

# **Type D personality is associated with increased desire for alcohol in response to acute stress**

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## **Abstract**

Type D personality (the combination of negative affectivity and social inhibition) is associated with high levels of alcohol consumption. We examined if Type D was associated with higher levels of alcohol use, and if Type D was associated with desire for alcohol in response to a social stressor. In an experimental study, participants (n=138) completed measures of Type D, stress, and alcohol use. They also took part in a stress-inducing public speaking task and provided measures of desire for alcohol at baseline, stressor, and recovery. Type D was associated with higher levels of alcohol use, stress and desire for alcohol at stressor and recovery. Mixed measures ANOVA demonstrated that there was a significant group effect of Type D ( $F(1, 136) = 6.86, p < .05$ ), and a significant time x Type D interaction ( $F(1.50, 204.49) = 3.44, p < .05$ ) on desire for alcohol. Type D individuals exhibited significantly higher levels of desire for alcohol during the stressor and recovery phases, compared to non-Type D individuals suggesting that Type D individuals may be motivated to consume alcohol in order to cope with stressful situations.

**Keywords:** alcohol use; Type D personality; stress; desire for alcohol

Various personality dimensions are associated with alcohol consumption, with the majority of research focussed on the Big Five personality factors (openness, conscientiousness, extraversion, agreeableness, neuroticism). High levels of neuroticism have been associated with higher levels of alcohol consumption, whereas high levels of conscientiousness have been associated with lower levels of consumption (Hussong, 2003; Loukas et al., 2000). In addition, personality dimensions are known to be related to an individual's motives for alcohol consumption, indicating that alcohol use serves specific purposes depending on an individual's personality profile (Kuntsche, von Fischer & Gmel, 2008).

In addition to the research on the link between the Big Five and alcohol consumption, research has also identified a link between Type D personality and high levels of alcohol use. Type D personality refers to the synergistic effects of two traits, negative affectivity (NA) and social inhibition (SI). Type D individuals therefore experience negative emotions across time and situations and inhibit the expression of their emotions (Denollet, 2005). NA describes the stable tendency to experience negative affect across time, irrespective of the situation. NA is associated with feelings of dysphoria and tension. High-NA individuals have a negative view of self, report more somatic symptoms, and have an attentional bias towards adverse stimuli. NA correlates with neuroticism from the Big Five, with correlations of .68 in healthy participants (de Fruyt & Denollet, 2002). SI, on the other hand, denotes the stable tendency to inhibit the expression of emotions and behaviours in social interaction. High-SI individuals are more likely to feel inhibited, tense and insecure when with others. SI is associated with reticence, withdrawal, non-expression and discomfort in encounters with other people (Denollet, 2000). SI is negatively correlated with the extraversion facet of the Big Five (De Fruyt & Denollet, 2002). Initially Type D was identified as a risk factor for poor clinical outcomes in cardiac patients (Grande, Romppel & Barth, 2012; O'Dell et al.,

2011), but research has also shown that Type D is associated with a range of deleterious health-related behaviours (Williams et al., 2008) in healthy individuals, including higher levels of alcohol dependence (Bruce et al., 2013).

A number of studies have now examined the link between Type D and alcohol consumption. While several studies found Type D to be related to less alcohol use (Van Bon Martens et al., 2012; Mommersteeg et al., 2010; Hausteiner et al., 2010), others have found that Type D is associated with significantly higher levels of alcohol consumption. For example, Michal et al. (2011) found higher rates of problematic alcohol use among Type D individuals in a general population sample. Similarly, Ginting et al. (2016) found that Type D coronary heart disease patients reported significantly higher levels of addictive behaviours (including alcohol use) compared to non-Type D individuals. However, all of the aforementioned studies carried out brief assessments of alcohol use, within the context of larger studies examining multiple behavioural outcomes. In addition, the inconsistent findings on the nature of the relationship between Type D and alcohol use may be explained by the variety of ways in which alcohol use has been measured in these studies. For example, one study conceptualised alcohol use as consuming at least one alcoholic drink per week (Mommersteeg et al., 2010). Whereas, Michal et al. (2011) focussed on alcohol abuse and dependence as measured by the Patient Health Questionnaire.

One study, which carried out a more detailed examination of the relationship between Type D and alcohol use, was conducted by Bruce et al. (2013). They investigated the relationship between alcohol consumption and Type D in a non-dependent sample and examined if this relationship could be explained by drinking motives. The study found that individuals who scored higher on Type D exhibit higher levels of alcohol dependence. In addition, Type D individuals were motivated to consume alcohol in order to cope with their negative emotions. Type D individuals are high on negative affectivity and thus experience a range of negative

emotions including dysphoria, worry and tension. It would appear that Type D individuals may be consuming alcohol in order to cope with these negative emotions.

Type D individuals are also known to experience high levels of stress. For example, Type D is associated with higher levels of occupational stress among healthcare professionals (Oginska-Bulik, 2006) and higher levels of cardiac output in response to an experimental stressor among students (Williams et al., 2009). However, to-date, the relationship between Type D, stress and alcohol use has not been examined. Given that previous research has identified that Type D individuals consume alcohol in order to cope with their negative emotions, it seems likely that Type D individuals may also consume alcohol in response to stress.

The present study aimed to examine the relationship between Type D, stress and alcohol use in two ways. First, we examined the correlations between Type D, alcohol use, and stress. Next, we examined if Type D individuals exhibited a higher desire for alcohol in response to an acute social stressor, in comparison to the non-Type D individuals.

## **Method**

### *Participants*

There were 138 participants (60 males, 78 females), recruited via poster, flyer and email campaigns at a Scottish University. Participants included both staff and students. The mean age of the participants was 31.8 years (SD=10.71, Range 18–63). Identifying as a non-drinker was an exclusion criteria for taking part in the study. Ethical approval was obtained from the University Ethics Committee before testing.

## *Measures*

Socio-demographic variables including age and gender were collected. In addition, all participants completed the following measures via a paper-based questionnaire:

### *Type D personality*

Type D is measured using the Type D scale (DS14; Denollet, 2005) which is a 14-item questionnaire measuring levels of negative affectivity (NA) (seven items), e.g. 'I often feel unhappy' and social inhibition (SI) (seven items), e.g. 'I often feel inhibited in social interactions'. Respondents rate their personality on a 5-point Likert type scale which ranges from 0=false to 4=true. The NA and SI scales can be scored as continuous variables (range 0-28) to assess these personality traits independently. Type D has been conceptualised as both a categorical and continuous construct. Based on a categorical approach Type D can be classified when individuals score  $\geq 10$  on both the NA and SI subscales (Denollet, 2005). Alternatively, Type D can be utilised as a continuous measure by multiplying the NA and SI score in order to give an overall Type D score (Ferguson et al., 2009). Both approaches are utilised in the current study.

### *Alcohol use*

The Severity of Alcohol Dependence – Community Sample (SADQ-C; Stockwell et al., 1994) is a 20 question self-report survey which measures aspects of alcohol dependence and impaired control over alcohol consumption in community samples. Answers to each question are rated on a four-point scale, with scores ranging from 0-60. A score of 31 or higher indicates "severe alcohol dependence", a score of 16 -30 indicates "moderate dependence" and a score of below 16 usually indicates only a mild physical dependency.

### *Perceived stress*

Stress was measured using the Perceived Stress Scale (PSS-10; Cohen, 1983) which consists of rating ten statements (e.g. “In the last month, how often have you been upset because of something that happened unexpectedly?”) on a four-point Likert type scale of Never (0) to Very Often (4), with scores ranging from 0-40.

#### *Desire for alcohol*

Desire for alcohol was measured with a single-item which asked “On a Scale of 1-100 how much do you want an alcoholic drink right now?”. Participants completed the measure at three time points: baseline, stressor and recovery and indicated their answer with a number. The brevity of this instrument made it well suited for the current study as the measure was repeated three times. The single-item approach to measuring craving has been well established (e.g., Drobles & Thomas, 1999) with a single-item measure of craving found to be as effective as a longer, multi-item scales at predicting treatment outcome in a group of mild to moderate alcohol users (Fedoroff et al., 1999).

#### *Stressor task*

The task was a self-disclosing, public speaking social stress task, where participants were asked to prepare and present a three-minute speech on the topic “What I like and dislike about my body”. The stress manipulation procedure of using public speaking task about body image has been used successfully in a previous study by Lewis and Vogeltanz-Holm (2002) to induce stress. Participants were told they would have three minutes to prepare the speech and that it would be recorded with a video camera. Some topic sentences were provided to ensure the speech lasted for the full three minutes. Instructions were given in line with previous research as follows: “The next part of the experiment is designed to assess your social skills and public speaking ability. You will be asked to produce a three minute speech on a controversial topic in front of the Researcher. Try to be as open and honest as possible.

The speech will be videotaped. The topic of the speech is: What I like and dislike about my body and physical appearance. You now have three minutes to prepare your speech and the following questions should be answered: how important are your looks to you; how would you describe your body; what is your best feature and why; what do you dislike most about your body; what part of your body would you change the most and why. You will be informed when there are two minutes and one minute of preparation time remaining. Then you will face the Researcher and begin your speech". No scoring of the questionnaires took place before administration of the stressor task so the experimenter was blind to the characteristics of the participant (e.g. Type D personality score).

### *Procedure*

At the start of the study, participants completed the self-report report measures of Type D, stress, alcohol use and a baseline measure of current desire for alcohol. The stress test instructions were then read to participants, who subsequently prepared their speech for three minutes. The researcher timed them and informed them of how much time was left every 60 seconds. Just before the participants delivered the speech they were asked their current desire for alcohol, which they wrote down and the speech was then delivered and recorded. Participants then read for ten minutes (post-stressor recovery phase) and desire for alcohol was measured for the final time.

### *Statistical analysis*

Correlations, means and standard deviations were computed for all variables in order to examine the associations between Type D as a continuous variable (NAxSI), its subcomponents, stress, alcohol use and desire. Next, a Mixed measures ANOVA was performed in order to examine the change in desire for alcohol across the three time points



(baseline, stressor, recovery), by group (Type D vs non-Type D using Denollet's (2005) cut-off points to classify Type D).

## **Results**

### *Prevalence of Type D personality and Alcohol Dependence*

From the sample of 138 participants, 50 (29 males and 21 females) were classified as Type D (36.2%) according to the recommended cut-off points of  $\geq 10$  for the subscales of NA (M = 12.09; SD = 5.76) and SI (M = 9.91; SD = 6.1). Type D individuals had a mean level of NA of 16.46 (SD=4.34) and a mean level of SI of 15.58 (SD=4.59). Non-Type D individuals had a mean level of NA of 9.6 (SD=4.94) and a mean level of SI of 6.68 (SD=4.21). Levels of alcohol dependence in the sample were relatively low, with 10.7% of the sample scoring in the range of 'moderate dependency' and 5% scoring in the range of 'severe alcohol dependency'.

### *Correlations*

As shown in Table 1, correlation analysis showed that higher scores on Type D (utilising Type D continuously as the NAxSI multiplicative term) were significantly correlated with higher levels of alcohol use, stress, and with higher levels of desire for alcohol at stressor and recovery. In addition, NA was significantly associated with higher levels of stress and with greater desire for alcohol at stressor and recovery. Finally, SI was significantly associated with alcohol use, stress, and desire for alcohol at stressor and recovery.

Insert Table 1 here

### *Group Comparisons*

As shown in Table 2, initial t-test comparisons (utilising Type D via the traditional categorical approach) demonstrated that Type D individuals scored significantly higher than non-Type D individuals on stress, and on desire for alcohol during the stressor and recovery phases of experiment. However, there were no significant differences when comparing Type D and non-Type D individuals on alcohol use, or desire for alcohol at baseline.

Insert Table 2 here

Mixed measures ANOVA revealed a significant effect of time on desire for alcohol ( $F(1.50, 204.49) = 42.69, p < .001$ ), and a significant group effect of Type D on desire for alcohol ( $F(1, 136) = 6.86, p < .05$ ) indicating that Type D individuals reported significantly higher levels of desire for alcohol compared to non-Type D individuals. In addition, there was a significant time x Type D interaction effect ( $F(1.50, 204.49) = 3.44, p < .05$ ). T-tests showed that Type D individuals ( $M = 33.16; SD = 31.87$ ) had a significantly higher desire for alcohol at stressor compared to non-Type D individuals ( $M = 20.03; SD = 24.19$ ),  $t(136) = 2.53, p < .05$ . Similarly, Type D individuals ( $M = 16.44; SD = 21.76$ ) also had a significantly higher level of desire for alcohol at recovery compared to non-Type D individuals ( $M = 9.51; SD = 14.01$ ),  $t(136) = 2.03, p < .05$ . No significant differences were observed at baseline between Type D's and non-Type D's. It should also be noted that we investigated the effect of gender on our results and found that it had no significant effect.

Insert Figure 1 here

## **Discussion**

We identified that Type D is significantly associated with greater levels of alcohol use when Type D is conceptualised as a continuous construct, utilising the NAXSI multiplicative term. However, the association was small. Type D was also moderately positively correlated with higher levels of stress. In addition, we found that Type D individuals had significantly higher

levels of desire for alcohol in relation to an acute social stressor (at both the stressor and recovery stages) compared to non-Type D individuals. The relationship between Type D and higher levels of alcohol use has been identified previously (e.g. Bruce et al., 2013) and the present study adds to that evidence base relating higher levels of Type D to higher levels of alcohol use and alcohol desire.

Previous research has also shown that Type D is associated with particular drinking motives. For example, Bruce et al. (2013) showed that Type D individuals were motivated to drink alcohol in order to cope with their negative emotions. The present study is the first to demonstrate that Type D individuals have higher levels of desire for alcohol in response to acute social stress. Type D's displayed this elevated desire for alcohol at both the stressor and recovery stages of the experiment demonstrating that not only do Type D individuals have higher levels of desire for alcohol during stress, this level of desire remains elevated after the stressor has passed. Previous research has shown that individuals with alcohol dependence may utilise alcohol as a means by which to regulate unpleasant emotional states, such as stress. Specifically, inefficient emotion regulation strategies have been related to increased craving for alcohol (of which desire for alcohol is a facet) (Petit et al., 2015). In order to combat the high levels of alcohol use observed in Type D individuals it may be useful to target their stress levels and foster improved coping, social and emotion regulation skills. Previous research has shown that individuals with a Type D personality are more likely to have deficits in emotion regulation (Messerli-Bürgy et al., 2012) and more often rely on inadequate coping strategies such as avoidance (Martin et al. 2011).

There are some limitations of the present study which future research should address. Firstly, the study is limited by the use of a college student sample. In addition, while we demonstrated that Type D individuals experienced increased desire for alcohol in response to the stressful experience, it is not known whether this precipitates actual consumption of

alcohol. It would therefore be interesting for future studies to examine whether exposure to stress actually increases the likelihood of using and misusing alcohol among individuals with Type D personality. In addition, as the current study utilised an artificial lab-based stressor future research is required in order to examine if Type D is associated with increased desire for alcohol in response to real life stressors, including daily hassles or major stressful life events.

The present study has again identified that there is a significant relationship between Type D personality and alcohol use. In addition, we demonstrated that Type D individuals exhibit higher levels of desire for alcohol at the stressor and recovery phases of an acute social stressor. These findings should be replicated in alcohol-dependent patients in order to examine the extent of the relationship between Type D and alcohol dependence in this population.

### References

- Bruce, G., Curren, C. & Williams, L. (2013). Type D personality, alcohol dependence, and drinking motives in the general population. *Journal of Studies of Alcohol and Drugs*, 74, 120-124. doi: 10.15288/jsad.2013.74.120
- Cohen, S., Kamarck, T., and Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior*, 24, 386-396. Retrieved from <http://journals.sagepub.com/home/hsb>
- De Fruyt, F. & Denollet, J. (2002). Type D personality: A Five-Factor Model perspective, *Psychology & Health*, 17, 671-683, doi: 10.1080/08870440290025858
- Denollet, J. (2000). Type D personality: A potential risk factor refined. *Journal of Psychosomatic Research*, 49, 255-266. doi: 10.1016/S0022-3999(00)00177-X

Denollet, J. (2005). DS14: Standard assessment of negative affectivity, social inhibition, and Type D personality. *Psychosomatic Medicine*, 67, 89–97. Retrieved from <http://journals.lww.com/psychosomaticmedicine/pages/currenttoc.aspx>

Drobes, D. J., & Thomas, S. E. (1999). Assessing craving for alcohol. *Alcohol Research and Health*, 23, 179-186. Retrieved from [https://pubs.niaaa.nih.gov/publications/arh341/toc34\\_1.htm](https://pubs.niaaa.nih.gov/publications/arh341/toc34_1.htm)

Fedoroff, I., Sobell, L. C., Agrawal, S., Sobell, M. B., & Gavin, D. R. (1999). Evaluation of the Yale-Brown Obsessive Compulsive Scale (YBOCS-hd) for heavy drinking with mild to moderately dependent alcohol abusers. *Alcoholism: Clinical and Experimental Research*, 23(9), 1477-1483. Retrieved from [http://onlinelibrary.wiley.com/journal/10.1111/\(ISSN\)1530-0277](http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1530-0277)

Ferguson, E., Williams, L., O'Connor, R. C., Howard, S., Hughes, B. M., Johnston, D. W. . . . O'Carroll, R. E. (2009). A taxometric analysis of Type-D personality. *Psychosomatic Medicine*, 71, 981–986. doi: 10.1097/PSY.0b013e3181bd888b

Ginting, H., van de Van, M., Becker, E. S. & Naring, G. (2016). Type D personality is associated with health behaviors and perceived social support in individuals with coronary heart disease. *Journal of Health Psychology*, 21, 727-737. doi: 10.1177/1359105314536750

Grande, G., Romppel, M. & Barth, J. (2012). Association between type D personality and prognosis in patients with cardiovascular diseases: A systematic review and meta-analysis. *Annals of Behavioral Medicine*, 43, 299–310. doi: 10.1007/s12160-011-9339-0

Hayes, A.F. (2013). *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach*. New York: Guildford Publications.

- Hussong, A. M. (2003). Social influences in motivated drinking among college students. *Psychology of Addictive Behaviors, 17*, 142-150. Retrieved from <http://www.apa.org/pubs/journals/adb/>
- Kuntsche, E., von Fischer, M. & Gmel, G. (2008). Personality factors and alcohol use: A mediator analysis of drinking motives. *Personality and Individual Differences, 45*, 796-800. doi: 10.1016/j.paid.2008.08.009
- Lewis, B. A. & Vogeltanz-Holm, N. D. (2002). The effects of alcohol and anxiousness on physiological and subjective responses to a social stressor in women. *Addictive Behaviors, 27*, 529–545. Retrieved from <https://www.journals.elsevier.com/addictive-behaviors/>
- Loukas, A., Krull, J. L., Chassin, L., & Carle, A. C. (2000). The relation of personality to alcohol abuse/dependence in a high-risk sample. *Journal of Personality, 68*, 1153–1175. Retrieved from [http://onlinelibrary.wiley.com/journal/10.1111/\(ISSN\)1467-6494](http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1467-6494)
- Michal, M., Wiltink, J., Grande, G., Beutel, M. E., & Brähler, E. (2011). Type D personality is independently associated with major psychosocial stressors and increased health care utilization in the general population. *Journal of Affective Disorders, 134*, 396–403. doi: 10.1016/j.jad.2011.05.033
- Martin, L. A., Doster, J. A., Critelli, J. W., Purdum, M., Powers, C., Lambert, P. L. & Miranda, V. (2011). The 'distressed' personality, coping and cardiovascular risk. *Stress and Health, 27*, 64-72. doi: 10.1002/smi.1320
- Messerli-Bürgy, N., Barth, J., von Känel, R., Schmid, J.P., Saner, H., Znoj, H. (2012). Maladaptive emotion regulation is related to distressed personalities in cardiac patients. *Stress and Health, 28*, 347-352. doi: 10.1002/smi.2420

- Mommersteeg, P. M. C, Kupper, N. & Denollet, J. (2010). Type D personality is associated with increased metabolic syndrome prevalence and an unhealthy lifestyle in a cross-sectional Dutch community sample. *BMC Public Health* 10: 714. doi: 10.1186/1471-2458-10-714
- Nolen-Hoeksema, S. (2004). Gender differences in risk factors and consequences for alcohol use and problems. *Clinical Psychology Review*, 24, 98–1010. doi: 10.1016/j.cpr.2004.08.003
- O'Dell, K. R, Masters, K. S., Spielmans, G. I. & Maisto, S. A. (2011). Does Type D personality predict outcomes among patients with cardiovascular disease? A meta-analytic review. *Journal of Psychosomatic Research*, 71, 199–206. doi: 10.1016/j.jpsychores.2011.01.009
- Petit, G., Luminet, O., Maurage, F., Tecco, J., Lechantre, S., Ferauge, M., Gross, J. J. & de Timary, P. (2015). Emotion regulation in alcohol dependence. *Alcoholism: Clinical and Experimental Research*, 39, 2471-2479. doi: 10.1111/acer.12914
- Preacher, K. J. & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, 40, 879–891. doi: 10.3758/BRM.40.3.879
- Stockwell, T., Sitharan, T., McGrath, D. & Lang, E. (1994). The measurement of alcohol dependence and impaired control in community samples. *Addiction*, 89, 167-74. Retrieved from <http://www.addictionjournal.org/>
- van Bon-Martens, M. J. H., Denollet, J., Kiemeney, L. A. L. M., Droomers, M., de Beer, M. J. A., van de Goor, I. A. M., & van Oers, H. A. M. (2012). Health inequalities in the Netherlands: A cross-sectional study of the role of Type D (distressed) personality. *BMC Public Health*, 12, 46. doi: 10.1186/1471-2458-12-46

Williams, L., O'Connor, R. C., Howard, S., Hughes, B. M., Johnston, D. W., Hay, J. L., . . .

O'Carroll, R. E. (2008). Type-D personality mechanisms of effect: The role of health-related behavior and social support. *Journal of Psychosomatic Research*, *64*, 63–69. doi:

<https://www.journals.elsevier.com/journal-of-psychosomatic-research/>



Table 1. Correlations, means and standard deviations for all variables

	1	2	3	4	5	6	7	8
1. Type D (total score)	--	.782**	.865**	.198*	.554**	.122	.362**	.359**
2. NA		--	.491**	.057	.637**	.151	.342**	.301**
3. SI			--	.221**	.427**	.112	.321**	.301**
4. Alcohol dependence				--	.295**	.391**	.448**	.426**
5. Stress					--	.237**	.353**	.283**
6. Desire for alcohol (baseline)						--	.516**	.705**
7. Desire for alcohol (stressor)							--	.595**
8. Desire for alcohol (recovery)								--
Mean	136.86	12.09	9.91	9.29	18.75	11.17	24.79	12.02
SD	135.62	5.76	6.1	8.98	6.78	16.26	27.84	17.47
Range	0-624	1-26	0-24	0-40	4-36	0-90	0-100	0-90

Table 2. Type D personality as a function of mean (S.D.) ratings on stress, alcohol use, and desire

	Type D	Non-type D	t	p
Stress	22.66 (5.93)	16.52 (6.23)	5.66	<.001
Alcohol use	10.6 (10.3)	8.55 (8.13)	1.22	.197
Desire for alcohol (baseline)	13.68 (19.4)	9.74 (14.1)	1.37	.172
Desire for alcohol (stressor)	33.16 (31.83)	20.03 (24.19)	2.53	.013
Desire for alcohol (recovery)	16.44 (21.76)	9.51 (14.01)	2.03	.046

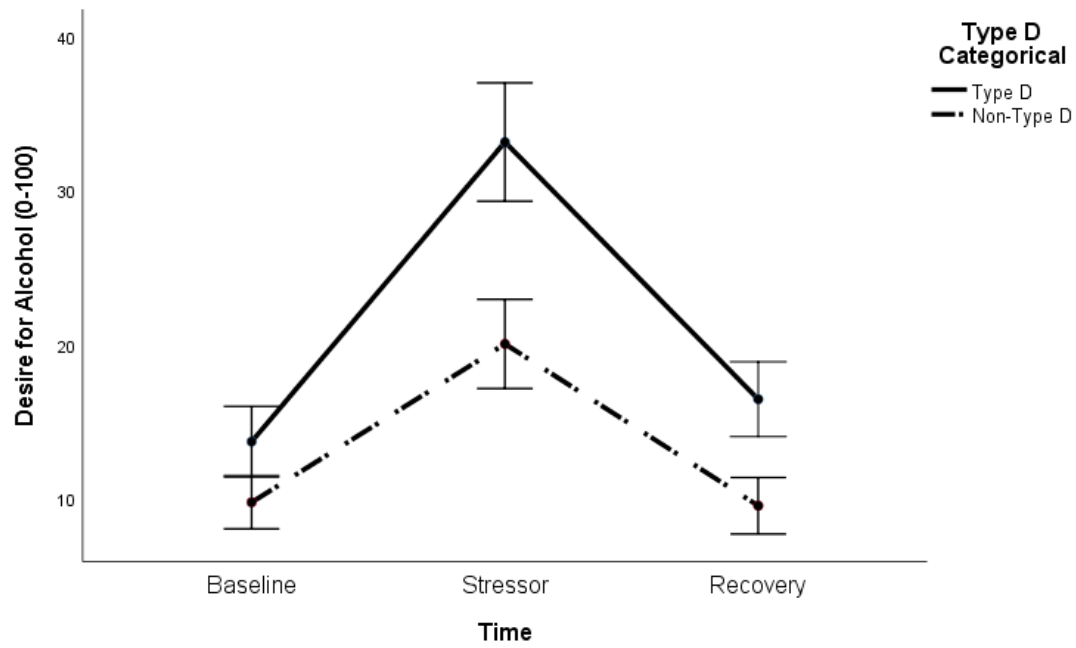


Figure 1: The effect of Type D on desire for alcohol across the baseline, stress and recovery phases.

Note: Error bars represent the standard error of the mean