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The Impact of Gamma Hydroxybutyrate (GHB) Legal Restrictions on Patterns of Use: Results from an International Survey

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Abstract

Aims—To conduct an Internet-based survey of GHB use, identifying differences by respondent residence.

Methods—We recruited GHB-knowledgeable persons via “social networking Internet sites.” Individuals (n=314) or groups (n=66) were approached based on GHB-use testimonials.

Data collected—location, use, reason for cessation (if applicable).

Findings—We recruited 155 GHB users. U.S. respondents (53 of 70; 76%) compared to non-U.S. respondents (38 of 85; 45%) were older and more highly educated ($p < 0.05$) but manifest a 3-fold greater adjusted odds of GHB cessation (Odds Ratio [OR] 3.1; 95% CI 1.4–6.9; $p < 0.05$). Of the 80 respondents stating reason for cessation, 36 (45%) cited legal risk, price, or access; 44 (55%) cited health or related concerns. U.S. compared to non-U.S. respondents more frequently invoked legal and related concerns (OR 2.5; 95% CI 0.99–6.3; $p = 0.05$). In a nested analysis, narrowly stated legal (n=4/5 U.S.) versus health (n=6/18 U.S.) reasons differed by location ($p = 0.048$, one-tailed).

Conclusions—In the U.S., where GHB has stricter legal penalties, GHB cessation is more likely, with legal and related reasons more commonly invoked for cessation. These findings support a link between declining U.S. GHB abuse and more stringent restrictions; although other un-assessed factors may also explain this association. The Impact of Gamma Hydroxybutyrate (GHB) Legal Restrictions on Patterns of Use: Results from an International Survey

INTRODUCTION

Gamma hydroxybutyrate (GHB) was initially marketed as a dietary supplement and was particularly promoted among body-builders, but it quickly emerged as a drug of abuse as it became known as a “party drug.” (DAWN, 2004; MMWR, 1999) As part of this evolving pattern of abuse, GHB garnered a reputation for use as a “date rape drug.” (ElSohly and Salamone, 1999) With its widening abuse, GHB became recognized as a major cause of drug-induced coma. (DAWN, 2004) Indeed, numerous case reports of GHB-associated morbidity and mortality from around the world have documented this drug’s potent effects and narrow therapeutic index. (Bosman and Lusthof, 2003; Caldicott et al., 2004; Knudsen et al., 2008; Liechti et al., 2006) Moreover, it also became clear that a new and serious syndrome of GHB-withdrawal was occurring. (Dyer et al., 2001; Gonzalez and Nutt, 2005; McDaniel and Miotto, 2001; Tarabar and Nelson, 2004) Superimposed on the original GHB-related syndromes, abuse of a number of GHB congeners taken as alternatives to the original compound has been linked to additional adverse events attributable to variations in dosing, metabolism, and other toxicokinetic and toxicodynamic parameters. (Palmer, 2004; Wojtowicz et al., 2008; Wood et al., 2008; Zvosec et al., 2001)

In response to the growing GHB abuse and its attendant health hazards, the U.S. Controlled Substances Act was amended in 2000 to list GHB as an illicit Schedule I substance, although this regulatory restriction was complicated by the 2002 U.S. Food and Drug Administration (FDA) approval of a prescription formulation of GHB (Xyrem®) for the treatment of cataplexy.

A major GHB congener, gamma butyrolactone (GBL), is a U.S. List 1 controlled chemical (a substance defined as “important to the manufacture of a controlled substance”). Abuse of other GHB congener/precursors (gamma valerolactone [GVL] and 1,4-butanediol [BD]) may also result in U.S. federal prosecution. (Zvosec et al., 2001) For example, the U.S. FDA declared BD a Class I Health Hazard, stating that it poses a significant health hazard. (Federal-Register, 2000) The net result of these regulations is that it is illegal in the U.S. to possess, manufacture, or sell GHB, GBL, GVL, or BD ‘when the intent is for ingestion,’ unless prescribed by a physician.

The U.S. restrictions contrast distinctly with those in place internationally, especially in Europe. In March 2001, GHB was added to Schedule IV of the UN “Convention on Psychotropic Substances,” to whose general principles all European Union (EU) member states are bound. However, the GHB congener, GBL, is not controlled in many EU member states, and thus GBL is readily available for sale over the Internet in the EU. (EMCDDA, 2008) Restrictions on BD are also lax. For example, GHB was classified as a Class C controlled substance in the U.K. under the Home Office Misuse of Drugs Act in 2003, although it is still legal to possess and supply GBL and BD in the U.K.. (Wood et al., 2008) In Canada, GHB is a Schedule III agent and both GBL and BD are considered Class A precursors, requiring a license and a permit for all imports and exports of these chemicals. (United.States-Canada, 2008) Thus, Canadian restrictions are more closely aligned with U. S. regulations, although current U.S. restrictions are more stringent.

Legal restrictions have certainly limited the availability of GHB and its congeners. Associated legal penalties, especially in the U.S., may also have served as a deterrent for sellers and consumers of these illicit substances. Awareness of the potential health hazards of acute and chronic GHB misuse (including surreptitious administration) could also account for declining use. Although awareness of the health hazards has been best documented in the U.S. GHB-using community (Barker et al., 2007; Kim et al., 2007), such knowledge can be presumed to diffuse rapidly across national borders.

We have previously documented a steep decline in GHB exposures reported through poison control reporting and other U.S. surveillance and survey data sources. (Anderson et al., 2006) Nonetheless, even in the U.S. GHB use is still an ongoing concern especially among gay and bisexual men (Halkitis and Palamar, 2006), individuals with GHB dependence and victims of GHB drug facilitated assault (Anderson et al., 2006) Furthermore, the picture internationally appears to be more heterogeneous. For example, recent reports from Sweden suggest an upswing there in total GHB abuse (Knudsen et al., 2005), while in a report of hospitalized patients following acute overdoses in Oslo, Norway, GHB was among the drugs most frequently involved. (Hovda et al., 2008) And, concerns about apparent recent illicit use of GHB and ketamine in Australia prompted an epidemiologic survey of their use in the general population. (Degenhardt and Dunn, 2007)

We have previously reported findings from both structured and open-ended interviews with active GHB and GHB-congener users. (Barker et al., 2007; Kim et al., 2007) By design, these studies were not intended to investigate factors associated with abstinence from GHB and GHB congener use, either among those who considered but did not initiate GHB use or among former users who ceased doing so. In order to assess the impacts of both health concerns and legal restrictions on GHB abstinence, we carried out a survey specifically designed to ascertain factors that might be associated with such behavior, both in the U.S. and outside the U.S.. In order to reach a national and international audience of persons likely to be familiar with GHB and to collect sensitive data in a non-threatening context, we used an Internet-based approach both to reach targeted social-networking sites and to allow anonymous participation in a brief self-completed survey form.

METHODS

Overview

We utilized an anonymous, Internet-based, self-completed, structured survey to collect data among knowledgeable GHB users and ex-users to investigate reasons that might explain why the trend of declining GHB abuse is not paralleled internationally. We utilized an innovative recruitment methodology specifically targeting websites frequented by illicit drug users. Individuals who had posted videos or testimonials depicting GHB use were sent e-mails including study recruitment announcements. This innovative recruitment method allowed the study to successfully target the specific population that we wished to study internationally. This study was approved by the Committee on Human Research at the University of California, San Francisco.

Survey Development and Content

We created a brief 13-item GHB survey instrument adapting key selected questionnaire items we used previously in our more in-depth structured telephone GHB-focused interview (Dyer et al., 2007). The principal demographic items included in the Internet survey instrument were: postal zip code (if the U.S.), country if not U.S., age, gender, level of education, current employment status (working, not working or unable to work, student, keeping house), and sexual orientation. Additional GHB-specific questions included: frequency of GHB use, current and past GHB use, and the context and reasons for using or, new to this survey compared to our previous study, cessation of GHB. Pilot testing revealed an average completion time of 2 minutes.

Identification of Target Populations

We utilized Internet websites as the sole subject recruitment vehicle for this study. Initially, we posted study recruitment notices on three websites known to be frequented regularly by international GHB knowledgeable users (ProjectGHB, YouTube and Craig's List) (ProjectGHB, 2008; YouTube, 2007) (Craigslist, 2008). In an attempt to be as comprehensive as possible, we expanded our recruitment to include social networking websites likely to be visited by individuals worldwide who were knowledgeable of GHB or illicit drug use. We used the *Wikipedia* Social Networking site (Wikipedia-Contributors, 2008a) to formulate an initial list of such sites (n=110). We systematically evaluated all of these websites to identify those likely to be visited preferentially by GHB knowledgeable individuals. Reasons for excluding websites on the *Wikipedia* list are detailed in Table 1.

Survey Subject Recruitment

Participants were recruited from selected websites as described above. The survey was advertised by posting a study recruitment announcement, including the study's direct URL hyperlink, on all message boards for groups meeting the inclusion criteria. In addition, a brief informational email describing the survey was sent to all individuals who publicly posted information depicting recreational GHB use. These subjects included: 1) individuals who posted a publicly available testimonial or video depicting recreational GHB use with a corresponding contact link allowing that person to receive an email; and 2) individuals who voluntarily joined a self-identified group of recreational GHB users on the website (e.g., "GHB, Nature Mood Enhancer," "I Do Tons of Drugs") with a corresponding contact link ("send message") allowing email communication. Each individual received only one informational email.

It is noteworthy to mention that this innovative recruitment method was very time-consuming and faced various restrictions. Most websites allowed only a maximum of 5 to 7 individual

“send messages” to be electronically delivered per day (e.g. FaceBook) (FaceBook, 2007) prior to being ‘locked out’ over ‘spamming’ concerns. Other websites allowed more frequent ‘send messages’ to be delivered, but only if the posted videos were viewed in their entirety rather than based on the initial video picture or associated testimonial (e.g., YouTube). Certain websites monitored the content of the study advertisement and required the study investigator to complete an application describing the research study, investigator qualifications, and University Committee on Human Research approvals prior to recruitment. Only after the application was approved by the website management was further recruitment permitted (e.g., Drugs~Forum) (Drugs-Forum, 2008).

Survey Administration

This self-administered study was conducted solely over the Internet over a four and one-half month period (October 30, 2007 through March 15, 2008). The survey was posted using a unique URL (<http://www.calpoison.org/forged2/FORGE1.html>). The web interface was monitored with data uploaded under the auspices of the University of California at San Francisco’s (UCSF) affiliated California Poison Control System’s (CPCS) computer analyst to ensure that all collection and processing met Committee on Human Research standards and was Health Insurance Portability and Accountability Act (HIPAA)-compliant. No personal identifying information, electronic or otherwise, was collected. All data was stored in a secure, password-protected customized database accessible only by study investigators. There was no financial or other incentive provided for participation.

Inclusion criteria included: 1) self-stated age ≥ 18 years; 2) self-report of current or past GHB or GHB congener use; 3) access to the Internet; 4) ability to read and understand English, and 5) voluntarily consented and initiated survey participation. Only those meeting study eligibility requirements were allowed access to the study information screen containing the actual survey content. Participants could refuse to answer any question or end the survey at any time.

Summary Data for Survey Internet Site Inquiries

Summary data for survey Internet site inquiries and survey completions are summarized in Table 2. In total, 337 individuals initially visited our survey Internet site, of whom 102 did not consent and thus did not initiate survey participation. Of the remaining 235 potential respondents, 64 (27%) were defaulted out of survey access because of their responses to initial screening questions regarding age or GHB use. There were 171 completed surveys. After review of each set of responses by the study team a total of 16 surveys were excluded. Of these, 12 respondents (10 males; mean age 24 ± 9 years) had considered using GHB, but had never actually done so. The majority of these never-users (7; 58%) were from the U.S.. The reasons for exclusion are detailed in Table 2. Ultimately, we had available for analysis 155 completed surveys from survey respondents who had used GHB at least once and with no key data missing.

Data Analysis

We used simple descriptive statistics to describe the frequencies for selected variables derived from the survey. Because legal restrictions for GHB and congeners are more restrictive in the U.S. than outside the U.S., we dichotomized the geography of responders primarily on that basis. We calculated differences in demographics, GHB use characteristics, and specific reasons for GHB cessation among former users using the chi square test (for educational level, chi square test for trend) or Fisher’s exact test (for narrow legal verses health concerns as reason for cessation), t-test (mean age) and Wilcoxon rank sum test (median age). Among ever-users of GHB or congeners, we calculated the odds ratio (OR) and its 95% confidence interval (CI) for abstinence and non-abstinence associated with geographic location of the respondent. We used a similar approach for reason for cessation among those who discontinued use, collapsing the stated reason for cessation into either legal or non-legal concerns. In addition to simple

(univariate) analysis, we also carried out multiple logistic regression analysis including age, gender, sexual orientation, education, and cumulative lifetime GHB use.

RESULTS

Subject Location and Demographics

We analyzed data from 155 survey respondents who reported any lifetime use of GHB. Survey participants were located in the U.S. and 15 other countries; in total there were 70 U.S. and 85 non-U.S. respondents included. Countries of origin for non-U.S. survey respondents, in order of frequency, included: United Kingdom (44), Canada (15), Netherlands (10), Austria (4), Germany (2), with the remainder having just one respondent per country (France, Holland, Iceland, Korea, Norway, Peru, South Africa, Spain, Sweden, and Switzerland). The demographic and related variables of the survey participants by geographic location (U.S. vs. non-U.S.) are summarized in Table 3. The U.S. group was older (34.7 ± 10.1 years vs. 28.9 ± 9.3 years; $p = 0.0003$) and more highly educated ($p < 0.001$) compared to the non-U.S. respondents. Demographic characteristics of the U.S. (70) compared to the non-U.S. (85) groups were similar in regard to gender, sexual orientation, and employment status.

Characteristics of GHB Use

We compared the GHB use characteristics [frequency of use, reason for use and reason for cessation (for six months or longer)] between U.S. and non-U.S. survey participants (Table 4). There was no significant difference between the two groups with regard to the stated reason for GHB use ($p = 0.64$). The overall pattern of GHB use in terms of frequency categories (defined *a priori*) differed between the groups, although the difference was marginal ($p = 0.047$). Most saliently, cessation of GHB for six months or longer was significantly more common among the U.S. group [53 of 70 (76%)] compared to the non-U.S. survey respondents (38 of 85 [45%]) ($p = 0.0002$).

Predictors of GHB Cessation

Table 5 summarizes the specific reasons for reported GHB cessation, excluding 11 respondents who declined to state a reason for doing so. The overall pattern of specific reasons did not differ statistically among U.S. vs. non-U.S. respondents ($p = 0.15$). We carried out a secondary analysis of reason for cessation by geographic location of respondent excluding all responses other than the narrowly defined reasons of “health risks” ($n = 18$, of which 6 were in the U.S. group) and “legal risks” ($n = 5$, of which 4 were in the U.S. group). The associated Fisher’s exact test result was $p = 0.048$, one-tailed (as a nested analysis with an *a priori* expectation of direction of effect) and $p = 0.06$, two-tailed.

Table 6 presents univariate and multivariate logistic regression models testing the associations between geographic location and reported GHB cessation for six months or longer. In univariate analysis, being from the U.S. was associated with four-fold odds favoring GHB cessation [OR 3.9; 95% CI 1.9–7.7; $p = 0.0001$]. Including key demographic variables and GHB use frequency in the model attenuated this association, but only modestly (OR 3.1; 95% CI 1.4–6.9). In that model, increasing age was associated with increased odds of cessation (three-fold increase per 10 years), while the most frequent GHB users (20 times or more lifetime use) were more than three-fold less likely to report cessation. Gender, sexual orientation, and education were not statistically associated with cessation.

Table 6 also shows, among those reporting GHB cessation, the association between geographic location and a legal or other non-health rationale stated for such cessation (difficult to get, legal risks, too expensive) relative to health and safety concerns (health risks, getting addicted, didn’t like the high). Among the 80 former users who stated a reason for cessation, U.S. respondents

had 2.5 times the odds of invoking legal or non-health related concerns as the reason for GHB cessation, although this association was of borderline statistical significance [OR 2.5; 95% CI 0.99–6.3; $p=0.05$]. In multivariate analysis, the point estimate of this association was unchanged, although the confidence intervals widened (OR=2.5; 95% CI 0.8–7.6; $p=0.10$). Moreover, none of the other covariates included in the model were significantly associated with legal reasons for cessation, suggesting that demographics and use frequency did not account for the observed geographic association with stated reason for cessation.

DISCUSSION

The most salient observation from our survey is that cessation of GHB use was significantly more common among U.S. compared to non-U.S. survey respondents, with U.S. residency associated with three-fold odds favoring GHB cessation. Additionally, being from the U.S. was associated with increased odds of invoking a legal or other non-health related rationale for GHB cessation.

Our U.S. and non-U.S. samples differed in age and education. Including these variables in multivariate analysis, however, did not explain the geographic association we observed in the odds of reporting GHB cessation. The age and educational level overall appears consistent with other studies of GHB users (see Limitations). (Barker et al., 2007; Kim et al., 2007) Nonetheless, it is highly probable that other, unmeasured variables that we could not include in the model also differed between the two groups. To confound the association between self-reported legal and related reasons for abstinence among those no longer using GHB and geographic location, co-factors would have had to act on both the predictor and outcome. For example if within the non-U.S. group occupations that would lead to heightened concerns over health were more common, such as healthcare providers, this might explain the observed association.

One factor that may come into play in international differences in GHB use is variability in GHB-congener access. Selective use of congeners is difficult to access in surveys because GHB users themselves are frequently unaware of the chemical-structural specificity. In our previous study evaluating area-level socioeconomic status in relation to outcomes in GHB intoxication, 13% (27 out of 210) of the analyzed subjects reported GHB congener use. (Anderson et al., 2008) Additionally, in a recent study of GHB ingestions presenting to emergency departments in the U.K., 95% of patients self-reported ingestion of GHB compared to only 5% for GBL. Post-ingestion clinical toxicological testing cannot clarify the actual use pattern because of the rapid metabolism of the congener to the active agent. However, when 418 samples of GHB were seized from club venues and analyzed, 38% contained GHB and 62% GBL, suggesting ready availability of GBL. None of the samples tested contained BD. (Wood et al., 2008)

The impact of legal restrictions on abuse patterns has been assessed before, particularly in regard to methamphetamine. To assess the health impact of U.S. federal regulation of ephedrine and pseudoephedrine, the precursors used in illicit methamphetamine production, methamphetamine-related acute care hospital admissions were evaluated in California, Arizona and Nevada. In each state, regulations restricting the sale of ephedrine and pseudoephedrine in bulk powder form, in products containing ephedrine only, and in products containing pseudoephedrine all resulted in a significant reduction in methamphetamine-related hospital admissions. Although admissions gradually rose by the end of the study period, they were still well below peak 1990's levels. (Cunningham and Liu, 2003) In 2005, the state of Iowa classified pseudoephedrine as a Schedule V Controlled substance. In 2004, Iowa ranked second in the nation for methamphetamine lab incidents, seizing an average of 120 labs per month. In 2006, only 20 labs per month were seized, an 83% decrease from the previous year. (Burke et al., 2008)

The U.S. experience with methylene dioxymethamphetamine (ecstasy), in contrast, argues that increased regulatory controls do not necessarily correlate with a decline in use. In 1985, ecstasy was placed on the U.S. Drug Enforcement Administration's (DEA) list of Schedule I drugs prohibiting its use. Despite that, emergency department reports of ecstasy-related events increased dramatically in the ensuing decades (2001), although more recently there may have been a decline in use as reflected in surveyed adolescents. (Johnston et al., 2006) It has been suggested that the implementation of U.S. legal sanctions on ecstasy has not directly curbed its popularity as a recreational drug but that such legal restrictions have led to the distribution of adulterated and falsely represented ecstasy tablets. (Pentney, 2001)

Limitations

We recognize that this study has several potentially important limitations. Since this was an anonymous study, we were unable to absolutely preclude the possibility of survey resubmission from any one individual, because to do otherwise, for example, through tracking computer identifiers, would have compromised respondent anonymity. To reduce motivation for multiple responses, we did not offer any financial or other incentive for participation. Despite this limitation, it can be argued that the anonymous survey design may have resulted in more reliable responses, considering the sensitive nature of the survey regarding illicit drug use. Another limitation is that the survey relied on subject self-report; independent confirmation of responses was not feasible. After careful evaluation of all surveys, two were eliminated due to highly suspect responses.

We utilized a systematic Internet-based recruiting approach based on specific social networking websites. Internet-based research has been previously used successfully as a valuable and effective method in a multitude of drug abuse studies. (Gamma et al., 2005) (Duncan et al., 2003; Miller et al., 2007; Reneau et al., 2000; Scholey et al., 2004) Nonetheless, this recruitment strategy could have introduced sampling bias. It is unknown as to whether visitors to Internet-based social networking websites are representative of the larger population of recreational GHB drug users. Such recruitment could over-sample a younger population with higher levels of education or greater financial resources. Of note, the mean age (31.5 ± 10 years) and educational level of the respondents to this survey are comparable to the mean age and education of GHB users from other studies we have carried out with quite different recruitment strategies, suggesting that the group is representative of the larger target population. (Barker et al., 2007; Kim et al., 2007) Moreover, the Internet recruitment was carried out in a systematic fashion, uniformly applied regardless of geographic location, although limited to English language social networking websites. Thus sampling bias, to the extent that it was a factor, should not have operated differentially among U.S. as compared to non-U.S. respondents. Finally, ours is a relatively small survey that places limitations on its analysis. For example, the numbers of respondents do not allow for stratified analyses by age or gender or more detailed analyses of country sub-groupings beyond the U.S. non-U.S. – dichotomization.

CONCLUSION

These data, based on an innovative Internet-based targeted survey strategy, indicate that in the U.S., where GHB has greater legal restrictions and penalties for abuse, stopping GHB use is significantly more likely, with greater odds of legal and other non-health concerns being invoked as the reason for cessation. Although these findings support a causal relationship for the temporal association between the decline in reported GHB use in the U.S. and the new legal restrictions on the illicit use of GHB as of the year 2000, additional factors not elicited in this analysis may be contributing to the decline as well.

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Table 1

Recruitment by Internet Website: Inclusion and Exclusion Criteria

Internet Websites by Inclusion & Exclusion Criteria	N	%
Total Potential Internet Websites[‡]	113	100%
Excluded Websites		
Unrelated topic based on Wikipedia's description (eg: software developers)	51	
Predominant language, non-English	18	
Unable to search website using key search term/s (e.g. GHB)	8	
Invitational only (vs. publicly available)	4	
Age < 18 years exclusively	1	
Unable to contact individuals or post messages	1	
Website did not contain any GHB-affiliated individuals or groups [*]	12	
Total Excluded Websites	95	84.1%
Total Included Websites used in Subject Recruitment	18	15.9%

[‡] Websites were comprised of Wikipedia's list of social networking sites (Wikipedia-Contributors, 2008a) and 3 additional sites: ProjectGHB, Craig's List and YouTube. (Craigslist, 2008; ProjectGHB, 2008; YouTube, 2007)

^{*} GHB-affiliation was determined by searching the website for the following terms: GHB, GBL, BD, drugs, abuse, rave, party, club.

Table 2

Survey Participation, October 30, 2007 through March 15, 2008

Potential Survey Participants by Study Status	N	%
Total potential survey subjects	337	100%
Ineligible Subjects		
Declined to consent and initiate survey participation	102	
Failed screening questions	64	
Never considered using GHB (46) or refused to answer question regarding lifetime use of GHB (8)	54	
Age < 18 years (9) or refused to answer age question (1)	10	
Total Ineligible Subjects	166	49.3%
Total Completed Surveys	171	50.7%
Excluded surveys		
Duplicate survey entry	1	
Suspected bogus survey entry (age entered as > 90 years old)	1	
Considered, but never used GHB	12	
Missing data for country of origin	2	
Total Excluded Surveys	16	9.4% *
Total Eligible Surveys Included in this Analysis	155	90.6% *

GHB subsumes GHB, GBL and BD use

* Percentage calculated as a proportion of potentially eligible cases

Table 3

Demographic Characteristics for 155 Survey Respondents Analyzed

Subject Characteristic	Geographic Location			p value
	All n=155	U.S. n = 70	Non- U.S. n = 85	
Age in years *, mean $\pm$ SD	31.5 $\pm$ 10.1	34.7 $\pm$ 10.1	28.9 $\pm$ 9.3	0.0003
Age in years *, median (range)	29 (18– 67)	35 (18–67)	25 (18– 64)	<0.0001
Gender identification, n (%)				0.44
Male	116 (74%)	49 (70%)	67 (79%)	
Female	35 (23%)	19 (27%)	16 (19%)	
Transsexual	4 (3%)	2 (3%)	2 (2%)	
Education, n (%)				<0.001
High School Graduate or Less	29 (19%)	6 (9%)	23 (27%)	
Some college, Associate or Trade Degree	52 (34%)	19 (27%)	33 (39%)	
Bachelor's Degree or above	74 (48%)	45 (64%)	29 (34%)	
Employment Status n, (%)				0.35
Not working, unable to work, keeping house	27 (19%)	11 (16%)	16 (19%)	
Attending school	17 (12%)	5 (7%)	12 (14%)	
Currently working for a salary	101 (70%)	48 (69%)	53 (62%)	
Sexual Orientation n, (%)				0.17
Heterosexual	103 (66%)	51 (73%)	52 (61%)	
Gay, Lesbian or Bisexual	42 (34%)	16 (23%)	30 (35%)	

* Age $\geq$ 18 years for all, but exact age not reported for one non-U.S. respondent

Employment information was not provided by 6 U.S. and 4 non-U.S. subjects

Sexual orientation was not stated by 3 U.S. and 3 non-U.S. subjects

Table 4

GHB Use Characteristics among 155 Survey Respondents

	U.S. (n=70)	Non-U.S. (n=85)	p value
Frequency of Use			0.047
1–2 times	7 (10%)	7 (8%)	
3–5 times	11 (16%)	8 (9%)	
6–20 times	1 (1%)	11 (13%)	
More than 20 times	50 (72%)	59 (69%)	
Reason for GHB Use			
Body building	4 (6%)	2 (2%)	0.64
Being alone	14 (20%)	14 (17%)	
Intimate relations/sexual enhancement	11 (16%)	15 (18%)	
Dances, clubs, bars or raves	14 (20%)	24 (29%)	
Small private parties	21 (30%)	29 (35%)	
Quit using GHB for 6 months or longer			0.0002
Yes	53 (76%)	38 (45%)	
No	17 (24%)	47 (55%)	

Frequency of GHB use was declined by 1 U.S. respondent

Reason for GHB use was declined by 6 U.S. and 1 non-U.S. respondents

Table 5

Stated Reason for Quitting GHB among 91 Respondents Reporting Cessation*

Reason for Quitting GHB	U.S. (n=46) n (%)	Non-U.S. (n=34) n (%)	p value
			0.15
Any Health and Safety Concerns	21 (46%)	23 (68%)	
Health risks [†]	6 (13%)	12 (35%)	
Getting addicted	12 (26%)	7 (21%)	
Didn't like the high	3 (7%)	4 (12%)	
Any Legal or Other Non-Health Risks	25 (54%)	11 (32%)	
Difficult to get	17 (37%)	9 (26%)	
Legal risks [†]	5 (11%)	1 (3%)	
Too expensive	3 (7%)	1 (3%)	

* 7 U.S. and 4 non-U.S. respondents declined to state a reason for GHB cessation

[†] Comparing the narrowly defined response of reasons of 'health risks' (n=18) with that of 'legal risks' (n=6) by U.S. verses non-U.S. status yields a p value=0.06 (Fisher's exact test, two-tailed) or a p value=0.048 (Fisher's exact test, one-tailed), based on an *a priori* expectation of a more frequently invoked legal rationale in the U.S. group.

Table 6

Respondent Location and GHB Cessation: Logistic Regression Modeling

Risk Factor	Odds of GHB Cessation n=91/155 Respondents OR (95% CI) [p value]	Legal Reason For Quitting n=26/80 Reporting Cessation OR (95% CI) [p value]
Univariate Analysis		
U.S. Respondent	3.9 (1.9–7.7) [0.0001]	2.5 (0.99–6.3) [0.05]
Multivariate Analysis		
U.S. Respondent	3.1 (1.4–6.9) [0.004]	2.5 (0.8–7.6) [0.10]
Age, per 10 years	1.6 (1.1–4.2) [0.02]	1.5 (0.8–2.8) [0.14]
Gender		
Female or Transsexual	1.0 (Referent)	1.0 (Referent)
Male	1.0 (0.4–2.4) [0.95]	2.5 (0.7–8.3) [0.14]
Education		
HS or Less	1.0 (Referent)	1.0 (Referent)
Some College	1.5 (0.5–4.2) [0.45]	0.4 (0.1–2.7) [0.35]
College Graduate	1.5 (0.5–4.2) [0.48]	0.7 (0.1–5.1) [0.7]
Sexual Identify		
Gay or Bisexual	1.0 (Referent)	1.0 (Referent)
Straight	1.5 (0.7–3.3) [0.29]	2.0 (0.7–5.8)
GHB Use 20 Times or More	0.3 (0.1–0.5) [0.001]	0.6 (0.2–1.9)