Associations between transition into adulthood and alcohol consumption: Analysis of a cross-country population based survey.

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Abstract

Objective: To understand better the relationship between alcohol consumption and transition into adulthood to assist in determining appropriate alcohol programs for the priority population of 18 to 35 year olds.

Method: Cross-sectional, multistage, random sample, face-to-face survey undertaken in Ilorin (Nigeria), Wuhan (China), Montevideo (Uruguay) and Moscow (Russia). The questionnaire was forward and back translated into relevant languages. Three questions regarding transition into adulthood were asked. For each city, associations between emerging adulthood and alcohol consumption (grams per day) using quantile regression modeling adjusting for selected socio-demographics were undertaken.

Results and Discussion: The data were weighted to the population of each city. In total 6235 structured interviews were undertaken (1391 in Ilorin, 1600 in Montevideo, 1604 in Moscow and 1640 in Wuhan). The proportion ever consuming alcohol varied from 33.3% in Ilorin, 53.4% in Wuhan, 86.1% in Moscow to 96.4% in Montevideo. After adjustment no association between alcohol consumption and transition into adulthood was found in Ilorin or Moscow while in Montevideo an inverse association was found with the higher the level of adulthood the less alcohol consumed. In Wuhan higher levels of adulthood were associated with increased alcohol consumption after adjustment.

Conclusion: High levels of country specific influences on alcohol consumption and the associations with level of adulthood were apparent for these 18-35 year old populations. Assessment of country specific influences together with assessment of level of adulthood, are important for specific interventions when implementing projects aimed at reducing harm from alcohol for this priority population.

Keywords: Alcohol consumption, Gastrointestinal disorders, Cardiovascular disease, Cardiomyopathy, Diabetes mellitus.

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Introduction

The transitions taking place in a person between the ages of 18 and 35 years in many countries and cultures are numerous and often include changes in relationships, employment, accommodation and roles [1-3]. It is seen as a time when greater independence in many aspects of life is achieved. One of the transitions repeatedly taking place during this period of the life-course is associated with alcohol consumption patterns, with drinking alcohol commonly undertaken and widely accepted [4-6]. From the first regular consumption through to the age around the mid-20s, alcohol consumption is often categorized as binge drinking, reckless, experimental and peer-related drinking [5-11]. The later years of the transition towards mid-30's frequently reports alcohol consumption as being more refined, more moderate and less impulsive [2,8,11-13]. Most of the research in this area has been undertaken in western/industrialized and high income countries.

Patterns of alcohol consumption associated with specific age groups explored in the peer-reviewed literature continue to debate the acceptable level of alcohol consumption. The evidence that high levels of alcohol consumption negatively affect health outcomes is undeniably proven [14,15] and is a major concern within the public health and other disciplines. High levels of alcohol consumption, in addition to adverse social consequences, and liver and gastrointestinal disorders, is associated with increased cardiovascular disease (cardiomyopathy, ischaemic heart disease, hypertension and stroke) [16,17]. The relationship with type 2 diabetes mellitus requires additional research with a review of studies indicating moderate alcohol consumption may have a protective effect [16]. The role that lower levels

of consumption have on health outcomes is still being debated [18,19]. Positive outcomes in terms of coronary heart disease, high blood pressure, and psychosocial benefits are reported for those whose alcohol intake is limited [20]. Differences in health outcomes by type of alcohol consumption have been reported [20].

Of concern for younger cohorts are the repeated dangerous and negative outcomes that can be associated with high levels of alcohol consumption. These include drunk driving, inappropriate sexual activity, and violence; frequently with serious outcomes [1,9,11]. Also, of concern is the research showing that high alcohol consumption among emerging adults is often a time of experimentation and accompanied by other substance abuse [1,3,5,10]. The behaviours occurring during this time in the life course, described by some researchers as 'emerging adulthood' or 'maturing out' [8,10,11,13,21], are important as they can influence future behaviours and health outcomes [2]. There are variations in the age range associated with definition of transition to adulthood. However, common threads indicate that it encompassed those years from late adolescent into the 30s. Given the variation within the literature, we adopted an inclusive age range of 18 and 35 years of age.

Alcohol use is incorporated into many national cultural traditions with heavy drinking and alcohol experimentation often seen as a culture norm in this younger age group [2,22]. However, international research into alcohol consumption is relatively rare. This study collected data in four diverse cities in four different continents to determine the role country-specific culture has on alcohol consumption and degree of adulthood. We aim to add evidence to this complex area that assesses the relationship between this important life stage and alcohol consumption patterns and behaviours.

Methods

Four cities were chosen to be involved in the study based on diversity. The city of Wuhan, capital of Hubei Province in China; Moscow, the capital and the largest city of Russia; Ilorin which is the administrative capital of Kwara State, Nigeria; and Montevideo, the capital of Uruguay. For each city, multistage random sampling was undertaken and was kept consistent across the four cities. Levels of geographical distinction (administrative area/local government area) followed by selection of streets/blocks/wards and then households formed the multistage component of the sampling. In each randomly selected household, the person with the most recent birthday, aged between 18 and 35 years, and who had lived in the city for at least six months, was eligible and was invited to participate in the face-to-face interviewer administered (via pen and paper) study. The detailed methodology and demographical profile of respondents has previously been published [23]. All respondents gave formal consent before publication.

In Wuhan, ethical approval was obtained from the Hubei Provincial CDC (Hubei Provincial Society for Health Promotion & Cigarette-smoking Control, HBPHP&CCS-2014-01), in Moscow from the Ethics Committee on the NRC on Addictions, in Ilorin from the Ethics Research Committee of the University of Ilorin (UERC/ASN/2014/007) and in Montevideo from the Pro Humanities Ethics.

The questionnaire was forward-translated into the relevant languages (e.g. English to Chinese) and back-translated (e.g. Chinese to English) to ensure the questions were conceptually and culturally equivalent between the cities. Prior to the main survey, a pilot study of 25 to 50 structured interviews was conducted in each city. Data collection was interviewer-administered. The average length of interviews was 15 minutes. Response rates ranged from 48.4% in Moscow to 95.0% in Ilorin.

Survey questions

Among the questions each respondent was asked were: 1) if they had ever consumed alcohol (excluding sips), 2) how often during the past 12 months they had drunk beer, wine, spirits (e.g., vodka, gin, whisky, brandy), and any other alcohol beverage, even in small amounts, and 3) during the past 12 months, how many alcoholic drinks they had on a typical day when they drank alcohol. Alcohol consumption (in grams per day) was calculated by multiplying frequency and amount of alcohol consumed using the country specific ethanol content for each beverage type. Overall quantity-frequency (QF) (i.e. usual frequency of drinking by usual number of drinks consumed per drinking occasion) was calculated by multiplying the responses to the above two questions (how often and how many).

Respondents were asked to rank, using a 5-scale likert score from strongly agree to strongly disagree, three separate question regarding emerging adulthood: 1) you have reached adulthood, 2) you are financially independent of your parents or other family members, and 3) you are emotionally independent of your parents or guardians. These questions were based on the work of Arnett and Padilla-Walker [24] and adapted to fit the common assumptions within the four cities. The scores from these three questions were added together (available range 3 to 15) with higher numbers equating to higher levels of adulthood. Demographic questions included age, sex, marital status, highest education obtained and employment status.

Analysis

To adjust for potential biases and to make sure that the results accurately reflect the population of interest, the data were weighted by age, sex and probability of selection. Details on specific weighting methodology are contained in a previous publication [23]. Data were analysed using Statistical Package for the Social Sciences (SPSS) version 24 for Windows (Chicago, IL), STATA version 14.0 (College Station, TX) and R 3.3.2.

Descriptive statistics were undertaken on grams of alcohol consumed each day and emerging adulthood for both the complete sample (n=6104) and for those who had consumed at least one drink of beer, spirits, wine or other country-specific alcohol beverage in the past 12 months in each city (n=3446). Quantile regression modeling [24,25] at quantiles of 25, 50, 75 and 90 were undertaken assessing the association between emerging adulthood and alcohol consumption (measured by grams per day) for all alcohol drinkers for each city. Quantiles were chosen so as to highlight the low, middle and high consumption patterns. Model 1 was unadjusted. Model 2 was adjusted for age, sex, marital status, education and employment.

Results

In total, 6235 structured interviews were undertaken (1391 in Ilorin, 1600 in Montevideo, 1604 in Moscow and 1640 in Wuhan). Males represented 47.6% of the sample in Ilorin, 49.2% in Montevideo, 49.2% in Moscow and 52.4% in Wuhan. Mean age of respondents was 25.58 (S.D. 4.81) – 25.08 years (S.D. 4.75) for Ilorin, 25.82 years (S.D. 4.91) for Montevideo, 26.21 years (S.D. 5.00) for Moscow and 25.15 years (S.D. 4.46) for Wuhan). The proportion having ever consumed alcohol was 33.3% (95% CI 30-9-35.9) of respondents from Ilorin, 53.4% (95% CI 51.0-55.8) for Wuhan, 86.1% (95% CI 84.3-87.7) for Moscow, and 96.4% (95% CI 95.3-97.2) for Montevideo.

To determine overall levels of alcohol consumption for the whole population for each city, descriptive statistics were produced for grams of alcohol consumed in the last 12 months (including drinkers and non-drinkers) (Table 1). Also included in Table 1 are the descriptive statistics for alcohol consumption (grams per day) for those who had consumed alcohol in the last 12 months for the four cities. The descriptive statistics for levels of adulthood for all respondents and for those who have consumed alcohol in the past 12 months are described in Table 2.

The results of the regression analysis modeling are shown in Table 3 and Figure 1. For each city, the quartile levels of consumption are presented for both models. No significant differences were found for Ilorin, indicating no association between alcohol consumption and level of adulthood. For Montevideo, an inverse association between adulthood and alcohol consumption was seen when the quantile levels was higher (75^{th} and 90^{th}) but not lower (25^{th} and 50^{th}). The (adjusted) regression coefficients for each unit increase of adulthood score were -0.582 (-1.024 to -0.140) at 75th and -1.113 (-2.156 to -0.069) at the 90^{th}. In Moscow, a different pattern was observed with no association with level of adulthood in the unadjusted

Table 1. *Descriptive statistics for current alcohol consumption (g per day), (all respondents and those who have consumed alcohol in last 12 months).*

All respondents[#]	**Ilorin, Nigeria**	**Montevideo, Uruguay**	**Moscow, Russia**	**Wuhan, China**
n	1388	1597	1534	1585
Mean	4.1	11	10.9	2.4
Standard Deviation	15.3	33.9	29.5	12.6
Median	0	2.3	2.3	0
Minimum	0	0	0	0
Maximum	251.7	596.2	350.9	257.1
Percentiles:				
25^{th}	0	0.3	0.1	0
75^{th}	0	10.7	9.7	0.5
95^{th}	26.5	40.3	40.5	10
99^{th}	67.2	114.8	184.5	57.4
Skewness	7.1	10.7	6.4	12.2
Consumer alcohol	**Ilorin, Nigeria**	**Montevideo, Uruguay**	**Moscow, Russia**	**Wuhan, China**
n	275	1351	1160	660
Mean	20.8	13	14.4	5.9
Standard Deviation	29	36.5	33.1	19.1
Median	11.1	3.9	4.3	0.9
Minimum	0	0	0	0
Maximum	251.7	596.2	350.9	257.1
Percentiles:				
25^{th}	4.1	0.9	1.4	0.3
75^{th}	26.5	13.8	13.5	3.5
95^{th}	67.3	43.6	54.1	22.9
99^{th}	173.5	133.5	207.2	86.2
Skewness	3.4	9.9	5.6	8

[#]Missing data for 131 respondents

Table 2. *Descriptive statistics for emerging adulthood (all respondents and those who have consumed alcohol in the last 12 months).*

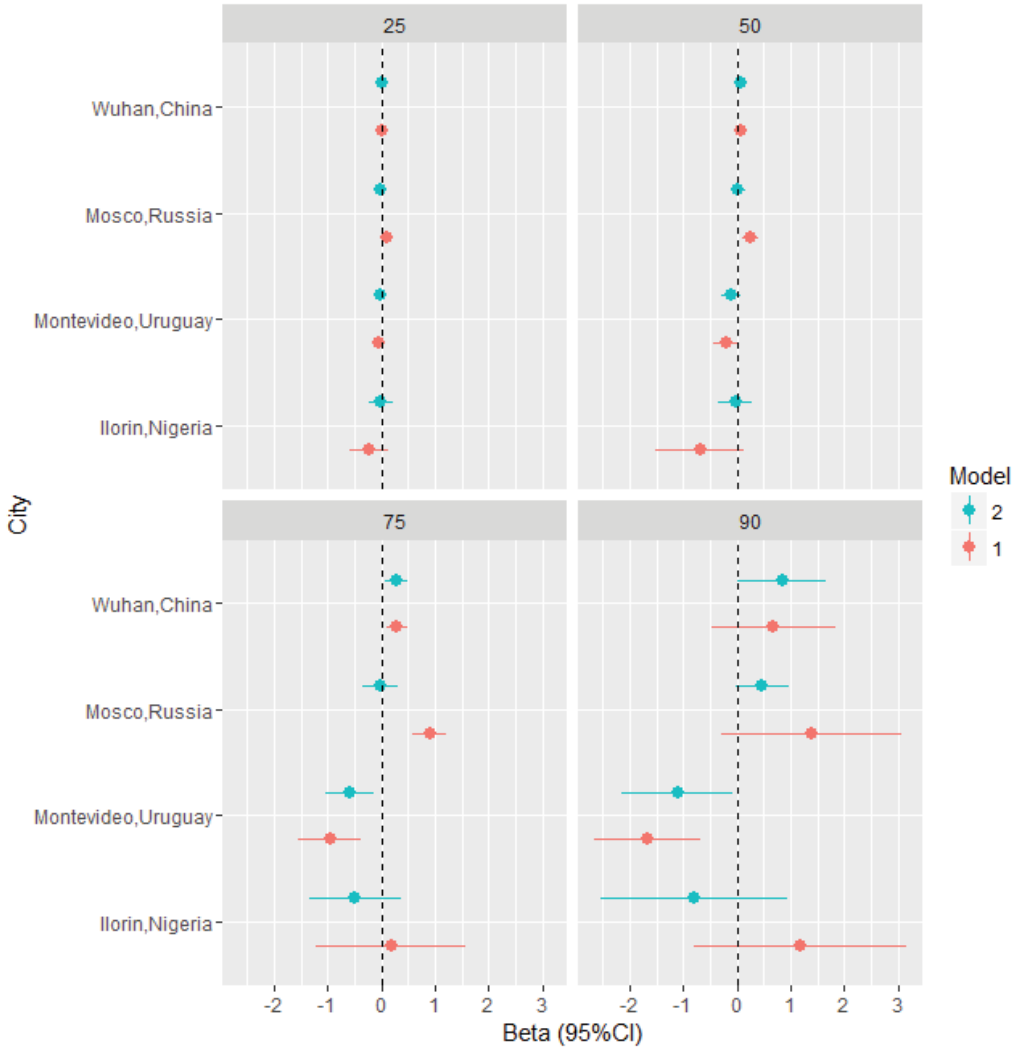
All respondents[#]	**Ilorin, Nigeria**	**Montevideo, Uruguay**	**Moscow, Russia**	**Wuhan, China**
n	1388	1597	1534	1585
Mean	9	10.4	11.9	12.9
Standard Deviation	3.7	3.1	3.2	2.7
Median	9	11	12	14
Minimum	3	3	3	3
Maximum	15	15	15	15
Consumer alcohol	**Ilorin, Nigeria**	**Montevideo, Uruguay**	**Moscow, Russia**	**Wuhan, China**
n	275	1351	1160	660
Mean	10.1	10.3	12.3	12.8
Standard Deviation	3.8	3.1	2.9	2.6
Median	11	11	13	13
Minimum	3	3	3	3
Maximum	15	15	15	15

[#] Missing data for 131 respondents

Table 3. *Quantile Regression Models association of emerging adulthood with alcohol consumption (excluding non-drinkers).*

Variables	Q 0.25		Q 0.50		Q 0.75		Q 0.90	
	Beta (95% CI)	P-value	Beta (95% CI)	P-value	Beta (95% CI)	P-value	Beta (95% CI)	P-value
Ilorin, Nigeria								
Model 1 - unadjusted	-0.225 (-0.596 - 0.146)	0.233	-0.694 (-1.524 - 0.136)	0.101	0.191 (-1.202 - 1.584)	0.788	1.190 (-0.793 - 3.173)	0.239
Model 2[a]	-0.008 (-0.226 - 0.211)	0.944	-0.030 (-0.354 - 0.293)	0.854	-0.489 (-1.343 - 0.365)	0.261	-0.804 (-2.537 - 0.929)	0.362
Montevideo, Uruguay								
Model 1 - unadjusted	-0.049 (-0.088 - -0.009)	0.016	-0.206 (-0.435 - 0.024)	0.079	-0.961 (-1.550 - -0.372)	0.001	-1.672 (-2.661 - -0.683)	0.001
Model 2[a]	-0.017 (-0.059 - 0.025)	0.438	-0.112 (-0.287 - 0.062)	0.207	-0.582 (-1.024 - -0.140)	0.01	-1.113 (-2.156 - -0.069)	0.037
Moscow, Russia								
Model 1 - unadjusted	0.090 (0.035 - 0.146)	0.001	0.244 (0.098 - 0.390)	0.001	0.905 (0.589 - 1.221)	<0.001	1.386 (-0.303 - 3.075)	0.108
Model 2[a]	-0.017 (-0.077 - 0.043)	0.587	0.021 (-0.102 - 0.144)	0.742	-0.013 (-0.352 - 0.325)	0.939	0.470 (-0.015 - 0.955)	0.057
Wuhan, China								
Model 1 - unadjusted	0.007 (-0.002 - 0.015)	0.107	0.071 (0.006 - 0.136)	0.031	0.296 (0.110 - 0.481)	0.002	0.679 (-0.469 - 1.826)	0.246
Model 2[a]	0.006 (-0.005 - 0.017)	0.326	0.074 (0.008 - 0.140)	0.028	0.274 (0.059 - 0.490)	0.013	0.834 (0.011 - 1.658)	0.047

CI: Confidence Interval.
[a]: Adjusted for age, sex, marital status, education and employment



Model 1: *Unadjusted;* ***Model 2:*** *Adjusted for age, sex, marital status, education and employment*
Note: *Four plots represent 25th, 50th, 75th and 90th quantile of alcohol consumption*
Figure 1. *Associations between emerging adulthood and alcohol consumption (grams per day) for 4 cities in quantile regression among alcohol drinkers.*

models at the 25th and 50th quantiles. Alcohol consumption increased as level of adulthood increased in the unadjusted models but the final adjusted models indicated no association between alcohol consumed each day and adulthood score across all quantile levels of alcohol consumption although the final adjusted model approached significance for the 90th quantile. For Wuhan, adulthood predicted high alcohol consumption. The final model predicted an additional 0.8 grams of alcohol being consumed per day for each unit increase of adulthood score when the quantile level of alcohol consumption was 90th.

Discussion

This study was undertaken to determine the level of adulthood associated with the use of alcohol during the transitional years of 18 to 35 years of age in four different cities across the world. Results indicate high levels of country specific influence on alcohol consumption for this priority age group with different levels of associations found for each of the four cities. In Ilorin the level of adulthood had no association with alcohol consumption. In Montevideo strong associations were found, with the higher the level of adulthood, the less alcohol that was consumed. In Moscow higher level of adulthood indicated increased alcohol consumption, but after adjusting for confounding demographics no association was found. In Wuhan, higher levels of adulthood were associated with increased alcohol consumption after adjustment.

Major differences in alcohol consumption prevalence rates has been found in other published multi-country research with wide variations across the globe [14,26,27]. The country-specific prevalence estimates of alcohol consumption across the four cities found in this study equates to other research whereby the proportion consuming alcohol in Nigeria is low, but for those who do drink alcohol consume large amounts [28]. In China, low to moderate levels of alcohol are consumed while in Uruguay moderate to high levels are consumed although a large proportion of the population drink alcohol [14]. Similar results to other Russian studies, our results showing relatively high rates of alcohol consumption [14,20,29]. The value of our study is the consistent, comparable methodological between the cities, such as constant methodology and timing, taking into account aspects of the specific countries.

In Nigeria, religion plays an important role in abstaining from alcohol consumption [28,30]. While Islam strictly forbids alcohol, Christianity and African traditional religion preaches against harmful use or preferably abstinence. However, the current existence of a more liberal society, poor implementation of legislation and increased marketing of alcohol and tobacco to younger age groups have been reported with concomitant increase in prevalence rates [28,30]. Cultural heritage and societal norms may have an influence in higher prevalence rates in males compare to females since it is more acceptable for males to drink alcohol [28,30,31]. Alcohol is traditionally consumed at a time of celebration and social rituals with drinking alone not often occurring [28,31,32]. These traditions and cultures, plus the changing role of alcohol in Nigerian society, could go some way in explaining why the relationship with adulthood has no association with alcohol consumption in our analysis. What was of concern in previous research undertaken in Nigeria is the lack of detailed alcohol policies and overall population knowledge regarding important concepts such as size of standard drinks, and alcohol content of drinks especially in regard to sweetened alcoholic drinks [28,30]. Although not many people consume alcohol in Ilorin, those that do consume alcohol, drink relatively heavily as found in our analysis [32].

High levels of alcohol consumption in Russia have previously been reported with alarming rates of high alcohol consumption over many decades [20,29]. Previous studies have shown that problematic consumption of alcohol often starts in young people (less than 15 years of age) [33]. Furthermore, research has linked the patterns of alcohol consumed by parents and this can predict the consumption patterns of the adult children [29]. While our results do not indicate strong relationships between alcohol consumption and levels of adulthood it is important to continue to track alcohol consumption across a wide age range.

It has been argued that Uruguay can be seen as having a similar alcohol drinking culture as southern European countries such as Italy and France where a 'wine-culture' exists such that drinking alcohol is rarely undertaken to become intoxicated but rather seen as a food or as a thirst-quencher [34]. Alcohol consumption is incorporated into lifestyles such that daily consumption is accepted and drinking excessive amounts of alcohol such that one becomes intoxicated is strongly condemned [27]. WHO classified Uruguay as a country with moderate to high levels of risk [20] although only a small proportion of residents report themselves to be experiencing alcohol abuse [27].Our analysis suggests higher rates of ever consuming alcohol among the younger age group in Uruguay compared to the other cities studied. This relatively higher rate is of concern and suggests that this age group would benefit from bespoke intervention to minimize the risk of harm from consumption of alcohol.

China, although traditionally a low alcohol consumption country, has seen an increase in alcohol consumption in recent decades with resultant social and health implications [5,14,35,36]. Alcohol consumption in China epitomizes happiness and success and is seen as a tool connecting friends/relatives as well as work colleagues and business relationships [35,36]. Income has been reported as an important indicator associated with alcohol consumption [36], and although not included in this present analysis, warrants further investigation especially in regards to preventive campaigns, policy directions and health education endeavours.

Of interest in our analysis was the strong association between level of adulthood and alcohol consumption once the final model was adjusted for known confounders including education and employment, indicating the importance of these variables.

These differences in associations between alcohol consumption and culture reinforce the results of a USA and Canada comparative study undertaken by Kairouz and Greenfield [37]. They argue, when comparing alcohol drinking influences and behaviours, differences in behaviours were the result of different drinking context, as well as policies and legislations. Our study takes this comparison further by including a diversity of cities and countries, limiting the age range to the emerging adulthood group, and showing the importance in context as well as culture. The mixed results found in our study replicate other

studies. Often the assumption is that a decline in consumption is expected as youth maturated into adulthood. Wilsnack et al. [26] study of 35 countries, reported that the only countries displaying this pattern were high-volume alcohol drinking countries such as some European countries, USA, Australia and New Zealand. The authors challenged the assumption that maturity decreases the rate of heavy drinking, and like our results, suggest the importance of place and culture. The proposition that 'maturing out' of consumption may be an Anglo-European phenomenon is reinforced somewhat by our results although our analysis was limited to ever-consumers rather than high frequency consumption.

When assessing the transition of alcohol consumption with the assumption that the prevalence estimates decline in the late 20s years of age, one must be mindful that many of these studies come from industrialized and high-income countries (normally USA) [1,6,8]. Many studies are limited in scope of representativeness and often limited to college students. In particular, the custom of USA adolescents moving to college in a different state is not universal across more countries; it is therefore unlikely USA college student studies will be representative of the patterns of consumption internationally.

Another common theme in the published literature is the reason for delay in the transition to adulthood. In most industrialized countries the traditional life events associated with 'becoming an adult' such as marriage and parenthood, have been delayed as a result of increased education opportunities [1,5,10,11,21,38]. Demographic indicators highlight that the age of both being married and becoming a parent have increased, although the United Nation statistics on the mean age of marriage for our four cities were very similar at around 25 years [39]. This delay in marriage has resulted in the experimental and often inappropriate behaviors associated with alcohol and drug related behaviors being extended into the late 20's [10].

Weaknesses associated with this study include the lack of a standard valid and reliable tool such as the Inventory of the Dimensions of Emerging Adulthood [40]. Transition, although an important concept, was not the primary focus of our overall project. We also acknowledge the lack of validity and reliability of our 'emerging adulthood' variable. In addition, this analysis is limited to a cross sectional study with no cause or effect or long-term trends in transition implied. Furthermore, no gender specific analysis was undertaken to determine differences although sex was controlled for in the final models. There was no assessment of a measure of acceptance within each culture on the satisfactory levels and tolerance of intoxication and because of the analysis undertaken we also did not incorporate how often, how regular, where, and when alcohol consumption occurred which are all recognized as importance determinants of alcohol consumption [22]. We also acknowledge that the different countries have specific legislation and we did not take into account the different legal age limits associated with alcohol consumption. We also did not take into account the economic and development status of each city/country, which have previously been shown to be indicators [1,22]. However, we have controlled by employment status of individuals in the final models which can be seen as an indicator of income and a proxy for economic status of the city/country. We also only assessed respondents who had consumed alcohol in the past 12 months with wide variations in means and mediums reported for each city. Different results may have been found if only regular drinkers were assessed. We also only used grams per day and could have used a range of other measures such as binge drinkers, heavy episodic drinkers or beverage specific consumption. Further research is required into the role and pattern of social interactions as socializing for this age group is an important undertaking. We also acknowledge that the range of response rates (48% to 95%) could introduce bias.

The strengths of this study include the diversity of the cities studied, the focus on the limited age range, the relatively large sample size and the use of comparable probability-based sampling methodology in each city. Often the important area of transition into adulthood and alcohol consumption is assessed using variables such as parenthood, employment status, and personality [11,21]. Our study controlled for marital status in the models which we believe is a strength. In addition, alcohol consumption is often not recorded in official statistics and this self-report methodology has been able to incorporate all levels of consumption [1,5,6,9,19,22,37-40].

Conclusion

This research, addressing the need for more geographical based, methodologically-comparable studies especially in low and middle income countries re-enforces the importance of context in alcohol consumption patterns. Country specific culture is an important indicator of alcohol consumption among young people. This study, controlling for factors such as age, sex, education, employment and marital status, indicates that high-level, as well as country specific interventions, planning and projects should be implemented to reduce any harm.

Conflict of Interest

Taylor AW is currently a recipient of a research grant provided by the International Alliance for Responsible Drinking (IARD). BMB, as keynote speaker/expert adviser, has received reimbursement of travel expenses and/or time from Anheuser-Busch, Noctis, and the International Centre for Alcohol Policies. BMB has been in receipt of a research grant provided by the European Research Advisory Board (ERAB) and is currently a recipient of a research grant provided by the International Alliance for Responsible Drinking (IARD). BMB has received reimbursement of reasonable expenses incurred as a member of the independent Research Advisory Board for the European Foundation for Alcohol Research. These projects/activities did not influence the current work. The other authors declare that they have no competing interest other than those mentioned in the acknowledgment section.

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