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Alcohol 'Pre-loading': A Review of the Literature

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Abstract — Aim: To review the international literature concerning pre-loading (PL); this is drinking before going out to pubs and bars. **Method:** A literature review conducted in May 2013 using the EBSCO database entering the following search terms 'pre-loading', 'front-loading', 'pre-partying' and 'pre-drinking'. Thereafter, the reference lists were checked for further relevant articles. The review consisted of 40 articles of which 11 were excluded because PL was not the primary unit of analysis or they did not fulfil a quality assurance criterion. **Results:** Despite being an internationally widespread development to date, most of the research on this has been from the USA and UK. The majority of US studies have been concerned with PL in a college and high school setting, while the research in the UK has mainly concentrated on the correlation/relationship between PL and what takes place when drinkers enter pubs and bars later in the evening. A consistent finding was that PL is associated with greater alcohol consumption, intoxication and alcohol-related risks. The price of alcohol and achieving intoxication were the main motivations for PL. However, other reasons included a chance to meet members of the opposite sex or own friends in surroundings that encouraged interaction rather than intoxication. **Conclusion:** PL should be regarded as part of a wider drinking culture and understood within the context of what individuals require from a night out or staying in when drinking. There is little evidence to suggest that PL is a risk factor for admissions to accident and emergency services.

INTRODUCTION

Pre-loading (PL) (also known as pre-drinking, pre-partying, front-loading or pre-gaming in the American literature) is the consumption of alcohol at a domestic residence prior to attending licensed premises. To avoid confusion, the term pre-loading is used throughout this paper other than in Table 3 and when describing the literature search methodology. The Scottish Executive (2007) introduced the term into widespread use in the UK.

Wells *et al*. (2009) stated it was mainly undertaken by young people for reasons of cost, to achieve drunkenness quickly and to socialize with friends or reduce social anxiety. The UK Government published its Alcohol Strategy (HM Government, 2012), and referred to the need to tackle PL within the context of addressing 'binge drinking' and heavy episodic drinking in licensed premises in town centres. It cited Hughes *et al*. (2008) who found that pre-loaders drank significantly more alcohol overall than their non-pre-loading peers, and suffered more negative consequences, such as assault, injury and arrest.

Forsyth (2006) expressed concern that some policies designed to reduce alcohol-related harm could inadvertently encourage PL. These include, firstly, duty increases which disproportionately impact on the price of on-sales alcohol, and increase the price discrepancy between this and off-sales alcohol, frequently cited as a motivation for drinking at home (Foster and Ferguson, 2012). Secondly, restricted closing times which may exacerbate a phenomenon termed 'post-loading' (Forsyth, 2006)—drinking after visiting licensed premises. Finally, more rigorous enforcement by door and bar staff that may result in increased confrontation, and more drunk people on the street (Wells *et al*., 2009).

Much of the work on PL has taken place in the USA. This deals mainly with the drinking behaviour of college students, in the context of campus events, residence and fraternity and sorority parties and sporting-event drinking. Work in the UK has concentrated on the interaction between PL and later use of pubs, bars and night clubs, collectively known as the night-time economy (NTE). To date there has been little work on PL from other countries even though it is frequently mentioned on the Internet (Wells *et al*., 2009), and Australian conference proceedings reported young adults drinking half a bottle of vodka, a bottle of wine and six or seven beers before going out (Fry and Dann, 2003).

This review

(a) overviews studies dealing with PL;
(b) identifies trends and patterns and negative consequences of PL and motivations for it;
(c) identifies gaps in the evidence base and suggests future areas for research.

METHODOLOGY

Papers and journal articles were searched using the EBSCO database (includes Medline and Web of Science, among others) entering the search terms 'pre-loading', 'front-loading', 'pre-partying' and 'pre-drinking' as at December 2012. The first two search terms returned a number of false-positives, and were refined to 'pre-loading and alcohol'; 'pre-loading and drinking'; 'front-loading and alcohol' and 'front-loading and drinking' and 'drinking before drinking'.

These search terms returned a total of 33 papers. The references from these papers were checked for further relevant articles not identified by database searches, and of which the authors were not previously aware. This returned a further six papers and one home office report (Engineer *et al*., 2003). Seven were discarded as PL did not form the primary unit of analysis. Next, a quality-control measure for excluded papers was built into the selection process, derived from Cormack (1996), which is presented in Table 1. One paper was

Table 1. Quality-control criteria from Cormack (1996)

Title	Does the title clearly indicate the content of the paper?
Introduction	In the introduction, is the rationale for the study clearly stated?
Literature	Does the summary of the existing literature identify the need for the research proposed?
Hypothesis	Is the hypothesis/research question unambiguous?
Methods	Is the method appropriate to the research question?
Participants	Are the participants clearly identified?
Sample Selection	Is the approach to sample selection clearly stated?
	Is the sample size clearly stated?
Data collection	Are the data collection procedures adequately described?
	Have the validity and reliability of any instruments or questionnaires clearly been stated
Ethical considerations: is confidentiality assured?	
	Is anonymity guaranteed?
Results	Are the results presented clearly?
	Is sufficient detail given to enable the reader to judge how much confidence can be placed on the findings?
Data analysis	Is the approach appropriate to the type of data collected?
	Has the statistical analysis been correctly performed?
	Are confounding factors accounted for?
	Are the statistics fully reported?
Discussion	Is the discussion balanced?
	Are the limitations of the study acknowledged?
	Has previous research been incorporated into the discussion?
Conclusion	Are conclusions supported by the results obtained?

Table 2. Rejected papers and rationale

	Peripheral	Quality control	Comment only
Austin and Knaus (2000)	✓		
Clapp *et al*. (2009)	✓		
Foster and Ferguson (2012)	✓		
Grazian (2007)	✓		
Hummer *et al*. (2011)	✓		
Room and Livingston (2009)			✓
Fry and Dann (2003)		✓	
Thomas (2007)			✓
Wells *et al*. (2009)			✓
Woodyard and Hallam (2010)	✓		
Forsyth (2006)	✓		

discarded because it was only accessible as conference proceedings. Three 'letter to the editor' type comment articles were also rejected, although they were published in peer-review journals. A summary of the reasons for exclusion from the review is shown in Table 2. Thus, in total, the review comprised 40 articles. The search was global but no non-English language papers were obtained.

RESULTS

Summary of findings from US Studies

Most work in the USA has focused upon college and high school students and the findings are summarized in Table 3. In all groups of students PL was associated with prolonged and greater drinking and more at-risk behaviours (e.g. Paves *et al*., 2012).

The study with the largest sample size (Paschall and Saltz, 2007) found that PL was associated with attending parties and greater overall drinking—i.e. it was not a substitute for later drinking however alcohol consumption levels were low. Glindemann *et al*. (2006) tested blood alcohol levels of bar attendees; 70% reported PL, and had higher levels of intoxication and later drinking compared with those who only drank at a bar. The finding that PL was associated with greater levels of intoxication and other high-risk behaviour has been a consistent finding throughout the literature (e.g. Pedersen and La Brie, 2007) and one study reported an association with blackouts (LaBrie *et al*., 2011).

A measuring tool tested the motives for PL and loaded upon three factors: inebriation/fun, instrumental motives and social ease (Bachrach *et al*., 2012). This was consistent with Read *et al*. (2010) where the reasons for PL were cost and obtaining alcohol below the legal age (21). Pedersen and La Brie (2008) confirmed the findings concerning cost but another motive was 'to make the night more interesting'. Males were more likely to mention using PL as a way of meeting members of the opposite sex. Studies with predominantly female students (Pedersen *et al*., 2009; DeJong *et al*., 2010) have shown positive alcohol expectancies were associated with a greater likelihood of PL and a narrowing of consumption patterns (LaBrie and Pedersen, 2008), but both sexes tend to overestimate the amount of PL and overall drinking of their peers (Pedersen and La Brie, 2008).

In Zamboanga *et al*. (2010, 2011) older age and being male was associated with greater drinking and PL in high school students (age range 14–18). For college students the relationship was not as clear. There is a trend for greater PL below the age when alcohol can be purchased legally (21) (Paschall and Saltz, 2007; Read *et al*., 2010);however, Pedersen *et al*. (2009) found no relationship between PL and age, gender or ethnicity. Most studies suggested a link between PL and taking part in drinking games in both college students (e.g. LaBrie *et al*., 2011) and high school students (Kenney *et al*., 2010; Zamboanga *et al*., 2011). Borsari *et al*. (2007) found they were separate constructs and PL predicted intoxication but taking part in drinking games did not, though their sample were students mandated for alcohol-related offences. Mandated students have either breached an alcohol-related policy or experienced a medical incident related to alcohol and, subsequently, have to attend some form of alcohol treatment—usually a group programme. Kenney *et al*. (2010) provided an excellent summary of different types of drinking games.

Non-college studies

Two studies have investigated PL in predominantly non-college samples. Reed *et al*. (2011) randomly selected 1040 'young adults' who drank at 32 bars in a city in Southern California. They were surveyed and breathalysed on entry into and exit from the club. Their findings confirmed the majority of trends from college studies, in particular that PL was associated with heavy drinking and that drinking intentions predicted the level of alcohol consumption and intoxication. Miller *et al*. (2005) surveyed the alcohol and drug use of 240 participants when attending music events at night clubs—over half of their samples were non-students. Sixty per cent drank alcohol before admission; however, the methodology did not investigated where the alcohol was drunk prior to entering the club.

Table 3: US Preloading Studies.

Title:	Sample Size	Demographic characteristics of Sample	Location of Study	Study Methodology	Measures Used	Type of Drink/ Drinking Pattern	Main Findings
Bachrach *et al.* (2012)	Stage 1 (Item Generation) 43 Stage 2/3 527	College Students Stage 1 (74% male) Stage 2/3 (50% males)	Buffalo, New York	Focus Groups and testing of Pregaming Motives Measure (PGMM)	PGMM	Type of Drink: Not Stated. Drinking Pattern: Not Stated.	Loaded on factors: Inebriation/Fun Instrumental Motives Social Ease
Paves *et al.* (2012)	4351	College Students: 60% Females Mean Age = 19.86 (SD = 1.36) 50% White 28% Asian Pacific Islander Americans (APIA) 8% Hispanic/ Latino 3% African Americans. 11% Others 2%	Two West Coast Universities. One large public. One mid-sized private.	Random selection. Internet Survey	1.Pre-partying Behaviour. 2.Daily Drinking Questionnaire (DDQ) (Collins et *al.*, 1985) 3.Rutgers Alcohol Problem Index (RAPI) (White and Labouvie 1989)	Type of Drink: Not Stated. Mean number of PL days over past 30 days: Males: 5.09: Females: 3.81. Mean number of drinks when PL: Males 4.36: Females: 2.99. Mean number of drinks when in single gender groups: Males: 3.86: Females: 2.72. Mean number of drinks when in mixed gender groups: Males: 4.13: Females: 3.06. Heavy Episodic Drinking: – (HED) * Prevalence not reported.	1. The following were the percentages of PL# in different ethnic groups. White (60%) Hispanic/Latino (52%), African American (44%), and APIA (37%). 2. Hispanic/Latino students who PL had the same frequency and consumption levels as white students. 3. Females in all ethnic groups were more likely to PL in mixed gender groups. 4. PL was associated with greater alcohol consumption and alcohol-related harms.
La Brie *et al.* (2011)	2,546	58% Female 58% Caucasian, 20% Asian/ American 63% below aged 21.	Los Angeles, California	Online Questionnaire	1.Socio Demographic 2.Measures of Pre-partying behaviour./ Link to Blackouts. 3.Typical Alcohol Use Behaviour 4. DDQ	Drinks when PL: Shots (70%), Beer (55%), Wine (15%), Mixed (55%). 55% PL 2-5 days over the last 30 days. HED – 35%, Males and 29%, Females (Not restricted to PL).	1. 25% students reported blacking out after PL within past month. 2. The following had significant relationship with blackouts: a) Greek affiliation, b) family history of alcohol abuse, c) frequency of PL, d) drinking games and consuming shots when pre-partying. Males drink more when PL and this effect is heightened as the number of PL days are increased.
Zamboanga *et al.* (2011)	233	High School Students: 51% Female Mean age 16.1 (SD = 1.11) Range: 14-18 76% White	North Eastern US State	Cross-sectional Survey	Measuring Tool designed for the study	Type of Drink: Not Stated. Drinking- level evaluated by AUDIT scores: Mean –current PL- 8.77 v 4.92 not-current PL. HED: Prevalence not reported.	1.PL associated with being a) male b)older c) High level of hazardous drinking d) drinking games. 2. Occurred most often at parties and sporting games. 3. Not a substitute for later drinking.

Continued

Table 3: *Continued*

Title:	Sample Size	Demographic characteristics of Sample	Location of Study	Study Methodology	Measures Used	Type of Drink/ Drinking Pattern	Main Findings
DeJong *et al.* (2010)	112	Undergraduates from 10 colleges 51% Female 82% White	Pennsylvania	Focus Group and Written Questionnaire	1.Drinking Patterns 2.Strategic Calculations 3.Consequences 4. Drinking Motives	Distilled spirits particularly popular – minimal smell helps to avoid detection and can be mixed in water bottles. HED: Described as "rapid fire" "line em up and drink em." HED : 47%, 3 or more occasions over past 2 weeks. (Not restricted to PL).	1. 65% PL in the past 2 weeks-consuming a mean of 4.9 (SD = 3.1) drinks per session. 2. Positive alcohol expectancies were associated with PL, 3. Heavy drinking predicted PL. 4. No demographic variables predicted PL.
Kenney *et al.* (2010)	477	High School Students: 94% 18 years old 66% Females 59% Caucasian	Los Angeles	Online Questionnaire to High School students who were followed up in their first month of college	1.High School Drinking. 2.Pre-Partying and Drinking Game Behaviour. 3.DDQ 4.Brief Young Adult Alcohol Consequences Questionnaire (B-YAACQ)- (Kahler *et al.*, 2005)	Type of Drink: Not Stated. Mean 4.05 (SD = 3.68) days PL during the past month. Mean 3.22 (SD = 1.68) drinks when PL. Mean 5.61 (SD = 4.64) total drinks per drinking occasion (i.e. PL and bar afterwards). 61% of PL reported HED compared to 28% Non-PL.	1.45% of participants engaged in pre-partying. 2 PL associated with greater alcohol consumption and at risk behaviours 3. PL and engaging in drinking games in high school was associated with higher drinking and more at-risk behaviours in the first month of college.
Read *et al.* (2010)	159	Students from Introductory Psychology classes. 52% Female Age 18-24	Buffalo, New York	Self-report measures of pre-gaming and other drinking variables	1.Alcohol Use – Time Line Follow-Back (TLFB) Sobbell and Sobell (1995) 2. Estimated blood alcohol concentration. 3. Alcohol Consequences (Young Adult Alcohol Consequences Questionnaire (YAACQ) (Read et al., 2006) 4.Pregaming Practices 5. Pregaming 6. Drinking Motives Questionnaire (DMQ) (Cooper 1994)	Type of Drink: Not Stated. Mean number of PL occasions was 5.20 (SD= 4.26) days over 60 days. 31% of drinking occasions included PL. Mean 4 (SD= 1.73) drinks consumed when PL: Typically 40% of a drinking occasion. PL drinks per occasion (Mean 7.3, SD= 2.84) Non PL (Mean 4.9, SD= 1.96) $p < 0.0001$ HED: Prevalence not reported.	1.Two-thirds of the sample PL 2. Younger age was associated with PL. 3. Reasons for PL were saving money and obtaining alcohol when under 21.
Zamboanga *et al.* (2010)	1327	College Students who reported they drank alcohol (75% Females) Mean Age 20.15: (SD = 3.28) Ethnically diverse sample 57% White	Nine Colleges from across the US	On-line Survey	1.Pregaming 2.AUDIT (Saunders et al 1993) 3. Drinking Games Participation 4. Alcohol Expectancies – Brief Comprehensive Effects of Alcohol Scale (Ham et al., 2005)	Type of Drink: Not Stated. PL associated with hazardous drinking in drinkers regardless of legal status. HED: Prevalence not reported.	Positive but not negative expectancy outcomes were associated with greater PL and participation in drinking games. These finding were consistent across age and gender.

Pedersen *et al.* (2009)	444	57% Female Mean Age 19.51 (SD = 1.36) 54% Caucasian 18% Hispanic/ Latino	Washington and other campuses across the US	On–line Survey	1.Drinking frequency and quantity in past one month. 2.List of contexts where pre-partying could take place. 3. Reasons for pre-partying. 4. B-YAACQ	Type of Drink: Not Stated. Number of days PL over 30 days, no difference between Males and Females (Mean 3.38, SD= 3.64). Males drank more than Females when PL. Males (4.68, 2.12, Mean, SD): Females (3.26, SD = 1.50) $p < 0.001$. HED: Prevalence not reported.	1.Arriving under the influence at a social place in both genders was commonplace. 2. Main reasons for PL was saving money and making the night more interesting. 3. Males were more likely to mention sexual facilitation than females. 4. Greater amount of PL in students under 21.
Pedersen and La Brie (2008)	524	College Students Females 61% Mean Age 19.37 (SD = 1.31) 51% White 18% Hispanic Latino	Los Angeles	On-line Survey	1.Drinking frequency and quantity in past one month. 2. Actual and perceptions of Pre-partying/student drinking behaviour during the past month	Type of Drink: Not Stated. Mean 2.71 (SD = 3.50) days spent PL over past 30 days: Males (3.07, 3.71, Mean, SD) Females (2.48, 3.34, Mean, SD). Drinks on PL occasion: Mean 3.91 (SD = 1.94). Males (4.76, 2.14, Mean, SD). Females (3.29, 1.51. Mean, SD). HED: Prevalence not reported.	Both genders overestimated the amount of PL and drinking behaviours in all students.
Paschall and Saltz (2007)	10,152	Students from 14 Californian public universities Majority under 21 White (55%) Equal gender split.	California	Web-based or mail survey	1. Questions concerning drinking before and after events such as sporting events and different types of student parties. 2. Alcohol Expectancies	Type of Drink: Not Stated. Low drinking levels reported: Less than a mean of 1 drink prior to event and 2 drinks at the event over three hours. Events: off- campus parties (35%), bars/restaurants (19%), fraternity parties (14%), outdoor settings (12%), residence hall parties (11%) and campus events. HED levels were low.	1. Drinking before an event was associated with fraternity or sorority parties. 2. PL drinking was not at the expense of drinking before the event. 3. Differences in age and gender patterns. 4. Students under legal age consumed more alcohol before attending events
La Brie and Pedersen (2008)	238	College Students 60% Female Mean Age 19.51 (SD = 1.32) 54% Caucasian 21%: Hispanic/ Latino	Los Angeles	Online survey	1.Drinking frequency and quantity in past one month. 2.Assessment of most recent drinking event: pre-partying and non-prepartying	Types of Drinks: Not Stated. Rapid binge drinking patterns reported: Leading to greater risk for female students. When PL- Mean number of drinks, Males (4.85, SD = 2.61) v Females (3.45, SD= 1.91) $p < 0.001$. HED: Prevalence not reported.	1. PL associated with greater drinking behaviour and adverse alcohol-related consequences for both genders. 2. Females drink more drinks on PL days

Continued

Table 3: *Continued*

Title:	Sample Size	Demographic characteristics of Sample	Location of Study	Study Methodology	Measures Used	Type of Drink/ Drinking Pattern	Main Findings
Pedersen and La Brie (2007)	227	College students on introductory psychology courses 60% Female Mean Age 19.05 years (SD = 1.18)	Los Angeles	On-line survey	1.Questions relating to Drinking behaviour 2.RAPI 3.DMQ 4.TLFB	Male students preferred beer while PL Females preferred shots of liquor. Females also more likely to have a mixed pattern of drinking PL associated with HED for both genders. 72% Male and 68%, Female events involved HED. For both genders- 80% of all PL occasions involved HED. Number of drinks on a PL day. Males (8.15, 3.91, Mean, SD), Females (5.76, 2.83, Mean, SD) PL associated with greater drinking for both genders.	1. 45% male student events and 55% of events involved PL in past month. 2. Associated with more all day drinking and adverse alcohol consequences. 3. Minimal gender differences in reasons stated for PL. 4. PL associated with social reasons for drinking
Borsari *et al.* (2007)	334	Mandated students who had been referred for an alcohol violation. 63% Male 95% Caucasian 66% Freshmen Mean Age 18.6 (SD = 0.86)	Providence –Rhode Island	Survey as part of a larger Randomised Controlled Trial	1.Alcohol and Drug Use Measure (Borsari and Carey 2000) 2. B-YAACQ- 3. Event Description Measure (Monti *et* al., 1999)	Type of Drink: Not Reported. PL associated with high BAL. Drinking frequency during previous month Number of days. Mean 11.0 (SD = 6.36)-PL significantly more than non PL (p = 0.05). Heavy drinking days for PL, Mean 8.62 (SD = 4.93). Difference between PL and Non-PL - not significant. Typical number of drinks per occasion for PL. Mean 7.43 (SD= 3.02). Difference between PL and Non-PL - not significant. HED: Prevalence not reported.	1. PL and taking part in drinking games are separate constructs. 2. PL was a unique predictor of intoxication.
Glindermann *et al.* (2006)	1,528	Pedestrians in a downtown area 72% Male 85% Students Mean Age 21.8 (Range 18-59)	Blacksburg, Virginia	Blood Alcohol Levels (BAC) collected by breathalyzer	1.BAC 2.Downtown Drinking Questionnaire designed for the study.	Types of Drink: Not Stated PL associated with HED. HED: Prevalence not reported.	1.69% reported PL and going out to a bar. 2. PL and consuming alcohol in a bar associated with higher levels of intoxication compared to front-loading or bar only. 3. No relationship between PL and legal age of drinking. i.e. 21. 4. Males PL more than women and consumed more alcohol in bars.

PL includes, pre-loading, pre-gaming, front-loading, and pre-partying.
* HED defined as 5 or more US drinks on one occasion-: Males and 4 or more drinks on one occasion-: Females (0'Malley and Johnson, 2002).

Burger *et al*. (2011) conducted a small-scale study of $n = 89$ female students to examine the impact of being given normative PL information. Data were collected at baseline and participants assigned to one of three conditions: (a) control (b) normative only and (c) gender-specific norms. There was a tendency to overestimate PL consumption and being provided with normative information was associated with less PL; this was marked in group c.

UK pre-loading studies

The main findings are presented in Table 4. The samples tended to be small and to use qualitative methodologies, whereas the US studies utilized more surveys with online data collection being the favoured method. The majority of US studies were from college populations; in contrast the UK studies tended to be concerned with the impact of PL when entering the night-time economy (NTE). A consistent finding in both the US and UK studies was that PL was associated with excessive drinking, intoxication and adverse alcohol-related consequences.

Barton and Husk (2012) found a shift from 'pub-club' to 'home-pub-club' drinking and significant 'flash-points' for violence such as when waiting to go into a club when PL entered the NTE. Hughes *et al*. (2008) found that PL was associated with more alcohol consumption, greater chances of getting into a fight and being sexually molested. PL and 'Post-loading' was also described by Engineer *et al*. (2003). Post-loading is drinking at home after having been to a pub or club. The post-loading discussion referred to female interviewees who described going to strangers' houses and taking part in at-risk sexual behaviour that they would not have done if they had not been drinking.

Although the UK works have tended to use methodologies that make generalizable conclusions difficult, unlike the US studies they have considered groups other than college students; however, a study with university students in the UK found a PL prevalence rate of 60% (Hammersley and Ditton, 2005). Ritchie *et al*. (2009) found that PL and general drinking behaviour changed on leaving university as the students started work and took on greater responsibilities. The participants described two types of PL, first 'yarding', which is drinking a bottle of wine in one go, and second drinking at home to promote safety by reducing the amount consumed. PL was more common in non-graduates and older graduates and although cost was a factor for the older groups (24–29 years), the opportunity to socialize in a quiet environment with friends was also important. Holloway *et al*. (2008) surveyed PL patterns in a group of residents representative of 2001 census data (i.e. older profile than Ritchie *et al*., 2009), 40% described PL and 23% post-loading within the past 7 days. In a semi-structured interview a female interviewee (25–34) reported PL to meet friends and relax before going out. The importance of both these studies is that they confirm that PL is not restricted to young drinkers.

There were two other UK studies conducted with, first, street drinkers (Galloway *et al*., 2007) and, second, accident and emergency attendees (Boyle *et al*., 2010). PL was common in street drinkers and the main motivation was cost; most alcohol was purchased in off-licences rather than in supermarkets. In Boyle *et al*. (2010) PL was infrequent in accident and emergency attendees and women were more likely to PL than men.

Pre-loading studies in non-UK/US settings

Three other studies examined the relationship between alcohol consumption/other related problems and PL. A Swiss study (Labhart *et al*., 2013) asked participants ($n = 183$) young adults (53% women, mean age = 23.31 (SD = 3.1) to record their drinking behaviours via their mobile phones on different evenings (1441 events in total). PL was associated with heavier alcohol consumption and more adverse consequences. Miller *et al*. (2012) in the 'Dealing with alcohol-related harm and the night-time economy' (DANTE) study used secondary data sets from accident and emergency departments and the police, key informant interviews, observation of venues and a community survey in the form of a computer-assisted telephone interview. Bar owners consistently reported PL as a challenge for them in terms of management of intoxicated customers and lost revenues and the report confirmed that 'drinking before going out was shown to be a major predictor of harm in the night-time economy'. The same group (Miller, 2013) has published the 'Patrons Offending and Intoxication in Night-Time Entertainment Districts (POINTED) study. Patrons ($n = 6804$) were interviewed entering bars and clubs between 10 pm and 3 am on Friday or Saturday night in Geelong, Melbourne, Perth, Sydney and Wollongong. Sixty-five per cent reported PL and this was most common in 18–19-year-olds (67%). The main motive for PL was price (61%) though 22% reported PL for social reasons such as 'fun' or 'to catch up with friends'. PL was the strongest predictor of intoxication and encountering harm.

DISCUSSION

The main finding was that for young people PL should be seen as a supplementary form of drinking. Young people who PL are more likely to drink excessively, become intoxicated and encounter more alcohol-related problems than those who do not. Whether this finding extends to older groups is an area for further exploration. PL presents a challenge for policy makers who focus upon price being the main motivation for PL, but the works on college populations in the US and non-graduates in the UK confirm that one of the reasons for PL is to provide an environment for socialization and conversation, and any interventions to reduce this may have to concentrate on replacing it with something equally meaningful.

American work is almost exclusively focused upon college and high school students. PL was associated with greater alcohol consumption and alcohol-related harms, and, although a separate construct, an important mediating factor was taking part in drinking games. While one of the drivers for PL is cost, other factors such as meeting members of the opposite sex and socialization are also key. Students tended to overestimate the amount others are drinking during PL but providing normative information reduces PL, especially when gender-specific information is targeted at young women (Burger *et al*., 2011). It is difficult to generalize the US findings, due to major differences in drinking, university and youth culture and not least because the legal age for purchasing alcohol is 21 years of age (Read *et al*., 2010). In the US there is a tendency to adopt

Table 4: UK Preloading Studies.

Title:	Sample Size	Demographic characteristics of Sample	Location of Study	Study Methodology	Measures Used	Type of Drink/ Drinking Pattern	Main Findings
Barton and Husk (2012)	597	Arrestees Age Range 17-55 68% 17-30. 78% Males 43% Unemployed	Plymouth	1.Questionnaires delivered by police officers- 2. Brief interview prior to release. 3. Semi-structured interviews with arrestees and night club security personnel	Structured questionnaire concerning the relationship between drinking patterns, violence, and commission of presenting offence.	Lager/Vodka and Wine (though different amounts not reported). Many participants reported being drunk before entering NTE. Binge Drinking:* Prevalence rates were not reported.	1. There is a shift from "pub-club" to "home-pub-club" drinking. 2. PL was associated with excessive drinking and individuals being intoxicated before entering the Night-Time Economy (NTE) 3. PL was associated with violence and flash points whilst attempting to get into a club/bar or at a taxi rank. 4. Cost is a driver for PL. 5. Average spent per night £50-PL ranged from £6-15. 6. Most preloaders enter the NTE 10.30-11.30. and drink heavily
Boyle *et al.* 2010	1,079	58% Male Mean Age: 32 (Range 16-84) 98% Caucasian	Cambridge	Cross-sectional survey at peak times in an Accident and Emergency (A&E) department	1.Screening question. 2. Question whether alcohol consumed within past 6 hours. 3. Where alcohol was drunk prior to presentation at A&E	Type of Drink: Not Reported. Alcohol Consumption Levels and Patterns: Not Reported.	1. 15% suffered an alcohol related problem. 2. PL was not associated with A&E presentation. 3. Women (27%) more likely to PL then men (14%).
Ritchie *et al.* (2009)	120: 30 in each group	Four groups of young people: 18-23: Undergraduates/ non-graduates at work 24-29 Graduates/ non-graduates in work. Even gender balance	Cardiff	Self administered questionnaires and follow-up interviews with representatives from each group	Questions concerning drinking behaviours and patterns in particular venues of drinking and reasons for choosing them.	Type of Drink: Not Reported. Male Student drinkers 18-23 highest overall consumption (Mean 70+ units per week) Lowest Consumption: Non Graduate 27-29 (Mean 28 Units per week) Females: Highest overall consumption Graduates 24-29 (Mean 35 Units per week) Lowest Non-student 18-23 (Mean 26 Units per week) PL rates not reported. Binge Drinking: Prevalence rates were not reported.	1.Drinking behaviour of students changes on leaving university as they enter work and take on responsibilities. 2. Different patterns of PL – a) "yarding"-drinking a bottle of wine in one go b)drinking at home because it is cheap and promotes safety- often only consuming one drink or soft drinks when entering the NTE. 3. Main reasons for PL were cost and getting drunk. 4. Most common in non-graduates across both genders. 5. Older participants saw preloading as an opportunity to socialise with friends in a quiet environment.

Holloway *et al.* (2008)	1139 residents 63 in depth interviews	Residents using a stratified random sample based on 2001 census data Representative in terms gender and social class. Difficulty in recruiting younger people due to their tendency to rely on mobile phones.	Eden (Cumbria) and Stoke on Trent	Telephone interviews and thereafter in depth interviews (representative in terms of class, age and gender)	Questions concerning attitudes to and consumption of alcohol including how much drink takes place at home within the past 7 days	Qualitative Interview: Female 25-34 described typically at 2pm. "Opening the wine, then the vodka and if we are feeling cheeky a couple of alco-pops before going out- and continuing to drink after having been out." Binge/Heavy Episodic drinking over an extended period. 50% of residents survey drinking over safe limits (34% dangerously over safe limits).	1.40% of residents sample described preloading within past 7 days 2.23% of residents described drinking at home after going out. 3. Female interviewee (25-34) described PL taking the form of meeting friends, helping her relax and then going out.
Hughes *et al.* (2008)	380	Young People 52% Males Mean Age 24.3 61% aged 18-24. 70% Employed, 28% Student.	City in the North-West England	Cross-sectional survey in bars and clubs.	Anonymous questionnaire; quantities of alcohol consumed prior to and during a typical night out and negative consequences encountered during the past year	Type of Drink: Not Reported. 38% of total nights drinking consisted of PL for Females and 25% for Males. Mean Units consumed when PL: 6.9 (No significant gender difference but females consumed more when PL) Mean Units consumed in bar or night club 16.2. Males consumed significantly more (20.1 (Males) v 12.0 (Females) $p < 0.001$). Binge Drinking: Described but prevalence rates were not reported.	1. 58% of sample PL before entering the NTE. Not a significant gender difference. 2. PL was associated with greater drinking levels. 3.Individuals who PL were 4 times more likely to state they drank more than 20 units and 2.5 times as likely to be involved in fight or sexually molested on a night out.
Galloway *et al.* (2007)	98 street drinkers	Males 70% Age Range 16-25	Glasgow city and surrounding area	24 Spontaneous Focus Groups 5.30-9.30pm	Themes of focus groups Problems associated with street drinking Reasons for street drinking Location of street drinking Source and method of supply of alcohol	Drinks that were cheap, strong and had a pleasant taste. Such as Buckfast Tonic/Fortified Wine#, White Cider, Strong Lagers (ABV > 8%), Vodka and cheap Whisky. Drinking pattern and amounts not reported though the explicit aim was to get as drunk as possible.	1. PL was frequent and the main reason for this was cost. 2. Most alcohol was purchased in off-licenses rather than large supermarkets.
Hammersley and Ditton (2005)	291	University Students Males 51% Age Range 16-25. 53% < 20 years 47% 21-25	Northern City	Student Interviewers approached interviewees in city centre licensed premises. Mean time of interview 9pm. Night likely to end at 1am	How much alcohol drank a)before going out b) since leaving home c) how much alcohol they expected to drink over the night	Type of Drink: Not Reported. Mean number of units drank before going out: Males 2.76 (SD = 3.25) Females 1.85 (SD = 2.08)-not significant. 60% drunk at cut-off for binge drinking (i.e. 4 units) prior to interview 4-5.9 Units: 24% 6-7.9 Units: 12% 8.8.9 Units: 10% 10-19.9 Units: 6% 20+ Units: 1%	1. 60% reported drinking before going out. 2. Tended to drink more slowly when PL compared to drinking in licensed premises. 3. No significant correlation between drinking rate before going out and at time of the interview.

Continued

Table 4: *Continued*

Title:	Sample Size	Demographic characteristics of Sample	Location of Study	Study Methodology	Measures Used	Type of Drink/Drinking Pattern	Main Findings
Engineer *et al.* (2003)	16 Focus groups 123 participants in total	Age Range 18-25 Males 51% Manual/Non-Manual workers and students.	Eight locations across England and Wales	Focus Groups with young people who were regular binge drinkers and many had experienced alcohol-related crime and disorder whilst drinking.	Focus groups with themes experiencing the following experiences: "Offending" "Victim" "At risk"	Type of Drink: Not reported. Focus of the study was upon binge drinking but prevalence or consumption rates were not reported.	1.PL was not the main focus of the study. 2. PL was associated with drinking quickly before going out. 3.Post-loading was also described. i.e. drinking after going to pub, bar or club. It could involve going to a strange persons house and for women could constitute at risk sexual behaviour.

* Binge Drinking defined as drinking at least 8 (male) or 6 (female) units in one "session" of drinking. 8 grams of alcohol equates to 1 UK unit. (NICE, 2011; Department of Health, 1995).
# Tonic Wine with an ABV of 15% and high caffeine content.

proscriptive solutions that may not be possible in other cultures. These include room searches (in most cultures students are regarded as independent adults and alcohol is a legal beverage for those 18 years or over) and the banning of drinking paraphernalia. In some US circles these restrictions are seen as counter-productive and the Amethyst Initiative (Amethyst Initiative, 2008), an organization of US college presidents and chancellors, has been formed to campaign for a reduction of the age alcohol can be purchased in the US because a 'culture of dangerous off-campus, clandestine binge drinking has developed'.

Work from the UK has concentrated on the link between PL and entering the night-time economy. PL is associated with greater drinking and more alcohol-related consequences, but it also suggests a complex picture, albeit in studies with small samples and less generalizable methodologies. Ritchie *et al.* (2009) lay down a challenge for US researchers because the findings indicate that PL behaviours differ markedly on leaving college and university as individuals take on more responsibilities at work and in relationships. Another contribution of the UK literature is to confirm that PL is not just confined to young people. The UK Government (HM Government, 2012) regards PL to be driven largely by price despite the fact that more money was spent in the NTE (Barton and Husk, 2012) and more alcohol was consumed in the NTE than in PL (Hughes *et al.*, 2008). Both the US and UK studies indicate another motivation is to encourage socialization, and while getting intoxicated is frequently one of the aims, this is not always the case, especially in non-college populations. There have also been two large-scale studies from Australia (Miller *et al.*, 2012; Miller, 2013) which confirm the high incidence of PL in young people and the association between PL and encountering harm, but also point out the loss of revenue for bar owners as the practice has become more widespread.

Methodological issues

PL takes place in private and is a difficult subject to research. The studies that have been conducted in the UK can be criticized on the grounds that methods have been used where it is not possible to reach generalizable conclusions. A number of US studies have used randomly selected samples and larger sample sizes but they have almost exclusively been focused upon student populations and, as previously discussed, PL is not restricted to students. Attempts have been made to collect data that allow for participant confidentiality, such as completion of survey data on the Internet (e.g. Paves *et al.*, 2012), but this is based on retrospective recall. A Swiss group of researchers (Labhart *et al.*, 2013) attempted to address this by the use of mobile phone technology. However, both data collected over the Internet and mobile phone are reliant on self-report and the participant may be intoxicated. Thus, one of the chief tasks of researchers is to develop methodologies that collect contemporaneous data that can be corroborated in a robust manner.

Pre-loading in context.

University of Mitchigan (2012) found that the percentage of individuals who have drunk five drinks in a row at least once over the past 2 weeks has fallen among 8th grade (ages in brackets) (13–14), 10th grade (15–16) and 12th grade (17–18)

students from 1990–2011. Heavy drinking rates in college students have been stable for 30 years but alcohol-related problems have increased (Hingson *et al*., 2009). We suggest that there are lessons for the US from other cultures. In addition to concentrating on positive and negative alcohol expectancies, it may be beneficial to understand the symbolic importance of alcohol to US college students as in many other cultures consuming alcohol is legal at an equivalent age.

International comparisons as to what constitutes a drink and binge drinking are difficult. In the UK most research studies use the term unit, which is equal to 8 grams of alcohol (Department of Health, 1995). International Center for Alcohol Policies (ICAP, 1998) provides international comparisons for how many standard drinks are included in 500 ml of 5% ABV beer. This is 2.5 in the UK, 1.4 in the US and 2.0 in Australia. PL is seen as an activity undertaken by young people and has been linked with binge drinking. The NHS definition of binge is 'drinking heavily in a short space of time or to feel the effects of alcohol' (National Institute of Clinical Excellence, 2011) (NICE). The same guidelines equate this as twice the recommended daily guidelines for sensible drinking–thus the cut-off point for binge drinking in males is 8 units and in females 6 units in one 'session' of drinking. For the US the NIAAA (2004) definition of binge drinking is 5 US drinks for males and 4 for females consumed over about two hours. A number of US studies use the term Heavy Episodic Drinking (HED), which has the same cut-off points as the US cut-off levels for binge drinking (O'Malley and Johnson, 2002). In Australia (Australian Government National Health and Medical Research Council, 2011) there is reluctance to provide cut-off points as binge drinking 'means different things to different people', but they suggest that a single occasion of drinking constitutes a binge.

There is evidence that young people's alcohol consumption in the UK is on a downward trend. Health and Social Care Information Centre (2011) show a fall of 14% in 11- to 15-year-olds who drank alcohol in the previous week, and binge-drinking levels using the UK definitions described previously have also decreased from 2005 to 2010. For women (16–24 years old) the fall was from 27% to 17% (10%) and for men (16–24 years old) the reduction was from 32% to 15% (2005) and to 17% (2010). These trends are reflected in UK universities; a recent newspaper article has dubbed many students 'The New Puritans' (Mc Veigh and O'Neill, 2012)—although it is important to note they have reduced, not stopped, their drinking.

The reasons for these changes are varied; possible explanations are lack of disposable income, and the fact that alcohol now has far more competition for leisure time from other leisure pursuits such as the Internet and social networking, though it is still possible to drink during these activities. There have also been more initiatives such as greater sanctions for selling alcohol to individuals under 18 (in the UK 18 is the legal age to purchase alcohol). Furthermore, public health information and alcohol education may also contribute to this shift. Pubs/bars may be less appealing to young people than in previous generations and no longer provide what many young people want. Research should ascertain what young people mean by socializing and the role alcohol plays in it. To survive, pubs and bars may have to move towards becoming multi-purpose premises and selling just alcohol and food may be of lesser importance than finding other ways of attracting users. Moving towards an Internet café/coffee shop model (especially during day time hours) and a more traditional pub/bar model in the evening may attract users who currently rarely frequent pubs/bars. Licensing authorities could drive this idea forward, assuming that it is regarded as a commercially viable proposition for potential licensees.

The trends reported by Mc Veigh and O'Neil (2012) are not universal. Warwick *et al*. (2009) interviewed 82 young people under 18 who confirmed that alcohol was a key factor when socializing with their peers. These findings have recently been confirmed by Percy *et al*. (2011). Seaman and Ikegwuonu (2010) considered drinkers aged 18–25 using drink diaries and focus groups in a total sample of 80. Excessive alcohol consumption was regarded as the norm and PL was seen as commonplace and being about achieving 'the right level of drunkenness' to enjoy the bar or club. Another motivation for PL was 'to catch up' in a situation more conducive to conversation, and comments were made concerning a 'partial resistance to the type of alcohol culture on offer in bars and clubs'. There has also been a focus upon binge drinking, risk and young people in Australia. A report written for Drinkwise Australia (Roche *et al*., 2008) focusing upon drinkers aged 14–24 found that the main driver of alcohol consumption in this group was 'pleasure and hedonism' and that the following were among the factors associated with greater risk: bringing one's own alcohol, drinking games and PL.

Pre-loading and policy

The UK strategy document (HM Government, 2012) presents itself as focusing upon the problems caused by visible binge drinking though its main headline was the introduction of a minimum unit price (MUP) for alcohol, which is a measure designed to reduce drinking in the general population. This impacts upon PL and one author suggests a target of MUP is home drinking (Foster, 2012). The impact of the MUP is to reduce the price gap between alcohol purchased in the supermarket or off-licence and at the pub/bar or restaurant. The strategy also proposes to consider restricting the sale of discount alcohol and this too is likely to have an impact on PL. Although the level of the MUP is still to be fixed, it is likely to be 45p (UK) (0.53 Euros) (0.68 US$). Not surprisingly, this proposal has been received negatively by many sectors of the alcohol industry and, to date, fierce lobbying has taken place. In July 2013 the Coalition Government announced the MUP and banning multi-buy promotions was no longer government policy in England and Wales. Instead alcohol cannot be sold below the cost of duty and tax (BBC News Politics, 2013a,b). In Scotland a bill has been passed proposing to introduce an MUP of 50p (0.59 Euros, 0.76 US $) though this has not received Royal Assent due to legal challenges from the Scottish Whisky Association (SWA), European Spirits Association (ESA) and EU wine-producing countries, notably Italy, Spain and France (EU) (BBC News Scotland Politics, 2012). The legal challenge from SWA, ESA and EU has been rejected (Judiciary of Scotland, 2013) and they are now appealing against this decision at the European Court of Justice.

A form of MUP has been in operation in British Columbia (Canada) and an evaluation tracking prices changes from 1989–2010 found that a 10% price increase reduced alcohol consumption by 3.4% and was associated with a 32%

reduction in alcohol-related deaths (Stockwell *et al*., 2012; Zhao *et al*., 2013). The National Institute on Alcohol Abuse and Alcoholism (NIAAA) has called for an initiative to address binge drinking in US colleges and universities (including PL and drinking games) (NIAAA, 2002). It stresses the importance of a continuing research programme and designing interventions that are based on scientific evidence. The Australian Ministerial Council on Drug Strategy (2006) has produced a National Alcohol Strategy (now operational until 2011). It is a result of collaboration between the Australian government, non-governmental organizations, the alcohol industry and wider community and has four main aims: reduction of intoxication, enhancing public safety, improving community and individual health outcomes, and developing a healthier culture surrounding alcohol. Australian Government Preventative Health Taskforce (2008) builds upon this and stresses addressing the 'binge drinking epidemic' in young people, whom it defines to be in the age group 12–24, and there is now a 'National Binge Drinking Strategy' (Australian National Preventative Health Agency, 2008). The two reports referred to earlier (Miller *et al*., 2012; Miller, 2013) have included findings concerning PL and are part of a body of work designed to address the Australian binge-drinking culture.

Future research

Price considerations are of importance but they are not the sole driver for PL, and motivations such as providing a space for socializing (that by implication is not provided by pubs/bars) may be of equal importance. To understand PL, it has to be seen within the changing cultural context within which it is taking place, and the priority of researchers should be to understand what different groups want when socializing. This should include further research on how pubs can be designed and run so that they become attractive and safe places for all potential users but especially for young people. Bremner *et al*. (2011) have confirmed the importance of parents as role models to promote responsible drinking practices in young people. Research should investigate whether 'intelligent pre-loading' could be promoted by involving parents or other adults.

Drinking patterns and the types of drink consumed are likely to be associated with different age groups, genders and the likelihood of encountering risks. Few papers reported the type of drinks being consumed and while statements were made about binge drinking or HED, the prevalence was rarely reported. Another frequent omission was the length of time of the drinking episode (both PL and later drinking). It should be standard practice to collect information concerning the beverage type and prevalence of binge drinking/HED and length of time of the drinking episodes in PL studies.

Although PL is assumed to be associated with binge drinking, the study with the largest sample (Paschall and Saltz, 2007) reported comparatively low alcohol consumption levels. While PL is most commonplace among young people, it is not restricted to young people, and future work should be expanded beyond the UK, US and Australia and across different age bands. Gender is also an area that should be investigated in greater depth as there is some evidence that PL is more popular in females (Hughes *et al*., 2008) and this effect may be even more pronounced in the 30-yearplus groups (Holloway *et al*., 2008). Finally, much of the work that has explored PL and young people's drinking in general has used qualitative methods. Drinking in young people is complex and there appears to be many subgroups with differing patterns. While the drive towards obtaining in-depth data is to be applauded, it risks providing information that may not be generalizable. There is also a need to conduct robust surveys that capture drinking and PL behaviours in larger, preferably randomly selected samples.

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