activities ($F(2,301) = 63.97, p < .0001$), overall
379 quality of life ($F(2,301) = 65.29, p < .0001$) and level of associated shame (See Table 6).
380 ($F(2,301) = 64.66, p < .0001$). The more severe the driving anxiety, the more perceived
381 impact across all four aspects. Post-hoc analysis revealed that for each aspect of daily life, the
382 scores were significantly higher for moderately and extremely anxious drivers than for the

383 mildly anxious group ($p < .001$ for both comparisons). Further, extremely anxious drivers
384 scored significantly higher than the moderately anxious group ($p < .001$).

385 Table 6.

386 Mean (SD) of the self-reported impact on four aspects of personal life (10-points scale) across
387 whole sample ($N = 304$) and separately for each anxiety group.

	Total ($N = 304$)	Mild ($n = 98$)	Moderate ($n = 136$)	Extreme ($n = 70$)
Influence on choice of residence's place	3.01 (3.72)	0.95 (1.88)	2.84 (3.46)	6.21 (3.98)
Negative impact on daily life activities	3.71 (3.41)	1.28 (1.88)	4.18 (3.20)	6.21 (3.29)
Impact on quality of life	3.65 (3.38)	1.14 (1.64)	4.27 (3.22)	5.97 (3.30)
Associated level of shame	3.89 (3.45)	1.37 (2.04)	4.47 (3.13)	6.31 (3.38)

388

389 **3.5.2 Driving anxiety and occupational life.** A significant difference in classification
390 among the three levels of driving anxiety according to work status was ($\chi^2(10) = 26.65, p =$
391 $.0029, \phi_c = .209$) (see Table 7). This corresponded to an under-representation in the mildly
392 anxious group and an over-representation in the extremely anxious group of people reporting
393 working in intermediate profession and employees. In addition, there was an over
394 representation of unemployed (others than students and retired people) among the extremely
395 anxious group.

396

397 Table 7.

398 Repartition of the sample according to driving anxiety and French socio-professional
399 categories.

French socio-professional categories	Total % (n)	Mild %	Moderate %	Extreme %
Self-employed and farm operator	33.9 (103)	30.6	35.3	35.7
Managerial and highly qualified worker	9.2 (28)	13.3	7.4	7.1
Intermediate profession, employees and factory workers	20.7 (63)	12.2	22.1	30
Retired	4.3 (13)	5.1	5.2	1.4
Students	24.7 (75)	34.7	24.3	11.4
Other unemployed	7.2 (22)	4.1	5.9	14.3

400 *Note.* Anxiety group columns sum to 100%. The values in bold correspond to the ones which
401 make the largest contribution to the overall chi-square statistic.

402

403 Table 8 shows the self-reported impact of driving anxiety on occupational factors,
404 across anxiety intensity. This was only for the respondents who were currently employed or
405 had been employed ($n = 290$) and did not include people who have never been employed. As
406 expected, greater levels of anxiety were associated with higher negatively perceived impacts
407 on occupation. Statistical analysis revealed significant differences on the three aspects:
408 occupational orientation ($F(2,287) = 25.51, p < .001$), work performance ($F(2,287) = 24.56, p$
409 $< .0001$) and quality of work ($F(2,287) = 25.48, p < .0001$) according to intensity of anxiety.
410 Post-hoc analysis also revealed significantly higher scores for moderately than for mildly
411 anxious group ($p < .01$) and for extremely than for moderately anxious group at each stage (p
412 $< .001$; see Table 8). Thus, individuals with higher anxiety levels tended to report greater
413 impacts of their anxiety across all three aspects of work, with mean scores doubling between
414 moderately and extremely anxious groups.

415

416 Table 8.

417 Mean scores (*SD*) of driving anxiety impact on career choice, quality of work life and
418 performance for all the respondents who were currently employed or had been employed ($n =$
419 290) and separately for each anxiety group.

	All ($n = 290$)	Mild ($n = 93$)	Moderate ($n = 128$)	Extreme ($n = 69$)
Impact on career direction	1.61 (3.09)	0.32 (1.27)	1.5 (3.00)	3.55 (3.92)
Negative impact on work performance	1.57 (2.85)	0.37 (1.1)	1.48 (2.72)	3.35 (3.73)
Impact on quality of work life	1.90 (3.07)	0.53 (1.3)	1.94 (3.03)	3.70 (3.86)

420

421 To further understand the perceived impact of driving anxiety on work, respondents
422 who were employed or had been employed ($n = 290$) reported whether their driving anxiety
423 1) had ever been a barrier to getting a position, 2) led them to ever consider leaving a
424 position, 3) meant they ever missed or 4) were ever late to work (Table 9). A strong impact of
425 driving anxiety intensity was observed with an over-representation of people reporting that

426 their anxiety has been a barrier to getting a position in the extremely anxious group and an
 427 under-representation in the mildly anxious group. The same pattern was observed for people
 428 reporting having ever considered leaving a position because of their anxiety.

429

430 Table 9.

431 Relationships between anxiety group and work issue, for all the respondents who were
 432 currently employed or had been employed ($n = 290$) and separately for each anxiety group.

	All ($n = 290$) %	Mild ($n = 93$) %	Moderate ($n = 128$) %	Extreme ($n = 69$) %	χ^2 (2)	p	ϕ_c
<i>Has your driving anxiety ever been a barrier to get a position you were interested in?</i>							
Yes	28.6	6.5	28.1	59.4			
No	71.4	93.6	71.9	40.6	54.43	< .0001	0.433
<i>Have you ever considered leaving a position because you had to drive?</i>							
Yes	11.4	0	13.3	23.2			
No	88.6	100	86.7	76.8	21.94	< .0001	0.275
<i>Has driving anxiety ever caused you to miss work?</i>							
Yes	21.7	21.5	19.5	26.1			
No	78.3	78.5	80.5	73.9	1.14	<i>ns</i>	
<i>Has driving anxiety ever caused you to be late for work?</i>							
Yes	11.0	3.2	14.1	15.9			
No	89	96.8	85.9	84.1	8.67	0.013	0.173

433 *Note.* The values in bold are the ones, which make the largest contribution to the overall chi-
 434 square statistic.

435 4. Discussion

436

437 The aim of this study was to examine the manifestation of driving anxiety in a French
 438 population experiencing driving anxiety (not restricted to motor vehicle crash victims), and to
 439 explore the extent of its perceived impact on daily life and work according to its intensity. To
 440 achieve this aim, an online survey was conducted in France, recruiting people who had
 441 experienced anxiety over driving. Therefore, this was not a prevalence study as 1)
 442 participants were not selected to be representative of the French population and 2) we focused

443 only on people reporting some level of driving anxiety. However, this study provides a better
444 understanding of the characteristics of participants experiencing driving anxiety in France, of
445 how anxiety manifests and the perceived influence on other aspects of their life beyond
446 mobility. Not surprisingly, the results of this survey are in agreement with those obtained in
447 other countries: the greater the intensity of driving anxiety, the greater the perceived impact
448 on avoidance and quality of life (Costa et al., 2014; Ehlers et al., 1994; Hempel et al., 2017;
449 Stephens et al., 2020; Taylor, 2018). Considering our whole sample, the mean reported level
450 of driving anxiety was 6.45 (± 2.63) on the 11-point scale. This level is similar to that reported
451 by Taylor, Deane & Podd (2007) in their survey focusing on fearful driver women in New
452 Zealand (6.98, ± 1.94).

453 The study builds on previous research in the area by including a classification for
454 extreme anxiety. For example, in previous surveys using the same 0 to 10 point scale to rate
455 driving anxiety, only two categories have been used: scores between 2 and 4 were considered
456 as mild anxiety and scores between 5 and 10 were considered as moderate to extreme anxiety
457 (Hempel et al., 2017; Taylor et al., 2007). Here, as in the study by Stephens and colleagues
458 (2020), we discriminated three levels of driving anxiety: mild (from 1 to 5), moderate (from 6
459 to 8) and extreme (from 9 to 10). The distribution of anxiety was similar in both countries
460 with respectively in the Australian survey and in the French survey: 32% and 32% of mildly
461 anxious respondents, 55% and 45 % moderately anxious and 14% and 23 % extremely
462 anxious. This finer categorisation has proven to be relevant insofar as we have observed
463 strong statistical differences in the impact of driving anxiety between the moderately and
464 extremely anxious groups, which might not be apparent using a less sensitive classification.
465 These results are discussed in the next sections.

466

467 ***4.1 Characteristics of our sample by level of anxiety***

468 Our results revealed a significant proportion of those aged 35-44 years in the
469 extremely anxious group whereas the 18-24 years old people were the least represented in the
470 same group. This last result could be explained by a reduced need to use a car by younger
471 people. As a result, they are less exposed to driving and would experience less anxiety.
472 However, this relationship has not been clearly demonstrated in the literature on driving
473 anxiety (see for instance Stephens et al., 2020) and further studies are needed to better
474 understand this possible relationship between age and driving anxiety.

475 In our sample, as in Stephens et al. (2020), the most anxious people were over-
476 represented among unlicensed drivers. Some people may choose not to learn how to drive
477 due to their anxiety, while others may fail their driving test because of their anxiety during
478 the driving examination (Fairclough, Tattersall & Houston, 2006).

479 People with extreme driving anxiety were under-represented in the population living
480 in rural areas. It would be interesting to investigate this point further. At least two hypotheses
481 could be proposed. People with more severe anxiety may relocate to urban areas to find some
482 alternatives to car driving, or where traffic density is lower and therefore perceived risk of
483 crash is also lower. Another explanation is that living in rural areas may protect against
484 anxiety in general and driving related anxiety. While, individual factors such as personality
485 and transportation needs are important factors, it is known that city life and mental wellbeing
486 are interconnected (Lecic-Tosevski, 2019). This issue is beyond the scope of this discussion,
487 however, these should all be evaluated and considered when working with, and supporting,
488 individuals with their driving anxiety.

489 How driving anxiety manifests can be examined using the Driving Cognitions
490 Questionnaire. Considering the whole sample, the three reported main concerns were: "I
491 cannot control whether other cars will hit me", "I will not react fast enough" and "I will hold
492 up traffic / people will be angry". These are the same main concerns as those reported by
493 Taylor et al. (2007) and Ehlers et al. (1994). In addition, and as expected, the scores for the
494 four types of concerns (panic, social and crash risks with fear for others or for oneself) were
495 higher for extremely anxious drivers than for those with lower anxiety (both mild and
496 moderate). As it has also been observed by Stephens et al. (2020), the type of main concerns
497 strongly depended on driving anxiety intensity. If concerns were similar between mildly and
498 moderately anxious groups, they strongly differed with those of the extremely anxious group.
499 The predominant concern in this group was the fear of losing control. That is, they were not
500 confident in their own capabilities to manage the situation. In contrast, the predominant
501 concern in the other two groups was the fear of being hit by others. This difference may be
502 due to a weaker self-confidence and/or self-esteem of the most anxious individuals at least on
503 their driving performances or capabilities. Literature on general anxiety shows that low self-
504 esteem and high trait anxiety are associated (Danielsson & Bengtsson, 2016). This highlights
505 the fact that the level of self-confidence and level of trust in others should be assessed in
506 order to understand the mechanisms of driving anxiety at an individual level.

507

508 ***4.2 Avoidance, quality of life and quality of work and driving anxiety***

509 Driving anxiety often leads to avoidance, which may be partial or total. Avoidance
510 can have a strong impact on mobility and autonomy particularly for people who do not have
511 easy access to public transport services. To fully examine this, our sample included
512 unlicensed drivers. This allowed consideration of the impact of driving anxiety at the early
513 stages of driving history, e.g. prior to learning. It also allowed inclusion of people who may
514 have once driven, but have now surrendered their licence due to anxiety, either of their own
515 violation or through medical advice. Not surprisingly, in terms of avoidance, the more intense
516 the anxiety, the stronger the avoidance, both total and partial.

517 To assess avoidance, we used a French translated version of the driving and riding
518 avoidance scale (DRAS). Factor analyses revealed a strong consistency with data from
519 Stewart & St Peter (2004) by replicating the four same dimensions: general avoidance, traffic
520 avoidance, weather/darkness avoidance and riding avoidance. Only one item (“18-I put off a
521 brief trip or errand that required riding in a car”) classified in “general avoidance” in the
522 original paper of Stewart and St Peter (2004), has been classified in “Riding avoidance” in
523 our case. In addition, our results are consistent with those from previous international studies
524 using this scale (Blachnio Przepiórka, Sullman & Taylor, 2013; Stewart & St Peter, 2004;
525 Taylor et al., 2020), with the main situation avoided for the three groups being “I avoided
526 driving a car if I could”. However, there was a strong quantitative difference between the
527 scores according to driving anxiety intensity. Similar to previous research using the DRAS,
528 the scores were significantly higher in the four dimensions (general avoidance, traffic
529 avoidance, weather/darkness avoidance and riding avoidance) for the extremely anxious
530 group than the other two groups (Stephens et al. 2020).

531 Our data are also in agreement with previous research showing that driving anxiety
532 was associated with poorer perceived quality of life (Costa et al., 2014; Hempel et al., 2017).
533 This was most evident with the extremely anxious group, who rated higher negative impacts
534 on all aspects of daily life (place of residence, daily activities, overall quality of life and
535 shame related to driving anxiety) than the moderately (and mildly) anxious group. The notion
536 of shame is clearly important to consider in the context of the quality of life as it can have
537 strong psychological impact in terms of self-esteem (Velotti, Garofalo, Bottazzi & Caretti,
538 2017).

539 Regarding work, as described by Stephens et al. (2020) the reported impact of anxiety
540 on work was lower when compared to the reported impact on general quality of life.
541 However, people with extreme driving anxiety reported a strong impact of this anxiety on
542 their occupational life, indicating negative impacts on quality of work life, performance and
543 career direction. Driving anxiety may impede access to a job and our findings provide
544 evidence of this. For example, unemployed people were over-represented in the extreme
545 anxious group and two-thirds of the extremely anxious group reported that driving anxiety
546 has already been a barrier to getting a position. Those in the extremely anxious group were
547 also likely to leave a position as a result of their anxiety. Thus, we observed that people with
548 extreme driving anxiety have concerns about their driving skills (DCQ: “People will think I
549 am a bad driver”) and perceive that this anxiety has significant negative impacts on their
550 quality of daily life and work. It is known that quality of daily life and occupational life
551 interact with stress and general anxiety, which are linked to well-being. Therefore, it is
552 plausible that driving anxiety may play a detrimental role in general well-being. All these
553 aspects are interconnected and should be considered collectively to better understand how to
554 improve well-being for those with anxiety over driving.

555

556 **5. Limitations and further research**

557

558 We used two questionnaires in the framework of this survey: the DCQ and the DRAS.
559 Both were translated to French for the purpose of this study. French validated versions of
560 these questionnaires did not exist, and the sample used here did not allow such validation.
561 Therefore, analyses were conducted to confirm the most appropriate factor structure for the
562 scales prior to use. This follows previous examples using the DCQ (Taylor, Stephens &
563 Sullman, 2021) and DRAS (Taylor, Sullman & Stephens, 2020) where the original factors
564 structures could not be replicated, and new structures were proposed. The analyses of the
565 French data showed similar structures as reported previously (Blachnio et al., 2013; Stephens
566 et al., 2020; Taylor et al., 2020). Therefore, there is evidence to suggest the scales were
567 robust to translation.

568 The data reported here showed that the impact of driving anxiety extends to
569 occupational life in a detrimental way. However, our sample was not representative of the
570 entire French population, in particular in terms of occupational status. Consequently, these

571 first results about the occupational life of people experiencing driving anxiety warrant further
572 exploration and replication using a more representative sample.

573 Our sample was also comprised mainly of women. This has been the case in several
574 studies on this topic (Munjack, 1984; Taylor 2018; see also Taylor, Deane & Podd, 2002 for
575 a review). However, this does not necessarily indicate that women experience more driving
576 anxiety than men. Indeed, it seems that women are more prone to participate to online
577 surveys than men (Smith, 2008), which can at least partly explain the rate of women in our
578 study and other international studies. The relationship between gender and intensity of
579 driving anxiety (with men over-represented and under-represented in mildly and extremely
580 anxious group, respectively) should also be interpreted with caution. Indeed, some gender
581 stereotypes associated with driving can have an impact on the expression of driving anxiety
582 in men and women. Women are generally perceived as having poorer driving skills and lack
583 of self-control despite being considered as prudent, whereas men are generally perceived as
584 more skilled and self-controlled although careless (Degraeve, Granié, Pravossoudovitch & Lo
585 Monaco, 2015; Granié & Papafava, 2011). These gender stereotypes may influence the way
586 men and women talk about their driving weaknesses, with men being less likely than women
587 to confess their fear of driving and the intensity of this fear.

588 It is not currently clear whether driving anxiety is a specific anxiety or if it is a
589 component of a general anxiety trait, which may be expressed when driving, or when
590 considering driving. Driving as a whole may be considered as a stressful activity because of
591 the associated inherent risk (Bowen, Budden & Smith, 2020). This may lead to a greater
592 manifestation of anxiety as a driver or passenger. Future research in this area, should consider
593 personality traits and perceived skills (measured objectively and subjectively).

594

595 **6. Conclusion**

596

597 To conclude, this survey is the first study addressing driving anxiety in a French
598 sample. The results are consistent with the international literature on the topic about 1)
599 concerns about driving, 2) anxiety related avoidance, 3) quality of life. In addition, our
600 results, bring highlight for the first time the perceived impact of driving anxiety on
601 occupational life in people with driving anxiety in France. The use of three levels of driving
602 anxiety intensity also demonstrates the need to distinguish between moderate and extreme

603 anxiety in future research. Further research is required to elucidate the extent of driving
604 anxiety in our modern societies and to better assess any gender effect.

605

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611

612

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