The initial measurement structure of the Home Drinking Assessment Scale (HDAS)

Abstract

Aims: To evaluate the initial psychometric properties of a novel Home Drinking Assessment Scale (HDAS)

Participants: Five-hundred and twenty-five (58% female) participants recruited from the internet address book of an English University. This also included a sub-sample (6%) recruited from twitter and facebook contacts.

Design and Methods: Internet-based survey analysed using a two-stage factor analysis protocol and internal consistency (IC) assessment.

Findings: A power calculation was made on the basis of pilot data and this established that 317 interviewees were required to test the reliability of the HDAS. The items comprising the HDAS were found to offer the best fit to data when they comprised two-subscales, (1) *emotional reasons for home drinking* (5-items) and (2) *practical reasons for home drinking* (3-items). Subscale 1, was found also to have acceptable IC whereas subscale 2,exhibited sub-optimal IC characteristics.

Conclusions: This initial study indicates the HDAS has promise as a measure of the individuals' rationale for home drinking. Subscale 1, may usefully be used in future research whereas the IC characteristics of subscale 2, suggests that further development is required, including the evaluation of additional items.

Keywords: Alcohol; Alcohol-related harm; Behavioural assessment; Cognition; Home drinking;

Introduction

Per capita consumption has been falling in the England and Wales steadily since 2004 (Alcohol Policy UK, 2009). However the context in which alcohol is consumed has changed markedly over the past 30 years and arguably the most fundamental shift is greater consumption of alcohol at home. The Living Costs and Food Survey revealed that from 1992 until 2012 there was a 33% increase in the amount of alcohol purchased for home consumption. This was accompanied by a fall in alcohol-related on-trade sales of 42% from 2002-2011 (Health and Social Care Information Centre, 2014). Figures for 2013-2014 from the British Beer and Pub Association based on data from CG Nilesen showed that in the UK, 80.7% of wine is consumed in off-sales and the equivalent figures for spirits, ciders and beers are 77.9% and 62.3% and 49.8% respectively. Finally the percentage of Ready to Drink spirit beverages such as the breezer/Ice drinks purchased through off-sales was 58.5% (British Beer and Pub Association, 2014). Men are more likely to purchase alcohol in a bar, public house or restaurant, but there is little difference in the amount of alcohol purchased at supermarket between men and women (Lader and Steel, 2009).

Home drinking was not referred to in a policy document until the second national alcohol strategy (Home Office, 2007). There is a complex relationship between alcohol and social class/occupation/deprivation. Individuals who are employed are more likely to be drinking above the recommended guidelines for sensible drinking (Department of Health, 1995) than those who are “economically inactive.” Drinking at home is more likely in higher income groups and there have been a number of national newspaper articles which have suggested that home drinking is now having a significantly adverse impact on “middle class” drinkers (e.g. Whiley, 2011). However the health impact of alcohol is greater in poorer households (Institute of Alcohol Studies, 2013).

Much of the alcohol consumed at home is purchased through large supermarkets and there is some evidence that alcohol is sold by supermarkets as a loss-leader (Meier, 2010). The purchasing of wine is increasingly prevalent in supermarkets (Burnett, 1999) and market research shows purchasing alcohol is now routine supermarket practice (Mintel, 2010). Once more the role of wine was emphasised in

the Mintel Report. It was the main choice of women and was often a “compromise item.” This means that it was not the first choice for men (this was beers) but often purchased when men and women shopped together.

Foster and Ferguson (2012) conducted a review of the literature concerning home drinking from 2000-2011 including grey literature and market research data that consisted of six articles from an original pool of 48. The key words entered were “home drinking”, “alcohol” and “adult”. The most comprehensive study revealed was Holloway et al, (2008), this was a telephone survey of adults followed up with 63 in-depth interviews. The headline finding was that the main venue of drinking was at home or friends/family houses and drinking at home was perceived (in contrast to binge drinking) to be non-problematic and largely, risk free. Most of the other work to date has been conducted by the Foster et al research group which draws on the findings of four focus groups conducted in Blackpool, England. They found a more nuanced understanding of risk (Foster and Heyman, 2013). The participants were aware that drinking at home involved a form of “calculated risk” but the risks they acknowledged were acute ones such as falling over, being sick or getting involved in fights. In contrast long term health risks were minimised, or dismissed. Foster et al., (2010) described an explanatory model for home drinking that found the reasons for drinking at home revolved around cost, convenience, and relaxation.

There have been some studies since the aforementioned review. The majority have concerned preloading which is drinking before going out to pubs bars and night clubs. A consistent finding of a review of the international literature (Foster and Ferguson, 2014) is that preloading is associated with greater alcohol consumption, more drunkenness and at-risk behaviours. One of the assumptions that under-pins much of the discussions around preloading is that the main motivation is cost. Whilst this is clearly important other important drivers of preloading include the maintenance of personal safety and the possibility that pubs and bars may not be providing what young people require from a night of socialising (Barton and Husk, 2014). Most of the work around preloading has been focused on drinking patterns of young people. However there has been a paper that has used focus group methods to examine adult middle class drinking in professional, managerial and clerical workers both in public houses/restaurants and at home in North-East England

(Brierley-Jones et al., 2014). Drinking at home was associated with wine drinking and a sense of greater cultural capital and sophistication.

To date there has been little attempt to collect data systematically examining home drinking, this may in part, be a consequence of the lack of a suitable measuring tool. The aim of the current investigation is to evaluate the psychometric properties of a new measure to assess reasons for home drinking, the Home Drinking Assessment Scale (HDAS).

Method

Pilot Study

A Pilot investigation was conducted where thirty individuals were asked to provide feedback as to the understandability and comprehensiveness of the measure and to nominate what was the main reasons for drinking at home from three options; a) cost, b) relaxation c) other. The primary reason given was to relax (71%) and a power calculation using a binomial proportion confidence interval for a single sample was made to establish that 317 participants were required to achieve the reliability of the HDAS with a $\pm$ 5% margin for error assuming 95% certainty/probability.

Design and Participants of the Main Study

This paper reports the results of an internet survey published on line using survey gizmo software.

The participants (n=525) were University of Greenwich staff recruited alphabetically via the university address book (response rate 26%) and thereafter booster samples were obtained when the web link was distributed via twitter and facebook. Fifty eight percent were female and 70% were aged 20-49 and 60% lived with either their partner or children. More comprehensive data is provided in table 1. Four hundred and ninety four participants (94%) were recruited through the University address book and a further 19 (4%) through a twitter feed and 11 (2%) facebook. E-mails were sent to the participants providing links to the survey in batches of 100 over a three month period (March-June 2011). Four and three (both < 1%) individuals did not provide data concerning their gender and age respectively. The project was approved by the University of Greenwich Research Ethics Committee.

The full survey tool contained 5 components: Frequency and level of alcohol consumption (Component A), Motivations for drinking at home (Component B), Activities associated with drinking at home (Component C), Alcohol purchasing behavior (Component D) and Attitudes towards alcohol (Component E). This paper focuses on Component B only.

TABLE 1. ABOUT HERE

Results:

The nine items that constituted Component B are shown in Table 2. These combined items produced a Cronbach alpha of 0.83, this means the scale has prima facie internal consistency.

Table 2 about here

Subsequent Statistical analysis

The optimization of the HDAS measure was achieved by a two-stage process of exploratory factor analysis (EFA; Kline, 2000) followed by a confirmatory factor analysis (CFA; Byrne, 2012). Given that the dataset includes more than double the minimum N for any single analysis, a random split-half approach was taken comprising complete data, thus furnishing two independent datasets for EFA and CFA exceeding a minimum N>200. Statistical analysis was conducted using the statistical software packages PASW version 18 (SPSS, 2009a, b) and the Analysis of Moment Structures (AMOS) version 18 (Arbuckle, 1995-2009).

Exploratory factor analysis

Principal components extraction was used for initial component condensation (Kline, 2000) followed by an oblique factor rotation, the accepted approach when extracted components are likely to be correlated (Redshaw and Martin, 2009). Item-component loadings were considered meaningful if a loading coefficient of at least 0.40 was observed (Jomeen and Martin, 2004; Upton and Upton, 2006). Items that loaded on more than one component or had an item-component loading below 0.40 were rejected.

Confirmatory factor analysis

CFA evaluates how well data statistically 'fits' a factor structure and allows the model identified by EFA to be evaluated within a second dataset. A maximum-likelihoods (ML) estimation approach was chosen (Byrne, 2012; Kline, 2000). Multiple goodness of fit tests were used (Bentler and Bonett,1980; Hollins Martin and Martin, 2014) these being the comparative fit index (CFI; Bentler and Bonett, 1990) and the root mean squared error of approximation (RMSEA; Byrne, 2012). CFI values in excess of 0.90 indicate an acceptable model fit to data (Hu and Bentler, 1995). A value of 0.95 or greater is indicative of a good fit to data (Hu and Bentler, 1999). RMSEA estimations of less than 0.08 are considered acceptable for model evaluation (Browne and Cudeck, 1992). RMSEA values of 0.06 or less indicate a good model fit (Schumaker and Lomax, 2010).

Internal consistency

The internal consistency of identified HDAS subscales and the total scale was evaluated using Cronbach's alpha (Cronbach, 1951). A Cronbach's alpha internal consistency of 0.70 indicates acceptable internal consistency (Kline, 2000).

Composite reliability

Exploratory factor analysis

Following factor extraction and oblimin rotation, three components were identified, all with eigenvalues greater than 1, explaining 61% of the total variance. Scrutiny of the scree-plot (Figure 1.) however, suggested that a two-component solution was more appropriate. The PCA was then rerun specifying a two-component solution explaining 48% of the common variance. The component loadings of the individual HDAS items are shown in Table 2. The components were clearly differentiated and no cross-loading items were identified.

FIGURE 1. ABOUT HERE

Confirmatory factor analysis

Measurement evaluation of the two-factor structure identified by EFA was conducted using the second random split-half dataset (N=219). Model fit was found to be

relatively modest based on established acceptability criteria, $\chi^2_{(df = 26)} = 81.56$, $p < 0.001$, $\chi^2/df = 3.14$, CFI = 0.82 and RMSEA = 0.10. Examination of the individual item performance and contribution to the overall fit of the model suggested that item 6. 'I drink alcohol at home because I do not feel comfortable drinking out' was a problematic item within the scale. The CFA was then rerun excluding item 6. which resulted in an improved and acceptable model fit, $\chi^2_{(df = 19)} = 37.58$, $p < 0.007$, $\chi^2/df = 1.98$, CFI = 0.93 and RMSEA = 0.07[1]. This model was therefore representative of an acceptable fit to the data in relation to the CFI and RMSEA, however, scrutiny of modification indices suggested that the model could be improved further by correlating the error terms of HDAS question 1 '*I prefer to drink alcohol at home rather than a pub/restaurant etc*' and HDAS question 4 '*I drink alcohol at home because it is safer than going out*'. This resulted in an improved, acceptable and best-fit model, $\chi^2_{(df = 18)} = 30.97$, $p = 0.03$, $\chi^2/df = 1.72$, CFI = 0.95 and RMSEA = 0.06. The CFA model of this best-fit two-factor model is summarised statistically and diagrammatically in Figure 2.

FIGURE 2. ABOUT HERE

[1] It was noted that in the resulting two-factor CFA model that item-7 has a low loading onto Factor 2. Though a reanalysis excluding this item improved model fit very slightly, it is of note that such an approach would result in a factor comprising just two items. It was therefore felt appropriate *at this time* to keep this item (item 7).

HDAS subscales internal consistency

Calculated Cronbach's alpha of HDAS subscale 1. (Factor1.) and HDAS subscale 2. (Factor 2.) were 0.73 and 0.44 respectively. The total scale (8-items) Cronbach's alpha was 0.61.

Discussion

Despite the fact that there has been a move in the United Kingdom towards more drinking at home since the 1970s which has since accelerated significantly; this has trend has received little research attention. The HDAS is the first attempt to design and validate a measure to examine home drinking and shows promise as a measure of the motivations underpinning home drinking in adults. Factor 1 which we have termed "Emotional Reasons for drinking at home" (5 items) may usefully be applied in future research. Factor 2 has the provisional title "Practical Reasons for Drinking at Home" however the low alpha suggests that other items are required to supplement the scale e.g. to playing computer games and/or eating meals whilst drinking or holding parties at home and further testing of these or similar items is required to supplement Factor 2. The research team is currently testing these separate items in other groups and this will enable us to provide further data as to the psychometric properties of the HDAS. The finding of improvement to the model by correlating the errors between HDAS items one and four may be explained by a commonality of these two questions, in that they are conceptually related beyond the determination of the underlying factor identified by the EFA and CFA.

This study was not without limitations. One potential issue in terms of generalisability of the findings concerns the participant population which was drawn from the University sector and is skewed towards younger women. It is possible that this particular population may not be representative of the general population and this may therefore impact not only on HDAS sub-scale scores, but also potentially, the underlying factor structure of the instrument. It is therefore suggested that future studies seek to confirm the observations from the current study in other groups in order to determine both factorial stability and mean representative scores for different groups. Among the issues that will need to be considered in future studies are gender, social class ethnicity and age. Evaluation of the invariance

characteristics of the tool would also be a valuable goal of further research endeavour in order to be confident of the veracity of comparisons between these distinct groups. A further potential issue which should be addressed by further research enquiry concerns item-7 which had a relatively modest loading on Factor 2. Evaluation of the performance of this item within the context of future empirical research will help address whether revision, inclusion or exclusion of this item is appropriate.

Internet survey tools are increasing popular but there may be groups who may be excluded from using the internet as they are unable to access it or less confident when working on the web. Thus further work should test differing methods of administration of the HDAS such as pen and pencil or telephone to establish whether the HDAS retains its psychometric properties with these differing modes of administration.

In summary, the HDAS has potential as an internet based measure of the motivations for home drinking in adults and the emotional sub scale can be used with some confidence. Further work is required to test and augment the practical reasons for drinking sub-scale.

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Table 1: Socio-Demographic Profile of the participants (n=525):

Variable	Number	Percentage
Gender		
Male	219	42
Female	302	58
Age		
< 20	1	< 1%
20-29	110	21
30-39	146	28
40-49	119	23
50-59	111	21
60 and Over	35	7
Living Situation:		
Alone	94	18
Partner Only	183	35
Partner and Children	133	25
Parents	25	5
Friends	47	9

Children only	19	4
Other	20	4
Source		
University Address Book	495	94
Twitter	19	4
Facebook	11	2

Table 2: Component loadings of the HDAS subscale items following principal components analysis and oblimin rotation.

HDAS item	HDAS question	Factor 1	Factor 2
HDAS 1	I prefer to drink alcohol at home rather than a pub/restaurant etc	.77	
HDAS 2	I drink alcohol at home because it helps me relax	.52	
HDAS 3	I drink alcohol at home because it is convenient	.76	
HDAS 4	I drink alcohol at home because it is safer than going out	.69	
HDAS 5	I drink alcohol at home because I have children I cannot leave home if I go out		.77
HDAS 6	I drink alcohol at home because I do not feel comfortable drinking out.	.64	
HDAS 7	I drink alcohol at home because it is difficult to smoke in licensed premises		.49
HDAS 8	I drink alcohol at home because it is cheaper than drinking at pub/bar/restaurants etc	.70	
HDAS 9	I drink alcohol at home because I do not have to drink and drive		.58

Figure 1. Scree plot revealing the optimal selection of factors is a two-factor solution based on the components identified before the point of inflection.

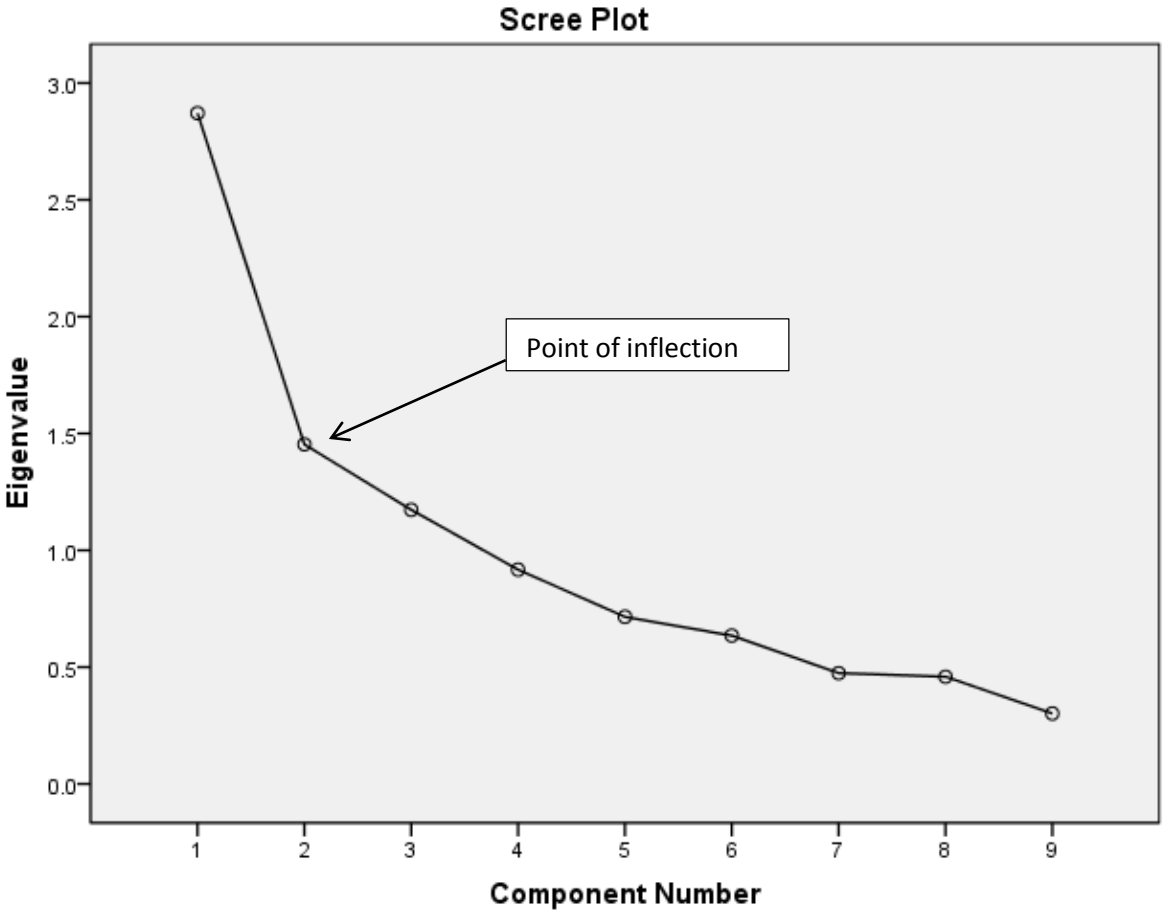
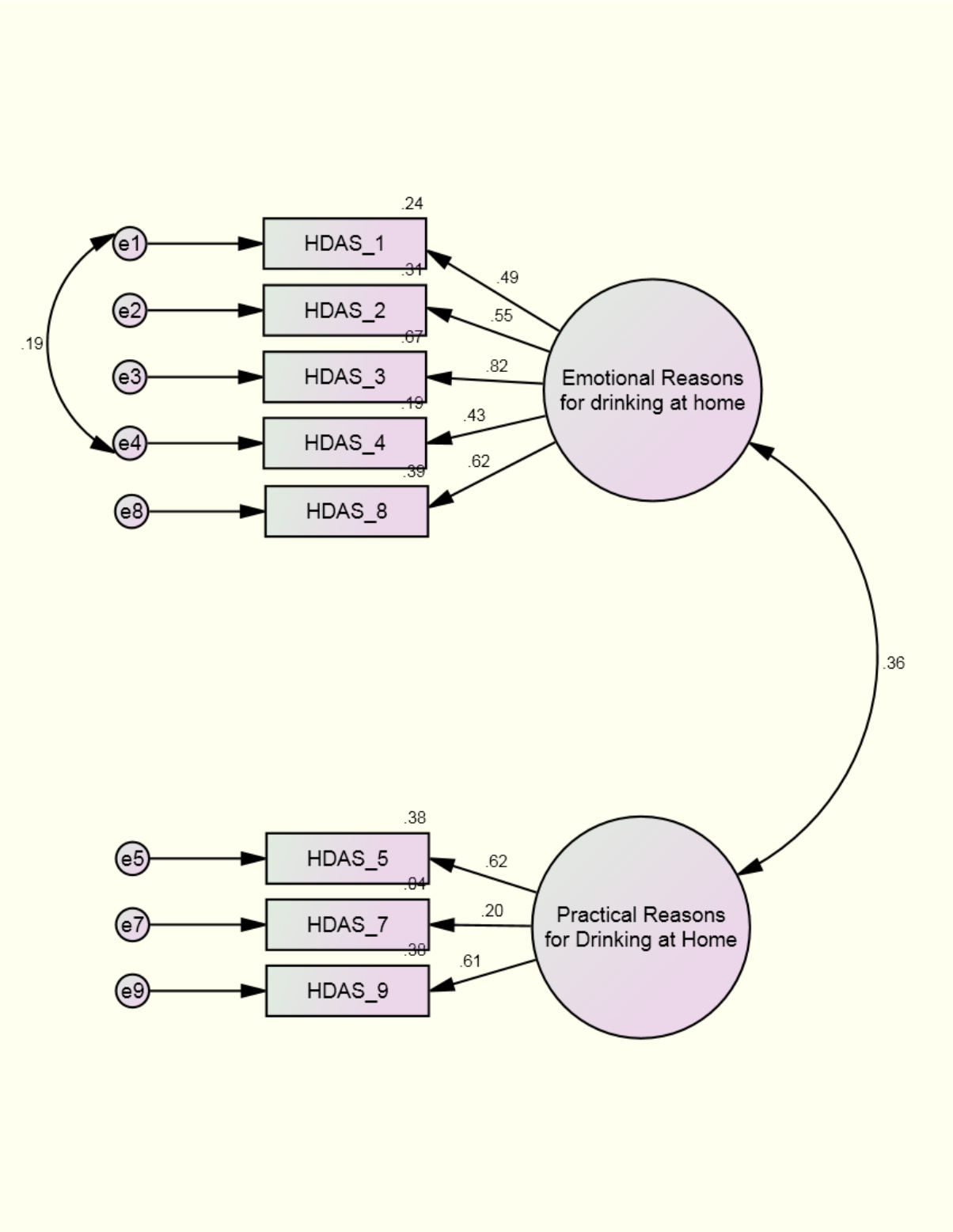


Figure 2. Final measurement model of the HDAS following model respecification and confirmatory factor analysis.



Item-factor loadings, squared multiple correlations and factor covariances are standardised.