

Alcohol consumption impairs visual function and adversely affects driving performance

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A study participant using the driving simulator. Credit: University of Granada

A study carried out by researchers from the Department of Optics of the

University of Granada (UGR) has revealed that alcohol consumption impairs visual function and adversely affects driving performance. It was found to decrease contrast sensitivity (that is, the ability to discern image contrasts) and create a veiling luminance over the individual's vision, by increasing the retinal straylight (intraocular scattered light that reaches the retina).

A total of 40 subjects (aged 28, on average) participated in this study, the results of which have been published in the journal *Scientific Reports*. The alcoholic beverage consumed in the experiment was red wine from the province of Granada (Pago de Almaraes, Benalúa de Guadix), and a precision breathalyzer was used to measure the level of alcohol in exhaled air. The Local Police Force of Granada and Dräger Iberia both collaborated in the study and loaned the breathalyzer used in the experiments.

Each of the participants took part in three sessions on different days: one session with zero alcohol consumption, another in which they consumed 300 ml of wine, and a third in which they consumed 450 ml. Two groups were then established, based on the average Breath Alcohol Content (BrAC)—concentration of alcohol in exhaled air—that the participants presented in the third session, in which they consumed 450ml of alcohol. The participants were assigned to the two groups in line with the legal limit for driving in most countries, which is a BrAC reading of 0.25mg/l: low BrAC (those who presented a reading of 0.25mg/l or less) vs. high BrAC (those who exceeded the legal limit for driving—that is, over 0.25mg/l).

In each session, two visual functions were evaluated: [contrast sensitivity](#) and straylight. Participants were asked to perform a series of tasks using a [driving simulator](#), from which information was extracted to assess their driving performance. The simulator-based test contained three different scenarios: dual carriageway, mountain road, and inner-city driving.

The results indicate that driving performance worsens after alcohol consumption, and especially so among those with a higher wine intake.

Driving performance on the mountain road

The deterioration in driving performance was more marked on the mountain-road section of the simulated itinerary, due to the complexity of the route. The variables most affected were those that determine the position of the car on the road and the reaction time in braking responses. It was found that driving performance after alcohol consumption depends on the individual's sensitivity to contrast and straylight, indicating that these visual functions can partially predict driving performance under these conditions.

The published article forms part of the doctoral thesis of Miriam Casares López, which is being supervised by José Juan Castro Torres, Associate Professor at the Department of Optics of the UGR. Both are researchers with the Laboratory of Vision Sciences and Applications, whose Principal Investigator, Professor Rosario González Anera, has authored other research papers linking vision with driving performance.

As Miriam Casares points out, "alcohol consumption has become so commonplace and natural when we socialize that sometimes we don't stop to reflect on the major consequences it can have on our health and safety. That's why we believe this work is so important, especially considering that the visual tests we have to perform to pass the driving test or renew our driving license do not take into account these aspects of visual function."

José Juan Castro concludes: "We believe the results of this study are relevant to driving-related matters, given that [alcohol consumption](#) is related to approximately 30% of traffic accidents in countries such as Spain or the United States. Furthermore, the importance of driving-

related aspects of vision other than visual acuity becomes even more evident under these experimental conditions, so it is important to study how vision affects driving performance especially after [alcohol consumption](#), which, sadly, remains a contributory factor in a significant percentage of traffic accidents."

More information: Miriam Casares-López et al. Contrast sensitivity and retinal straylight after alcohol consumption: effects on driving performance, *Scientific Reports* (2020). [DOI: 10.1038/s41598-020-70645-3](#)

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