

Mediating effects of mental health problems in the stress alcohol relationship

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Aim

To investigate the relationship between stressful life events and alcohol consumption in a general population sample

Background

A number of models have been developed by researchers to explain the relationship between stress and alcohol use. The Tension Reduction Hypothesis (TRH: Conger 1951) suggests that those who experience stresses or traumas in their life often drink more in order to reduce or avoid these unpleasant stresses. The Self Medication Hypothesis (Khantzian, 1997, 1999)/(Brady, Back & Coffey, 2004) was based upon research findings showing traumatised individuals tend to use substances e.g.: alcohol, drugs etc... in order to dull or diminish traumatic or painful memories associated with trauma symptoms e.g.: PTSD. Evidence has suggested that alcohol is used to self medicate in response to distress caused by trauma among those who have been diagnosed with PTSD or alcohol dependence (Dantas & deAndrade, 2008).

The proposed models are similar in their reasoning and are based upon research findings. Indeed earlier research into the effects of stress on alcohol has found that alcohol consumption was related to the number of recent life changes experienced by an individual (Tattosion, Charpy, Remy, Prinquey & Poinso, 1983), more specifically it appeared to be associated with the number of negative life events experienced (Rosenberg, 1983; Marlatt & Gordon, 1980, Billings & Moos, 1983). More recent clinical research supports earlier findings. Pohorecky (2006) conducted a review of

related research since 1981, finding that prospective studies “generally support an effect of stress on alcohol ingestion” (p.438). Life events such as retirement and widowhood increased alcohol intake among 7731 mature adults over a 6-year period (Perreira & Sloan, 2001). Hospitalisation and chronic health problems were associated with decreases in alcohol consumption among the same group. It appears that certain life events may be related to increases in alcohol intake whilst others may have the opposite effect. Research conducted among adolescents with alcoholic parents and a comparison group (n=451) found exposure to family related stressors is indicative of short-lived increases in alcohol intake (King, Molina & Chassin, 2009). The research also concluded that adolescents at risk for alcoholism, alcohol use increased when stress increased beyond the usual level.

Norman, Tate, Anderson and Brown (2007) conducted research among groups of 134 male veterans treated for substance use dependency. They reported that participants relapsed when more often when experiencing heightened states of emotion. The group most commonly reported negative interpersonal contexts i.e.: anger, fear and depression. The researchers also reported that the level of PTSD symptomology reported was a significant predictor of relapse among those expressing negative interpersonal contexts.

Experience of stressful or traumatic events appears to increase alcohol intake. Dragan and Lis-Tuelejska (2007a; 2007b) conducted 2 studies among 458 (75% males) alcohol dependent patients in Poland. In the first study (2007a) they found that 81% had reported exposure at least one Potentially Traumatic Event (PTE) in their lifetime (M=2.7 PTEs). Results also showed a small, but significant, correlation between the number of PTEs experienced and alcohol useage ($r=0.18$, $p<0.001$). The second study (2007b) focused on the prevalence of PTSD among this group. Findings showed that

patients who had experienced an assault committed by someone they knew were more likely to report significantly higher PTSD symptom severity and also higher alcohol intake. Patients who reported assault by a stranger did not report significantly different PTSD symptom severity from the rest of the group, however they did report significantly higher scores for alcohol use.

Research into trauma and PTSD among 459 participants (59.7% males) with alcohol, drug or dual dependence reported that PTSD was approximately two times greater among those reporting dual dependency (alcohol and drugs) rather than alcohol dependence (Dreissen et al. 2008). This study also reports a significantly lower mean age of onset of alcohol related problems among those with PTSD. Back, Brady, Sonne and Verduin (2006) assessed improvements in PTSD symptoms and alcohol dependence after a 12-week treatment programme. They found that a decrease in the level of PTSD symptoms led to a decrease in the levels of alcohol dependence among the sample.

The research outlined above presents a strong case for the link between stress or trauma and alcohol use. However, these studies have focussed on small, select groupings or patients within clinical settings and this makes it difficult to generalise these findings beyond these groups. It is important to understand if this relationship between stress and alcohol use holds true within the general population where the link appears to be less clear-cut.

Veenstra et al. (2006) reviewed the relationship between life events and alcohol in the general population. They found the research to be contradictory as some studies reporting a link between the number of life events experienced and alcohol use, with others suggesting life events increased or decreased alcohol consumption, whilst

others reported finding no significant association between the two. Abbey, Smith and Scott (1993) investigated the relationship between reasons for drinking and alcohol consumption among 781 participants living in Michigan (45% males). They found that drinking to cope with stress was strongly related with alcohol consumption especially among those who were identified as heavy drinkers. Differences in reactions to life events are seen between the genders, Brennan, Schutte and Moos (1999) reporting that women experience more negative life events than men, however they also consumed significantly less alcohol, drank less often and had fewer alcohol associated problems. It appears the type of stressor may be important also, with women reporting more negative life events and financial stress and men reporting more spouse related stressors having more drinking problems across time (Brennan, Schutte & Moos, 1999). Conger, Lorenz, Elder, Simons and Ge (1993) echo this view finding that men are more likely to report distress associated with work and finances, whilst women report stronger feelings regarding negative family related events.

The effects of negative life events on alcohol intake were monitored across time among a population of 2040 participants (39.12% males) in Connecticut. Findings indicated that alcohol intake at Time 1 was significantly associated with alcohol intake at Time 2. Married men reported significantly larger decreases in alcohol intake over time, than their unmarried counterparts. Models show that hospitalisation and nursing home admission have a significant negative effect on alcohol intake among men, whilst losing a friend, or death of a close friend have a positive effect on alcohol intake among women (Glass, Prigerson, Kasl & Mendes de Leon, 1995).

SanJose, Van Oers, Van de Mheen, Garretsen and Mackenbach (2000) also found differences in responses to life events among men and women. Their research, among 2802 respondents living in and around Eindhoven, found that among men, being a

victim of crime, going through a divorce or relationship breakup and increasing financial difficulties were all associated with increased alcohol intake among heavy drinkers, whilst being separated or divorced was positively related to heavy drinking among women. The differences between the genders was supported by the work of Frone, Cooper and Russell (1994) who report that stressful life events among men were strongly related to alcohol use, however they were more strongly associated with drug use among women.

Simons, Gaher, Jacobs, Meyer and Johnson-Jimenez (2005) investigated the link between alcohol and PTSD among 779 red cross relief workers responding to September 11th attacks. Results looked at various regression models investigating the symptom clusters associated with PTSD i.e.: Intrusion, Avoidance and Hyperarousal. They reported increases and decreases in alcohol consumption were both positively and significantly associated with levels (number and frequency of symptoms endorsed) of intrusion, avoidance and hyperarousal (at 0.05 level of significance).

Specific life events appear to increase or decrease alcohol intake, however it may be the case that an individual experiences a number of stressors, life events, or traumas across time. The cumulative effects of these stressors/ adversities may affect alcohol use. The stress-alcohol relationship was investigated among 26, 946 US citizens (Dawson, Grant & Ruan, 2005). Findings showed drinkers who endorsed 6 or more stressful events reported a daily alcohol intake and frequency of drinking 3 times that of those respondents who endorsed no stressful events. The study also looked at the cumulative effects of stressors reporting an increase in ethanol intake of 14% (among males) and 8% (among females) with the inclusion of an additional stressor. Lloyd and Turner (2008) investigated the effects of cumulative life events on alcohol dependence among 1786 (50.3% males) adolescents and young adults living in South

Florida. Significant differences were found in the number of adversities experienced and alcohol dependence. A significant positive relationship is reported, across time, between the number of cumulative adversities and risk for alcohol dependence over 2 years later. Stressors experienced early in life may also have a bearing on alcohol use with reports of parental divorce, parents with mental health issues and being bullied at school associated with heavy drinking in early adulthood among men (Kestil et al. 2008). However the same study reports significant relationships between alcohol problems in parents and heavy drinking in early adulthood among their children across both genders.

Many other factors may influence alcohol use e.g.: age (Leigh & Stacy, 2004), religiosity (Krause, 1991), social support (Jennison, 1993), coping styles (Veenstra et al. 2007). Cooper, Russell, Skinner, Frone & Mudar (1992) investigated the moderating effects of gender, coping and expectancy in the relationship between stress and alcohol use. They found that perception of high levels of social support and use of active coping were both indicative of a decrease in levels of drinking to cope with stress. Alcohol expectancies were strongly, positively related to alcohol problems among men. They report stressors were positively related to alcohol intake and abuse. Findings also showed high levels of social support “buffered the relationship between events and alcohol use” (p.146). Veenstra et al. (2007) also investigated coping style as a mediating factor among 3253 participants (49.43% male). They report action based coping and cognitive coping did not act as mediators in the relationship between life events and alcohol intake. They also report no mediation effects for the role of social support.

Rumination as a mediator in the stress-alcohol relationship was investigated among 161 adolescents across time (Skitch & Abela, 2008). Results showed that those in the

sample who ruminated in response to stress were more likely to report elevated levels of substance abuse following negative life events when compared to their counterparts.

Jennison (1993) investigated alcohol use in response to life stress among 1418 respondents over 60 years of age. Findings are in line with previous research showing that respondents who experience stressful loss are likely to drink significantly more than those who have not reported such losses. Jennison reports “supportive resources of spouse, family, friends and church appear to have stress-buffering effects that reduce excessive drinking” (p. 99). She also states that the elderly are more likely to experience loss of these social supports over time and therefore may remain at risk for increased alcohol use.

It may also be important to examine the role of comorbid disorders in the relationship between stress and alcohol use. Psychological disorders may be indicative of increases or decreases in alcohol use. Graham and Schmidt (1999) report that among a sample of 826 people (35% males) aged 65 and over, low levels of psychological wellbeing (e.g.: depression) were highly correlated with heavier drinking. In general the findings showed that higher quantities and volumes of alcohol intakes among elderly participants was associated with poorer psychological health. However, other research has shown that higher levels of depression have been found among those endorsing greater numbers of life events, yet this made no significant difference to the level of alcohol use among participants (Neff & Husaini, 1982).

Therefore aim of this study was to model the relationship between exposure to a diverse range stressful life events and hazardous alcohol use using a large nationally representative database. In addition, the mediated effects of neurotic disorders were

included in the model. Previous population based research has not focused on the potential mediating factors that can shape the association between stress and alcohol, either strengthening or weakening the association. For example, the effects of stressful experiences on alcohol use may be ameliorated by concerns about physical wellbeing. However, stress can also induce anxiety and depression which may contribute to higher levels of alcohol use. Until recently, the process of statistically testing for mediation was limited as only one mediator could be used and the estimate of the mediated effect lacked statistical power. Recent statistical developments have allowed for models to incorporate multiple mediating variables, efficient estimation of indirect effects, and the inclusion of covariates in the model (MacKinnon, 2008).

It was hypothesized that there would be both a significant positive direct relationship between the number of stressful experiences and hazardous drinking. Significant mediated effects were also predicted. First, disorders such as anxiety and depression have been shown to be predicted by exposure to stressful events and they can also lead to self-medication using alcohol. Therefore it was predicted that the indirect, or mediated, effect would be positive. Second, it has been shown that health related events are associated with a decrease in alcohol consumption. On the basis of this it was predicted that neurotic disorders with related to somatic and physical concerns would mediate the stress-alcohol association; this indirect effect was predicted to be negative.

Method

Sample

Data was drawn from the “Psychiatric Morbidity Among Adults living in Private Households, 2000” survey (Singleton, Bumpstead, O’Brien, Lee & Melzer, 2001).

The survey was conducted among a population of adults living in England, Scotland and Wales between March and September 2000. When participants with any missing data were removed from the study the sample size was 7849. 55.9% of the sample were male, with 93% reporting they were of white ethnic origin. Ages ranged from 16-74 years ($M=45$, $SD=15.43$). A more detailed methodology is reported in Singleton et al. (2001).

Measures

The List of Threatening Experiences (LTE; Brugha, Bebbington, Tennant, Hurry, 1985).

This scale measures exposure to a range of stressful and traumatic experiences across four main areas; threats to personal safety (assault, violence at home, etc), emotional problems (death/ illness of loved one, problems with friends, etc), financial problems (redundancy, debt, etc), and behavioral problems (expelled from school, homelessness, etc). Responses given were either “yes” or “no”. The number of events endorsed were summed for each participant to give the total number of stressful life events experienced.

Alcohol Use Disorders Test (AUDIT; Saunders et al., 1993; Babor et al., 1992).

This is a 10-item scale that assesses alcohol use in the past 12 months with a score ranging from 0 to 40. Internal reliability estimates for the scale over 18 studies had an acceptable Cronbach’s alpha with estimates of test-retest reliability ranging from .64 to .92 over three studies (Reinert & Allen, 2002). Shevlin and Smith (2007) found that

a three factor model (consumption, associated problems, and dependence) was the best explanation of AUDIT scores based on an analysis of the BPMS.

The Clinical Interview Scale Revised (CIS-R: Lewis and Pelosi, 1990) was used to measure neurotic symptoms among the sample. The CIS-R comprises of 14 sections, seven of which were used in this study.

CIS-R Subscale	Example questions
Somatic Symptoms	Have you had any sort of ache or pain in the past month? During the past month have you been troubled by any sort of discomfort, for example, headache or indigestion?
Fatigue	Have you noticed that you've been getting tired in the past month? During the past month, have you felt you've been lacking in energy?
Sleep Problems	In the past month, have you been having problems with trying to get to sleep or with getting back to sleep if you woke up or were woken up? Has sleeping more than you usually do been a problem for you in the past month?
Worry about Physical Health	Many people get concerned about their physical health. In the past month, have you been at all worried about your physical health? During the past month, did you find yourself worrying that you might have a serious physical illness?
Depressive Ideas	Have you felt hopeless at all during the past seven days, for

	<p>instance about your future?</p> <p>During the past week, have you been feeling you are not as good as other people?</p>
Worry	<p>In the past month, did you find yourself worrying more than you needed to about things?</p> <p>In your opinion, have you been worrying too much in view of your circumstances?</p>
Anxiety	<p>Have you been feeling anxious or nervous in the past month?</p> <p>In the past month have you felt anxious, nervous or tense about any specific things when there was no real danger?</p>

Results

Analysis

A mediation analysis was utilised to estimate the direct effect of stressful life events on alcohol use and the indirect (mediated) effect via somatic symptoms, fatigue, sleep problems, worry about physical health, depressive ideas, worry, and anxiety. The model is presented in Figure 1.

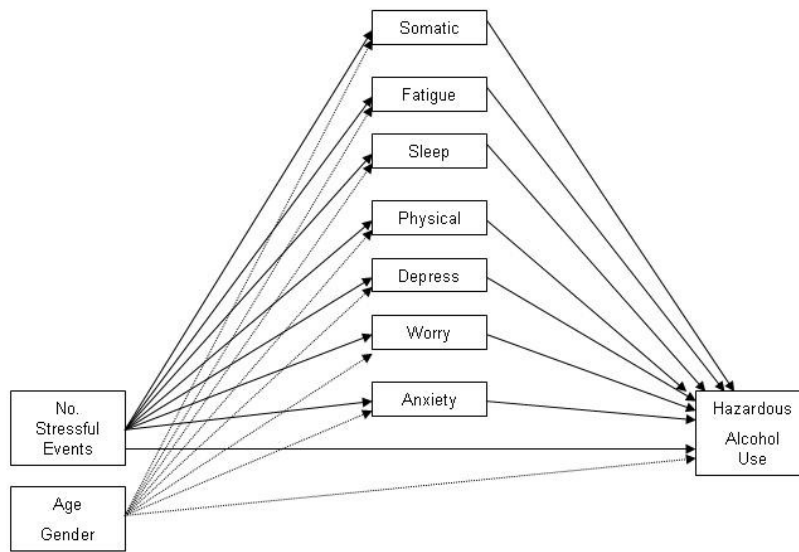


Figure 1. Multiple Mediation Model of Stressful Life Events and Alcohol Use.

The statistical significance of the mediated effects were calculated using bootstrapped bias-corrected and accelerated percentile based confidence intervals (Efron, 1997, Efron, Tibshirani, 1993). The overall model was based on the approach proposed by Preacher and Hayes (2008). The model was specified and estimated using SPSS v15.0 based on maximum likelihood estimation and 1000 bootstrap draws. Maximum likelihood estimation provides estimates that are not biased under conditions of non-normality, but the associate test statistics may be incorrect (Bollen, 1989). The empirically based confidence intervals used in this study should avoid incorrect inferences about statistical significance being made.

Results

The results of the mediation analysis are presented below.

Stressful Events to Mediators

	Coeff	se	t	p
Somatic	.0512	.0035	14.4771	.0000
Fatigue	.1561	.0064	24.4839	.0000
Sleep	.1017	.0054	18.8703	.0000
Worry Physical	.0537	.0030	18.1136	.0000
Depress	-.0419	.0021	-19.7223	.0000
Worry	.1088	.0046	23.6626	.0000
Anxiety	.0826	.0037	22.6139	.0000

Direct Effects of Mediators on Alcohol Use

	Coeff	se	t	p
Somatic	-.2819	.0956	-2.9472	.0032
Fatigue	-.2098	.0579	-3.6222	.0003
Sleep	.1828	.0648	2.8216	.0048
Worry Physical	-.6590	.1169	-5.6375	.0000
Depress	.5310	.1497	3.5465	.0004
Worry	.2334	.0810	2.8807	.0040
Anxiety	.0949	.1004	.9452	.3446

Total Effect of Stressful Events on Alcohol Use (c path)

	Coeff	se	t	p
Stressful Events	.2692	.0286	9.4063	.0000

Direct Effect of Stressful Events on Alcohol Use (c-prime path)

	Coeff	se	t	p
Stressful Events	.3222	.0303	10.6168	.0000

Indirect Effects of Stressful Events on Alcohol Use through Proposed Mediators

	Data	boot	Bias	SE
TOTAL	-.0530	-.0532	-.0002	.0129
Somatic	-.0144	-.0145	-.0001	.0063
Fatigue	-.0328	-.0328	-.0001	.0098
Sleep	.0186	.0185	-.0001	.0072
Worry Physical	-.0354	-.0354	-.0001	.0080
Depress	-.0223	-.0223	-.0001	.0064
Worry	.0254	.0255	.0001	.0096
Anxiety	.0078	.0079	.0001	.0099

Discussion:

The results show a significant positive association between stressful life events reported and alcohol use. That is, as the number of stressful life events reported increases, so too does alcohol consumption among the sample. This is in line with the findings of previous research showing an increase in alcohol intake in response to an increase in the number of stressors experienced (Dawson, Grant & Ruan, 2005; Pohorecky, 2006; Glass, Prigerson, Kasl & Mendes de Leon, 1995). The relationship between stressful life events and alcohol use was expected to be positive and significant based on the findings reported in the literature.

Results also indicate that the relationship between stress and alcohol use is mediated/moderated by specific neurotic symptoms (assessed using the CIS-R). These are factors that may have an indirect effect on the relationship between stress and alcohol

use. A number of the mediating factors were found to significantly affect the effects of stress on alcohol use. Somatic symptoms, fatigue and health worries were found to buffer the effects of stress on alcohol consumption. These variables were found to affect the relationship between stress and alcohol indirectly, causing a reduction in the level of alcohol use in relation to stressful life events. When considered in relation to the research outlined above, it would be reasonable to expect that health concerns and somatic symptoms may lead to a fall in alcohol use. The literature has shown that health-related life events/ stressors were related to reductions in alcohol consumption (Veenstra et al., 2006; Brennan, Schutte & Moos, 1999). Being hospitalised, which may be related to health issues, is predictive decreased alcohol use (Glass et al., 1995); whilst being diagnosed with a chronic condition also led to a fall in alcohol intake (Perreira & Sloan, 2001). Therefore this buffering effect of health worries and somatic symptoms appears to be consistent with the research in this area. It may also be the case that those with health concerns and somatic symptoms may be reducing their alcohol intake in response to advice from their GP. Fatigue was also found to buffer the effects of stress on alcohol intake. Fatigue may accompany ill-health, this may offer an explanation of the reduction in alcohol intake (as outlined above).

Irritability and worry were also found to have a significant indirect effect on alcohol use, however in this instance, these variables were found to exacerbate the effects of stress on alcohol intake; causing an increase in the levels of alcohol use. Worry may be related to a number of areas of life e.g.: financial issues, marital problems, which may have a positive effect on alcohol use (Brennan, Schutte & Moos, 1999; San Jose et al. 2000; Skitch & Abela, 2008).

These findings may also be explained by the tension reduction hypothesis (TRH: Conger, 1951). As stress increases it may be assumed that the levels of worry and irritability will also increase. This may lead to an effort on the part of the individual to reduce these symptoms. The TRH suggests that people will drink to reduce or avoid unpleasant stressors. Therefore as worry and irritability increase so too may alcohol use as a method to cope with these stressors (Abbey, Smith & Scott, 1993; Veenstra et al., 2007). Individuals may have outcome expectancies associated with drinking e.g.: drinking will reduce irritability or help to forget worries. Positive outcome expectancies have been shown to cause an increase in alcohol use (Leigh & Stacey, 2004), and perhaps these expectancies help to explain the exacerbating effects of worry and irritability on the relationship between stress and alcohol use.

Depression and anxiety were found to have no significant indirect effects on the relationship between stress and alcohol use, i.e.: they did not significantly mediate the relationship between the two. These variables may have been expected to exacerbate alcohol use as Nation and Heflinger (2006) reported that frequent alcohol use was predicted by higher levels of depression and anxiety. However, other research has suggested that the presence of stress can appear to cause a slight increase in depression among drinkers. However, this increase does not appear to be significant (Lipton, 1994). This may provide support for the non-significant results, if increases in stress cause only a slight increase in depression and anxiety, perhaps it is not at a level which would affect the relationship between stress and alcohol use. Results also indicated forgetfulness and sleep problems did not mediate the relationship between stress and alcohol consumption.

This study has a number of limitations. The research is dependent on cross sectional data, which only provides a look at short term or current effects, therefore may limit the generalisability of the findings. Longitudinal studies in this area may provide more clarity on the effects of mediators on the relationship between stress and alcohol use. The use of self-report measures may be problematic as they are reliant on the memories, perceptions and emotions of respondents. Therefore information obtained may not always be accurate. Indeed previous research has indicated that people may often underestimate their alcohol intake, incorrect reporting, such as these, may cause inaccuracies in results. The research only examines neurotic symptoms as mediating variables in relation to stress and alcohol use. It may be helpful to include further variables in future research to get a fuller picture of the factors that may affect the association between stress and alcohol intake.

Future research conducted in this area may be improved by using a longitudinal design, but also by including other variables for analysis such as gender and age. These variables have been shown to affect the relationship between stress and alcohol use (Abbey, Smith & Scott, 1993; Waldrop, Santa Ana, Saladin, McRae & Brady, 2007) and future research may benefit from their inclusion. Longitudinal research may also offer some insight into the pathways for addiction/ dependence and stressors which may encourage addiction (Driessen et al., 2008)

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APPENDIX 1

Stressful Life Events

18 stressful life events were used in the questionnaire. Respondents indicated whether or not they had experienced any of the events listed below.

Serious illness, injury or assault to yourself

Serious illness, injury or assault to a close relative

Death of a close relative

Death of a close friend/other relative

Separation or Divorce

Serious problem with a close friend

Made redundant or sacked

Looking for work for more than 1 month

Major financial crisis

Problem with police and a court appearance

Something valued lost or stolen

Bullying

Violence at work

Violence in the home

Sexual abuse

Being expelled from school

Running away from your home

Being homeless

Participants endorsed the events experienced by responding Yes where appropriate.