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Prevalence and Patterns of Polydrug Use in Latin America: Analysis of Population-based Surveys in Six Countries

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Abstract

The abuse of multiple substances continues to be a major public health concern in the United States, Latin America and other countries in the world. Recent studies have revealed that polydrug use has increased in many European countries. The main objective of this study was to determine the patterns of polydrug use in several Latin American countries. The data for this study was derived from separate studies conducted in Argentina, Bolivia, Chile, Ecuador, Uruguay and Perú. In each country a household survey was conducted using a multistage, stratified, cluster sample design. In all six countries, probabilistic samples of household residents aged 12 to 65 years of age were selected in three stages. The data were collected by a face to face interview using the same structured questionnaire, which was based on the Inter-American Uniform Drug Use Data System (SIDUC). A multivariate ordinal logistic regression model was fitted to assess the effects of country of origin on polydrug use, after adjusting for age and gender. The overall prevalence of polydrug use was 21%. The multivariate ordinal logistic regression model showed that males, participants aged 18 to 34 years and those from Chile, Uruguay and Argentina were significantly more likely to be polydrug users after adjusting for age and sex. This is the first study that documents the burden of polydrug use in Latin American countries. Future epidemiological studies should be conducted to examine the relationship between other demographic characteristics and risk behaviors with patterns of polydrug use.

Keywords: polydrug use, Latin American countries, Hispanics, drug abuse

1. Introduction

The abuse of multiple substances continues to be a major public health concern in the United States (U.S.), Latin America and other countries in the world. According to the National Survey on Drug Use and Health of the U.S. Department of Health and Human Services (DHHS) in 2005, 56% of all admissions to publicly funded treatment facilities were for multiple substances; among these admissions, 76% abused alcohol, 55% abused marijuana, 48% abused cocaine, 27% abused opiates, and 26% abused other drugs (United States Department of, Human Services. Substance & Mental Health Services Administration. Office of Applied, 2009). In the U.S., of the estimated 188,981 alcohol-related emergency department visits made by patients aged 12 to 20 in 2008, 70.0% involved alcohol only, and 30.0% involved alcohol in combination with other drugs (Substance Abuse and Mental Health Services Administration & Center for Behavioral Health Statistics and Quality, 2011). More than two-thirds (68.4%) of visits involving both alcohol and drugs were related to illicit drugs. Marijuana was the most common illicit drug reported (57.3%), followed by cocaine (13.3%), illicit stimulants (i.e., amphetamines and methamphetamines; 4.9%), and heroin (3.9%).

Recent studies have revealed that polydrug use has increased in many European countries. In Sweden, population surveys have documented that polydrug use has significantly increased compared with earlier surveys (Byqvist, 2006). Findings from a national household population survey in Great Britain have indicated that being young, male and hazardous drinker were associated with an increased likelihood of being a polydrug user (Smith, Farrell, Bunting, Houston & Shevlin, 2011). Other studies in Latin American countries have also found that

more than 25% of secondary school students of Argentina (36.3%), Bolivia (29.1%), Colombia (26.7%), Chile (30%) and Ecuador (26.6%) report use of combination of two or more substances (Naciones Unidas & Oficina contra la Droga y el Delito, 2006). Despite the high prevalence rates of polydrug abuse around the world, the scientific literature about this public health problem is limited.

Polydrug use is most often described as the use of at least two substances in the same time period. The World Health Organization (WHO) defines polydrug abuse as the concurrent or sequential abuse of more than one drug or type of drug, with dependence upon at least one (World Health Organization, 1994). Some of the dangers associated with polydrug use are due to the synergistic, cross-tolerance, and addictive effects. Several studies have shown that synergism complicates the detoxification process and increases the possibility of morbidity and mortality among drug addicts (Caplehorn & Drummer, 2002; Mathias & Zickler, 2001). Polydrug use has also been associated with adverse health outcomes, such as drug dependence (Leri, Bruneau, & Stewart, 2003), increased risk of exposure to HIV and HCV (Peters, Davies, & Richardson, 1998), and decreased cognitive functioning (Dillon, Copeland, & Jansen, 2003). Polydrug use has been increasingly reported in emergency room admissions and has been linked to drug-related deaths as well as nonfatal overdoses (Coffin et al., 2003; Strang et al., 1999).

Other studies have found that polydrug use is associated with physical and mental health conditions and is also related to higher probability of aggressive and suicidal behaviors (Borges, Walters, & Kessler, 2000; Feigelman, Gorman, & Lee, 1998).

Although previous research has documented that polydrug use is an important public health issue, knowledge about the magnitude and patterns of polydrug use is still limited, particularly in countries of Latin America. The objectives of this study were to: 1) determine the patterns of polydrug use in several Latin American countries; 2) compare the different combinations of polydrug use across countries; and 3) examine sociodemographic characteristics associated with polydrug use.

2. Methodology

2.1 Study Population and Sampling Design

The data for this study was derived from separate studies conducted in six countries: Argentina, Bolivia, Chile, Ecuador, Uruguay and Perú. In each country a household survey was conducted using a multistage, stratified, cluster sample design. In all six countries, probabilistic samples of household residents aged 12 to 65 years of age were selected in three stages. In a first stage, enumeration districts (EDs) were stratified and randomly selected from each strata. The sampling frame of EDs in each country was derived from the national census bureau or equivalent organization. In a second selection stage, households were randomly selected from each ED. In the final stage, one eligible individual was randomly selected from each household and invited to participate in the study.

2.2 Data Collection and Measurements

The data were collected by a face to face interview using the same structured questionnaire, which was based on the Inter-American Uniform Drug Use Data System (SIDUC). The interview included questions about demographic characteristics (age and gender) and substance use patterns. The instrument consisted of 50 questions, and respondents were asked if they had used each of the 13 classes of drugs/substances including alcohol, tobacco, marijuana, cocaine and heroin, inhalants and tranquilizers and stimulants for non-medical purposes. Use of substances was asked of the last 30 days, last year, and lifetime use. On the basis of responses to these questions, two separate dichotomous measures of drug use reports were generated: (1) use in the previous year, and (2) use in the past 30 days.

2.2.1 Definition of Polydrug Use

A count variable of last month substance use was calculated. The count increased by an index of one for each substance used over the last month. Polydrug use was defined as the use of two or more substances by one person in a month preceding the study interview. The count index ranged from 0 to 9. Polydrug use was categorized as follows: 0=no substances, 1=one substance, 2=two substances and 3=at least three substances. The substances included in this study were alcohol, tobacco, marijuana, cocaine, paste of cocaine, crack, heroin, inhalants and ecstacy. The polydrug use variable was recoded as: 0=no use, 1=monodrug use, and 2=polydrug use.

2.3 Statistical Analyses

Frequency distributions and summary measures were used to describe age, sex, and patterns of polydrug use across countries. Country-specific sample weights – which accounted for the unequal probability of selection and adjusted for non-response and non-coverage – were incorporated in the estimation procedure. Simple ordinal logistic regression was used to examine the distribution of polydrug use patterns across age, sex and country of origin. A multivariate ordinal logistic regression model was fitted to assess the effects of country of origin on polydrug use, after adjusting for age and sex. The satisfaction of the proportionality-of-odds assumption was assessed with the likelihood ratio test. Data management was performed using SPSS version 17 (SPSS Inc., Chicago, IL), and statistical analyses were performed using the statistical package Stata (Version 11.0, College Station, TX, U.S.).

3. Results

A total of 66,977 individuals were included in this analysis. Of these, females represented 56.8% of the sample (Table 1). The average age was 35.5 (±15.1) years, with nearly 38% (25,389) aged 18-34 years. The age category with fewest individuals was that of 12-17 years old. Table 1 also shows the sample sizes of each individual study, which varied from 7,000 observations collected in Uruguay to 17,182 observations in Chile.

Table 1. Baseline characteristics of the study sample (n=66,977)

Variable	n	%
Gender		
Female	38,064	56.8
Male	28,913	43.2
Age group in years		
12-17	8,894	13.3
18-34	25,389	37.9
35-44	12,541	18.7
45-64	20,153	30.1
Sample sizes per study country		
Argentina	13,493	20.2
Bolivia	9,523	14.2
Chile	17,182	25.6
Ecuador	7,954	11.9
Perú	11,825	17.7
Uruguay	7,000	10.4

The prevalence rates of 30-day use of substances and the number of substances reported are shown on Table 2. Alcohol and tobacco were the substances most frequently reported, 45.05% and 28.38%, respectively. Marijuana was the most frequently reported illicit drug – 2.69%. One-fifth of participants (21%) reported combining at least two substances. Roughly 18.75% of participants reported using two substances, whereas 2.25% reported using three or more drugs.

Table 2. Prevalence of substance use during the last 30 days

Substances	Prevalence (%)	95% CI
Alcohol	45.05	43.93 - 46.18
Tobacco	28.38	27.58 - 29.19
Marijuana	2.69	2.39 - 2.98
Cocaine	0.80	0.67 - 0.93
Cocaine paste	0.21	0.15 - 0.27
Inhalants	0.06	0.04 - 0.08
Ecstacy	0.06	0.02 - 0.09
Number of substances		
None	46.63	45.50 - 47.77
One	32.37	31.65 - 33.10
Two	18.75	18.04 -19.46
Three	1.66	1.41 - 1.90
Four	0.52	0.40 - 0.63
Five	0.07	0.04 - 0.10

Table 3 presents the distribution of polydrug use across country of origin, and age and sex categories. Males were significantly more likely to be polydrug users than females (p<0.001). Compared to females (13.5%), males were more likely (28.3%) to report using at least two drugs during the last month. Participants aged 18 to 34 years were significantly more likely to use at least three substances compared with other age groups. Older individuals (45-64 years) were less likely to report using three or more substances. Regarding country of origin, participants from Argentina (22.3%) and Chile (29.0%) were significantly more likely to report the use of at least two substances than their counterparts (p<0.001). Individuals from Perú (11.8%) and Ecuador (13.0%) were less likely to be polydrug users. In addition, participants from Perú and Ecuador were more likely to report no drug use during the last month (63.3%, respectively).

Table 3. Polydrug use by gender, age and country of origin (n=66,977)

	Polydrug use				
	Number of substances used				
	None	One	Two	Three or more	P value*
	N (%)	N (%)	N (%)	N (%)	
Sex					
Female	21,389 (56.2)	11,540 (30.3)	4,760 (12.5)	375 (1.0)	
Male	10,953 (37.9)	9,766 (33.8)	7,495 (25.9)	699 (2.4)	<0.001
Age group in years					
12-17	6,730 (75.7)	1,389 (15.6)	649 (7.3)	126 (1.4)	
18-34	10,643 (41.9)	8,225 (32.4)	5,878 (23.2)	643 (2.3)	
35-44	5,428 (43.3)	4,479 (35.7)	2,490 (19.8)	144 (1.2)	
45-64	9,541 (47.3)	7,213 (35.8)	3,238 (16.1)	161 (0.8)	<0.001
Latin American country					
Argentina	5,453 (40.4)	5,034 (37.3)	2,546 (18.9)	460 (3.4)	
Bolivia	5,402 (56.7)	2,665 (28.0)	1,421 (14.9)	35 (0.4)	
Chile	6,191 (36.0)	6,010 (35.0)	4,624 (26.9)	357 (2.1)	
Ecuador	5,038 (63.3)	1,882 (23.7)	1,010 (12.7)	24 (0.3)	
Perú	7,480 (63.3)	2,958 (25.0)	1,346 (11.4)	41 (0.4)	
Uruguay	2,778 (39.7)	2,757 (39.4)	1,308 (18.7)	157 (2.2)	<0.001

*P value generated from simple ordinal logistic regression.

Table 4 shows the most common combinations of substance use by country of origin. Individuals from Uruguay were more likely to report solely alcohol (28.1%) and tobacco use (11.2%). Participants from Chile were more likely to report the combination of alcohol and tobacco (26.4%), while the combination of alcohol and marijuana was more prevalent in Argentina and Uruguay (0.6%, respectively). Alcohol, tobacco and marijuana were the most commonly three substance combination, with Argentina having the highest prevalence (1.9%). Meanwhile, Bolivia and Ecuador reported the lowest prevalence of these three substance combination (0.1%). The most common four substance combination reported was alcohol, tobacco, marijuana and cocaine, with Argentina also having the highest prevalence (0.8%). Each of the remaining two and three substance combinations accounted for less than 0.1% of the total sample.

Table 4. Prevalent substance combinations by country of origin

	Country of Origin					
Substance Combinations	Argentina n (%)	Bolivia n (%)	Chile n (%)	Ecuador n (%)	Perú n (%)	Uruguay n (%)
None	5,453 (40.4)	5,402 (56.7)	6,191 (36.0)	5,038 (63.3)	7,480 (63.3)	2,778 (39.7)
Alcohol only	3,567 (26.4)	1,989 (20.9)	4,113 (23.9)	1,485 (18.7)	2,464 (20.8)	1,969 (28.1)
Tobacco only	1,451 (10.8)	646 (6.8)	1,890 (11.0)	396 (5.0)	492 (4.2)	784 (11.2)
Alcohol and marijuana	86 (0.6)	10 (0.1)	66 (0.4)	5 (0.1)	1 (0.1)	45 (0.6)
Tobacco and marijuana	41 (0.3)	5 (0.1)	22 (0.1)	2 (0.1)	1 (0.1)	11 (0.2)
Alcohol, tobacco and marihuana	255 (1.9)	14 (0.1)	256 (1.5)	11 (0.1)	21 (0.2)	106 (1.5)
Alcohol, tobacco and cocaine	25 (0.2)	2 (0.1)	19 (0.1)	0 (0.0)	4 (0.1)	4 (0.1)
Alcohol, marijuana and cocaine	25 (0.2)	0 (0.0)	7 (0.0)	1 (0.1)	0 (0.0)	6 (0.1)
Alcohol, tobacco, marijuana and cocaine	107 (0.8)	1 (0.1)	32 (0.2)	5 (0.1)	1 (0.1)	30 (0.4)
*Other	79 (0.6)	67 (0.7)	58 (0.3)	8 (0.1)	18 (0.2)	16 (0.2)

*Other substance combinations used by participants accounted for less than 0.1%.

Table 5 shows the distribution of polydrug use given use of each substance. Participants who reported using alcohol (3.7%) or tobacco (5.5%) during the last month were less likely to use three or more substances than those who used other substances. On the other hand, those who used marijuana (74.4%), cocaine (90.2%) and paste cocaine (94.9%) reported a higher prevalence of polydrug use. All the individuals who reported the use of ecstasy also reported the use of at least three substances.

Table 5. Percentages of use of one substance associated with the use of polydrug use

	Polydrug use Number of substances used		
Substance used during the last month	One (%)	Two (%)	Three or more (%)
Alcohol	54.1	42.2	3.7
Tobacco	30.3	64.2	5.5
Marijuana	2.3	23.3	74.4
Cocaine	2.9	6.9	90.2
Cocaine paste	1.0	4.0	94.9
Inhalants	31.7	26.7	41.7
Ecstacy	0.0	0.0	100.0

Note: Percentages of polydrug use were calculated from the total users of each substance type

The multivariate ordinal logistic regression model showed that males were more likely to be polydrug users (OR=2.35; 95% CI: 2.2-2.5) compared to females after adjusting for age and country of origin (Table 6). Participants aged 18 to 34 years and those aged 35-44 years were more likely to be polydrug users than those aged 45 years and over (OR=1.54; 95% CI: 1.5-1.6; OR=1.26, 95% CI: 1.2-1.4; respectively), while those aged 12-17 years were less likely to be polydrug users (OR=0.28, 95% CI: 0.2-0.3). Compared with Perú, participants from Chile (OR=3.66, 95% CI: 3.4-4.0), Uruguay (OR=2.48, 95% CI: 2.3-2.7) and Argentina (OR=2.42, 95% CI: 2.2-2.6) were significantly more likely to be polydrug users after adjusting for age and sex. On the other hand, participants from Bolivia (OR=1.54, 95% CI: 1.3-1.8) were almost twice as likely as Perú participants to be polydrug users after adjusting for age and sex. However, participants from Ecuador had similar odds of polydrug use as participants from Perú.

Table 6. Unadjusted and adjusted odds ratios from an ordinal logistic regression model for polydrug use*

Variables	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Gender		
Female†	1.00	1.0
Male	2.11 (2.0-2.2)	2.35 (2.2-2.5)
Age group in years		
12-17	0.33 (0.3-0.4)	0.28 (0.2-0.3)
18-34	1.47 (1.4-1.6)	1.54 (1.5-1.6)
35-44	1.15 (1.1-1.2)	1.26 (1.2-1.4)
45-64†	1.00	1.0
Latin American country		
Perú†	1.00	1.0
Argentina	2.29 (2.1-2.5)	2.42 (2.2-2.6)
Bolivia	1.47 (1.2-1.7)	1.54 (1.3-1.8)
Chile	3.32 (3.0-3.6)	3.66 (3.4-4.0)
Ecuador	0.90 (0.8-0.9)	0.89 (0.8-1.0)
Uruguay	2.31 (2.1-2.5)	2.48 (2.3-2.7)

Polydrug use was defined as: reference=no use; monodrug use= one substance; polydrug use= two substances or more.

4. Discussion

This study showed that 20.9% of individuals aged 12-65 years reported polydrug use in six different Latin American countries. Alcohol was the prevailing substance of choice across countries. However, participants who reported using alcohol or tobacco during the last month were less likely to use three or more substances than those who used other substances. Those who used marijuana, cocaine and paste cocaine reported a higher prevalence of polydrug use. Moreover, all individuals who reported the use of ecstasy also reported the use of at least three more substances, a finding consistent with previous studies showing that ecstasy consumers are more likely to be polydrug users of other legal and illegal substances (Degenhardt et al., 2009; Smith et al., 2011). These studies also indicate that ecstasy is frequently consumed in combination with tobacco, cannabis, cocaine or alcohol. Prevention messages and more effective intervention strategies are needed among the general population to reduce the risks associated with ecstasy use and the progression to polydrug use patterns. In addition, community-based intervention programs working with ecstasy users could incorporate screening tools into their efforts to identify future polydrug users.

Results of this investigation also indicate that males in the six Latin American countries were significantly more likely to be polydrug users than females, a finding consistent with a national survey in Sweden that examined polydrug use and drug misuse patterns among women and men (Byqvist, 2006). However, existing evidence is not conclusive in this regard. Celentano and McQueen (1984) found that females were more predisposed to be polydrug users to a greater extent than men, while Fiorentine and collegues (1997) found that polydrug use

patterns were similar for both genders. Galaif and Newcomb (1999) did not find significant differences by gender among four ethnic groups, including Latinos residing in the U.S. Young and colleagues (2002) found an age effect between the genders related to polydrug use patterns. The similarities were notable in early adolescence, but began to change in the mid-adolescent period when the prevalence rose for all. The differences between genders increased in late adolescence, and later among young adults, the prevalence of polydrug use was higher for men than for women. These findings suggest the need to design and develop tailored prevention strategies to respond to the different demands as a result of gender and age characteristics in the general population.

In our study people aged 18-34 years were more likely to report polydrug use than other age groups. Some investigations have shown that the use of different drugs at different ages depends on availability, new trends, drug market supply and prices. The use of one drug often leads to another, which accounts for the increase in polydrug use at older ages. On the other hand, research has suggested that the incidence of polydrug abuse decreases with age. Raveis and Kandel (1987) found that 85-95% of abusers, other than those who were marijuana and alcohol dependent, had ceased multiple drug abuse by age 30. Similarly, Kedia, Sell and Relyea (2007) found that among heroin and amphetamine abusers, the number of drugs used decreased with age. In contrast to these previous studies, the present study found that while polydrug use was higher among individuals aged 18-34 years, no drug use prevailed among adolescents (12-17 years), and monodrug use was more prevalent among adults 45 years and over.

In terms of country of origin, the populations from Chile, Uruguay and Argentina were significantly more likely than Perú to be polydrug users. According to the Argentine Drug Observatory, approximately 10% of the 13,208 patients who entered emergency rooms in 2007 reported the consumption of multiple substances. Moreover, a previous survey had revealed that of 0.5% of the population who has ever used ecstasy, the majority (85%) reported the use of this drug in combination with alcohol and other substances.

Several countries of Latin America have implemented national drug control strategies to reduce substance abuse and its consequences. These plans make emphasis in the control of the supply by means of the destruction of the drug agricultures, the police action on the traffic and the criminalization of the consumption. Until now, the outcomes of this approach have been limited. The U.S. Department of State reported that eradication programs of drug agricultures were insufficient to reduce the supply. In spite of being more efficient and less expensive, eliminating the harvests does not solve the problem, as they are being conducted. It is essential to complement these programs of repression and intensified interdiction, to press in the numerous links of the chain of the traffic (U.S. Department of State, 1988).

There is a global consensus that both producing (e.g. Colombia, Perú and Bolivia) as well as consuming (U.S., Argentina, Chile and Uruguay) countries need to engage in joint solutions to the problem of drug trafficking that threatens the international public health and security. It is necessary to insist on the control of the demand, by means of interventions of prevention, treatment and rehabilitation, as well as of harm reduction strategies (e.g. needle exchange programs) among chronic addicts. On the other hand, policy makers should recognize the failings of current policies based on prohibition and the “war against drugs”, and adopt the growing consensus that “legal regulation of drugs production and supply is the best option for managing drug use” (Transform Drug Policy Foundation, 2009).

This study has two major strengths: first, the study participants comprised nationally representative samples of the population aged 12-64 years in six Latin American countries; second, a standardized interview for drug use patterns was employed in all countries to determine the prevalence of polydrug use. However, there are limitations to interpreting the results of this study. First, because this analysis is based on a cross-sectional design, causality cannot be determined. Second, polydrug use was based on self-report and, thus, subject to recall bias and denial. However, self-reported data have been used in multiple epidemiologic studies of drug use and have proven to be reliable and valid (Freedenthal, 2007; Freedenthal, Vaughn, Jenson & Howard, 2007; King, Bird, Hay & Hutchinson, 2009).

Despite these limitations, this is the first study to document the burden of polydrug use in six Latin American countries. Future epidemiological studies should be conducted to examine the relationship between other demographic characteristics and risk behaviors (e.g., age of initiation, family history of polydrug use, personality traits/behaviors, and mental health conditions) with patterns of polydrug use that could be considered in the design and development of innovative and more effective prevention strategies and treatment modalities. Moreover, future ethnographical studies may help to unravel the socioeconomic factors (e.g., social disorder,

poverty, unemployment, cultural identity and familism) that promote or inhibit the progression from monouse to polydrug use among different Latin American countries.

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