Alcohol Consumption Predicts Violent Victimization, Impulsive Decision Making Predicts Violence

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Abstract: *Aims*: First, to assess whether perpetrators of violence are also more likely to be victims of violence in a sample of drinkers who socialize in a city centre night-time economy. Second, to test whether extent of alcohol use and impulsive decision making, both associated with violence and violent injury, are associated with violence and victimization equally.

Design: A cross-sectional street survey conducted in an area characterized by a high density of licensed premises collected data on socio-economic status, gender, alcohol consumption, impulsive decision making and whether respondents had been victims of violence or had perpetrated violence. Impulsive decision making was assessed using a delay discounting task with hypothetical monetary rewards.

Participants: Data from 271 female and 294 male respondents who regularly socialized in the local night time economy were available for analysis.

Findings: Perpetrators of violence were more likely to be victims of violence; impulsive decision making predicted violence whereas alcohol consumption and the frequency that respondents visited the night time economy predicted victimization. Men were more likely to be perpetrators of violence than women.

Conclusions: Heavy alcohol consumption in areas densely populated with licensed premises increases the likelihood of victimization and perpetrators of violence are more likely to disregard the future consequences of their action. Measures that either reduce the impact of drunken behavior or reduce excessive alcohol consumption will reduce alcohol related harm.

Keywords: Violence, victimization, alcohol, discounting.

INTRODUCTION

Alcohol consumption and violence are prominent features of city centre night time economies (NTE): areas characterized by a high density of licensed premises are strongly associated with increased levels of violence and therefore violence-related harm [1, 2]. However, the nature of the relationship between alcohol, victimization and violence in the NTE is poorly understood. Risk factors in the NTE environment, such as crowding [3], alcohol promotions and the poor management of licensed premises [4] may affect individuals' proclivity or opportunity for violence which may be further modified by individual characteristics, such as personality factors [5, 6]. Thus, the NTE environment may mediate the more general observation that perpetrators and victims of violence are likely to be the same people [7]. A better understanding of the relationship between victims and perpetrators will inform interventions designed to reduce harm in the NTE.

Numerous studies have shown that violence-related harm is prominent in the NTE. Research into the relationship between outlet density and violence in North America found that both the socio-economic characteristics of an area and the density of licensed premises within it predicted levels of violence [1], a relationship that generalizes to Australia [2] New Zealand [8] and the UK [9]. However, these studies, while highlighting the need to understand violence in the night time economy, provide no insights into who hits who and why.

Research into the relationship between violence and victimization suggests that the perpetrators of violence are also significantly more likely to be victims of violence: studies specific to male youths, for example, show strong associations between violence, victimization and a range of problem behaviors including impulsive decision making, a form of decision making where the decision maker is more strongly motivated by immediate concerns at the cost of disregarding the delayed consequences of their decisions [10], and substance abuse. Youths who are violent are more likely to be victims of violent crime and tend to be persistent offenders, of low socio-economic status and reside in an urban area [6]. Confirming this relationship, a sample of victims drawn from a hospital emergency department found that victims were more likely to be male and to have had past convictions including woundings, sex offences, robbery, burglary, theft, drug trafficking, drunkenness and assault: 18.1% of 10 to 16 year old assault victims had convictions and 39.7% of 17 to 24 year olds. Moreover, victims of

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violence were statistically more likely to receive a future conviction compared to those who sustained unintentional injuries (e.g. sporting injuries) [7]. Furthermore, analysis of data from the Cambridge Study of Delinquent Development [11] found that fighting after drinking and heavy smoking at age 18 predicted both illness and injury at age 32 [12]. While these studies suggest a strong association between perpetrating violence, being a victim of violence, a proclivity for substance abuse, including alcohol, impulsive decision making and socio-economic status it is unclear whether the same is applicable to the night time economy and how alcohol consumption and impulsive decision making promote violence and victimization.

Socio-economic status, including poverty, will mean perpetrators of violence are more likely to be clustered together and as perpetrators require victims this will also increase their likelihood of victimization simply by mixing with other offenders [13]. Thus the relationship between violence and victimization could be understood through victims and perpetrators living in the same area and sharing social and demographic characteristics [14] rather than shared behavioral and consumption characteristics [15]. The NTE brings together a diverse range of drinkers with different socio-economic backgrounds, consumption characteristics and personalities. If the relationship between violence and victimization is due to socio-economic clustering then the general observation that victims are more likely to be perpetrators may not generalize to the NTE. The first hypothesis investigated in this research assessed whether offending is associated with victimization to the same extent as the studies described above. The second hypothesis centers on the role of alcohol consumption.

Evidence suggesting a relationship between variance in alcohol consumption levels and violence comes from two sources. First, individual level studies show an association between alcohol consumption levels and violence [16]. Moreover, victims' sustaining serious injury are more likely to have consumed more than ten units of alcohol compared to less severe cases [17]. While these studies suggest a relationship between alcohol consumption and both victimization and violence it is aggregate level studies that most strongly report an association between *changes* in consumption levels and violence.

The analysis of aggregate level data systematically indicates a relationship between population level alcohol consumption rates and convictions for violence [18]. Moreover, a positive association exists between the incidence of deaths due to alcohol poisoning and homicides, implying that population levels of consumption correspond with murder rates [19]. Furthermore, levels of alcohol consumption are sensitive to price: as the price of alcohol increases consumption rates decrease. In turn, econometric studies suggest that the price of alcohol is also positively associated with both the incidence of violence in the US [20] and the rate of victimization in the UK [21].

Although aggregate studies imply that factors which change consumption levels will affect a change in rates of violence they are limited in two ways. First, using injury data to infer the rate of violence is only valid if there is a strong correspondence between victimization and violence. While studies suggest there is a statistically significant association

in that victims are more likely to be perpetrators the association is not perfect (not all victims are offenders and not all offenders are victims), it is not clear what role alcohol plays in this relationship and it is not known whether it generalizes to violence in the NTE. Furthermore, the relationship between violence and alcohol can be understood in at least three ways: alcohol makes drinkers more likely to be victimized, alcohol consumption makes prospective offenders more aggressive or alcohol increases both the likelihood of victimization and violence [18]. Second, the use of aggregate measures assumes that violence is a function of consumption at times and places when violence is likely [22]. However, it is likely that the aggregate measure will reflect not only measures of consumption in the NTE but also a bundle of consumption metrics including, for example, household consumption and will not account for gray markets whereby drinkers purchase illegally produced or imported alcohol. Thus the relationship between consumption and whether it motivates violence or victimization is unclear. The second hypothesis investigated here sought to test this relationship with individual level data.

The third hypothesis concerned impulsivity. Impulsive decision making [23] has been one of the most important psychological factors explaining why some people are more likely to offend [6, 24]: perpetrators of violence systematically devalue their futures and are motivated by immediately available rewards even when delaying gratification may yield more substantial returns in the long-term [25, 26]. Discount rates describe the extent that decision makers discount the future when making a decision. Given the choice between $10 now or $100 in three months time a decision maker with a very steep discount rate will subjectively devalue the delayed $100 such that an immediate $10 appears more attractive and therefore opt for the immediate $10. Whereas decision makers with a more shallow discount rate would likely value the delayed $100 as more attractive and therefore choose to defer gratification. Variations in discount rates have been well described: decision makers addicted to substances of misuse yielding particularly steep discount functions [27]. Similarly, alcohol abuse is associated with impulsive decision making whereby the later health effects of alcohol misuse are relatively unimportant compared to the smaller but more desirable anticipated rewards from immediate intoxication [28, 29]. While impulsive decision making is strongly associated with violence and alcohol abuse the relationship between discounting rates, the extent that the decision maker devalues the future, and victimization has not received attention. One of the purposes of the current research is to better understand the relationship between victimization and violence, in particular, factors that may account for the unexplained variance in the relationship between perpetrators of violence and victimization. The third hypothesis under investigation is that discount rates discriminate between victims and offenders: those who care less about the future consequences of violence are more likely to offend.

METHODS

All aspects of the study were approved by the Cardiff University Research Ethics Committee. A street survey was used to collect data relevant to the above hypotheses. This method is preferred as it takes surveys into areas where those

who are most likely to socialize in the city centre are present and captures a cross section of respondents who are less likely to respond to more usual telephone and postal surveys.

Participants

422 men and 428 women agreed to participate, 566 men and 530 women refused. Non-response is typical of such surveys as surveying involves disrupting prospective respondents' activities, something that few would do despite the importance of the research. Previous research indicates that responding is randomly allocated [30]. Of those agreeing to participate, 105 men and 70 women stated that they had never socialized in the city centre and as a group were significantly older (mean = 36.49 years, SD = 13.99) than those who did socialize in the city centre (mean = 29.53, SD = 12.31; t = 6.47, p < 0.001). The top three reasons for not socializing in the city centre were the high price of drinks, crowding, and transport difficulties.

Measures

Violence and Victimisation. Violence is described in two ways. First, instrumental violence usually associated with achieving some goal, or, second, reactive violence in response to some perceived or actual threat. In the survey five questions were asked. For instrumental victimization, "in the past twelve months, has anyone used or threatened violence to get something they want from you? For example to make you give them something or do something." For victimisation where the reason was unknown, "in the past twelve months, has anyone been violent towards you for no reason?" For reactive victimisation, "in the past twelve months, has anyone been violent towards you because you may have provoked them?" For instrumental violence, "in the past twelve months, have you used or threatened violence to get something you want from another adult; for example, to make someone to do something or give you something?" Finally, for reactive violence, "in the past twelve months, have you ever been violent towards someone because they provoked you in some way?"

Estimating Attitude to Time. To the authors' knowledge no street survey had previously attempted to sample respondents' attitude to time. Thus measures were developed and first piloted. This pilot exercise showed that, while participants' responses indicated that they understood the questions where they were asked to place a value on a delayed reward responses were affected by the amount of the delayed reward. For example, the prospect £100 delayed by 30 days elicited equivalence values grouped at £90 whereas asking for the equivalence of £87 in 30 days elicited a near Gaussian distribution of responses. Three questions were constructed: "We often make choices between a prize that we can get hold of immediately and a larger prize we can only get hold of at a later date. These questions will ask you to compare immediate and delayed options. Imagine you had a lottery ticket and had won £87 but would not receive the £87 immediately, instead you had to wait a while before you could cash in the winning ticket". "What is the least amount of money, to the nearest pound, you would sell the ticket for today if you had to wait [D] days before claiming your prize". Values for D were 7, 30 and 90 days. Three delay periods were used so that assumptions underlying attitude to time could be tested. Broadly, attitude to time can be

described as an exponential or hyperbolic function [31]. A characteristic of the latter is time inconsistency, as time to reward increases the rate of discount decreases and comparing answers to the three questions allowed the time inconsistency assumption of hyperbolic discounting to be tested.

Demographics and Alcohol Consumption. A range of demographic measures were collected including age and gender. In addition, educational attainment (classed as 'none', GCSE or o'level, vocational qualification, A'Level, university degree) and whether the respondent smoked were collected. Historical drinking patterns were determined using the Fast Alcohol Screening Task (FAST) [32]. Although there are numerous measures of alcohol consumption the FAST is the most concise, essential for street surveys where respondents will not usually want to invest a lot of time. Moreover, recent research in the vicinity of licensed premises that compared FAST scores with objective measures of consumption (breath alcohol level) in drinkers found that the FAST score significantly predicted the rate of increase in breath alcohol level [33]. As far as the authors are aware this is the only self-report alcohol consumption measure that has been validated in this way.

Procedure

A cross-sectional street survey was conducted in Cardiff city centre in an area characterized by a high density of licensed premises. Surveys were conducted between 5pm and 9pm on Thursdays, Fridays and Saturdays until data from the target 850 respondents were collected. People were approached at random, had the purpose of the study explained and were offered, as an incentive, the opportunity to enter a prize draw with a first prize of £100 if they completed the survey. If they consented then the respondent's contact details were collected on a separate piece of paper. Once all of the surveys were complete a name was drawn at random and winner was paid.

RESULTS

The survey yielded data from 565 respondents who socialized in the city centre (see Table **1**). Of these, 20 claimed to have been violent in the past twelve months and 59 claimed to have been a victim of violence in the past twelve months. A binary logistic equation was used to assess whether violence predicted victimization and yielded a significant association (β = 3.53, z = 6.54, *p* < 0.001) consistent with expectations. However, the relationship was not perfect with only 15 respondents indicating that they had both perpetrated violence and been a victim of violence. Consistent with expectations, a significant relationship between discounting and FAST score was observed (Spearman's ρ = -0.18, *p* < 0.001), those who discounted more heavily yielded higher FAST scores.

The three discounting questions yielded different values (7 day mean = £84.88, SD = 9.65; 30 day mean = £81.23, SD = 14.08; 90 day mean = £78.36, SD = 18.73). A repeated measures ANOVA yielded a significant main effect of delay on value (F(555, 2) = 70.52, *p* < 0.001) consistent with the general hypothesis that decision makers discount future rewards in proportion to the time to that reward. Inspecting the implied 30 day exponential discount rates yielded

inequalities (7 day rate = 0.91; 30 day rate = 0.95; 90 day rate = 0.97) contradicting the time consistency assumption of exponential discounting but in agreement with time inconsistency assumption of hyperbolic discounting [34]. Responses to the three discounting questions were significantly correlated (Spearman's $\rho > 0.50$ and $p < 0.001$ for each comparison) the median (30 day) responses were used as the predictor variable in subsequent analyses as this question had slightly less missing responses than the other two questions. All respondents who answered yes to the reactive violence question had also used violence instrumentally. Binary violence and victimization variables were created coded 1 if respondents answered yes to any of the violence or victimization questions respectively.

A multivariate biprobit model [35] was used to assess the equality of predictor variables for both outcomes. Table **2**, Model 1 presents the unadjusted coefficients for impulsive decision making and alcohol consumption and Model 2 presents results with control variables. Both indicate that that being male, a smoker and impulsive decision making predicts violence whereas having high educational attainment protects against violence. Being male, a smoker, heavy drinking and frequently drinking in the city centre predicts victimization with a modest protective effect of age such that older respondents were less likely to be victimized. Rates of both violence and victimization were low in the current sample and because logistic models can underestimate the probability of rare events the data were reanalyzed with routines that correct for rarity [36]. Models 3 and 4 present separate rare-event logits for perpetrators and victims of violent crime. These models confirm the relationship between discounting and being male with perpetrating violence and confirm the relationship between being male, smoking, greater frequency of drinking in the city centre and alcohol consumption with victimization.

Table 1.   Descriptive Statistics

	Percent or Mean (SD)
Violent	3.54%
Victim	10.44%
Male	52.04%
Age (years)	29.68 (12.57)
Unemployed	5.13%
Education	
University degree or higher	20.18%
None, GCSE or O'Level	30.27%
Smoker	29.03%
FAST	2.60 (3.10)
Discounting (£87 in 30 days)	£78.36 (18.73)
City centre drinking frequency	
More than twice a month	55.40%

Wald tests were used to test the equality of predictor coefficients using Model 2. There was an overall model effect such that the violence and victimization equations differed significantly ($\chi^2 = 28.87$, $p < 0.001$). Although being male significantly predicted both violence and victimization the Wald test indicated that being male was more likely to lead to violence than victimization ($\chi^2 = 4.09$, $p < 0.05$) whereas no significant difference was observed for being a smoker. Critically, and across all four models, discounting rate predicts violence but not victimization whereas the frequency of drinking in the city centre and FAST score predicts victimization but not violence, providing strong support for the hypothesis that victims of violence differ significantly from perpetrators of violence.

CONCLUSION

This paper sought to examine the relationship between two key factors associated with violence and violent victimization: discount rate and alcohol consumption. It was argued that although perpetrators of violence and their victims may share numerous characteristics, aggregate data demonstrating that alcohol consumption predicted violence could be understood in ways other the simplistic notion that those who drink more are more likely to become violent. Furthermore, discount rates have been strongly associated with aggression and violence but have not been assessed with regard victimization. In conclusion, this paper confirms that perpetrators are more likely to be victims of violence in the NTE and extends this observation by showing key differences in alcohol consumption and discounting for victims and perpetrators of violence. We interpret these results as follows. Alcohol has known effects on physical aptitude [30], heightened levels of drunkenness lead to a staggering gait, which may lead drinkers who abuse alcohol to generally provoke conflict through colliding with other drinkers' and that those who react aggressively are impulsive, with little regard for the future consequences of their actions. The view that heavy alcohol consumption leads drinkers to become irritants in the NTE, further enhancing their likelihood of victimization, is consistent with the known relationship between the density of licensed premises and violence [1, 2]: as density increases the physical effects of drunkenness become more acute. If alcohol abuse promotes the likelihood of victimization through causing drinkers to become irritants then this suggests that one means of reducing unwanted physical contact would be to either provide more space for drinkers or reduce the density of licensed premises.

The theory linking drunkenness and violence has recently been developed by Moore and colleagues [3]. These researchers hypothesized that drunkenness and a staggering gait might have bearing on how people navigate spaces in crowded situations. Existing analyses strongly indicates that under normal circumstances emergent phenomena, such as line formation, ease some of the crowd flow problems associated with congestion [37]. However, in their model, when Moore and colleagues introduced even a small number of staggering drunks they found such affiliative behaviours broke down and the effects of congestion were made worse. They reasoned that this might mean drunks become irritants to less intoxicated drinkers and therefore provoke aggression. This work is consistent with the observations made in the current behaviour where heightened alcohol consumption promoted victimization and those perpetrating violence were the most impulsive (presumably those who

Table 2.   Results from a Biprobit Model with Both Violence and Victimization as the Outcome Variables (Models 1 and 2) and a Rare-Events Logistic Model (Models 3 and 4)

| | Model 1 | | | | Model 2 | | | | Model 3 | | Model 4 | |
| | Perpetrator | | Victim | | Perpetrator | | Victim | | Perpetrator | | Victim | |
	ß	z	ß	z	ß	z	ß	z	ß	z	ß	z
Discounting	-0.01	-2.98**	-0.01	-1.61	-0.01	-2.70**	0.004	-1.03	-0.03	-2.99**	-0.01	-1.03
FAST	0.06	1.80	0.08	3.98**	0.02	0.67	0.07	2.93**	0.06	0.82	0.12	2.58**
Male					1.09	3.86**	0.54	3.25**	2.01	2.47*	1.01	3.11**
Age					0.01	0.79	-0.02	-2.19*	0.02	0.94	-0.02	-1.69
Unemployed					0.58	1.49	0.06	0.19	1.40	1.85	0.32	0.58
Education												
High					-0.84	-2.20*	0.08	0.39	-1.35	-1.22	0.16	0.38
Low					-0.35	-1.28	0.10	0.52	-0.62	-1.03	0.15	0.41
Smoker					0.66	2.82**	0.34	2.05*	0.99	1.79	0.61	2.01*
Drink frequency					0.20	0.81	0.55	2.98**	0.46	0.76	0.95	2.65**
Constant					-2.26	-3.81**	-1.61	-3.66**	-3.78	-2.59*	-2.78	-3.25**

Note: * $p < 0.05$, ** $p < 0.01$.

want to get where they are going more urgently). The relationship between cognitive factors, crowding, alcohol and violence should be looked at in more detail as a better understanding of these factors could suggest how changes to the environment might help reduce victimization.

The frequency with which respondents drank in the NTE was associated with an increased likelihood of victimization but not violence. This is broadly consistent with previous studies that have shown drinking in public places, rather than home, increases the risk of fighting [38]. Moreover, a modest relationship between alcohol consumption and discount rate, heavy discounters gave higher FAST scores, is consistent with other work showing that heavy social drinkers also had steeper discount functions [28]. An important characteristic of heavy discounting is that it implies that future selves are also discounted and one interpretation of this is that heavy discounters will be less likely to invest in their future [34]. This may explain why more education reduces future problem behaviors; education is a form of investment in the future self and indicative of less impulsive decision making.

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