Assignment ON13

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Due at 3:55 PM on Monday 25 May 2020

Instructions

You must attempt all questions. All answers must be submitted on ICE. The *ONLY* submission format accepted is an RMD file.

Data

According to Fils-Aime et al. [1], epidemiologic surveys have found that alcoholism is the most common mental or substance abuse disorder among men in the United States. Fils-Aime and associates investigated the interrelationships of age at onset of excessive alcohol consumption, family history of alcoholism, psychiatric comorbidity, and cerebrospinal fluid (CSF) monoamine metabolite concentrations in abstinent, treatment-seeking alcoholics. Subjects were mostly white males classified as experiencing early (25 years or younger) or late (older than 25 years) onset of excessive alcohol consumption. Among the data collected were the following measurements on CSF tryptophan (TRYPT) and 5-hydroxyindoleacetic acid (5-HIAA) concentrations (pmol/ml). In this dataset, age of onset is zero if late or one if early.

Table. Data from Fils-Aime et al.

ID	5-HIAA	TRYPT	ONSET	ID	5-HIAA	TRYPT	ONSET	ID	5-HIAA	TRYPT	ONSET
1	57	3315	1	45	118	3916	0	89	98	3181	0
2	116	2599	0	46	96	2797	0	90	78	4428	0
3	81	3334	1	47	49	3699	1	91	152	3303	0
4	78	2505	0	48	133	2394	0	92	108	5386	1
5	206	3269	0	49	105	2495	0	93	102	3282	1
6	64	3543	1	50	61	2496	1	94	122	2754	1
7	123	3374	0	51	197	2123	1	95	81	4321	1
8	147	2345	1	52	87	3320	0	96	81	3386	1
9	102	2855	1	53	50	3117	1	97	99	3344	1
10	93	2972	1	54	109	3308	0	98	73	3789	1
11	128	3904	0	55	59	3280	1	99	163	2131	1
12	69	2564	1	56	107	3151	1	100	109	3030	0
13	20	8832	1	57	85	3955	0	101	90	4731	1
14	66	4894	0	58	156	3126	0	102	110	4581	1
15	90	6017	1	59	110	2913	0	103	48	3292	0
16	103	3143	0	60	81	3786	1	104	77	4494	0
17	68	3729	0	61	53	3616	1	105	67	3453	1
18	81	3150	1	62	64	3277	1	106	92	3373	1
19	143	3955	1	63	57	2656	1	107	86	3787	0
20	121	4288	1	64	29	4953	0	108	101	3842	1
21	149	3404	0	65	34	4340	1	109	88	2882	1
22	82	2547	1	66	102	3181	1	110	38	2949	1
23	100	3633	1	67	51	2513	1	111	75	2248	0

ID	5-HIAA	TRYPT	ONSET	ID	5-HIAA	TRYPT	ONSET	ID	5-HIAA	TRYPT	ONSET
24	117	3309	1	68	92	2764	1	112	35	3203	0
25	41	3315	1	69	104	3098	1	113	53	3248	1
26	223	3418	0	70	50	2900	1	114	77	3455	0
27	96	2295	1	71	93	4125	1	115	179	4521	1
28	87	3232	0	72	146	6081	1	116	151	3240	1
29	96	3496	1	73	96	2972	1	117	57	3905	1
30	34	2656	1	74	112	3962	0	118	45	3642	1
31	98	4318	1	75	23	4894	1	119	76	5233	0
32	86	3510	0	76	109	3543	1	120	46	4150	1
33	118	3613	1	77	80	2622	1	121	98	2579	1
34	84	3117	1	78	111	3012	1	122	84	3249	1
35	99	3496	1	79	85	2685	1	123	119	3381	0
36	114	4612	1	80	131	3059	0	124	41	4020	1
37	140	3051	1	81	58	3946	1	125	40	4569	1
38	74	3067	1	82	110	3356	0	126	149	3781	1
39	45	2782	1	83	80	3671	1	127	116	2346	1
40	51	5034	1	84	42	4155	1	128	76	3901	1
41	99	2564	1	85	80	1923	1	129	96	3822	1
42	54	4335	1	86	91	3589	1				
43	93	2596	1	87	102	3839	0				
44	50	2960	1	88	93	2627	0				

Regress the age of onset on the concentrations of both CSF metabolites, interpret the results and provide a diagnostic assessment of the model.

Questions

1. (5 marks) Produce a properly-formatted scatterplot of the data.
2. (5 marks) Find the logistic regression equation describing the relationship among these variables. Produce the regression equation.
3. (10 marks) Interpret the point estimates of the estimated slope parameters.
4. (10 marks) Report 95% confidence intervals of the estimated slope patameters.
5. (10 marks) Evaluate the presence of outliers in the independent variables using leverage values. What do you conclude?
6. (10 marks) Evaluate the presence of influential observations using Cook's distance. What do you conclude?
7. (10 marks) Report goodness of fit using the Hosmer-Lemeshow test and Nagelkerke's R^2. Interpret these values. What do you conclude?

References

1. Fils-Aime ML, Eckardt MJ, George DT, Brown GL, Mefford I, Linnoila M. Early-onset alcoholics have lower cerebrospinal fluid 5-hydroxyindoleacetic acid levels than late-onset alcoholics. *Archives of General Psychiatry* 1996;53:211-216.

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