GHB USE AMONG COLLEGE STUDENTS: APPLICATION OF A MEMORY MODEL TO EXPLORE THE INFLUENCE OF OUTCOME EXPECTANCIES

by

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B.S. University of Central Florida, 2003

A thesis submitted in partial fulfillment of the requirements
for the degree of Master of Science
in the Department of Psychology
in the College of Sciences
at the University of Central Florida
Orlando, Florida

Spring Term
2008

ABSTRACT

Gamma Hydroxybutyrate (GHB) was banned from the consumer market by the Food and Drug Administration in 1991. Despite the ban, use of GHB has continued to contribute to thousands of emergency department visits and numerous fatalities in recent years. Efforts to reduce the use of this drug have had limited impact, which may be the result of using traditional prevention strategies that focus exclusively on educating people about of negative consequences of substance use rather than addressing the factors that motivate use. In an effort to identify motivational factors that could be targeted in future prevention efforts, the present study was designed to examine outcome expectancies for GHB that may promote use of this drug. Methodology that has led to successful strategies to reduce alcohol use was applied to identify GHB expectancies and model cognitive processes likely to encourage or discourage GHB use. Individual differences scaling was used to empirically model a two dimensional semantic network of GHB expectancies stored in memory, and preference mapping was used to model likely paths of expectancy activation for male and female GHB users and nonusers. Differences in expectancies between GHB users and nonusers followed patterns previously identified in relation to alcohol expectancies and alcohol use. Conclusions were limited by relatively low numbers of GHB users in the sample, despite the use of a very large number of participants, overall. Despite this limitation these findings lay the groundwork for development and validation of GHB expectancy based prevention strategies.

This work is dedicated to my son, Jason. His love, support, and energy sustain me.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

INTRODUCTION

Gamma hydroxybutyrate (GHB) is a popular club drug due to its euphorigenic properties, easy manufacture, and low cost (Galloway, Frederick-Osborne, Seymour, Contini, & Smith, 2000; National Drug Intelligence Center [NDIC], 2002, 2003). While under the influence of GHB, people typically report experiencing desirable feelings similar to alcohol intoxication including euphoria, tranquility, increased libido, reduction in social inhibition, and an overall sense of well being (Center for Substance Abuse Treatment [CSAT], 2002; Galloway, et al., 2000; Miotto, Darakjiam, Basch, Murray, Zogg & Rawson, 2001; NDIC, 2002; Nicholson & Balster, 2001). Undesirable effects, however, also are very common and are increasing as the use of GHB continues (NDIC, 2003; Substance Abuse and Mental Health Services Administration, [SAMHSA] 2003, 2007a). Typical negative experiences include lack of coordination, disorientation, confusion, lethargy, nausea, vomiting, hallucinations, and seizures (CSAT, 2002; Galloway, et al., 2000; Li, Stokes & Woeckener, 1998; NDIC, 2003). Other negative consequences associated with GHB ingestion include automobile crashes and accidents that lead to serious injuries, both of which are closely tied to impairment caused by the drug (Centers for Disease Control and Prevention [CDCP], 1999; Li, et al., 1998; NDIC, 2002). The inability to determine the potency of a GHB sample, and variability in the potency of GHB samples, increases the probability of negative consequences substantially (Freese, Miotto & Reback, 2002; Hensley, 2003). Moreover, the concurrent use of substances such as alcohol, cocaine, amphetamines, and

methylenedioxymethamphetamine (MDMA; ecstasy) are quite common and can produce multiplicative effects that lead to unpredictable consequences requiring medical intervention (Freese, et al., 2002; Galloway, et al., 2000; Liechti, Kunz, Greminger, Speich, & Kupferschmidt, 2006; Sanguineti, Angelo & Rudin-Frank, 1997; SAMHSA, 2003). Furthermore, studies conducted with club drug consumers indicate that individuals who abuse club drugs are more likely to combine GHB with substances such as ecstasy, amphetamines, and methamphetamine in an attempt to enhance or extend the effects of those drugs (Degenhardt, Darke & Dillon, 2002; Uys & Niesink, 2005; Liechti, et al., 2006; Matisson, Ross ,Wolfson & Franklin, 2001; Miotto, et al., 2001).

Epidemiological studies have revealed that the use of club drugs and the initiation to the use of these substances continues to increase (Johnson, O'Malley, Bachman & Shulenberg, 2007a, 2007b; SAMHSA, 2007b) and hospital emergency departments nationwide, have reported thousands of GHB intoxications annually, beginning in the mid 1990s (SAMHSA, 2003, 2007b). Individuals in need of medical care related to GHB use often appear combative and agitated, and frequently experience respiratory depression and coma (CSAT, 2002; Liechti, et al., 2006; NDIC, 2003; Nicholson & Balster, 2001; Rosenberg, Deerfield & Baruch, 2003). Information obtained from the Drug Abuse Warning Network (DAWN) indicates that the occurrence of emergency room reports involving young adults experiencing GHB overdoses or unexpected symptoms associated with use, increased 2200% from 1995 to 2002 (SAMHSA, 2003). The report also reveals that use by young adults, 18 to 25, has increased annually since 1992, with more than half of all emergency department mentions in 2002 involving GHB stemming from patients age 20 to 25. Ninety percent of these patients were Caucasian,

and males represented 67% of the total (SAMHSA, 2003). The National Drug Threat Assessment 2007 report (NDIC, 2006) states that even though GHB and other club drugs are less accessible as compared to the prevalence of other common illicit drugs of abuse or pharmaceuticals, the attractiveness of these drugs to adolescents and young adults increases their risk. The most serious outcome, death resulting from an overdose of GHB, either alone or in combination with alcohol or other drugs, also has increased in likelihood with the rising popularity of club drugs (NDIC, 2003; Nicholson & Balster, 2001; SAMHSA, 2003).

Another particularly concerning feature of GHB is its ability to incapacitate, induce memory loss, and cause blackouts (Galloway, et al., 2000; Hensley, 2002, 2003; Nicholson & Balster, 2001; NDIC, 2004). GHB is concealed easily in commonly consumed beverages, thus it is easy to administer to individuals without their knowledge (Hensley, 2002, 2003; NDIC, 2004; Nicholson & Balster, 2001). These characteristics have led to a rise in its use to commit sexual assaults and other serious crimes against victims who are made vulnerable by the potent disorienting effects of this drug, and victims' memory of these attacks is often corrupted by GHB leading to vague or non-existent recall of the incident (Galloway, et al., 2000; Hensley, 2002, 2003; Nicholson & Balster, 2001). In fact, the relative availability, low cost, and undetectable characteristics of GHB have caused drug-facilitated sexual assaults using GHB to surpass Rohypnol in frequency (NDIC, 2001, 2004).

Information regarding the negative consequences of GHB ingestion has become better known to law enforcement personnel, and medical and mental health professionals through published case studies, hospital and emergency department trend reports, and

increased incidences of GHB facilitated date rape. Despite this increase in recognition of the dangers, the prevalence and frequency of negative consequences resulting from GHB consumption continue to be encouraged by the availability of GHB, especially in proximity to universities and college campuses nationwide (NDIC, 2003). Because GHB-related problems are less frequent and harder to identify than alcohol-related problems on most college campuses, relatively little information regarding GHB effects is disseminated to the population that GHB affects the most, namely college students and young adults. Consequently, that harm associated with GHB will continue to increase due to a lack of basic information among those most vulnerable. Sneaking GHB into the drinks of others for the purpose of facilitating sexual assault is particularly easy to accomplish in the social environment of many colleges because there is a steady supply of naïve individuals who are actively seeking social engagement with people previously unknown to them, making them easy targets

Although it is clear that GHB is harmful, effective prevention methods targeted at this substance have yet to be developed and disseminated. Thus far, many strategies aimed at reducing alcohol use and illicit substance abuse among high school and college students have typically been non-interactive and are often delivered in a didactic classroom environment (Tobler, Roona & Ochshorn, 2000). These prevention programs have usually focused on educating students about the long-term pharmacological and physiological effects of substances, and also may focus on norms, values, and attitudes, and emphasize abstinence. These strategies have repeatedly proven to be disappointing in the realm of prevention and ineffective in reducing substance or alcohol consumption (Botvin, Baker, Dusenbury, Botvin & Diaz, 1995; Dunn, Cruz, Bowers, Ingram &

Besaw, 1998; Tobler, Roona & Ochshorn, 2000), although they might be effective in identifying high-risk targets. Basic research is essential to understand the precursors and antecedent variables of substance abuse to facilitate the development of theory-based prevention and intervention approaches and to begin to reduce the associated negative consequences of substance abuse by young adults.

One very promising direction for alcohol and drug prevention strategies relies on extensive literature describing the importance of outcome expectancies in understanding substance use. Tolman (1932) presented one of the early descriptions of expectancy theory. He suggested that mental representations of past experiences, or "expectancies," are the learned relationships between behaviors and their consequences that become ingrained in memory by an individual's experiences with related stimuli. A sizable body of research has revealed that alcohol expectancies develop in childhood and exist prior to direct experiences with the substance (Dunn & Goldman, 1996; Miller, Smith, & Goldman, 1990). Expectancies also covary with the alcohol use levels of children and adults (Brown, Goldman, Inn & Anderson, 1980; Dunn & Goldman 1998, 2000), predict future alcohol use (Christiansen, Goldman & Brown, 1985; Christiansen, Smith, Roehling & Goldman, 1989), and mediate the influence of other antecedent variables on alcohol use (Sher, Walitzer, Wood & Brent, 1991; Stacy, Newcomb & Bentler, 1991). Furthermore, studies involving other regularly abused substances, such as nicotine, cannabis, and cocaine, have identified the existence and importance of expectancies (Brandon, Juliano & Copeland, 1999; Jaffe, 1992; Jaffe, Kilbey & Rosenbaum, 1989; Linkovich-Kyle & Dunn, 2001; Schafer & Brown, 1991; Stacy, 1997; Stacy, Dent, Sussman & Raynor, 1990). Finally, expectancy research conducted with children and

adults has resulted in successful modification of alcohol expectancies (Cruz & Dunn, 2003; Dunn, Lau, & Cruz, 2000; Dunn & Yniguez, 1999), and found that expectancy changes correspond logically to subsequent drinking behavior (Darkes & Goldman, 1993, 1998; Dunn, Lau, & Cruz, 2000). Therefore, the typical criteria used to infer causality have been met in alcohol expectancy research, and delineation of processes and mechanisms by which expectancies influence substance use (e.g., memory processes) has become increasingly important for the development of effective intervention strategies.

Estes (1991) contributed to the development of memory theory by stating that network memory could be represented and viewed with vectors and points in multidimensional space. He proposed that memory is "stored in the form of a multicomponent trace," (p. 12) and once activated, would serve to trigger others in a network. The activated components within the network are representative of the information that is stored within an alterable and adaptable system of memory. These points of information can be interpreted for strength associations and similarity, and separated into discreet categories based on semantic meaning. Invoking a network concept to understand memory processes has a distinct advantage over other possible theoretical approaches due to the statistical methods available to empirically model networks of information. One of the methods available to apply a network model is multidimensional scaling (MDS), and a variant of MDS known as individual differences scaling (INDSCAL; Carroll & Chung, 1970). INDSCAL has been used in a series of studies focused on modeling the hypothetical organization of alcohol expectancies in memory (Dunn & Earleywine, 2001; Dunn & Goldman, 1998, 2000; Rather & Goldman, 1994; Rather, Goldman, Roehrich, & Brannick, 1992). In addition, preference mapping

(PREFMAP; Carroll, 1972) has been utilized to model activation patterns of alcohol expectancies in memory in both children and adults (Dunn & Goldman, 1996, 1998; Dunn et al., 2000; Dunn & Yniguez, 1999; Rather et al., 1992; Rather & Goldman, 1994). Rather and colleagues (1992) state that the semantic network is represented with informational nodes that are linked together by both learning and meaning. MDS maps the relationship between the elements stored in the network onto a stimulus configuration that results in a graphical representation of expectancy words and renders a visual model of the cognitive process (Goldman, Del Boca & Darkes, 1999).

Over the past two decades, a growing body of literature has indicated that expectancy organization and activation patterns in memory, as modeled by multidimensional scaling and other techniques, "supports the inference that expectancies have a causal influence on drinking" (Goldman, 2002, p.737). These findings have been applied to the development of interventions that challenge alcohol expectancies, and have proven successful in altering expectancies with corresponding reductions in alcohol consumption (Cruz & Dunn, 2003; Darkes & Goldman, 1993, 1998; Dunn, Lau, & Cruz, 2000; Dunn & Yniguez, 1999; Lau & Dunn, in press). Challenging alcohol expectancies in college student populations is one of only two types of strategies to be recognized as an "empirically validated" tier-one intervention strategy by the National Institute of Alcohol Abuse and Alcoholism (2002). When considered in concert with the relatively poor performance of other approaches to reducing alcohol and other substance use (Botvin, Baker, Dusenbury, Botvin & Diaz, 1995; Clayton, Cattarello. & Johnstone, 1996; Tobler, et al, 2000), findings from alcohol expectancy research provide a

compelling argument for extending strategies found to be successful in reducing alcohol use among young adults, to other problem substances like GHB.

The present study was designed to apply methods used in alcohol expectancy research to advance understanding of mechanisms by which GHB expectancies influence use, and to contribute to the development of expectancy-based interventions to reduce GHB use modeled after successful approaches to reduce alcohol consumption. To that end, we used identified existing outcome expectancies for GHB use among college students, and then utilized INDSCAL and PREFMAP to model the organization and activation of GHB expectancies in memory in relation to use of GHB. It was hypothesized that INDSCAL dimension weights would differ between groups based on gender and GHB use and would vary systematically based on group membership, similar in pattern to the differences found when INDSCAL has been applied to expectancy data related to alcohol and other substances. Furthermore, the PREFMAP vectors produced by regression of expected effects for GHB use in each group would produce vectors that vary systematically based on gender and GHB use, in correspondence with participant weights. And finally, we hypothesized that the PREFMAP vectors would indicate that the participants identified as non users of GHB would likely begin path activation along a negative dimension and emphasize more negative expectancies, for GHB use. Conversely, the participant group identified as past or present consumers of GHB, would likely begin path activation along a positive dimension, and emphasize positive GHB expectancies. This exploration of potential differences in expectancies is essential for creating a theoretical foundation for the development and validation of effective expectancy-based interventions focused on reducing GHB and other club drug use.

Hypotheses

1) INDSCAL dimension weights will differ between groups based on gender and GHB use and are expected to vary systematically based on group membership, similar in pattern to the differences found when INDSCAL has been applied to expectancy data related to use of alcohol and other substances.
2) The PREFMAP regression of expected effects for GHB use in each group will produce vectors that vary systematically based on based on gender and GHB use, in correspondence with participant weights.
3) PREFMAP vectors will indicate that the participants identified as never using GHB will likely to begin path activation along a more negative dimension, and emphasize more negative expectancies as related to GHB use, and the GHB use group identified as past or present consumers of GHB will likely begin path activation along a more positive dimension, and emphasize greater positive GHB expectancies.

METHOD

This project was conducted in two phases at a large public university in the southeastern United States. In Phase One, GHB expectancies were solicited from participants to generate items for a GHB expectancy measure. In Phase Two, a second sample of participants completed the new expectancy measure. The students that participated in this study were provided and acknowledged informed consent (see Appendix A) prior to their participation in the online survey and were provided a debriefing form (Appendix B) to print out at the conclusion of the online session.

Phase I – First Associates and Item Generation

Participants

Participants were 926 undergraduate college students (684 females) whose ages ranged from 18 to 60 years (M = 21.33, SD = 3.32). Based on self-reported ethnicity, Caucasian participants represented 75%, Hispanic/Latinos represented 11%, African Americans represented 7%, Asians represented 3%, and participants identified as Other represented 4% of the sample.

Measures

Phase One participants completed a demographics questionnaire (see Appendix C) and a free response task (Appendix D) to tap the entire domain of GHB expectancies, followed by a self-report measure of GHB use (Appendix E). The free responses task consisted of the prompt "GHB makes one ____." This task has been used by memory researchers to obtain uncontaminated memory contents and conceptual elements (Battig & Montague, 1969; Nelson, Bennett, Gee, Schreiber, & McKinney, 1993). A non-

personal pronoun was used in the prompt so that participants could identify and include expectancies that they did not apply to themselves.

The GHB use measure was completed after the GHB expectancy generation task to avoid priming GHB expectancies. This is a standard procedure for expectancy studies because priming can influence the content of expectancies reported and the likelihood of reporting various specific expectancies. The GHB use measure consisted of questions that inquired about lifetime and current use of GHB and asked students to provide the amount consumed and the length of time they used GHB to acquire information that most closely matched their use level. Questions regarding age of first GHB use and first time use of other commonly abused substances were included to inform the process of the development future intervention strategies. Questions regarding suspected unintentional ingestion of GHB, and alternatively, the administration of GHB to another person without their knowledge, were included to gauge the frequency of these occurrences in the sample.

Procedure

Recruitment for participants for this study took place in undergraduate Psychology classes. Participants were asked to visit a secure website and complete an anonymous online survey regarding student's perceptions and beliefs. Students completed the free response task, a GHB use measure, and a brief demographics questionnaire. Students were offered extra credit for their time and participation, and at the conclusion of the survey were directed to an online research management forum at a different website where each student could enroll to receive extra credit. Extra credit

enrollment information was completed by students in the separate database to ensure the information could not be linked.

Phase Two – Administration of the GHBEQ

Participants

A second sample of 1373 undergraduates (922 females) was recruited for Phase Two via an online research management program and individuals were offered extra credit for their participation. Their ages ranged from 18 to 55 (M = 20.02, SD = 3.26). Caucasian participants represented 69%, Hispanic/Latinos represented 14%, African Americans represented 11%, Asians represented 4%, and participants identified as Other represented 2% of the sample.

Measures

Participants in Phase Two completed the online GHB Expectancy Questionnaire (GHBEQ; see Appendix F) followed by the Phase One demographic measure and an updated GHB use measure to reflect the actual practice of measuring GHB by the capful (i.e., utilizing a plastic water bottle twist off cap to measure GHB). As in Phase One, the GHB use measure was completed after the expectancy measure to avoid priming effects. The GHBEQ is a memory model-based GHB expectancy questionnaire created from Phase One participant responses that asked participants to rate the likelihood that an individual would experience each stimulus item after consuming GHB. Participants who had never consumed GHB were asked to report their best estimate of how likely they would experience each effect if they had used this substance. Response options ranged from "Never" to "Always" on a four-point Likert-type scale.

The GHBEQ is described as "memory model-based" because it was developed by following the recommendations of memory researchers to tap uncontaminated material for items. The items were limited to individual words or short phrases so that their use on the subsequent measure would be amenable to the memory modeling procedures of MDS and others. Details on the creation of the GHB expectancy measure and item selection are provided in the Results section below.

Procedure

The study was posted in an online research management forum hosted by the Psychology Department at the university. Students who were interested in completing the "Student Perceptions" study were directed to a commercial online survey management site where they completed the GHBEQ, a GHB use measure, and a brief demographics questionnaire. At the conclusion of the survey, students were redirected to an online form within the research management forum database to enroll to receive extra credit. The information from the extra credit form and could not be linked ensuring the students' anonymity.

RESULTS

Phase I

Participant responses were divided into groups based on GHB consumption. Two groups consisted of participants who had never consumed GHB (n = 818), and participants who endorsed any lifetime use of GHB (n = 108). The first four response items in each use-group were retained for analysis and tabulated to ensure that the items were representative of the domain of the "effects of GHB" beyond the concepts of being "high" or "messed up." Items that were conjugative variations of the same word were calculated together and idiosyncratic words, words that did not grammatically complete the prompt, and non-word responses were eliminated. Participants generated 178 unique expectancies. The proportionate frequency of responses by GHB use-group was calculated by tabulating frequencies for the effects reported and dividing the total number of responses reported by the group. This computation provides one of the most direct and standardized measure of the associative relation between the concept of GHB use and each reported expectancy (Marshall & Cofer, 1963). Following the methodology of earlier expectancy studies (see Dunn and Goldman, 2000; Linkovich-Kyle and Dunn, 2001), expectancy items were retained and included on the expectancy measure if the proportionate frequency was 0.0200 or greater. Thirty-two resultant items were compiled into a list representing nodes of the concept of the effects of GHB. This tabulation produced the GHB Expectancy Questionnaire (GHBEQ) which was administered during Phase II of the study.

Differences in First Associates of GHB Users and Non-users

Corresponding to research with alcohol and marijuana, results indicated "drunk" and "high" to be the most likely expectancy reported by users of GHB as well as nonusers. Looking beyond the general concepts of being "drunk" or "high," however, differences in expectancies with specific meaning corresponding with the effects of GHB were apparent, as shown in Table 1. For example, positive terms such as, "energetic," "fun," "loving," "funny," "feel sexy," and "talkative" were frequently endorsed expectancies unique to students who had consumed GHB. In contrast, expectancies that were frequently reported and unique to the nonuser group were obviously negative terms including, "unaware," "unconscious," "confused," "lethargic," and "hallucinate." Many terms describing other effects of GHB were endorsed frequently by both groups. "Happy," "sleepy," "tired," "forgetful," "vulnerable," and "bigger" were among those terms.

Gender Differences in First Associates

In Table 2, a comparison of the GHB use groups by gender revealed remarkable overall differences. The diversity of expectancies reported by male users was greater than was reported by any other group. In fact, the male user group (n = 41) reported a three times greater amount of distinct and different expectancies in comparison to the male nonuser and female user groups and six times greater number than the female nonuser group. In addition, each of the other groups, male nonuser (n = 201), female nonuser (n = 617), and female user (n = 67) was considerably larger than the male use group.

Phase II

Deriving a GHB Expectancy Network

Individual Differences Scaling (INDSCAL; Carroll & Chang, 1970) was utilized to map GHB expectancies into a possible network organization. INDSCAL is a variation of Multidimensional Scaling (MDS) that has the added benefit of providing information on different groups of participants to quantify differences between the groups in their understanding of the information they provided. The measure of group differences calculated by INDSCAL is known as a dimension weight (also known as "group" or "subject" weight). In the present application, dimension weights quantify differences between groups in their understanding of potential effects (expectancies) of GHB. Using INDSCAL in this way to analyze expectancy data is consistent with a series of studies that used these methods to model alcohol and marijuana expectancy networks in memory (Alfonso & Dunn, 2007; Cruz & Dunn, 2003; Dunn, et al., 2000; Dunn & Earleywine, 2001; Dunn & Goldman, 1996, 1998; Dunn & Yniguez, 1999; Linkovich-Kyle & Dunn, 2001; Rather & Goldman, 1994; Rather Goldman, Roerich, & Brannick, 1992).

INDSCAL is used to describe a type of analysis and is also used as the name of the algorithm that the analysis is based upon. When applied to the GHB expectancy data in the present study, the INDSCAL algorithm identifies the stimulus components relevant to each of the GHB used-based groups by evaluating the average ratings for each group on each expectancy item. The relative similarity or dissimilarity of each expectancy, in relation to every other expectancy, is the actual data used by the INDSCAL algorithm to map the locations of each expectancy. The resulting map of expectancies is known as a

"stimulus configuration" and can be used as a hypothetical representation of the organization of expectancies in memory. The more dissimilar the stimulus items are to each other, the greater the distance there will be between the expectancies on the visual map. The stimulus configuration is composed of dimensions based on fit indices that show the emphasis that each group places on the derived dimensions by calculating group weights that range from zero to one. Higher group weights indicate that a group emphasizes one particular dimension over another. Additionally, a high group weight for a particular dimension indicates a greater distance between expectancies on that dimension within the stimulus configuration.

Participant responses to the GHBEQ were analyzed using INDSCAL to generate proximity matrices that represent each use group to ascertain group differences. Participant responses were divided into four groups based on gender and self-reported GHB consumption. As shown in Table 3, the stimulus means for male nonuser (n = 428), male user (n = 23), female nonuser (n = 880), and female user (n = 42) groups were examined to reveal each dimensional structure of expectancies important to them. The difference between the three-dimensional solution (R^2 = .88 and stress = .15) and two-dimensional solutions (R^2 = .85 and stress = .19) was not enough to warrant the reduced interpretability of the three-dimensional solution. An R^2 equal to or greater than .70 and stress values of .25 or less are regarded as measures of reasonable fit (Linkovich-Kyle and Dunn, 2001; Alfonso and Dunn, 2007) therefore, the two-dimensional solution was considered a good fit of the solution to the original data as is shown in Figure 1.

To arrive at the dimension labels, stimulus words at opposite points of the dimensional poles were examined. The words located at one end of the horizontal pole

were “energetic” and “funny” which contrasted with “vulnerable” and “unaware” at the opposite end. The horizontal dimension was thus labeled, positive-negative. The vertical dimension was labeled agitated-sedated, as the expectancy words on the bipolar ends were “hallucinate” and “crazy,” which contrasted with “relaxed” and “loose.” In Figure 2, the group weight comparisons show the dimensional emphasis of the four GHB use groups and reveal that each of the four groups emphasized the positive-negative dimension relative to GHB use outcomes. Specifically, the group weights indicated that female nonusers (.96), male nonusers (.94), female users (.89), and male users (.66) placed greater emphasis on the positive-negative dimension than the agitated-sedated dimension, although the male user group emphasized this dimension at a lesser degree than the other three groups. The male user group emphasized the two dimensions similarly (.66, positive-negative; 58, and agitated-sedated) and the female user group emphasized the agitated-sedated dimension (.21) to a greater extent than the nonuser groups (.03 male nonuser; .13, female nonuser).

Preference Mapping Results

To discover the likely memory activation patterns for each GHB use group, preference mapping (PREFMAP) was applied to the stimulus configuration derived from the INDSCAL solution. PREFMAP is a multiple regression procedure that computes the line of best fit as a function of GHB use and is represented as a vector through the stimulus configuration (or expectancy network) for each group. The vectors are calculated based on the mean responses to the GHBEQ and simulate the activation point of GHB expectancies and how expectancies might spread through a memory network once activated. A vector was plotted for each use group and represented the judgment of

the likelihood that the expectancy would occur as a result of GHB use. By moving a perpendicular line down the vector beginning at an arrowhead, the expectancies endorsed by the use group would appear in the order of their judged frequency of occurrence. As Figure 3 shows, the vectors for all use groups were plotted into the INDSCAL stimulus configuration. The vectors representing the female and male nonuser groups were plotted into the network almost identically and corresponded to the positive-negative dimension of GHB use within the stimulus configuration. The vectors revealed that the expectancies most likely to be activated in memory by the two groups, relative to GHB use outcomes, were "vulnerable," "unaware," and "prone to accident," respectively. The expectancies most likely to be activated in male and female users were more closely associated with the agitated-sedated dimension of GHB use, as both groups of users more readily activated "lethargic," "groggy," "sleepy," and "tired." Activation of expectancy outcomes for all groups were identified to begin with negative associations and words related to the sedating properties of GHB. Positive expectancies were less likely to be activated in the hypothetical memory network. However, the male user group was more likely to activate the outcome, "relaxed," earlier than any of the other use groups.

DISCUSSION

In the present study, a semantic network was modeled to explore the role of expectancies and how they might influence GHB use. Expectancies are the anticipated outcomes or effects of a substance that are organized and stored in memory and are recognized to be a key factor in understanding alcohol, marijuana, and cocaine use. Expectancies form as a response to newly acquired information and through vicarious learning from external sources such as, friends, family, and the media. Expectancies are also formed as a result of past direct experience with a substance and become strengthened with increased association with the drug. Strategies to reduce college student drinking have been developed that challenge and alter the desirable, arousing expectancies related to alcohol use and have been shown to decrease subsequent drinking behaviors in college students and adolescents. Similar to expectancy research conducted with alcohol and other substances, the present study modeled the likely organization and activation of a GHB memory network to establish a foundation for the development of similar strategies to reduce or prevent GHB use. From the results of this research, however, the role of outcome expectancies to influence GHB use is less clear as the stored associations held by the college students sampled in this project, emphasized the sedating properties of GHB and revealed an overall negative evaluation of the effects of this substance.

Since the use of GHB evokes certain desirable effects, similar to effects reported by drinkers regarding alcohol use, (e g., overall sense of well being and reduction in social inhibition), we anticipated the development of similar arousing expectancies in our

college student GHB users and sedating expectancies in the non users. In Phase One, we tapped the domain of the effects of GHB use, and obvious differences between the use groups emerged. Several arousing expectancies such as, "energetic," "fun," "loving," "funny," "feel sexy," and "talkative" were frequently endorsed and unique to students who had consumed GHB. Non users reported obviously negative expectancies. Terms such as, "unaware," "unconscious," "confused," "lethargic," and "hallucinate" were unique to the Phase One nonusers. In addition, a clear distinction was made regarding gender and GHB expectancy development in Phase One. The number of expectancies reported by male users was at least three times greater than the expectancies reported by any other group. In fact, the male user group comprised less than five percent of the entire sample and less than 40 percent of all GHB users. There appeared to be a diversity of GHB expectancy information developed in male users that was not developed in female users, or nonusers of either sex. Another important distinction regarding Phase I is the proportion of users in the sample. One out of ten participants reported at least one instance of GHB use in their lifetime. Epidemiological studies have only recently included GHB on survey measures as a substance of interest and have found a quite low prevalence rate for GHB use among adolescents and young adults since it was measured (Johnston, et al, 2007; 2007a) therefore, the prevalence of use in our sample was higher than anticipated. The proportion of Phase Two users however, was much lower with users comprising less than five percent of the participants.

In Phase Two, INDSCAL was utilized to empirically model the hypothetical organization of GHB expectancies in memory. The INDSCAL analyses revealed a two dimensional semantic network of expectancy information gathered from all Phase Two

participant responses on the GHB Expectancy Questionnaire. The two dimensions of GHB expectancies endorsed in the model were positive-negative and agitated-sedated, as determined by the expectancies present at the dimensional poles. It was hypothesized that INDSCAL dimension weights would differ between groups based on gender and GHB use similar to when applied to data related to alcohol and other drugs. The weights, however, were not shown to vary systematically based on group membership in the manner we expected. The male user group weights supported this group's emphasis of both the positive-negative and agitated-sedated dimensions. In fact, the subject weights for the male user group on both dimensions were close to equivalent. The female and male nonuser groups and the female user group emphasized the positive-negative dimension to a much greater extent than the agitated-sedated dimension. It was noted that the while the female user group emphasized the positive-negative dimension, the group also was shown to emphasize the agitated-sedated dimension more than the nonuser groups. While this finding was contrary to the hypothesis that groups would vary systematically based on use and gender, there were differences indicated.

To model the likely activation pattern of GHB expectancies by each group, PREFMAP was applied to the INDSCAL stimulus configuration to reveal the line of best fit for male and female use groups. The hypothesis that the PREFMAP regression would produce vectors that varied based on gender and GHB use, corresponding with participant weights, was partially endorsed. The vectors for the female and male nonuser groups are almost identical; there is one degree of separation between the two and correspond to the participant weights revealed in the INDSCAL analyses. The plotted vectors of the nonuser groups differed from the vectors of the user groups, although the

female user group was not as distinctly removed from them as the male user group which was also shown to correspond to the INDSCAL participant weights. What these findings suggest is that male users are experiencing the effects of GHB differently than female users and female users are reporting greater concern with evaluative experience of GHB use (positive-negative) than their male counterpart.

We hypothesized that PREFMAP vectors of GHB nonusers would begin and continue along a negative dimension and endorse more negative expectancies, and vectors of GHB users would activate and continue along a more positive dimension and endorse more positive expectancies. This hypothesis was partially supported. Female and male nonuser groups activated negative expectancies such as "vulnerable" and "unaware," while users activated sedating expectancies such as "lethargic" and "groggy." Positive expectancies were not activated or endorsed by any group, suggesting that the sedating properties and overall negative evaluation of this drug are salient to the users and nonusers of this sample.

Limitations

While the present study is the first to examine GHB expectancies and explore the role of expectancies to influence GHB use, there are limitations to the research. First, the number of GHB users in the Phase One sample, while greater than numbers typically seen in the population, may not be sufficient to generate an accurate representation of words for the development of a GHB expectancy measure. Alcohol studies that use proportionate word frequencies to develop expectancy measures rely on a substantial percentage of alcohol consumers, and consumers of differing use levels, to derive robust

word frequencies to ensure the greater likelihood of differentiation between use groups. In the present study, the words used to generate the expectancy measure were derived from a sample of 108 GHB users, 41 of whom were male. Even though there were unique differences in expectancy words among users and nonusers it is unclear whether the findings would persist if the sample included a greater percentage of GHB users. Another limitation, although a positive one, is that the reported use of GHB decreased considerably from Phase One to Phase Two in our college student sample, from close to 12 percent in Phase One, to less than five percent reported GHB users in Phase Two. The differentiation of user groups and the empirically modeled memory networks are based on a small representation of GHB consumers and must be considered cautiously. The decline of GHB use by young adults and college students has also been mirrored in epidemiological studies since 2005. However, the use of GHB by individuals who consume GHB in conjunction with other drugs and the initiation of GHB use in adolescents has remained stable.

Identification of the fundamental differences of individuals that use GHB is critical for the development of approaches to reduce or prevent use. Since larger numbers of GHB users are necessary to corroborate findings of this research or reveal unidentified expectancies, future research should attempt to include a more diverse group of participants that extend to the community and not be limited to a college student sample. In addition, the identification of the outcome expectancies endorsed by GHB users of varying level of use, and users that combine GHB with other substances will be an important beginning to understand the factors that motivate the use of GHB.

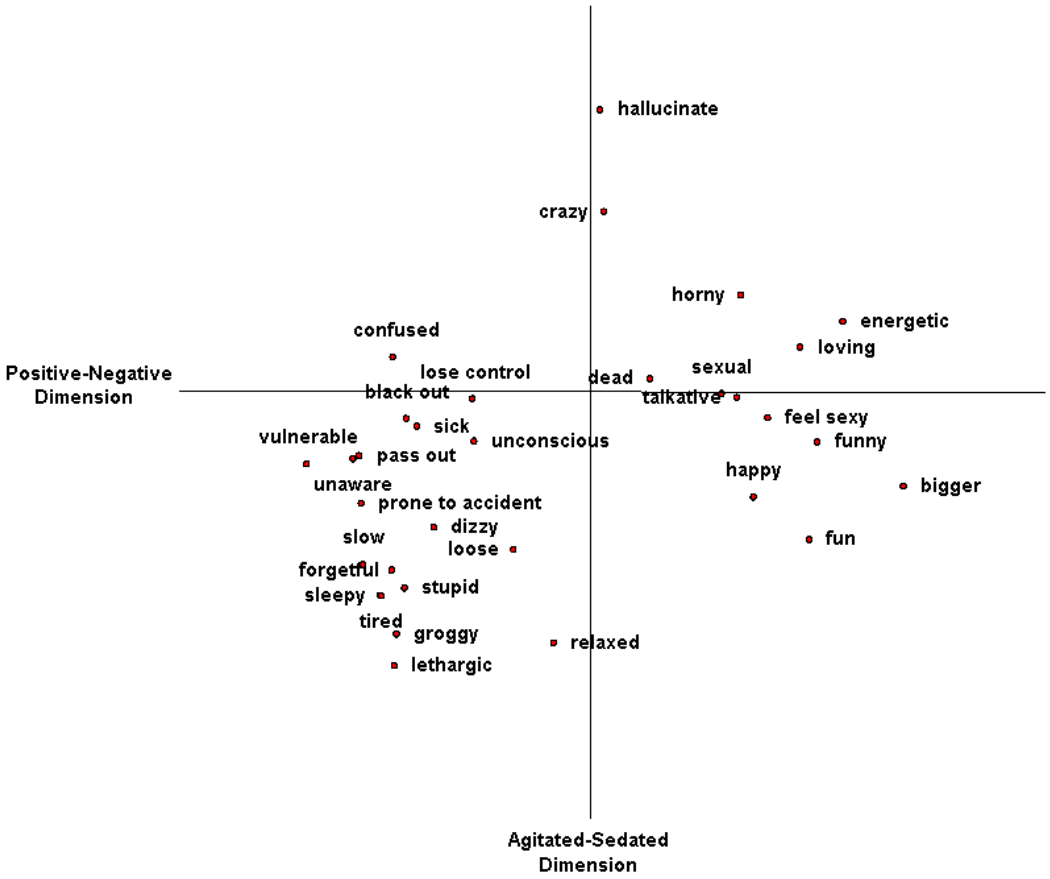

Figure 1. Individual Differences Scaling stimulus configuration

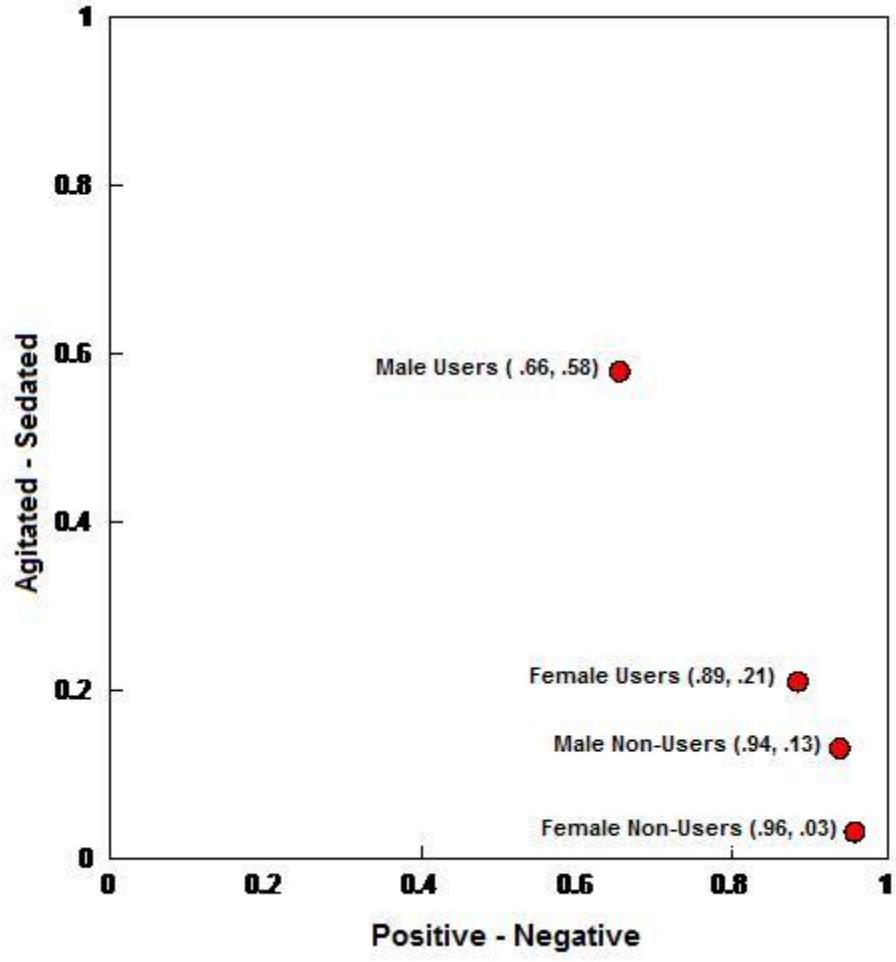

Figure 2. Individual Differences Scaling participant weights

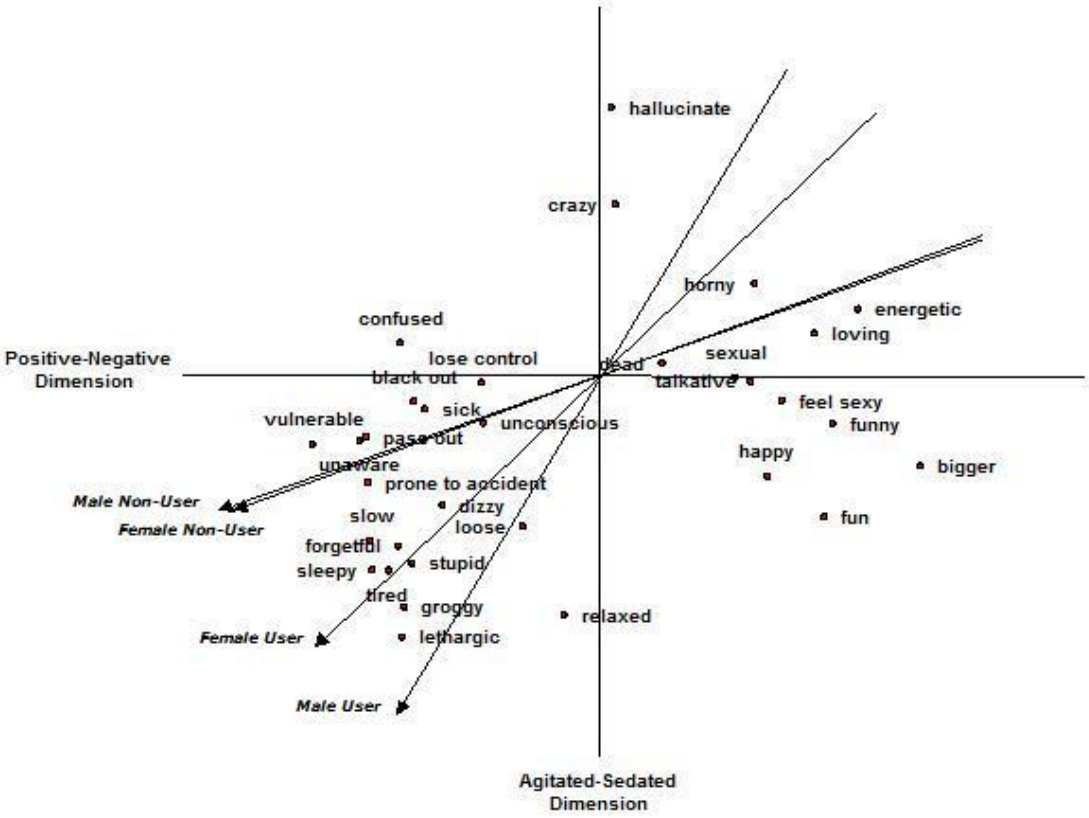

Figure 3. Individual Differences Scaling stimulus configuration with vectors.

Table 1. Proportionate frequency of expectancies

Non-User (n = 818)		User (n = 108)	
Expectancy	Frequency	Expectancy	Frequency
Stupid	0.08	Happy	0.08
Sick	0.07	Tired	0.07
Pass Out	0.07	Dizzy	0.07
Sleepy	0.07	Sick	0.05
Tired	0.06	Sleepy	0.05
Dead*	0.04	Pass Out	0.05
Happy	0.04	Horny	0.05
Dizzy	0.04	Stupid	0.04
Relaxed	0.03	Energetic*	0.03
Unaware*	0.03	Relaxed	0.03
Forgetful	0.03	Slow	0.03
Crazy	0.03	Crazy	0.02
Vulnerable	0.02	Black Out*	0.02
Unconscious*	0.02	Sexual	0.02
Groggy	0.02	Loose**	0.02
Sexual	0.02	Forgetful	0.02
Horny	0.02	Bigger	0.02
Confused*	0.02	Fun*	0.02
Bigger	0.02	Loving*	0.02
Lethargic*	0.02	Funny*	0.02
Hallucinate*	0.02	Prone to Accident*	0.02
		Vulnerable	0.02
		Feel Sexy*	0.02
		Talkative*	0.02

* unique to group

Table 2. Reported expectancies by use group and gender

Female Non-User (n = 617)		Male Non-User (n = 201)		Female User (n= 67)		Male User (n=41)	
Sleepy	0.08	Stupid	0.10	Dizzy	0.08	Tired	0.08
Stupid	0.07	Pass Out	0.08	Happy	0.08	Happy	0.07
Sick	0.07	Sick	0.08	Sick	0.06	Sleepy	0.07
Pass Out	0.05	Tired	0.06	Horny	0.05	Pass Out	0.06
Tired	0.05	Dead	0.06	Tired	0.05	Dizzy	0.05
Happy	0.04	Sleepy	0.06	Energetic	0.05	Sick	0.05
Dizzy	0.04	Happy	0.04	Pass Out	0.05	Horny	0.04
Unaware	0.04	Dizzy	0.03	Stupid	0.05	Slow*	0.04
Forgetful	0.04	Relaxed	0.03	Sleepy	0.04	Stupid	0.04
Crazy	0.03	Unconscious	0.03	Relaxed	0.03	Crazy	0.02
Vulnerable	0.03	Unaware	0.02	Black Out	0.02	Forgetful	0.02
Relaxed	0.03	Forgetful	0.02	Crazy	0.02	Loose*	0.02
Horny	0.02	Crazy	0.02	Dead	0.02	Bigger	0.02
Groggy	0.02	Sexual	0.02	Feel Sexy*	0.02	Black Out*	0.02
Dead	0.02	Bigger	0.02	Sexual	0.02	Energetic	0.02
Unconscious	0.02	Vulnerable	0.02	Talkative*	0.02	Fun*	0.02
Confused	0.02	Groggy	0.02			Funny*	0.02
Lethargic*	0.02	Hallucinate*	0.02			Prone to Accident*	0.02
Sexual	0.02	Confused	0.02			Relaxed	0.02
						Sexual	0.02
						Unconscious	0.02
						Groggy	0.02
						Vulnerable	0.02

***** unique to group

Table 3. Individual Differences Scaling stimulus means

Female User n =42		Female Non-User n = 880		Male User n =23		Male Non-User n =428	
vulnerable	3.19	vulnerable	3.04	stupid	2.74	vulnerable	2.84
confused	2.95	unaware	2.95	slow	2.70	unaware	2.73
slow	2.93	prone to acc	2.85	vulnerable	2.65	prone to acc	2.69
prone to acc	2.93	slow	2.85	prone to acc	2.61	pass out	2.65
groggy	2.93	forgetful	2.79	tired	2.61	sleepy	2.64
forgetful	2.90	pass out	2.78	groggy	2.57	tired	2.61
loose	2.90	confused	2.75	lethargic	2.52	slow	2.59
unaware	2.90	sick	2.71	sleepy	2.52	forgetful	2.57
lethargic	2.86	groggy	2.71	relaxed	2.48	dizzy	2.55
dizzy	2.86	blackout	2.68	dizzy	2.43	groggy	2.54
sick	2.79	dizzy	2.67	forgetful	2.43	confused	2.53
pass out	2.74	tired	2.67	sick	2.39	lethargic	2.52
lose control	2.71	lose control	2.66	pass out	2.39	stupid	2.52
stupid	2.67	stupid	2.64	loose	2.39	blackout	2.52
tired	2.64	sleepy	2.62	confused	2.39	lose control	2.48
sleepy	2.62	lethargic	2.60	unaware	2.35	sick	2.48
blackout	2.57	unconscious	2.49	lose control	2.30	loose	2.47
relaxed	2.57	loose	2.49	blackout	2.22	unconscious	2.39
crazy	2.43	hallucinate	2.41	unconscious	2.17	relaxed	2.38
unconscious	2.29	relaxed	2.40	talkative	2.13	hallucinate	2.18
hallucinate	2.21	crazy	2.21	fun	2.09	horny	2.18
sexual	2.19	sexual	2.17	crazy	2.09	sexual	2.17
horny	2.14	horny	2.01	horny	2.04	happy	2.11
happy	2.12	dead	2.00	feel sexy	2.00	feel sexy	2.11
feel sexy	2.05	happy	2.00	sexual	2.00	crazy	2.11
loving	2.05	feel sexy	1.99	loving	2.00	talkative	2.09
talkative	2.02	talkative	1.99	happy	1.91	dead	1.93
funny	2.00	funny	1.81	energetic	1.91	fun	1.92
fun	1.98	energetic	1.77	dead	1.87	loving	1.85
dead	1.93	fun	1.75	hallucinate	1.83	funny	1.85
energetic	1.81	loving	1.74	funny	1.74	energetic	1.80
bigger	1.26	bigger	1.42	bigger	1.74	bigger	1.44

APPENDIX A: FIRST ASSOCIATE EXPECTANCY QUESTIONNAIRE

Carefully read these directions before turning the page.

On the next page, you will be asked to answer a question. As quickly as possible, write down as many single words or short phrases as you can think of. Do not be concerned about giving a correct answer. **Just write whatever comes to your mind first**.

For example, if the question was, "Name types of cars", you might write:

Stock Car
Cadillac
Dodge
Eclipse
Acura
Neon
Accord
Isuzu
Toyota

Now turn the page, read the question, and quickly write down as many responses as you can think of. **Carefully read these directions before turning the page.**

GHB makes one:

APPENDIX B: GHB USE MEASURE

Please read each item carefully. If a bold item doesn't apply, write N/A next to it.

---

1. Have you ever in your life used GHB?

(circle one) Yes No

---

2. When was the last time you used GHB?

It has been _____ / Hours / Days / Weeks / Months / Years / since I last used GHB.

(write in the number) (circle one that applies above)

---

3. I suspect that I may have consumed GHB while I was unaware of doing so.

_____Yes _____No

This has occurred _____ times.
(write in the number)

---

4. How much GHB have you used in your lifetime? **(60 drops = 1 tsp, 3 tsp = 1 Tb, 2 Tb = 1 oz.)**

CIRCLE ONLY ONE of the following answers that applies to you and write in the number if requested.

a. I have used an average of _____ ounces a month for _____ years.
(write in the number) (write in the number)

b. I have used an average of _____ tablespoons a month for _____ months.
(write in the number) (write in the number)

c. I have used an average of _____ tablespoons a week for _____ weeks.
(write in the number) (write in the number)

d. I have used an average of _____ teaspoons a day for _____ weeks.
(write in the number) (write in the number)

e. I have used _____ ounces in my life.
(write in the number)

5. How much GHB do you use currently? **(60 drops = 1 tsp, 3 tsp = 1 Tb, 2 Tb = 1 oz.)**

CIRCLE ONLY ONE of the following answers and write the number if requested.

a. I use approximately _____ teaspoons a day, _____ days a week.
(write in the number) (write in the number)

b. I use approximately _____ tablespoons a week, over a period of _____ days.
(write in the number) (write in the number)

c. I use approximately _____ ounces a month, mostly on the weekends.
(write in the number)

d. I use approximately _____ ounces a year, for special occasions.
(write in the number)

e. I use approximately _____ teaspoons instead of drinking when I go out. This has happened
(write in the number)

at least _____ times.
(write in the number)

---

6. How many times have you stopped using GHB with the intention to never use it again? _____
(write in the number of times)

---

7. a. The first time I used alcohol I was _____ years old. (leave blank if never used)
(write in the number)

b. The first time I used marijuana I was _____ years old. (leave blank if never used)
(write in the number)

c. The first time I used GHB I was _____ years old. (leave blank if never used)
(write in the number)

---

8. The number of friends and acquaintances that I believe has used GHB in the last 6 months, is _____.
(write in the number)

---

9. I have administered GHB to someone without his or her knowledge of it.

Yes No
(circle one)

APPENDIX C: DEMOGRAPHICS QUESTIONNAIRE

Age: _____

Gender: (circle one) **Male** **Female**

Height: _____ (write in number) **Weight:** _____ (write in number)

Race: (circle one) Caucasian African American Asian

Hispanic Other _____

Year in School: (circle one) Incoming Freshman Freshman

Sophomore Junior Senior

_____ (write in number) Year Graduate Student

Family's Socio-Economic Status: (circle one)

15,000 or less 15,000 to 25,000

25,001 to 40,000 40,001 to 65,000

65,001 to 80,000 80,001 and above

Member of Intercollegiate Sports Team: (circle one) Yes No

Member of a Fraternity or Sorority? (circle one) Yes No

GPA: _____ (write in number)

During a regular semester, approximately how many hours a week do you spend studying?

_____ (write in number) **hrs.** **Working Out?** _____ (write in number) **hrs.**

APPENDIX D: INFORMED CONSENT

Student (18 and Over) Informed Consent Form

Dear Research Participant,

A study sponsored by the Psychology Department at the University of Central will involve anonymously completing a survey packet containing questions about certain beliefs you have regarding behaviors that may or may not apply to you. All of your responses will be anonymous. Your name will not be recorded or used to identify the records, and all information gathered will only be used anonymously for research purposes. You can withdraw from the study at any time without penalty.

Although there are no foreseeable risks from your participation in this investigation, the University requires that we inform every research participant of the following:

1. If you should suffer physical injury during participation in this research project, the University will provide referrals to appropriate health care facilities. Any treatment you receive will be charged to your insurance carrier, to any other party responsible for your treatment costs, or to you.

2. You acknowledge that the University of Central Florida is an agency of the State of Florida and that the University of Central Florida's operations and liabilities are regulated by Florida law, including the University of Central Florida's ability to indemnify any person, firm or corporation for injury or loss caused by the University of Central Florida; that the State of Florida is self-insured to the extent of its liability under law; and that liability in excess of that specified in statute may be awarded only through special legislative action. Accordingly, the University of Central Florida's ability to compensate you for any injury suffered during this research study is very limited.

3. Information regarding your rights as a research volunteer may be obtained from:

    Barbara Ward
    University of Central Florida (UCF)
    Office of Research
    12443 Research Parkway, Suite 207
    Orlando, FL 32826
    Telephone: 407-823-2901

If you have no objections to participating in this study, please indicate by checking the box (if online) or print and sign your name below. If you feel you need additional information about the research, please contact Michael Dunn, Ph.D. at the number listed below.

Sincerely,

Michael E. Dunn, Ph.D.
Department of Psychology
University of Central Florida
P.O. Box 161390 Orlando, FL 32816-1390
(407) 823-3083, mdunn@pegasus.cc.ucf.edu

_____ _____

Your Name (Please Print) Your Signature (Please Sign)

APPENDIX E: DEBRIEFING FOR PARTICIPANTS

Debriefing for Participation

Dear Participant,

Thank you for participating in the College GHB Expectancy Study. The purpose of the study was to investigate how beliefs about the effects of GHB may influence the decision to use or not use GHB. The results of this investigation will be used to formulate scientifically-based intervention programs aimed at reducing GHB use by college students.

All of the information gathered throughout this project has been and will be kept anonymous to protect participants. If you wish to receive a summary of the research findings, you may contact us at 407-823-2522, and upon completion of the study we can provide you with a summary of the findings.

If you feel you are experiencing any psychological distress, you may contact Lakeside Alternatives at 407-875-3700 or UCF's Community Counseling Center at 407-823-2052 for affordable or free counseling services. Any additional concerns or information may be obtained from:

Pamela C. Brown, B.S.
Clinical Doctoral Program
University of Central Florida
Department of Psychology
P.O. Box 161390
Orlando, Fl 32816-1390
Phone: (407) 823-2522
E-mail: alemap34@yahoo.com
or
Michael E. Dunn
Associate Professor
Voice: (407) 823-3083

Thank you very much for your participation and cooperation in this project!

Sincerely,

Pamela Brown, B.S.
Department of Psychology
University of Central Florida
Phone: (407) 823-2522

APPENDIX F: GHB EXPECTANCY QUESTIONNAIRE

GHBE Q

The following pages contain words describing possible effects of GHB.

Please circle the response that indicates how often you THINK this effect happens or could happen to you or someone after consuming GHB.

If you have NEVER used GHB, answer according to how you *THINK* it would affect you if you did consume GHB.

Answer each item quickly according to your first impression and according to your own personal beliefs about the effects of GHB. There are no right or wrong answers.
Circle one answer for each question

"GHB makes one _____."

1.	Dizzy	NEVER	SOMETIMES	USUALLY	ALWAYS
2.	Happy	NEVER	SOMETIMES	USUALLY	ALWAYS
3.	Sleepy	NEVER	SOMETIMES	USUALLY	ALWAYS
4.	Lethargic	NEVER	SOMETIMES	USUALLY	ALWAYS
5.	Funny	NEVER	SOMETIMES	USUALLY	ALWAYS
6.	Sick	NEVER	SOMETIMES	USUALLY	ALWAYS
7.	Feel Sexy	NEVER	SOMETIMES	USUALLY	ALWAYS
8.	Stupid	NEVER	SOMETIMES	USUALLY	ALWAYS
9.	Fun	NEVER	SOMETIMES	USUALLY	ALWAYS
10.	Pass Out	NEVER	SOMETIMES	USUALLY	ALWAYS
11.	Tired	NEVER	SOMETIMES	USUALLY	ALWAYS
12.	Forgetful	NEVER	SOMETIMES	USUALLY	ALWAYS
13.	Slow	NEVER	SOMETIMES	USUALLY	ALWAYS
14.	Hallucinate	NEVER	SOMETIMES	USUALLY	ALWAYS

"GHB makes one _____."

15.	Crazy	NEVER	SOMETIMES	USUALLY	ALWAYS
16.	Sexual	NEVER	SOMETIMES	USUALLY	ALWAYS
17.	Groggy	NEVER	SOMETIMES	USUALLY	ALWAYS
18.	Loose	NEVER	SOMETIMES	USUALLY	ALWAYS
19.	Prone to Accident	NEVER	SOMETIMES	USUALLY	ALWAYS
20.	Black out	NEVER	SOMETIMES	USUALLY	ALWAYS
21.	Unconscious	NEVER	SOMETIMES	USUALLY	ALWAYS
22.	Bigger	NEVER	SOMETIMES	USUALLY	ALWAYS
23.	Energetic	NEVER	SOMETIMES	USUALLY	ALWAYS
24.	Horny	NEVER	SOMETIMES	USUALLY	ALWAYS
25.	Vulnerable	NEVER	SOMETIMES	USUALLY	ALWAYS
26.	Dead	NEVER	SOMETIMES	USUALLY	ALWAYS
27.	Lose control	NEVER	SOMETIMES	USUALLY	ALWAYS
28.	Relaxed	NEVER	SOMETIMES	USUALLY	ALWAYS
29.	Talkative	NEVER	SOMETIMES	USUALLY	ALWAYS
30.	Loving	NEVER	SOMETIMES	USUALLY	ALWAYS
31.	Confused	NEVER	SOMETIMES	USUALLY	ALWAYS
32.	Unaware	NEVER	SOMETIMES	USUALLY	ALWAYS

APPENDIX G: IRB LETTERS

University of Central Florida

Office of Research & Commercialization

July 14, 2003

Pamela Brown
2010 ½ E. Harding Ave.
Orlando, FL 32806

Dear Ms. Brown:

With reference to your protocol entitled, "Developing a Measure to Model Anabolic Steroids and GHB Expectancies in Memory," I am enclosing for your records the approved, executed document of the UCFIRB Form you had submitted to our office.

Please be advised that this approval is given for one year. Should there be any addendums or administrative changes to the already approved protocol, they must also be submitted to the Board. Changes should not be initiated until written IRB approval is received. Adverse events should be reported to the IRB as they occur. Further, should there be a need to extend this protocol, a renewal form must be submitted for approval at least one month prior to the anniversary date of the most recent approval and is the responsibility of the investigator (UCF).

Should you have any questions, please do not hesitate to call me at 823-2901.

Please accept our best wishes for the success of your endeavors.

Cordially,

Chris Grayson
Institutional Review Board (IRB)

Copies: Dr. Michael Dunn
IRB File

November 15, 2004

Pamela Brown
University of Central Florida
Department of Psychology
Phillips Hall, Main office, 3rd floor
Orlando, FL 32816-1390

Dear Ms. Brown:

With reference to your protocol entitled, "Developing a Measure to Model GHB Expectancies in Memory" I am enclosing for your records the approved, expedited document of the UCFIRB Form you had submitted to our office.

Please be advised that this approval is given for one year. Should there be any addendums or administrative changes to the already approved protocol, they must also be submitted to the Board. Changes should not be initiated until written IRB approval is received. Adverse events should be reported to the IRB as they occur. Further, should there be a need to extend this protocol, a renewal form must be submitted for approval at least one month prior to the anniversary date of the most recent approval and is the responsibility of the investigator (UCF).

Should you have any questions, please do not hesitate to call me at 407-823-2901.

Please accept our best wishes for the success of your endeavors.

Cordially,

Barbara Ward, CIM
IRB Coordinator

Copies: IRB File

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