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Psychoactive Substance Use and School Performance among Adolescents in Public Secondary Schools in Uganda

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Abstract

Introduction: Psychoactive substance use among adolescents influences behavioral and cognitive processes and is associated with adolescents' performance in school. We therefore sought to investigate association of PASU with adolescents' school performance.

Methods: We employed quantitative methods of data collection and analysis. To test the substance use-school performance association, we specified and estimated fixed effects hierarchical linear models (HLMs). We nested the data in their respective four regions of Uganda.

Results: Model estimates show that only alcohol use had significant t-values in association with school performance ($b = 1.15$, $SE = .32$, $t = 3.83$, $p = .029$ for beer use; $b = .82$, $SE = .18$, $t = 4.49$, $p < .001$ for wines; and $b = .89$, $SE = .19$, $t = 4.53$, $p < .001$ for spirits).

Conclusions: **A**lcohol use significantly contributed to the model estimating association between PASU and adolescents' school performance.

Keywords: psychoactive substance use, adolescents, public schools, school performance, Uganda

1. Background

Studies show that psychoactive substance use (PASU) among adolescents in schools is associated with altering time sense, decreasing auditory discrimination (Holister, 1971); and difficulty in concentration (Scott & Scott, 2013). Further sources suggest that there is an association between adolescents' school performance and substance use, and that students who use psychoactive substances are at a greater risk of performing poorly in school and vice versa (Bergen, Martin, Roeger, & Allison, 2005; Diego, Field, & Sanders, 2003; Ellickson, Tucker, & Klein, 2001). Other known studies have confirmed that PASU is closely associated with truancy and school exclusion among other behavioral problems during adolescence (Atilola et al., 2014; Kacwamu, 2010).

Use of psychoactive substances among adolescents and its concomitant performance-related consequences is hence a notable concern, both globally and in the developing world (Geier et al., 2011; GreenBaum, Prange, Friendman & Silver, 1991; Miller, Davies & Greenwald, 2009; Najafi, Zarrabi, Shirazi, Fekri, & Mohsen, 2009). Researches worldwide have contextualized and operationalized substance use differently. For this paper, PASU denotes experimenting with or continuing to use licit or illicit substances among school adolescents. The present study therefore accounts for use of alcohol, tobacco (chewing and smoking), mirungi, marijuana, *kuber*, petrol, paint, cocaine, and caffeine. Though substance use is a necessary prelude to abuse or dependence, the present study will be limited to "use only", not abuse as the latter requires evidence of maladaptive pattern of substance use with clinically significant levels of impairment or distress (American Psychiatric Association, 2007), which is beyond the scope of the present study.

The findings of this study are reported in light of the literature (e.g. Newton & Bussey, 2011) regarding substance use and its association with students' school performance. However, other than the previous studies having been done in the developed world, many of them have been reported to have majorly considered the association between substance use and health effects (Yusoff et al., 2014) and others to have concentrated on grades as sole indicators of school performance among high school adolescents. Contextually, adolescents' school performance for this study is discerned to mean students' school engagements including involvement in day to date activities such as adolescent's patterns of participation in class room activities; including but not limited to readiness to learn, attendance at lessons, academic related discipline, and students' ability to carry on other school tasks.

Whereas much of the relevant literature views psychoactive use as having negative association with adolescents' school performance, there is established evidence to show that adolescents associate psychoactive substance use with positive school outcomes. Indeed, Lussier and Trunzo (2010) argue that students use psychoactive substances (such as alcohol and caffeine) to remain awake, making psychoactive substances a perceived quick source of energy. Lussier and Trunzo (2010) continue to assert that students use substances to allow them focus on an examination for which they stayed up all night studying, or to focus during any information encoding, such as reading or listening to lessons. Such arguments are again grounded and can be traced in the cognitive theory of reasoned action (Petraitis et al., 1995). According to the theory of reasoned action, students first make a link between substance use and perceived performance benefits before those students use particular substances.

While studies elsewhere have made an association between psychoactive substance use and adolescents' school performance, there were no known empirical findings in Uganda, and more so in Ugandan public secondary schools alluding to that association. There were only general, sporadic, unempirical reports in the press regarding such association among adolescents in Uganda. Other reports from civil society organizations were not conclusive as they were drawn from specific localities and did not bring out the national picture regarding PASU. There was virtually an apparent academic silence on existence of the association between psychoactive substance use and adolescents' school performance. There was hence an urgent need for a student to investigate the substance use-adolescents' school performance association within the realm of academia.

Objective: To establish the association between psychoactive substance use and school performance among adolescents.

Hypothesis: There will be no significant association between psychoactive substance use and adolescents' school performance.

2. Methods

Design: This study employed a cross-sectional survey. Cross-sectional design was effective in collecting data for short term and at a single point in time (cf. Mertens, 2005). We specifically use quantitative methods for data collection and analysis. Quantitative methods allowed collection of data from a large sample of students using close-ended questions, improving the generalisability of our study findings. We employed self-administered questionnaires to offer our participants greater response anonymity and to minimize under reporting of students' attributes regarding psychoactive substance use. The questionnaire return rate was 91.8% while the response rate was 98%, implying that most of the questionnaires returned by students were valid for data entry.

Procedure and Sample Selection: Schools were nested in their respective regions. We then purposively sampled 13 public schools from each of the four regions of Uganda. Apart from the Eastern region where four schools were sampled due to large number of schools in that area, we selected three schools from each of the Western, Central, and Northern Regions of Uganda. The number of students sampled from those schools was obtained using proportionate sampling. The sample from each school was obtained by dividing the number of students in the school (records obtained from the head teachers) by the approximate total number of students in Ugandan Public schools (obtained from the Ministry of Education and Sports records), then multiplying by the previously computed study sample.

3. Measures

Psychoactive Substance Use: Use of psychoactive substances was reported differently for caffeine, beers, wines, spirits, tobacco, mirungi, marijuana, kuber, petrol, paint, and cocaine by a pre-tested scale (α = .94 and .89 for pilot and final studies respectively) of 12 items. Items were arranged on five-point responses (1 = never, 2 = rarely, 3 = sometimes, 4 = often, 5 = very often) and respondents were requested to indicate how often they used each of the substances in the previous 12 months.

Adolescents' School Performance: Adolescents'school performance was assessed using a 12-item,

self-constructed pre-pilotted (alpha = .81 and .68 for pilot and final study respectively) questionnaire. Items under this section were sub-divided to test for students' grades, class attendance behavior, and other types of self-conduct in school. On a 5-point scale (1 = strongly disagree, 2 = disagree, 3 = undecided, 4 = agree, and 5 = strongly agree), participants were requested to tick one of the responses that applied to them. For analytical purposes, responses were dummied into a composite variable. Since the items in the adolescents' school performance instrument were negatively stated, a high score implied low school performance while a low score signified high school performance among students.

Ethical Review: Approval to conduct the study was initially sought from the Institutional Review Board of Mbarara University of Science and Technology. We later got clearance from the Uganda National Council of Science and Technology and from the office of the president of the republic of Uganda. Before interacting with students in schools, permission and consent were first obtained from heads of the respective schools. School heads were asked to sign the consent form as care takers of adolescents. Before we began the administering questionnaires, explanations regarding study aim and objects, right to decline participating or withdrawing, and issues of confidentiality were articulated to the students. Students were then verbally requested to participate and those who consented were given questionnaires to fill.

4. Analysis

We conducted cross tabulations to get frequencies and percentages of the demographic variables. For other analyses the 5-point scale for substance use items were used. However, we centred and scaled each of the substance use variables to zero mean and variance of one, to have comparable values with those of the continuous adolescents' school performance (criterion) variable. To test the hypothesis that "there will be no significant association between psychoactive substance use and adolescents' school performance", we estimated generalized linear models. Specifically, we specified hierarchical linear models due to the nested nature of the data collected during the study. Besides, such models are robust enough to withstand violations of linearity and normality of distributions of the scores (cf. Bryman & Cramer, 2001). Before estimating hierarchical linear models for the hypothesis, we tested for homoscedasticity using Levene's method, to determine the suitability of the variables for the models. Use of caffeine did not have homogeneous variances with respect to adolescents' school performance, and hence its values were first converted to Z-scores before they were included in the model.

Table 1. Levene's tests for homoscedasticity of predictor variables against adolescents' school Performance

Independent Variable	Levene's Statistic	df1	df2	p
Drink wines	.903	4	1778	.461
Drink beers	.786	4	1778	.535
Drink spirits	.815	4	1778	.516
Take caffeine	3.847	4	1778	.004*
Smoke cigarettes	.088	4	1778	.986
Chew tobacco	1.714	4	1778	.144
Chew mirungi	2.182	4	1778	.069
Smoke marijuana	.316	4	1778	.837
Use kuber	1.009	4	1778	.401
Intentionally sniff petrol	.568	4	1778	.686
Intentionally sniff paint	1.118	4	1778	.346
Use cocaine	.505	4	1778	.733

*Significance at $p \leq .05$

df1: Degrees of freedom on independent variable

df2: Degrees of freedom on dependent variable

5. Results

5.1 Demographics

The mean age of the students was 17.3 (Range = 13; SD = 1.9). Of the students who submitted complete questionnaires (n = 1784), 375(21.0%) were from the Western, 417(23.4%) from the Northern, 546(30.6%) from Eastern, and 446(25.0%) from the Central regions of Uganda. A total of 1778 students indicated their gender and 1054 (59.3%) of them were males and the rest were females.

5.2 Hypothesis regarding Association between PASU and Adolescents' School Performance

The results in Table 2 below show parameter estimates used to test the hypothesis mentioned in methods section. As recorded in the table, model 1 was estimated when all predictors were included. All predictors initially showed no statistical significance in association with adolescents' school performance. However, with a t-value of 2.43 for beer use, we detected multi-collinearity, probably due to auto correlations in the scores of alcohol use variables, since by the rule of thumb any t-value of 1.96 or greater should be significant at 95% level of confidence. The results could be that alcohol use variables explained the same part of the variation in adolescents' school performance scores, having the significance of their coefficients and their explanatory power divided up among themselves.

We then estimated further separate models where each of the alcohol use variables was entered alone in the subsequent models. The t-values for all three alcohol use variables were this time significant (b = 1.15, SE = .30, t = 3.83, p = .024) for beer use; (b = .82, SE = 18, t = 4.49, p< .001) for wine use; and (b = 89, SE = .19, t = 4.53, p < .001). Statistics for other variables remained non-significant for the subsequent models. For the three alcohol use variables, the hypothesis that there will be no significant association between PASU and adolescents' school performance was not accepted. The hypothesis was retained for the non-significant substances. Specifically, we made an assertion that use of beers, wines, and spirits was significantly associated with adolescents' school performance.

The coefficients (beta) values of the significant values were clearly different from zero (beer use = 1.15, wine use = .82 and use of spirits = .89) implying that the variables had a genuine relationships with adolescents' school performance.

The results also show that for every unit change in variance of beer use for example, there are .81 units of change in variance of adolescents' school performance (model1) and 1.15 units (model two). Also for every unit change in use of spirits, there were .89 units in change of variance of adolescents' school performance, while for every unit change in variance use of wines, there was .815 units in change of adolescents' school performance variance. As noted, the beta coefficients caused by change in variances of alcohol use variables are almost similar, further suggesting a resemblance among those variables. The results indicate low explanatory power of non-significant predictor variables on variation in adolescents' school performance scores, as depicted by low coefficients for all non-significant substance use variables (predictors). The predictor variables being many in numbers, their overall degrees of freedom could have lowered, causing less effect each variable had on adolescents' school performance.

Table 2. Models to estimate association of substance use with adolescents' school performance

	All Predictors Included					Spirits and Wines Removed					Beers and Spirits Removed					Beers and Wines Removed				
Parameter	CoE	SE	df	t	P	CoE	SE	df	t	P	CoE	SE	df	t	P	CoE	SE	df	t	P
Intercept	25.907	.657	2.969	39.421	<.001	25.90	.660	2.971	39.245	<.001	25.919	.653	2.968	39.699	<.001	25.921	.660	2.969	39.278	<.001
Beers	.810	.319	5.093	2.542	.057	1.154	.301	3.116	3.833	.029	-	-	-	-	-	-	-	-	-	-
Spirits	.364	.225	1766.5	1.619	.095	-	-	-	-	-	-	-	-	-	-	.893	.197	1747.6	4.532	<.001
Wines	.345	.206	1767.8	1.675	.099	-	-	-	-	-	.815	.181	1767.2	4.492	<.001	-	-	-	-	-
Kuber	.049	.333	1764.7	.149	.888	.074	.339	4.167	.220	.836	.188	.354	5.474	.32	.615	.086	.372	5.086	.232	.825
Cigarettes	.154	.318	1765.9	.486	.652	.127	.328	3.152	.389	.722	.306	.310	4.865	.987	.370	.223	.322	4.446	.694	.523
Marijuana	.231	.341	1766.9	.676	.519	.142	.353	6.069	.401	.702	.299	.335	7.525	.894	.399	.317	.317	8.123	.997	.347
Cocaine	.266	.279	1767.3	.955	.339	.199	.271	1733.8	.732	.464	.347	.279	1738.7	1.241	.215	.279	.280	1729.1	.998	.319
Mirungi	-.298	.288	1765.6	-1.036	.300	-.354	.279	1716.1	-1.271	.204	-.186	.289	1724.0	-.644	.519	-.254	.289	1699.8	-.877	.380
Petrol	.121	.273	1767.5	.445	.656	.132	.272	1761.0	.485	.627	.068	.274	1769.2	.250	.803	.130	.274	1767.1	.476	.634
Caffeine	-.052	.239	1765.9	-.219	.841	-.034	.236	2.928	-.145	.894	-.001	.275	3.031	-.003	.998	.080	.251	2.962	.318	.772
Paint	-.151	.275	1766.9	-.550	.582	-.141	.275	1752.5	-.514	.607	-.109	.276	1759.8	-.397	.691	-.103	.276	1764.0	-.374	.708
Tobacco	-.398	.296	1766.5	-1.345	.179	-.391	.296	1732.3	-1.319	.188	-.481	.297	1628.3	-1.620	.105	-.456	.297	1583.8	-1.536	.125

Model 1 Model 2 Model 3 Model 4

CoE: Estimated Coefficient; SE: Standard Error; t: Statistical Constant; p: Significance value; df: degrees of freedom.

*Refers to chewing of tobacco and should be distinguished from use of tobacco cigarettes

6. Discussion

The hypothesis that substance use is associated with adolescents' school performance was tested with hierarchical linear models. Results show significant and non-significant associations of alcohol and other psychoactive substances respectively with adolescents' school performance. The results show that as the scores in use of beers, spirits, and wines increase, the scores in adolescents' school performance also increase. But since high scores in the adolescents' school performance scale mean low performance, it means that increase in use of beers, wines, and spirits predicts low school performance among adolescents.

The findings confirm previous studies that articulate that due to alcohol consumption, high school students in stupor after the previous night's drinking miss classes, fall behind the rest of the students in academics, and ultimately lose whatever funding they may have secured (Stockwell, 2001, 2004; Voas & Fell, 2011). Similar sources from studies conducted at colleges and universities in the United States adduced that since the beginning of the school year, nearly one-third of high risk drinkers' hard missed class and that 21 percent had fallen behind their school work because of their drinking (Wechsler, Dowdall, Davenport, & Castillo, 1995).

Other studies (e.g. Carr, 2000) show that use of psychoactive substances among adolescents in school is of particular concern because it may have a negative long term cognitive effect on the youngsters who use the substances. Further researches also suggest a negative association between adolescents' school performance and substance use, and premise that students who use psychoactive substances are at a greater risk of performing poorly in school and vice versa (Bergen et al., 2005; Diego, Field, & Sanders, 2003; Ellickson et al., 2001; Sutherland & Shepherd, 2001).

However, contrary to the present study findings, Lussier and Trunzo (2010) argue that students use psychoactive substances (such as alcohol) to remain awake, making psychoactive substances a perceived quick source of energy. It was asserted that students use substances to allow them focus on an examination for which they stayed up all night studying, or to focus during any information encoding, such as reading or listening to lessons. Other past research shows that use of psychoactive substances is perceived as having a positive effect on cognitive

functions and abilities. But despite perceived benefits of substance use to adolescents' school performance; significant use of some of them leads to addiction and contribute to negative school effects (Lussier & Trunzo, 2010).

The present study results could be explained in terms of the cognitive theory of substance use and school performance. The cognitive theory proposes a school disengagement model which posits that where students are not mentally engaged by schools, they seek stimulation and challenge elsewhere, including substance use (Gould, 2010). And, in the situation where most communities have a culture of traditionally brewing alcohol in homes, students in schools are frequently and conveniently exposed to alcohol in miniature sachets and at modest prices, making them susceptible to alcohol-related academic behaviors and their concomitant effects on adolescents' performance in school. According to the cognitive theory, adolescents will use substances if they expect that those substances will produce more positive than negative consequences (Petraitis et al., 1995). Students therefore are more likely to consume substances when they think those substances are bringing positive school performance benefits.

7. Conclusion

Models estimates established that only alcohol use variables predicted low performance of adolescents in school.. Other substances were found not to be significant contributors to the model and therefore their association with adolescents' school performance is not to be generalized beyond the study sample.

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