Similarities and Differences in Alcohol & Other Drug Dependence Among Hispanic/Latino Subgroups: A Disaggregation Approach

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ABSTRACT

Background: Hispanic/Latino (H/L) heritage civilians out-number all other non-White ethnic groups in the United States. When studied as one group, H/L diversity is ignored, including rates of drug misuse. This study's aim was to examine H/L diversity regarding drug dependence by disaggregating how the burdens of active alcohol or other drug dependence (AODD) might change if we were to address syndromes drug by drug.
Method: Studying non-institutionalized H/L residents from the National Surveys on Drug Use and Health (NSDUH) 2002-2013 probability samples, we utilized online Restricted-use Data Analysis System variables to identify ethnic heritage subgroups and active AODD via computerized self-interviews. We estimated case counts of AODD with analysis-weighted cross-tabulations and variances from Taylor series. Radar plots disclose AODD variations when we simulate the reductions of drug-specific AODD one by one.
Results: For all H/L heritage subgroups, the most substantial AODD decline might be achieved by reducing active alcohol dependence syndromes, followed by declines of cannabis dependence. The burdens due to active syndromes attributed to cocaine and pain relievers vary somewhat across subgroups. For the Puerto Rican subgroup, our estimates reveal potentially important burden reduction if active heroin dependence can be decreased.
Conclusion: A sizeable reduction in the H/L population health burden attributable to AODD syndromes might be achieved via the effective decline of alcohol and cannabis dependence among all subgroups. Future research includes a systematic replication with recent NSDUH survey data, as well as various stratifications. If replicated, the need for targeted drug-specific interventions among H/L will become unequivocal.

1. Introduction

Affecting noteworthy proportions of the United States (U.S.) population, the alcohol and other drug dependence (AODD) syndromes represent complex public health challenges involving influences and outcomes across the biopsychosocial spectrum. This spectrum includes variations in drug exposure opportunities and street-level availability, clinician prescribing practices (e.g., with respect to opioid pain relievers), premature death, poorer mental and physical health, fatal injuries, family disruptions, financial challenges, and involvement with the criminal justice system (Bahorik et al., 2017; Grant et al., 2015; NHTSA, 2010; NIDA, 2018; ODPHP, 2020; ONDCP, 2011; SAMHSA, 2019, 2020). As such, both national and world health organizations have designated AODD prevention and treatment as primary objectives (Degenhardt, et al., 2016; SAMHSA, 2020; WHO, 2008).

The US Hispanic/Latino (H/L) heritage subgroup has not escaped AODD burdens. As of mid-2017, almost 60 million US residents were of Hispanic or Latino descent, representing about 18% of the total population and the country's largest ethnic minority group. The forecast to 2050 shows continued relative population growth to the 30% level (Colby & Ortman, 2017). Given this expected growth, it is imperative to account for drug dependence trends when addressing health disparities experienced by the H/L community. For instance, federal estimates for the H/L population show active alcohol disorders affecting approximately 9%-11% of 18-to-25-year-olds and 4%-6% of older adults; and corresponding prevalence estimates for other drug syndromes among H/L adults (excluding tobacco/nicotine) are 1.6%-1.8% (SAMHSA, 2020b).

Although there may be some value gained when all H/L individuals are aggregated into a single group, the practice of categorizing

H/L as a homogeneous ethnic group can hinder our understanding of patterns of drug use, with subsequent constraints on research to identify practical prevention and treatment strategies. Examples of research utilizing an ethnicity disaggregation approach have encompassed a variety of health outcomes, including, but not limited to, psychiatric morbidity (Alegria et al., 2007; Alegria, et al., 2008), cigarette smoking (Barnes, et al., 2010; Rodriguez et al., 2019); alcohol misuse (Barnes, et al., 2010; Caetano et al., 2008; Lipsky & Caetano, 2009; Ramisetty-Mikler, et al., 2010; Rios-Bedoya & Freile-Salinas, 2014), drug misuse (Lacey, et al., 2016; Parker et al., 2018), drug overdose (Cano, 2020; Cano & Gelpí-Acosta, 2022), and health care utilization (Barnes, et al., 2010; Mancini, et al., 2015). Taken together, this research has demonstrated that data aggregation conceals within-group inequities in health-related issues in various populations including countries outside the U.S. (Lacey, et al., 2016). The disaggregation approach is vital because it can disclose diversity in the occurrence of health outcomes, helping motivate more targeted public and behavioral health initiatives.

To the best of our knowledge, estimates of the effect of reducing dependence rates of different types of drug by H/L national group has not been reported. Hence, the aim of this work is to examine the relative burden of drug-specific syndromes in H/L in general and on specific subgroups. We use the ethnicity disaggregation approach with a novel research technique that starts by bundling all AODD syndromes (with tobacco/nicotine syndromes excluded for reasons explained below). We then estimate by how much the AODD burden might be reduced if we could meaningfully reduce AODD specific syndromes one by one. This work is aligned with recent calls for action of surveillance data disaggregation for racial and ethnic categories (Gelpí-Acosta et al., 2022; Kauh, et al., 2021).

2. Method

2.1. Population and Study Design

Each year from 2002 through 2019, the National Survey on Drug Use and Health (NSDUH) research staff drew multi-stage area probability samples of non-institutionalized civilians age 12 years and older. Sampling frames covered states and sub-state areas, non-institutional dwelling units (including homeless shelters, college dormitories, and other group quarters, as well as households), and each dwelling unit's residents. Each year's sample was large (n >55,000). NSDUH participation levels generally exceeded 70% (factoring in non-participation at the dwelling unit level and at the designated respondent level).

2.2. Datasets and Assessment

Almost all NSDUH variables are from self-report multi-item survey modules within audio computer assisted self-interviews (ACASI). For this report, estimates are from the subset of variables in the NSDUH online Restricted-use Data Analysis System (RDAS) 12-year de-identified file from 2002 to 2013 (https://rdas.samhsa.gov/#/survey/NSDUH-2002-2013-RD12YR). Data beyond this time period are not included in this report because there were changes in sampling methodology, survey design and assessments after 2014, which precluded to make comparable estimates of drug misuse vis a vis previous years. For instance, there were changes to the core modules concerning AODD (e.g., methamphetamines and prescription drugs) and the placement of questions which could affect responses. Specific details about changes and how comparability over the years is perceived can be found elsewhere (Center for Behavioral Health Statistics and Quality, 2015).

The NSDUH RDAS dataset includes standardized variables to categorize H/L participants self-identified as 'Mexican', 'Central or South American', 'Puerto Rican', 'Cuban' and 'Other' (e.g., Dominican, Spaniard, Other Hispanic origin). Of note, Puerto Ricans in the sample

refer to Puerto Ricans residing in the continental US and not in the island of Puerto Rico. Given the low sample size and the combination of people from different national backgrounds, the 'Other' category was excluded from our analyses and is not included in the "All Hispanics" table.

The NSDUH RDAS includes variables of drug-specific dependence syndromes for several drugs, assessed using the DSM-IV criteria (American Psychiatric Association, 1994). Diagnostic criteria are assessed for the interval of one year prior to the assessment date. A respondent is classified as having dependence if they responded positively to 3 of 7 dependence criteria. The drugs included in these analyses comprised: alcohol, cocaine, hallucinogens, heroin, inhalants, cannabis, pain relievers, sedatives, stimulants and tranquilizers. NSDUH definitions of drugs that fall into some of these groups include the following: 'Hallucinogens' include LSD or 'acid', PCP also called 'angel dust', Peyote, Mescaline, Psilocybin, and Ecstasy or MDMA. 'Inhalants' encompasses use of liquids, sprays, and gases (i.e., amyl nitrate, glue, paint solvents, aerosol sprays, etc.). 'Pain relievers' includes any form of prescription pain relievers that were not prescribed for the respondent, but that they took purely for the experience or feeling it caused (i.e., Percocet, Darvocet, Tylenol with Codeine, etc.); and does not include over the counter pain relievers that can be bought in drug stores without a doctor's prescription. 'Sedatives' are drugs people take to help them relax or go to sleep (e.g., barbiturates) and excludes over the counter "downers" such as Benadryl. 'Stimulants' are defined as drugs people take to lose weight, stay awake, or for attention deficit disorders, but do not include over the counter stimulants that can be bought without a doctor's prescription (i.e., methamphetamine, amphetamines, Ritalin, etc.). 'Tranquilizers' are drugs typically prescribed to calm or relax people, or relieve anxiety or muscle spasms. NSDUH asks respondents about their use of tranquilizers not prescribed for them, which they took only for the experience it caused (e.g., Alprazolam, Valium, Buspar, etc.).

2.3. Compliance with Ethical Standards

The study did not involve informed consent as it entailed the analyses of publicly available data. RDAS omits variables that can be used for indirect identification of individual participants. Thus, the institutional review board refereed this study's analysis plan as 'not human subjects' and was exempt.

2.4. Analyses

We conducted descriptive statistics of the demographic characteristics for the total sample and by H/L. We derived analysis-weighted estimates for dependence case counts, stratified by self-identified H/L subgroup. Variances and 95% confidence intervals (CI) are from Taylor series linearization suitable for complex survey designs. Plan position indicator (PPI) 'radar' plots created in Stata MP14 software (StataCorp, LLC) provide a visual representation of the projected number of dependence syndrome cases for all H/L combined, and for each disaggregated subgroup. The PPI radar plot center denotes the Y=0 case value and the line segments projecting outward from the center depict our projection based on the estimated number of all recently active AODD syndrome cases. The length of the line segment pointing outward from the center to the 12 o'clock position represents the estimated number of recently active AODD cases of all drug subtypes. Working counterclockwise to the 11:00 position, the reader can learn the projected effect of reducing all alcohol dependence cases, at the 10:00 position is the effect of decreasing cannabis, and so on. Error bars indicate precision (standard error) of each point estimate. We set an arbitrary threshold for what is an 'appreciable' reduction by calculating the overall number of recently active cases (for all drugs listed) minus the standard error of that estimate. We then looked at the estimates, drug-by-drug, in order to see whether reduction of the syndrome (or drug) might reduce the US projection to below that specified threshold. By looking clockwise around the radar

Table 1

NSDUH[a] 2002-2013 aggregated effective sample size and demographic characteristics by Hispanic/Latino subgroup.[b]

Demographic Variables	All Hispanics (N = 97,000)	Mexican (N = 67,000)	Central/South American (N = 14,000)	Puerto Rican (N = 11,000)	Cuban (N = 5,000)
Age					
12-17	13,400 (14%)	9,900 (15%)	1,500 (11%)	1,500 (11%)	400 (9%)
18-25	17,400 (18%)	12,500 (19%)	2,400 (17%)	1,900 (17%)	600 (12%)
26-34	20,100 (21%)	14,200 (21%)	3,200 (22%)	2,000 (18%)	700 (14%)
35+	46,000 (48%)	30,000 (45%)	7,100 (50%)	5,800 (52%)	3,100 (65%)
Sex					
Male	49,600 (51%)	34,400 (52%)	7,300 (52%)	5,500 (49%)	2,400 (50%)
Female	47,100 (49%)	32,200 (48%)	6,900 (48%)	5,700 (51%)	2,400 (50%)
Education					
Less than HS	31,900 (33%)	25,000 (37%)	3,700 (26%)	2,700 (24%)	1,000 (21%)
HS Diploma	23,800 (25%)	16,000 (24%)	3,300 (23%)	2,900 (26%)	1,300 (27%)
Some College	17,300 (18%)	11,000 (16%)	3,000 (21%)	2,500 (22%)	1,100 (22%)
College Degree	10,400 (11%)	5,100 (8%)	2,700 (19%)	1,500 (14%)	1,000 (21%)
Employment					
Full-time	47,500 (49%)	32,000 (49%)	7,700 (55%)	5,000 (45%)	2,300 (48%)
Part-time	9,800 (10%)	6,600 (10%)	1,700 (12%)	1,000 (9%)	500 (10%)
Unemployed	5,100 (5%)	3,400 (5%)	700 (5%)	800 (7%)	200 (5%)
Other[c]	34,400 (35%)	24,100 (36%)	4,000 (29%)	4,400 (39%)	1,800 (37%)

[a] NSDUH, National Surveys on Drug Use and Health

[b] The NSDUH Restricted Data Analysis System does not provide unweighted sample sizes for the Hispanic/Latino subgroups included in the 12-year dataset, but an approximate effective sample size can be derived using the methods developed by Vsevolozhskaya & Anthony (2014).

[c] 'Other' includes persons not in the labor force (retirees, not looking for a job, or 12-17 years old).

plot the reader can observe how much the dependence 'burden' might be reduced if we were able to reduce each drug-specific syndrome.

Our online supplemental material includes bar graphs of the weighted drug dependence estimates as an alternative display of the data.

3. Results

Table 1 shows the NSDUH 2002-2013 aggregated unweighted sample size, with roughly 105,000 self-identified as H/L, and their characteristics. The NSDUH RDAS does not provide unweighted sample sizes for the H/L subgroups included in the 12-year dataset, but an approximate effective sample size can be derived using the methods developed in previous work (Vsevolozhskaya & Anthony, 2014). As noted, the male-female ratios did not vary substantially across subgroups, nor did the age distributions. Although there were similarities among subgroups regarding education and employment, a few differences emerged. For instance, the Mexican subgroup reported a higher proportion of people with less than high school education while the Cuban subgroup reported a higher proportion of individuals with a college degree. Regarding employment, Puerto Ricans report the lower employment rate while Central/South American subgroup report the highest.

Table 2 shows the weighted estimates and standard errors of drug dependence counts by H/L subgroup. This will guide and complement the interpretation of the radar plots (and can be used by readers to generate other visualization approaches). Fig. 1 shows the obtained radar plots, organized in five separate panels (A-E, left to right). It shows analysis-weighted estimates for all recently active (past year) AODD syndrome cases at the 12:00 position (all drugs including alcohol but not tobacco/nicotine products). Specifically, panel A shows aggregate estimates for all H/L groups. Panels B-E show the disaggregated estimates for each H/L national subgroup.

The panel A represents all the US H/L population. The estimate in the 11:00 o'clock position shows the reduced projected number if we were to decrease the use of alcohol or to prevent and effectively treat all active cases of alcohol dependence in all H/L study population. If this were possible, the total number of affected alcohol dependence cases would drop by an appreciable amount from 1,607,000 (the number at the 12:00 position) to 413,000 (the number at the 11:00 position, 'All Alcohol Excluded'; see Supplemental material). On the other side of Fig. 1, at the

1:00 position ('Inhalants excluded'), it is possible to see the reduced projected number if we were to decrease the use of inhalants or to prevent and effectively treat all active cases of inhalants dependence in the study population. If this could be done, the total number of affected drug dependence cases would drop a non-appreciable amount from 1,607,000 (the number at the 12:00 position) to 1,596,000 (the number at the 1:00 position).

Panel B is focused on H/L participants who self-identified as 'Mexican' or 'Mexican-American' and the estimate shown at the 12:00 position indicates that in this US 'Mexican' population the projected number of drug dependence cases is 1,150,000 (i.e., 72% of the total overall number for H/L individuals). Similarly, panels C, D and E depict, respectively, the estimates for US residents self-identified as Central/South Americans, Puerto Ricans, and Cubans Americans.

All H/L subgroups (panels B-E) show a general congruency in that the most gain can be seen after subtracting alcohol dependence from the total, followed by cannabis. Additionally, other tangible drops are observed by the reductions achieved by addressing dependence to cocaine and pain relievers in all subgroups (although to a lesser extent among Central/South Americans). Of note, non-congruent with other H/L subgroups in the US, an appreciable reduction in drug dependence among the Puerto Rican population in the US can be achieved by reducing heroin dependence (panel D). Likewise, compared to other H/L subgroups, Cubans may benefit from a modest reduction in stimulants (panel E). Furthermore, congruent among all H/L subgroups is that the drug-related burden would be no more than modestly reduced by addressing drug dependence syndromes associated with hallucinogens, inhalants and sedative-hypnotics.

4. Discussion

This report capitalizes on what NSDUH participants self-disclose about the disaggregated categories of ethnicity and family heritage that most studies to date collapse into a single 'Hispanic' category of ethnic self-identification. Using the radar plots display, this work provides estimates of the AODD syndrome burdens that could be reduced by declines in drug-specific syndromes among H/L as a group and by national subgroups.

An essential observation is that Panel A (All Hispanics) is very similar to Panel B (Mexicans), which could be a mere reflection of Mexicans
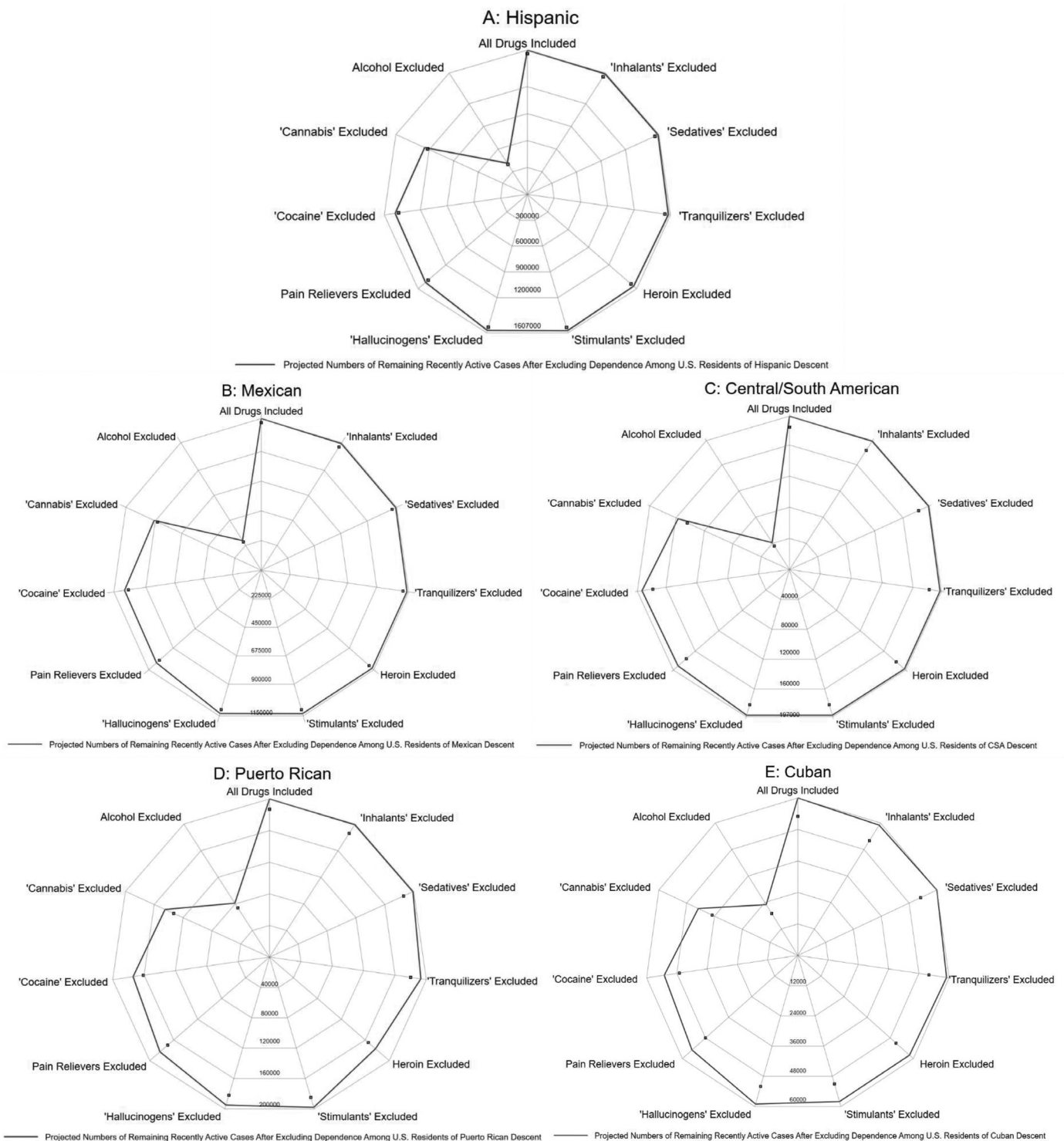
Fig. 1. Radar Plot Display of Estimated Projection of (a) the Number of Recently Active AODD Cases for all Hispanic/Latino subgroup community residents of the United States, 2002-2013, and for disaggregated Hispanic/Latino subgroups, and (b) the Number of Recently Active AODD Cases in each subgroup if it were possible to effectively treat each subtype of AODD syndrome. Point estimates and standard error values used in Fig. 1 are presented in Table 2. (Standard error bars are indicated with a 'dot' notation).

Tobacco/nicotine dependence syndromes had to be excluded because the NSDUH assesses 'current' dependence syndromes of this type for the individuals who have used a product within 30 days prior to assessment. There is no corresponding assessment of tobacco or other nicotine product dependence for the comparable year-long interval prior to assessment, which NSDUH uses for alcohol and for the internationally regulated drugs such as cannabis, cocaine, and the opioids.

Table 2
Weighted counterfactual estimates of drug dependence counts.

Counterfactual DDS Counts (Standard Error)	All Hispanics	Mexican	Puerto Rican	Central/South American	Cuban
All Drugs Included	1,607,000	1,150,000	200,000	197,000	60,000
	(40,000)	(31,000)	(13,000)	(14,000)	(7,000)
Excluded Drugs	413,000	268,000	81,000	41,000	23,000
Alcohol	(17,000)	(12,000)	(7,000)	(5,000)	(4,000)
Cannabis	1,255,000	910,000	145,000	157,000	43,000
	(37,000)	(29,000)	(12,000)	(13,000)	(6,000)
Cocaine	1,485,000	1,067,000	174,000	191,000	53,000
	(39,000)	(30,000)	(13,000)	(14,000)	(6,000)
Hallucinogens	1,580,000	1,131,000	195,000	195,000	59,000
	(40,000)	(31,000)	(13,000)	(14,000)	(7,000)
Heroin	1,563,000	1,133,000	177,000	195,000	58,000
	(39,000)	(31,000)	(12,000)	(14,000)	(7,000)
Inhalants	1,596,000	1,142,000	199,000	196,000	59,000
	(40,000)	(31,000)	(13,000)	(14,000)	(7,000)
Pain Relievers	1,498,000	1,071,000	183,000	189,000	55,000
	(39,000)	(30,000)	(13,000)	(14,000)	(7,000)
Sedatives	1,583,000	1,132,000	198,000	195,000	58,000
	(39,000)	(31,000)	(13,000)	(14,000)	(7,000)
Stimulants	1,584,000	1,137,000	193,000	195,000	59,000
	(40,000)	(31,000)	(13,000)	(14,000)	(7,000)
Tranquilizers	1,466,000	1,050,000	178,000	184,000	54,000
	(40,000)	(30,000)	(13,000)	(14,000)	(7,000)

being the largest group in the sample, accounting for 72%. For the purpose of this report, however, is critical to demonstrate the aggregated view, even with the naturally high weighting of Mexicans' AODD, before disaggregating the data into national subgroups. The purpose of Panel A is precisely to depict the typical aggregated view that most researchers are used to portray and to use it as a baseline comparison for the disaggregated data. This approach provides a more accurate picture of AODD burdens among H/L both when considered as a homogenous group (Panel A) and when considered by subgroups (Panels B-E) and highlight the risk and missed opportunities of not disaggregating data; namely, that the findings mirror the majority group and nuanced features are masked.

4.1. Alcohol

The main finding suggests the prominence of active alcohol dependence cases for all US residents of H/L descent as a group and stratified by diverse national subgroups. The observed profile of alcohol dependence reinforces past epidemiological findings indicating that a single estimate of drug reduction for the H/L population might serve well as a summary estimate for all H/L subgroups, echoing prior disaggregated analyses in alcohol research (Caetano et al., 2008; Rios-Bedoya & Freile-Salinas, 2014). Even though the rates of alcohol dependence vary across H/L subgroups (Rios-Bedoya & Freile-Salinas, 2014), the consistent reduction of the dependence (e.g., via effective supply constraints, primary prevention of alcohol misuse, or effective treatment of alcohol abuse/dependence) suggest benefits for all subgroups. Among various generic public health approaches that might be used to reduce alcohol dependence (and its related burdens), Caetano and colleagues (2017) suggest a focus on family cohesion intended to protect from hazard-laden drinking patterns. Of note, although the current analyses highlight the unique role of alcohol dependence in the reduction of AODD among H/L groups in both aggregated and disaggregated data by ethnic subgroup, previous research has documented that risk factors and alcohol use patterns differ by national group (Chartier & Caetano, 2010; Rios-Bedoya & Freile-Salinas, 2014; Ramisetty-Mikler et al., 2010). For example, Puerto Ricans have the highest risk of alcohol use disorder, followed by Mexicans, and both groups tend to binge drink compared to other Hispanic subgroups. Further, differences by age, education and gender have also been reported (Ramisetty-Mikler et al., 2010; Rios-Bedoya & Freile-Salinas, 2014; Vaeth et al., 2017). Taken together, studies suggest that disaggregated approaches should go beyond ethnicity

to include other characteristics that may impact prevention and treatment efforts for AODD and other health issues (Gelpí-Acosta et al., 2022; Nguyen et al., 2014; PAHO, 2020).

4.2. Cannabis and Cocaine

The relative congruence of the 'Cannabis Excluded' estimates is also noteworthy, perhaps especially for self-identified Cuban and Puerto Rican individuals. In future research, potential subgroup effects of cannabis policy liberalization deserves attention. The radar plots display less congruence for the other drug types. For example, the relative prominence of cocaine dependence varies considerably across the subgroups. Declines in cocaine use and dependence would seem to be more important for Puerto Ricans and Cubans relative to H/L of Mexican or South/Central descent. If reproduced in future research (e.g., with RDAS datasets from later years), our novel 'Cocaine Excluded' estimates should motivate focused attention on the Puerto Rican and Cuban subgroups.

4.3. Heroin

The prominence of heroin dependence was unique among individuals of Puerto Rican descent. This finding aligns with recent research documenting that drug overdose mortality rates in the Puerto Rican heritage group have increased overtime (Cano & Gelpí-Acosta, 2021) and are higher than other Hispanic heritage group across all US regions (Cano et al., 2022), suggesting that the phenomena is not a matter of geographical area or drug availability. Rather, prominent work on the Puerto Rican drug use research indicates that factors explaining health disparities associated with heroin use in this population are multifactorial/multilevel and encompass individuals' trajectories from Puerto Rico to the mainland. As a territory of the U.S., Puerto Rico is an entry point for cocaine and heroin, which increases drug availability in the island's neighborhoods and, in turn, increases the chances of incarceration due to drug possession. Also related to Puerto Rico colonial status (which is unique to this H/L subgroup) is their male participation in U.S.-involved wars, increasing the potential for trauma among these men. Among women in Puerto Rico, low education, unemployment, partner violence and concurrent alcohol use were identified as predictors of drug misuse, including heroin (Alegría et al., 2004). Further, the large relocation of individuals with problematic drug use, including injection drug users, from Puerto Rico to the stateside in efforts to search for treatment services has been documented (Deren et al., 2007; Torruella, 2012). Once

in the U.S., Puerto Ricans oftentimes continue experiencing social disadvantage (e.g., residential segregation, unemployment) that further perpetuates their risk for drug use and dependence.

Given the current opioid overdose epidemic, it is relevant to note that medically assisted treatment (MAT) with opiate agonists has proven to be clinically effective in the treatment of heroin dependence (SAMHSA, 2022). MAT is the use of FDA-approved medications, in combination with behavioral therapies, to provide a comprehensive and tailored approach to the treatment of substance use disorders. Unfortunately, H/L are less likely than other racial/ethnic group to access and benefit from substance use treatment programs (Chartier et al., 2016; SAMHSA, 2012). Puerto Ricans, in particular, have reported the use of MAT for opioids at about 27%, indicating that most individuals do not receive formal treatment (unpublished data; 2019-2020 NSDUH). A key reason for the underuse of MAT among stateside Puerto Ricans is their hesitancy or ambivalence related to evidence-based intervention treatments in favor of abstinence-only models learned via the predominantly faith-based drug treatment infrastructure in Puerto Rico (e.g., Hogar CREA; Gelpí-Acosta et al., 2019; Hansen, 2005). According to these normative beliefs, recovery is the sole responsibility of the individual and medications are seen as "a crutch", another drug that will just perpetuate the addiction.

These 'Heroin Excluded' estimates, along with underutilization of MAT, reinforce a need for community-focused strategies that are culturally and linguistically relevant to address the opioid epidemic that affects H/L groups, particularly Puerto Ricans (SAMHSA, 2019; Gelpí-Acosta, et al., 2021). Of note, community-based strategies are especially relevant given that many outpatient substance use treatment facilities that treat opioid addiction through the use of methadone or buprenorphine may be operating at capacity or above capacity (Lipari & Hughes, 2015). In addition, public health strategies of prevention and treatment initiatives in the island of Puerto Rico, including correctional facilities (Rodríguez-Díaz et al., 2011; Albizu-García et al., 2012) may reduce the need for relocation efforts, which frequently entail experiences such as family separation, under/unemployment, and other contextual challenges that may prevent recovery. Concrete collaborations between Puerto Rico and U.S. regions are also needed (Deren et al., 2014).

4.4. Drug burdens and acculturation

The influence of acculturation in the AODD burdens among H/L adults examined in this study is unknown. Existing research shows mixed findings regarding the associations between drug misuse among H/L and acculturation (Alegría et al., 2007; Chartier et al., 2016; Rodriguez et al., 2019), defined as the process by which immigrants progressively and selectively adopt the beliefs, attitudes and customs of the host country while also retaining the ones from their heritage country (Thomson & Hoffman-Goetz, 2009; Schwartz, Unger, Zamboanga, & Szapoznik, 2010). These findings appear to be partially explained by factors such as specific health outcomes, gender, national background, among others (Rodriquez et al., 2019; Kondo, et al., 2015; Gelpi-Acosta, et al., 2019). Hence, given the increasing proportion of H/L groups in the U.S. (Colby & Ortman, 2017), and the inherent acculturation process, it is crucial to characterize acculturation as a social determinant of AODD between and within diverse H/L groups. This is particularly relevant given the unique sociopolitical relationships between the U.S. and various H/L countries (i.e., Mexico, Cuba, Puerto Rico) and the potential of these contexts to influence pre-post migration experiences (González, et al., 2021).

5. Strengths and Limitations

Strengths of this paper include the large sample size, representativeness of the US H/L population, comparisons by specific H/L subgroups,

and the novel use of radar plots to showcase the estimates when dropping one drug dependence syndrome at a time. In particular, the portrayal of ethnicity data disaggregation for AODD across H/L residing in the U.S. is timely and of crucial public health significance. Despite these important strengths, this report should be interpreted considering some limitations, such as the NSDUH reliance on self-report data, our inability to disaggregate the 'Central/South American' H/L subgroup due to sample size constraints, the need to exclude tobacco/nicotine dependence because its assessment did not correspond with the one of other drugs of use, and the specific use of data up to 2013. Additionally, these analyses do not include Puerto Ricans living in Puerto Rico given that the NSDUH survey has only been administered in the 50 states and the District of Columbia. Hence, this data may be underestimating a large proportion of AODD in the Puerto Rican community as suggested by previous research (Alegría et al., 2007; Chartier & Caetano, 2010). We also acknowledge that the drug dependence syndromes were defined using DSM-IV criteria, not the current DSM-5 diagnostic system. However, there is substantial overlap between both editions' criteria and research has shown just modest changes in past-year prevalence when using DSM-IV and DSM-5 (Goldstein, Chou, Smith, et al., 2015), supporting the usefulness of the data.

6. Conclusions and Future Directions

6.1. Conclusions

This report contributes to recent recommendations to disaggregate racial and ethnic health data in order to better understand the needs of vulnerable communities (Gelpí-Acosta et al., 2022; Kauh, et al., 2021; Nguyen et al., 2014). Our findings indicate that a sizeable reduction of the public health burden attributable to the AODD syndromes among the H/L community might be achieved via public health work focused on effective treatment of alcohol and cannabis dependence among all H/L national subgroups. For some subgroups, focused attention on cocaine (i.e., Cubans and Puerto Ricans) and on opioid pain relievers is needed. Heroin dependence among self-identified stateside Puerto Rican individuals clearly deserves focused attention. Efforts directed toward other drug sub-types can be generally helpful but might be less impactful on the total number of recently active drug dependence cases among U.S. community residents who self-identify as H/L. Disaggregation approaches in health research are imperative; not only to identify risk factors across subgroups, but also because of their tremendous potential to detect protective factors in specific populations that will ultimately guide both prevention and treatment efforts.

6.2. Future Directions

Expressed via this initial step in a new line of research, we aim to set the stage for additional replications, stratifications, and estimates that can be used with greater precision and subgroup specificity in local, state, and federal initiatives intended to reduce AODD burdens among H/L groups. A direction for future research includes three main areas. First, it is suggested to conduct the replication of our approach with the 2002-2013 data to the 2014-2019 RDAS dataset, using meta-analysis to synthesize a summary estimate from the two replications, and discuss whether or not crucial distinctions arose. Replications can also be applied to the newer NSDUH data (https://govtribe.com/opportunity/federal-contract-opportunity/2023-2027-national-surveys-on-drug-use-and-health-nsduh-283220568-2) in an attempt to reproduce the findings and patterns, despite the changes in survey methods (Center for Behavioral Health Statistics and Quality, 2015), and to compare AODD between Puerto Ricans living in Puerto Rico and their counterparts living in the U.S., as well as with other H/L groups. Second, estimates stratified by age, gender, socioeconomic status indicators, acculturation measures and psychiatric comorbidity are warranted. It will be useful to contrast

age-specific estimates by nativity (i.e., US-born versus not), as recommended by Gelpí-Acosta and colleagues (2022), and as illustrated in past work on the incidence of initiation of extra-medical use of prescription pain relievers for Mexican-American heritage subgroups of adolescents (Parker et al., 2018). Additional contrasts include socioeconomic status, gender-related variations and acculturation measures (PAHO, 2020) as well as heterogeneity across birth cohorts that others have described for the U.S. population as a whole and for the aggregated U.S. census racial/ethnic subgroups (Wall et al., 2018). Given the co-occurrence of substance use disorders and mental illness among the H/L population (SAMHSA, 2020), estimates of reductions of AODD among individuals with psychiatric comorbidity (particularly externalizing domains) are also warranted. Finally, future research should examine disaggregation of AODD burdens for other non-White ethnicity populations of the U.S., including at the level of the individual's or family's state or nation.

Contributors

Only the authors listed are responsible for the content and preparation of this manuscript. VCF and JCA conceptualized the paper idea; VCF, MC and JCA drafted the initial manuscript, and VCF led the revisions; AB conducted data analyses, under the supervision of VCF and JCA, and prepared tables and figures. All authors revised and approved the final manuscript.

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Supplementary materials

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