Binge Drinking and Psychomotor Performance in Female Social Drinkers of Kalingalinga in Lusaka, Zambia

D V Likashi[1], RPaul[1], L Jason[2]

[1]*Department of Psychiatry, School of Medicine, University of Zambia*
[2] *Locum Consultant, Liaison Psychiatry, Leicester*

ABSTRACT

Introduction: Consuming large amounts of alcohol on an irregular basis is a common form of alcohol misuse among female adolescents and young women. This form of alcohol misuse is called binge drinking (BD) and is associated with harm to the central nervous system mainly due to repeated alternations between intense intoxication and withdrawal episodes. Adverse effects of BD on cognitive functions such as psychomotor skills negatively impact on women's daily living.

Methodology: Using a matched-pairs design and snowball sampling method, the present study investigated the relationship between binge drinking and psychomotor performance in a population of female social drinkers of Kalingalinga in Lusaka, Zambia. Two specific objectives based on continuity hypothesis guided the study; to identify characteristics of binge drinking among female social drinkers; to compare motor skills performance between female binge drinkers and their non-drinking female counterparts.

Sixty female participants (30 drinkers and 30 non-drinkers) were enrolled. Data was collected through a two-phase approach; AUDIT questionnaires in the first place and neuropsychological testing of motor skills using Grooved Pegboard and Finger Tapping tests, over a two-weeks period. Pearson's Chi-square revealed no significant differences in demographic characteristics.

*****Corresponding Author:**
Department of Psychiatry,
School of Medicine, University of Zambia
Dr. Likashi Danny Vumbi,
Email: dannylikshi2014@gmail.com

Data was normally distributed as shown by Shapiro Wilk's test and skewness and kurtosis results. Hence the use of the independent samples t-test whose results showed slower psychomotor performance among binge drinkers (M=84.07, SD=10.581; M=1.2167, SD=7.260 and M=42.17, SD=.88749) on both the Grooved Pegboard and Finger tapping tests than the non-drinking control group (M=66.77, SD=8.295; M=.5167, SD=5.050 and M=50.45, SD=.62261).

CONCLUSION

In conclusion, these results seem to suggest that there is a statistically significant relationship between BD and psychomotor performance among female social drinkers. The implication is that these women may be at risk of home and/or road accidents and that BD may impinge on their multitask-taking skills which may in turn affect their families and society. It is hoped that the results of the study will; open research prospects on female alcohol BD in Zambia and help therapists to consider focusing their efforts on the intensity and frequency of alcohol consumption as predicted by the study's regression analyses.

INTRODUCTION

Harmful alcohol use is high in males but women involvement in alcohol misuse is a public concern because of their vulnerability to alcohol related disorders[1]. Binge drinking, which involves consuming large amounts of alcohol on an irregular basis, is one of the commonest forms of alcohol misuse among adolescent girls and

young women. About 2.5 million deaths per year were attributed to alcohol misuse in 2010 and that more than half of these deaths are indirectly and directly associated to binge drinking[2]. Although binge drinking is common among males than females [3, 4], recent studies report that young women have begun to show drinking patterns similar to those of their male peers, especially regarding heavy episodic drinking[3]. About 30-50% of all women drinkers in South Africa, Zambia and Chad are said to be binge drinkers[4].Though there is no much data on the prevalence of binge drinking and alcohol misuse in general, Zambia has been projected to be amongst the nations with the highest levels of drinking in Africa [5]. Findings by the WHO published in the Washington Post, indicated that there is no nation that has harder-drinking women in the world than Zambia[6].

Binge drinking can be a confusing concept and its use can mean different things in different contexts [7]. Binge drinking can be defined as a pattern of heavy drinking that occurs in an extended period set aside for the purpose[8]. Secondly, binge drinking is clinically defined as a kind of drinking that occurs when a person follows a pattern of drinking alcohol that brings blood alcohol concentration (BAC) to 0.08-gram percent or above. For the typical adult, this pattern corresponds to consuming five or more drinks (male), or four or more drinks (female), in about two hours [9]. The terms "heavy episodic drinking, bout drinking and "spree drinking" are also used as synonyms to binge drinking. All in all, the definition, 'consuming of large amounts of alcohol on an irregular basis'[10] seems to be practical for developing countries like Zambia where the consumption of non-quantified alcoholic beverages is commonplace.

Several studies have indicated that, since alcohol binge drinking involves drinking to intoxication followed by periods of abstinence, it may cause severe neuronal damage that manifest as neurocognitive impairments[1, 11, 12, 13]. Motor skills, are among the primary neurocognitive functions that are impaired by repeated binges and withdrawals[14].

Psychomotor skills are functions that involve precise movement of muscles with the intent to perform a specific act. They are important indicators and predictors of cognitive and physical functionality, and are among the key determinants of individual well-being[15]. However, many drinkers, unaware of the neuronal damage due repeated binges and withdrawals, are likely to think that binge drinking is not harmful because it is done occasionally thereby putting their brains at risk of damage by alcohol neurotoxicity.

This study carried out an investigation into the effects of alcohol binge drinking on the cognitive motor skills of female binge drinkers. In this regard, the study identified characteristics of alcohol binge drinking in the said social drinkers and further, compared their cognitive motor performance with a control group of female non-drinkers of the same age group, social status, among others.

METHODOLOGY

Study Design: A matched pairs design was used based on the participants' age, gender, education, absence of disabilities and physical health.

Sampling: The study used snowball sampling method to enroll 60 female participants (30 binge drinkers, 30 non-drinkers) aged between 20 and 39 years. The sampling was preceded by dividing the study area into four and then identifying female drinkers from each of the areas who would roll out to other drinkers.

The mean age was 27 and the SD was 5.456. About 28.3% of the 60 participants (17) reported to have attained primary education only. Only 11 participants had gone up to tertiary level of education translating into 18.3% of the total sample. Since there was no statistically significant difference between binge drinkers and non-drinkers, the sample was comparable.

Measures: Data was collected in two phases: **phase 1** involved recruitment/identification of binge drinking characteristics using the AUDIT questionnaires, and **phase 2**which involved testing for psychomotor performance using the Grooved Pegboard and finger tapping tests.

Table 1: Variables used in the study

Variable	Variable Type	Tool used
Binge drinking; ▪ Days/Week, Number of drinks/Occasion, ⩾4 drinks/Occasion	Independent Variables	AUDIT Questionnaire
Motor Skills ▪ Average time taken to complete task, Average number of dropped pegs, Average number of taps per 10 seconds	Dependent Variables	▪ Grooved Pegboard ▪ Finger tapping Test

Ethical Consideration: The research was submitted to and approved by the University of Zambia Biomedical Research Ethics Committee (UNZABREC). Participants were informed of all their ethical rights that included confidentiality issues, giving consent, freedom to stop at any time, among others. Measures were put in place to ensure that participants would not be harmed physically or psychologically.

RESULTS

Response Rate: The study captured 60 female participants as proposed, comprising of 30 binge drinkers and 30 non-drinkers. It should also be reported that 54 under-age binge drinkers were turned down due ethical considerations of the eligible age group. Therefore, the response rate was at 100%.

Demographic Data of Participants: The main characteristics considered were age, years of education, presence/absence of impairments and alcohol drinking (for binge drinkers only).

Normality Testing: Normality testing using Skewness and Kurtosis was done to determine suitability of parametric test for analysis.

Table 2: Skewness and Kurtosis z-values

	Skewness z-values		Kurtosis z-values	
	Non-drinkers	Binge drinkers	Non-drinkers	Binge drinkers
Average Time taken to complete task	0.001	0.90	-0.0002	-1.054
Average number of dropped pegs	2.531	0.002	0.4502	0.4502
Average number of taps per 10 seconds	0.0094	0.248	0.054	-1.611

Relationship Testing: Independent samples t-test

- Mean scores and SDs

  - Binge drinkers: $M=84.07$, $SD=10.581$; $M=1.2167$, $SD=7.260$ and $M=42.17$, $SD=.88749$

  - Non-drinkers: $M=66.77$, $SD=8.295$; $M=.5167$, $SD=5.050$ and $M=50.45$, $SD=.62261$

These results were significant at $t(58)=7.048$, $p<.000$; $t(58)=3.537$, $p<.001$ and $t(51.74)=5.130$, $p<.000$.

Regression Analysis: Table 3 below show that the beta and p-values of two of the three predictor variables had a stronger relationship with all the outcome variables.

Table 3: Summary of Regression Analyses

Variables	Average time taken to complete task		Average number of dropped pegs.		Average number of taps per 10 seconds	
	β-values	*P-values*	β-values	*P-values*	β-values	*P-Values*
How often do you have six or more drinks on one occasion<	.920	.001	.872	.007	.892	.004
How often do you have a drink containing alcohol<	.496	.004	-.691	.001	.648	.001
How many drinks containing alcohol do have on a typical day when you are drinking<	.254	.227	.225	0.395	-.262	-1.072

DISCUSSION

Characteristics of Binge Drinking: The scores for these variables were: frequency (M=2.17, SD=.834, *p*=.000), quantity (M=3.03, SD=.964, *p*=.000) and intensity (M=2.53, SD=.507, *p*=.000). The mean of 2.17 represents response (2) on the questionnaire implying that an average female took an alcoholic drink '2 to 4 times per month.' This does not represent regular drinking but irregular type of drinking characteristic of binge drinking. Further, quantity is represented by a mean score of 3.03 translating into '7, 8 or 9 drinks' per occasion, implying consumption of large amounts of alcohol on one sitting. Besides, the intensity of drinking was represented by an average of 2.53 which meant that taking of six or more alcoholic drinks was almost on a weekly basis.

Similarly, these results match other studies which gave the same definition of binge drinking. The definitional characteristic of binge drinking of 'consuming large amounts of alcohol on irregular basis'[10] that was described earlier is such an example. The clinical definition of binge drinking as the 'drinking of alcohol that brings blood alcohol concentration (BAC) to 0.08-gram percent or above [9], is another key example that match the results of this study because the definition indicates that blood alcohol level of 0.08-gram percent or above is only reached by taking 5 or more drinks or more drinks (in males) or 4 or more drinks (in females) on an occasion'[14].

Comparison of Psychomotor Performance between Female Binge Drinkers and Non-drinkers:

Results from the Grooved Pegboard reveal that female binge drinkers performed less well (*M*=84.07, *SD*=10.581, *p*=.000; *M*=1.2167, *SD*=7.260, *p*=.001) than their non-drinking counterparts (*M*=66.77, *SD*=8.295, *p*=.000; *M*=.5167, *SD*=5.050, *p*=.001). The results here represent two categories of scores; average time taken to complete a task of putting pegs in some slots on the pegboard, and also the average number of pegs during the first activity. On average non-drinkers were faster by taking 66.77 seconds to complete the pegboard tasks than the binge drinkers who took 84.07 seconds on the same tasks. Generally, a non-drinker was 17.3 seconds faster than a binge drinker in completing the Grooved Pegboard task. In addition, the number of dropped pegs was on average higher among the binge drinking females (1.22) than their non-drinking counterparts (0.52). It implies that an average binge drinking participant dropped more than one peg by the time they complete an activity on the pegboard

In the same way, results from the second neuropsychological test, Finger Tapping test, also revealed that there are significant differences in psychomotor performance between female binge drinkers (*M*=42.17, *SD*=.88749, *p*=.000) and the non-drinking females (*M*=50.45, *SD*=.62261, *p*=.000). These results show that on average a non-drinking female participant made 50 taps per 10 seconds as compared to binge drinking females who on average made 42 taps per 10 seconds. It implies that a non-drinking female made about 8 taps faster than their drinking female counterparts.

Regression analyses were run and two of the variables seemed to have strong relationship with the dependent variables. In their order of importance is; intensity of drinking (β<.970, .848, .934 and *p*<.001, .007, .004), frequency of drinking (β<.552, .700, .699 and *p*<.003, .003, .001) and quantity of drinking (β<.970, .848, .934 and *p*<.296, .429, .345). From these analyses, we can deduce that the intensity of drinking, represented by taking four or more alcoholic drinks in females seem to make the strongest relationship with the outcome variables and therefore makes the best prediction of the psychomotor performance of binge drinkers.

These results of the present study seem to be consistent with many other study findings that overwhelmingly show that binge drinking can cause structural and functional damage to the brain resulting in many cognitive deficits that include motor skills[1, 11, 12, 13, 16, 17]. As earlier noted, periods of binge drinking followed by abstinence may trigger a cycle of responses that lead to increased neurotoxicity and cognitive deficits[17]. The pattern of drinking shown in the present study; 'taking 7, 8 or 9 alcoholic drinks per occasion on a weekly basis,' shows a pattern that can cause some form of neurotoxicity because there is heavy consumption of alcohol (7,8 or 9 drinks) once or twice in a week that is followed by some days of not drinking (withdrawal or abstinence) until the following week.

CONCLUSION

The aim of this study was to investigate the relationship between binge drinking and psychomotor performance in a population of female social drinkers in Kalingalinga township of Lusaka, Zambia. Overall, results got from the independence samples t-test revealed that there is a statistically significant relationship between binge drinking and psychomotor performance among female social drinkers. The findings showed that female binge drinkers performed much slower than the controls on both Grooved Pegboard and Finger Tapping test activities.

Further, regression analyses that were run showed a stronger relationship between two predictor variables (frequency and intensity of drinking) and the three outcome variables. The results revealed that on average a female binge drinker in Kalingalinga consumed 7, 8 or 9 alcoholic drinks on one occasion on a weekly basis. This form of drinking which has been predicted by regression analysis is typical of binge drinking because the intensity is above four drinks per occasion for females (as defined by the WHO AUDIT questionnaire) and the frequency is characterised by some days of withdrawal or abstinence.

The implication is that the irregular consumption of large amounts of alcohol may appear to be safe to many drinkers but the periods of withdrawal cause neurotoxicity which put their brains at risk of structural and functional damage. By and large, it implies that these women may be at risk of home and/or road accidents and that binge drinking may impinge on their multitask-taking skills which in turn affect their families and society. Further, the drinking pattern reported by participants in the present study should be a source of worry because this can increase the country's disease burden in the next few years if no measures are put in place to check this.

ACKNOWLEDGEMENTS

REFERENCES

1. Miller, M. P. (2013). *Biological Research on Addiction: Comprehensive Addictive Behaviours and Disorders.* Available @ https://www.elsevier.com

2. World Health Organisation (2011). *Global Status Report on Alcohol and Health-2011 Ed.* Geneva: WHO

3. Andersson, C., Sundh, V., Waern, M., Jakobson, A., Lissner, L., and Spak, F. (2013). "Drinking context and problematic alcohol consumption in young Swedish women," *Addiction Research and Theory.* 21(6): 457–468.

4. Culley, C. L., Ramsey, T. D., Mugyenyi, G., Kiwanuka, G. N., Ngonzi, J., MacLeod, S., Koren, G.,Grunau, B. E. and Wiens, M. O. (2013). "Alcohol Exposure Among Pregnant Women in Sub-Saharan Africa: A Systematic Review." *J Popul Ther Pharmacol.* 20(3):321-333.

5. Kabuba, N., Menon, A. J. and Hestad, K. (2011). "Moderate Alcohol Consumption and Cognitive Functioning in a Zambian Population." Medical Journal of Zambia. 38. 2.

6. Mwale, S. (2014). "Zambian Women Lead in Alcohol Consumption." Times of Zambia, May 3rd.

7. Berridge, V., Thom, B. and Herring, R. (2007). *The Normalisation of Binge Drinking<A Historical and Cross-cultural Investigation with Implications for Action.* Unpublished final report for AERC.

8. World Health Organisation (2015). *Global Status Report on Alcohol and Health-2011 Ed.* Geneva: WHO

9. National Institute on Alcohol Abuse and Alcoholism. (2004). *NIAA Newsletter, Winter2004 Number 3. NIAA Council Approves Definitions of Binge Drinking. (PDF).* Retrieved May 19th, 2013 from http://pubs.niaa.nih.gov/publications/Newsletter/winter2004/Newsletter-Number 3. pdf

10. Kokavec, A. and Crowe, S. F. (1999). *A Comparison of Cognitive Performance in Binge Versus Regular Chronic Alcohol Misusers.* La Trobe University, Bundoora.

11. Leonard, K, E. and Blane, H, T. (1999). *Psychological Theories of Drinking and Alcoholism.* New York: The Guilford Press:London

12. Strauss, E., Sherman, E. M.S. and Spreen, O. (2009). *A Compendium of Neuropsychological Tests: Administration, Norms and Commentary.* New York: University of Oxford Press

13. Ward, R. J., Lallemnd, F. and De Witte, P. (2009). "Biochemical and neurotransmitter changes in alcohol-induced brain damage in chronic or 'binge drinking' alcohol abuse." *Alcohol and Alcoholism.* 44(2): 128-135

14. Brumback, T., Cao, D. & King, A.; (2007). "Effects of Alcohol on Psychomotor Performance and Perceived Impairment in Heavy Binge Social Drinkers." *Drug Alcohol Depend.* 91(1): 10-17. NIH Public Access

15. Austin, D., Jimison, H., Hayes, T., Mattek, N., Kaye, J. and Pavel, M. (2011)."Measuring Motor Speed Through Typing: A Surrogate for the Finger Tapping Test." *Behaviour research Methods. 43.* Potland: Springer International Publishing AG

16. Acker, C. (1985). "Performance of Female Alcoholics on Neuropsychological Testing," *Alcohol and Alcoholism.* 20(4): 379-386. Available