



# Eye color predicts alcohol use in two archival samples

Jonathan F. Bassett, James M. Dabbs Jr. \*

*Department of Psychology, Georgia State University, Atlanta, GA 30303-3083, USA*

Received 14 March 2000; received in revised form 26 June 2000; accepted 12 August 2000

---

## Abstract

The present study used data from two archival samples to test the hypothesis, derived from Worthy, M. (1999), *Eye colour: a key to human and animal behaviour*. Lincoln, Nebraska: to Exel (originally published 1974) that light-eyed individuals would be more likely than dark-eyed individuals to abuse alcohol. Sample 1 consisted of 10,860 Caucasian male prison inmates, and Sample 2 consisted of 1862 Caucasian women respondents in a national survey. In both samples, individuals with light eyes had consumed significantly more alcohol than individuals with dark eyes. These results are consistent with previous findings that dark-eyed people exhibit more physiological arousal and more sensitivity to some medications than light-eyed people. The results may indicate that greater sensitivity to alcohol in dark-eyed individuals prevents them from drinking the large quantities of alcohol needed for development of physical dependence. Alternatively, greater behavioral inhibition may motivate light-eyed individuals to engage in alcohol consumption to achieve harm avoidance. © 2001 Elsevier Science Ltd. All rights reserved.

*Keywords:* Eye color; Alcohol; Behavioral inhibition

---

## 1. Introduction

Eye color is a polygenetic, partially sex-linked trait, meaning that it is controlled by multiple genes, one of which is located on the X-chromosome (Worthy, 1999). The color of the eyes is determined not by different pigments but by the number and size of melanin particles in the layers of the iris. More melanin makes the eyes appear darker, moving from blue to grey, green, hazel, brown, and black. Research has shown eye color to be related to domains that include perception, reaction time, motor skills, personality, and physiological reactivity (Jordan, 1985). The differences fall along a reactive-inhibited dimension, with darker eyes associated with more reactivity and lighter eyes associated with more inhibition.

---

\* Corresponding author. Tel.: +1-404-651-2282; fax: +1-404-651-1391.

*E-mail address:* jdabbs@gsu.edu (J.M. Dabbs).

Two possible explanations of the relation of eye color and behavior have been proposed. The first suggests that eye darkness is related to the speed of neural transmission, because the amount of melanin in the iris and in the central nervous system (CNS) are related embryologically. Melanin sheaths covering neuronal axons act as a sort of insulator in the CNS, allowing for faster conduction of nerve impulses. Behavioral correlates of eye color may therefore be a consequence of individuals with darker eyes having faster neural transmission (Hale, Landers, Snyder Bauer & Goggin, 1980). An alternative but not mutually exclusive explanation, presented by Worthy (1999), suggests that eye color is related to differences in endocrine function and that the endocrine system responds differentially to exposure to light of varying wavelengths. Melanin in the iris blocks short-wavelength blue light and allows more long-wavelength red light into the eye.

Physiological arousal and sensitivity to drugs are two areas where the association between darker eyes and greater reactivity have been demonstrated. Markle (1976) found that dark-eyed individuals exhibited greater autonomic reactivity, including galvanic skin response, respiration, and pulse rate, in response to external stimuli than did light-eyed individuals. Similarly, ophthalmologists report that patients with dark eyes show greater pupil dilation in response to drugs than patients with light eyes (Gambil, Ogle & Kearns, 1967). Worthy (1999) suggested that the higher physiological reactivity associated with darker eye color might generalize to sensitivity to the effects of alcohol. If this were the case, dark-eyed people should be less likely than light-eyed people to become physically addicted to alcohol, because dark-eyed people, with their greater sensitivity to alcohol, would need less alcohol to experience its effects and thus should be less likely to develop physical dependence.

The present study was designed to examine the link between eye color and alcohol in two archival samples. We hypothesized that among Caucasians, whose eyes range from very light to very dark, light-eyed individuals would drink more alcohol and more often exhibit alcohol abuse than dark-eyed individuals.

## 2. Method and results

Sample 1 consisted of adult male inmates in the Georgia state prison system, with data provided by the Georgia Board of Pardons and Paroles. The data included three items of information on each inmate: race, eye color, and a code designating whether or not the inmate had had problems with alcohol abuse. Only data from Caucasian inmates ( $n = 10,860$ ) were used in the analysis. As previous researchers have done, we classified brown and black eyes as dark and all other colors as light (Jordan, 1985). Of the 6242 light-eyed inmates, 42% had alcohol abuse problems; while only 38% of the 4618 dark-eyed inmates had alcohol abuse problems. As hypothesized, the light-eyed group included more individuals with alcohol abuse problems than did the dark-eyed group,  $\chi^2(1, n = 10,860) = 16.16, P < 0.01$ .

### 2.1. Sample 2

Sample 2 consisted of young adult female respondents to the National Longitudinal Survey of Youth. The data came from the Females 1979–1994 database of the Bureau of Labor Statistics (1979). From the database, we extracted information on respondents' race, eye color, and self-reported

drinking habits, including number of days they drank alcohol in the last week, number of days they drank alcohol in the last month, and number of days in the last month in which they drank more than six drinks. We used only Caucasian respondents ( $n = 1862$ ) in data analysis. We classified individuals with blue, green, grey, and hazel eyes as light-eyed and those with brown and black eyes as dark-eyed. Multivariate analysis of variance using all three questions about alcohol consumption as dependent variables showed that light-eyed individuals reported consuming significantly more alcohol than dark-eyed individuals  $F(3, 1858) = 2.98, P < 0.05$ . Univariate tests revealed that light-eyed individuals reported having more drinks in the last week  $F(1, 1860) = 4.41, P < 0.05$ , having more drinks in the last month  $F(1, 1860) = 6.46, P < 0.05$ , and more days on which they drank more than six drinks in the last month  $F(1, 1860) = 5.25, P < 0.05$  (see Table 1).

### 3. Discussion

While the effect sizes in Sample 1 and Sample 2 were small, taken together the findings suggest a real relation between eye color and alcohol consumption. As hypothesized, light eyes were associated with alcohol use or abuse in two different samples. One possible explanation is Worthy's (1999) assertion that darker-eyed individuals are more sensitive to alcohol than light-eyed individuals. This would be analogous to previous reports that people with darker eyes exhibit greater autonomic sensitivity in response to external stimuli (Markle, 1976) and greater pupil dilation in response to drugs administered by ophthalmologists (Gambil et al., 1967). Further research is warranted to test the hypothesis that dark-eyes are related to greater sensitivity both to alcohol and to other drugs. For example, hospital records may show eye color related to sensitivity to anesthesia or other drugs. If light-eyed people are less sensitive than dark-eyed people to the effects of drugs in general, this might lead them to drink more alcohol before experiencing its effects and thus be more likely to develop physical addiction.

An alternative explanation relates to the motivations underlying people's alcohol consumption. Cloninger (1987) describes two types of alcohol abuse, each associated with its own personality characteristics. Type II alcoholism is associated with novelty seeking and involves the active pursuit of alcohol. Type I alcoholism is associated with harm avoidance and involves the inability to abstain from drinking excessively. Harm avoidance is believed to be related to neurological systems involved in behavioral inhibition. Behavioral inhibition has been related to alcohol con-

Table 1  
Mean alcohol consumption of light-eyed and dark-eyed females in sample 2

	Light-eyed females ( $n = 1123$ )	Dark-eyed females ( $n = 739$ )
Drinks in last week	1.39	1.29
Drinks in last month	5.78	4.91
Days in last month drank more than six drinks	1.02	0.75

sumption in animals through the finding that alcohol-preferring rats show greater behavioral inhibition than do non-alcohol-preferring rats (Blankenship, Finn & Steinmetz, 1998), and in humans through the finding that children at high risk for developing alcohol dependence later in life show greater behavioral inhibition than children at low risk for developing alcohol dependence later in life (Hill, Lowers, Locke, Snidman & Kagan, 1999).

Severely behaviorally inhibited children, those who withdraw from novel people or situations, are more often blue-eyed than uninhibited children (Rosenberg & Kagan, 1987; Rubin & Both, 1987). Rosenberg & Kagan (1989) suggested this difference may be the result of greater responsiveness in the limbic area of the brain, which is involved in experiencing the emotions of fear and anxiety. If light-eyed individuals are more behaviorally inhibited than dark-eyed individuals due to their greater proneness to anxiety, then their greater alcohol use in the present study may be motivated by anxiety reduction. This would mean that light-eyed individuals are more likely than dark-eyed individuals to consume alcohol for its anxiolytic properties. Such an explanation is consistent with the fact that anxiety and eye color are related developmentally. The melanocytes, the cells involved in pigmentation, and the ganglion cells of the autonomic nervous system, which are involved in the experience of anxiety, both originate in the neural crest (Klein & Nordlund, 1981). Further research is warranted on the question of whether light-eyed individuals are more likely than dark-eyed individuals to engage in Type I alcohol abuse, motivated by harm avoidance.

## Acknowledgements

We thank Timothy S. Carr of the Georgia Department of Corrections Office of Planning and Analysis.

## References

- Blankenship, M. R., Finn, P. R., & Steinmetz, J. E. (1998). A characterization of approach and avoidance learning in alcohol-preferring and alcohol-non-preferring rats. *Alcoholism: Clinical and Experimental Research*, *22*, 1227–1233.
- Bureau of Labor Statistics, US Department of Labor. National Longitudinal Survey of Youth (1979) Cohort, Females 1979–1994 (release 7.0). Produced and distributed by the center for Human Resource Research, The Ohio State University. Columbus, Ohio, 1996.
- Cloninger, C. R. (1987). Neurogenetic adaptive mechanisms in alcohol. *Science*, *236*, 410–416.
- Gambil, H. P., Ogle, K. N., & Kearns, T. P. (1967). Mydriatic effects of four drugs determined with a pupillogram. *Archives of Ophthalmology*, *77*, 740–746.
- Hale, B. D., Landers, D. M., Snyder Bauer, R., & Goggin, N. L. (1980). Iris pigmentation and fractionalized reaction and reflex time. *Biological Psychology*, *10*, 57–67.
- Hill, S. Y., Lowers, L., Locke, J., Snidman, N., & Kagan, J. (1999). Behavioral inhibition in children at high risk for developing alcoholism. *Journal of the American Academy of Child and Adolescent Psychiatry*, *38*, 410–420.
- Jordan, J. J. (1985). Eye color and behavior: a revised annotated bibliography. Unpublished manuscript.
- Klein, L. E., & Nordlund, J. J. (1981). Genetic basis of pigmentation and its disorders. *International Journal of Dermatology*, *20*, 621–631.
- Markle, A. (1976). Eye color and responsiveness to arousing stimuli. *Perceptual and Motor Skills*, *43*, 127–133.

- Rosenberg, A., & Kagan, J. (1987). Iris pigmentation and behavioral inhibition. *Developmental Psychobiology*, *20*, 377–392.
- Rubin, K. H., & Both, L. (1989). Iris pigmentation and sociability in childhood: a re-examination. *Developmental Psychobiology*, *22*, 717–725.
- Worthy, M. (1999). *Eye color: a key to human and animal behavior*. Lincoln, Nebraska: to Exel (originally published 1974).