

DETERMINANTS OF ADOLESCENT DRINKING

**THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE**

**MASTER OF ARTS
(CLINICAL PSYCHOLOGY)**

**OF
THE UNIVERSITY OF NAMIBIA**

**BY
JAMES DIEDERICKS**

**SUPERVISOR
DR.S.WHITTAKER**

**EXTERNAL EXAMINER:
PROF. S.H. VAN DEVENTER**

SEPTEMBER 2007

ABSTRACT

Drinking in Namibia became so pronounced that it has been addressed as a national concern in multimedia campaigns. This study assessed the utility of Theory of Planned Behavior (TPB) to predict and explain alcohol intentions amongst selected adolescents in Namibia, and in particular to assess the relative contribution of individual and normative constructs in the TPB. A total of 98 (multiple $R = >0.3$) secondary school learners participated in the study. Elicitation interviews were conducted and data were evaluated by means of content analysis. The analysis formed the basis for the development of a questionnaire that measure TPB constructs. A questionnaire was administered to 100 adolescents (54% female and 46% male). Data were analyzed by means of multiple linear regression. The predictive utility of the model was confirmed: it accounted for 24% of the variance in intention to drink. There was a significant multivariate F for the main constructs of the model [$F(3,94) = 9.703, p < 0.01$]. A non-significant multivariate F for the effects of the construct "perceived behavioural control" was obtained. The positive regression coefficients obtained [attitudes ($\beta = .407, p < 0.05$) and subjective norms ($\beta = .255, p < 0.05$)] imply that intention to drink was greater for learners with positive drinking attitudes and high scores on the "friend" scale of subjective norms. Attitudes, subjective norms and current drinking status accounted for 31% of variance in intention [$F(6,96) = 22.577, p < 0.05$]. Structural modelling results provide support for the predictive utility of the TPB ($RMSEA = .912$). Whether the constructs measured in this study correspond to TPB constructs measured in developed countries need to be affirmed by empirical evidence. The findings offer

empirical evidence, supporting interventions that penetrate community networks. The study highlights the extent to which alcohol attitudes and behaviours are embedded in family/social contexts.

TABLE OF CONTENTS

LIST OF TABLES AND FIGURES

CHAPTER 1	INTRODUCTION	1
CHAPTER 2	REVIEW OF THE LITERATURE	10
2.1	The prevalence of Alcohol use	10
	Introduction	10
	The prevalence of alcohol use	10
	Use prevalence: Namibia	11
	Drinking related problems	14
	Trends in drinking problems	15
	Intoxication	15
	Problem drinking and alcoholism	16
	Academic performance	17
	Drinking and driving	17
	Criminal behavior	17
	Other problems	18
	Illicit drugs	19
	Use prevalence	19

Use patterns	20
2.2 Understanding alcohol use behavior	20
Correlates of substance use and problems	20
Demographic and background characteristics: gender	21
Race /ethnicity	24
Religion	27
Early substance use	28
Other demographic or background variables	29
Personality factors	31
Year in college and academic performance	32
College residence	34
Motivations, Reasons and Attitudes	36
Substance Use	38
Substance Use Problems	41
Relationship of Drinking and Smoking To Self-Concept	42
Self-Concept and Adolescent Use of Substances	43
Relationship of Drinking and Smoking to Health Locus Control	45
Relationship of Drinking and Smoking To Attitudes and Beliefs	57
Factors Responsible For Alcohol Drinking and Tobacco Smoking	63
Adolescents and Predictability of Smoking	69
Smoking and Personal Control Beliefs	73

	Patterns, Beliefs and Drinking Contexts of Alcohol	75
2.3	Models of drinking behavior	76
	Drinking contexts	77
	Drinking expectancies	80
CHAPTER 3	THEORETICAL FRAMEWORK	84
3.1	Expectancy Theory	84
	Main constructs of Expectancy Theory	84
	Social drinking contexts and the role of expectancies	85
	Expectancies of alcohol and a control substance	86
3.2	Relationship of drinking to intentions	89
	The Theory of Planned Behavior	89
	The TPB applied to alcohol use	91
	Normative influences in the TPB	91
3.3	Relationship of drinking to Academic Achievement	94
3.4	Relationship of drinking to Normative Pressures	96

CHAPTER 4	EMPIRICAL CONCEPTUALIZATION	99
CHAPTER 5	DATA PRESENTATION	107
CHAPTER 6	ANALYSIS AND INTERPRETATION	162
CHAPTER 7	CONCLUSION	171

REFERENCES

APPENDICES:

1. Learner Questionnaire
2. Questionnaire Development
3. Scoring Sheet
4. SPS Output: Regression Analysis

List of Tables and Figures**TABLES**

Table 1: Sample composition

Table 2: Learners' self-reported drinking status

Table 3: Cases by gender and drinking status

Table 4: Cronbach's Alpha for direct measures of predictor variables

Table 5: Correlation of direct predictor variables and intention

Table 6: Correlation of indirect predictor variables

Table 7: Correlations between direct and indirect attitude measures

Table 8: Correlation between direct and indirect subjective norms

Table 9: Correlations between direct and indirect perceived behavioral control

Table 10: Correlation between direct and indirect measures of intention

Table 11: Inter-Item correlation matrix: direct measure attitude

Table 12: Inter-Item correlation matrix: direct measure subjective norm

Table 13: Inter-Item correlation matrix: direct measure perceived behavioural control

Table 14: Inter-Item correlation matrix: direct measure generalized intention

Table 15: Chi-square test for association between pairs of variables (direct measure)

Table 16: Belief-based measures

Table 17: Attitude measures

Table 18: Subjective norm measures

Table 19: Perceived behavioural control measurements

Table 20: Regression: intention on predictor variables

Table 21: Model Summary: Regression analysis

Table 22: Analysis of variance (ANOVA)

Table 23: Regression coefficients

Table 24: Attitude and intention

Table 25: Attitude model summary

Table 26: ANOVA statistics for attitude as predictor variable

- Table 27: Regression coefficients: attitude
- Table 28: Regression: subjective norm and intention
- Table 29: Subjective norm model summary
- Table 30: ANOVA statistics for subjective norm as predictor variable
- Table 31: Regression coefficients
- Table 32: Perceived behavioral control and intention
- Table 33: Perceived behavioural control model summary
- Table 34: ANOVA statistics for perceived behavioral control as predictor variable
- Table 35: Regression coefficients: perceived behavioral control
- Table 36: Predicting intention from the indirect predictor variables
- Table 37: ANOVA statistics for indirect measures
- Table 38: Regression coefficients
- Table 39: Model summary subjective norm
- Table 40: Subjective norm
- Table 41: ANOVA statistics for subjective norm as predictor variable
- Table 42: Regression coefficients
- Table 43: Model summary perceived behavioral control
- Table 44: Perceived behavioral control
- Table 45: ANOVA statistics for perceived behavioral control as predictor variable
- Table 46: Regression coefficients
- Table 47: Variables used in the model
- Table 48: Model summary
- Table 49: ANOVA statistics summary
- Table 50: Regression coefficients
- Table 51: Model summary
- Table 52: Regression: "Many friends and active social life"
- Table 53: ANOVA summary: "Many friends and active social life"
- Table 54: Regression coefficients
- Table 55: Regression summary

Table 56: Model summary
Table 57: ANOVA summary
Table 58: Regression coefficients
Table 59: Correlation between direct measures
Table 60: Path coefficients
Table 61: ANOVA statistics summary
Table 62: Regression coefficients
Table 63: Variable counts
Table 64: Computation of degrees of freedom
Table 65: Results (default model)
Table 66: Maximum likelihood estimates
Table 67: Correlation between exogenous variables
Table 68: Standardized total effects
Table 69: Standardized direct effects
Table 70: Standardized indirect effects
Table 71: CMIN
Table 72: RMR, GFI
Table 73: Baseline comparisons
Table 74: Parsimony: adjusted measures
Table 75: RMSEA

FIGURES

- Figure 1: Histogram of generalized intention
- Figure 2: Histogram of overall attitude score
- Figure 3: Histogram of overall subjective norm score
- Figure 4: Histogram of overall perceived behavioural control score
- Figure 5: Boxplot of generalized intention score by age
- Figure 6: Boxplot of generalized intention score by gender

Figure 7: Boxplot of generalized intention score by status of drinking

Figure 8: Standardized residuals

Figure 9: Histogram of standardized residuals (direct measures)

Figure 10: Standardized residuals (indirect measures)

Figure 11: Histogram of standardized residuals (indirect measures)

Figure 12: Normal qq plot with line

Figure 12: Path analysis results

- the internal advisor, Dr. S. Whitaker, thank you for your support.
- Dr. Hüller of the Statistics Department at the University of Bamberg for her guidance and advice in improving the data presentation and analysis.
- Jürgen Trösch, chairman of the National Planning Commission for studying the work capacity, thinking and preparing the data for analysis.
- the entire teachers at St. Paul Secondary School that took part in this study.
- my mother, Juan, and two brothers, Arthur and Andre, thank you for your valuable support.
- My beautiful children, Sophia, Frank and Marcelino, I love you all deeply.

ACKNOWLEDGEMENTS

I herewith express my profound gratitude to the following people who have greatly assisted in the completion of this work.

- First and foremost, I thank the Almighty for His grace, for courage and perseverance to complete this work.
- The internal examiner, Dr. S. Whittaker, thank you for your support.
- Dr. Muller of the Statistics Department at the University of Namibia for her guidance and advice on improving the data presentation and analysis.
- Jannie Swartz, statistician at the National Planning Commission for assisting me with capturing, cleaning and preparing the data for analysis.
- The senior learners at Shifidi Secondary School that took part in this study.
- My mother, Joan, and two brothers, Arthur and Andre, thank you for your valuable support.
- My beautiful children, Mishka, Faruk and Marcelino, I love you endlessly.

DEDICATION

To my wife, Rushdia, with love.

1. Introduction

“Alcohol and drug abuse has become a major problem in Namibia. Alcohol is by far the most abused intoxicant in Namibia. 20% of school children, 75% of the out-of-school youth, and 40% of the adult population regularly abuse alcohol over weekends” (Sandborg, 1998, p.5).

The phenomenon of alcohol consumption is on the rise among Namibian adolescents. Usage figures indicate that more than half of Namibians have at least once consumed alcoholic beverages (SIAPAC, 2002). Flanking irresponsible usage of alcohol is the increase of health-risk behavior, including drinking and driving, and heightened propensity for risky sexual conduct. A fair amount of alcohol usage figures have been reported in Namibia, pointing to the fact that more and more people are drinking.

A Knowledge, Attitude and Practice (KAPB) study was conducted in Namibia in 2002 and the findings overwhelmingly indicated that a large number of Namibians use alcohol and smoke cigarettes. What is worrisome about the results is that it reports regular usage figures among Namibians as high as 56% of the total adult population (SIAPAC, 2002). Figures reported for smoking in the same study were lower than that for drinking, but nonetheless indicates to the fact that health risk behaviors are pronounced amongst the adult population (39%).

The magnitude of alcohol usage for Namibians has been reported in a number of usage studies. For example, it was reported in an alcohol usage study that mean consumption amongst the Namibian population is of the highest in Sub-Saharan Africa. It was further reported that amongst the Namibian population, approximately 10-15 litres of alcohol per person per year are consumed, compared to 4-5 litres in South Africa.

In another Namibian study the researcher aimed at investigating attitudes towards "normal drinking" (Dumba, 1998). Nearly half of the respondents indicated that one drink a week constitutes normal drinking, yet one is tempted to question this logic when usage figures are consistently reported as being particularly high amongst Namibians. Other Namibian-based research also corroborates the high alcohol usage figures, especially amongst adolescents (for example, Nghinaunje, 1998; UNAM, 1999; Nepembe, 1991).

Speculations about the causes for high usage figures have been reported in what may be deemed consistent observations: adolescents are bored and need a sense of belonging. A multitude of social and behavioral theorists have over the years advanced notions suggesting the relation between drinking and other factors commonly referred to as predictors of on-set/up-take or maintenance.

For centuries researchers accepted, perhaps even on uncertain grounds, that human behavior is principally guided by social attitudes, that people's behavior could relatively

easily be predicted by their attitudes towards particular behaviors. That social behaviors could be predicted by social attitudes was common cause. Notwithstanding, there were also those that challenged the notion that attitudes are the cornerstone to understanding people's behavior.

The current research conceptualizes adolescent drinking within the framework of a particular theory that has gained prominence in explaining human behavior, i.e. the Theory of Planned Behavior (TPB). This theory, which is an improved version of the Theory of Reasoned Action, postulates that behavior can be predicted by a specified number of predictor variables.

The main constitutive elements of the TPB (attitudes, subjective norms, perceived behavioral control, and intention) are explored in this research to gain an understanding of the predictive utility of each in accounting for variance in intention to drink. A shortcoming of this study is that the researcher did not use reported drinking status as an outcome variable, but rather treated it as a predictor variable of intention.

According to the TPB, intentions to drink alcohol are primarily determined by attitudes, subjective norms, and perceived behavioral control. Behavior is in turn determined by intentions and also directly influenced by perceived behavioral control. Variables that are external to the theory's model are assumed to influence intentions only to the extent that they affect attitudes, subjective norms, or perceived behavioral control. The

predictor variables in the model are assumed to be sufficient to account for intentions and actions, but their relative weight varies depending on the behavior under investigation.

Attitude toward the behavior is defined as "a person's general feeling of favorableness or unfavorableness for that behavior" (Ajzen & Fishbein, 1980). Attitude towards the behavior is a function of the product of one's salient beliefs that performing the behavior will lead to certain outcomes, and an evaluation of the outcomes.

Subjective norm refers to the perceived social pressure to perform or not to perform the behavior. It is a function of the product of one's normative belief which is the belief that salient referents think that he or she should or should not perform the behavior, and his/her motivation to comply with such referent.

Perceived behavioral control refers to people's perceptions of ease or difficulty of performing the behavior of interest. It is assumed to be a function of control beliefs and perceived facilitation. Control beliefs are thought to be the perception of the presence or absence of requisite resources and opportunities needed to carry out the behavior. Perceived facilitation is one's assessment of the importance of those resources to the achievement of outcomes (Ajzen & Madden, 1986).

The assumption in the TPB that intentions are an immediate antecedent of behavior is shared by other social psychological models. Indeed, intentions are generally found to predict corresponding behavior quite well. Meta-analysis veering diverse behavioral domains have reported mean intention-behavior correlations of .47 (Armitage & Conner, 2001; Notani, 1998); .53 (Shepherd, Hartwick & Warshaw, 1988); .45 (Randall & Wolff, 1994); and in a meta-analysis of these and other meta-analysis, Sheeran (2002) reported an overall correlation of .53 between intention and behavior, suggesting that intentions account, on average, for approximately 28% of the variance in behavior.

Models based on the TPB have been found to be very useful in predicting a wide range of behavior (Sheppard *et al.* 1988; Madden *et al.* 1992). However, the theory has been criticized for its focus on the individual decision maker. Having been developed and tested in the individualistic cultures of the developed world, the theory has been rejected by many researchers working elsewhere.

The bases of such claims primarily focus on the assumption that the theory fails to do justice to the collectivist ideals of some cultures in developing countries. Amongst these cultures, it is postulated, family and community are more central to health and well-being than the individual.

However, the very same critics who emphasized the theory's purported failure to acknowledge social factors risk rectifying cultural and political forces, by setting these

up as distinct from individual behavior. This view has generally been rejected by postmodern cultural theorists, asserting instead that culture is embodied in individual action.

Postmodern cultural theorists argue that through individual action culture's influences become pronounced. In a similar fashion the theory's proponents conceptualize macro-social forces as central to the formation of individual intentions (Ajzen & Fishbein, 1980), at the same time pointing out that the mechanisms by which these forces exert their influence (and can therefore be measured) are through individual decision making.

For reasons such as this the Theory of Planned Behavior model could, if properly applied, demonstrate enhanced, rather than diminished validity when used outside the developed countries for which it was first developed. Some evidence supporting this possibility can already be found (for example, Fekadu & Kraft, 2001).

The present study uses the TPB to predict and explain intentions to use alcohol amongst a relatively small group of Namibian adolescents (N=100). It aims to assess how well the model's overall predictive validity is upheld when the model is applied in less developed countries, and in particular to assess the relative contributions of the TPB constructs in variance in intention. The research question in this study is: "What are the strongest predictors of drinking intentions amongst a group of Namibian adolescents?"

In exploring this research question emphasis is placed on the main constitutive elements of the TPB and the relative weight of its predictor variables in predicting adolescents' intention to drink.

With the help of this study, an empirical issue of whether moral norms are relevant to the formation of intentions to use legal drugs such as alcohol is discussed. The TPB will elucidate the determinants of intentions to use, and self reported use of, alcohol. This study, which overcame several of the limitations of previous Namibian studies, contributes additional information to the drinking literature in Namibia concerning drinking researchers' understanding of adolescents' drinking acquisition and maintenance processes.

Limitations of the present study

The study attempted to combine qualitative and quantitative methods in order to have a reliable measurement tool in place. As such, the design of this study offers empirical evidence of the measurement instrument's internal consistency. Notwithstanding, the findings of the present study need to be read with the following considerations in mind.

Firstly, no criterion reference for comparison between the model's use in developed and less developed countries was included in this study. Internal-model similarity is not founded on the fact that in the present study the model's internal consistency was proven. Given this, conclusions drawn from the present study can only be compared on

theoretical grounds with studies that employed this model in more developed countries. In as much as this is recognized as a shortcoming of the present study, it is also recognized as an opportunity to further assess the model's predictive utility and to interpret subsequent findings in comparison to studies in developed countries on empirical grounds.

Secondly, self-reported drinking was not treated as an outcome variable of intention. Rather, the composite constructs were treated as predictor variables of intention only, thus missing out on the opportunity to assess the model's predictive utility against self-reported drinking. Self-reported drinking was treated as a predictor variable of intention to determine whether learners who reported being drinkers had a higher degree of intention to drink.

Structure of the thesis

Chapter Two presents a review of literature relevant to the subject of alcohol drinking and justifies the selection of the theoretical framework for this study. It surveys a number of studies that have applied the TPB and other health models in understanding health related behaviors. Chapter Three provides the theoretical conceptualization of this research. An exposition of the main constructs of the theory is presented, and each of its constitutive elements discussed.

Chapter Four presents the empirical conceptualization. It presents the research design for the study, how the measuring instrument was developed, and indicates some issues surrounding measurement of TPB constructs. Chapter Five provides results obtained from the research and offers a preliminary analysis. Chapter Six provides the main analysis and discussions of the obtained results. Chapter Seven provides a conclusion of the present research study, makes reference to study limitations, and indicates directions for future research.

2. Review of the literature

Introduction

Differences in the methodology of surveys and other epidemiological studies make it difficult to present definitive figures for the extent of substance use/abuse. Differences among studies include the measurement of use (quantity and frequency), the definition of substances, the number of substances inquired about, the specification of the sample, the type of analysis, and the format used for reporting the data. Such differences complicate both the comparison of results across studies and the tracing of substance use trends over time.

In addition, generalization of results from specific studies is often problematic because of unrepresentative samples or small numbers of respondents. Almost most studies of substance use among school/out of school adolescents have collected data on alcohol and drug use by self-report, with no confirmation by objective measures (Johnston, O'Malley & Bachman, 1992). Considerable evidence exists, however, that self-report questions do result in largely valid data and that any bias is likely to be in the direction of underreporting (Johnston *et al.* 1992).

2.1 The prevalence of alcohol use.

Earlier review articles (for example, Berkowitz & Perkins, 1987; Brennan, Walfish & AuBuchon, 1986; Saltz & Elandt, 1986) have summarized the findings of the many

surveys of alcohol use and alcohol-related problems among school and college students. The present review focuses on research that has been conducted since 1980.

2.1.1 Use Prevalence: Namibia

According to a nationwide Knowledge Attitude Practice (KAP) baseline survey on alcohol and drug use and abuse in Namibia, fifty-six percent (56%) of adults consume alcohol and other related alcoholic beverages on a regular basis. The same study also found that thirty nine percent (39%) of adults smoke cigarettes (SIAPAC, 2002).

It is asserted that although many Namibians abstain from alcohol altogether, the mean consumption is still significantly high (approximately 10-15 liters of absolute alcohol per person per year, compared to 4-5 in South Africa).

Dumba (1998) undertook a study in Namibia to survey and investigate the perceptions adolescents have toward "normal" drinking. The researcher made use of a structured questionnaire to obtain the data. The following represent what respondents regarded as normal drinking:

- (a) 40% of respondents say that less than daily but one drink a week constitutes "normal" drinking.
- (b) 30% of respondents say that two to three drinks a week constitutes "normal" drinking.
- (c) 20% of respondents say that one drink a year constitutes "normal" drinking.

- (d) 10% of respondents say that one drink a week constitutes “normal” drinking.

A 1993 desk analysis was conducted with the aim of establishing what the patterns of alcohol use among Namibians are. The researchers made use of a survey design and data were collected by means of documentary records in hospitals. The sampled population consisted of adults, young adults, school-going children, and out-of-school youth. The following information was obtained:

- (a) 51% of adults abuse alcohol.
- (b) 10% of adults abuse alcohol daily.
- (c) 30% of adults abuse alcohol over weekends.
- (d) 8% of adults are chronic alcoholics.
- (e) 75% of all reported alcohol abuse cases constitute young adults.
- (f) 75% of out of school youth will indulge in alcohol abuse.
- (g) 22% of 13 year olds “abuse” alcohol.
- (h) 33% of 14-16 year olds “abuse” alcohol.

Nghinaunje (1998) examined the use of alcohol during adolescence. He used a quantitative approach and gathered data by means of a questionnaire. His work was based on the assumption of adolescence as a time of turmoil, and concluded that the peer group forms an integral part of positive self-concept formation, and compliance with the wishes of peers fosters positive social relations. The results obtained were:

- (a) 60% of his sample said they use alcohol as a means of socializing.

(b) 100% of his sample saw alcohol use as part of adolescence.

In a study commissioned by Nepembe (1991), 2070 learners from 12 schools were interviewed to enquire about drinking behavior among school-going teenagers in Namibia. The researcher reported that 80% of the learners interviewed were well aware of the dangers of drinking. Most of the learners were using alcohol as an experiment, or they were using it to socialize with their friends.

Of this number 39 % of learners were using alcoholic drinks and 61 % were non-users. Of the number of respondents that used alcohol, 93 were learners between the ages of 10-14, 348 between the ages of 15-16, and 462 were 17 years and older.

Of the 810 learners that were reported as users, 54% were girls. Between the ages of 10-14 girls comprised 74%, and 71% between the ages of 15-16. Between the ages of 17 and older, 47% were reported users. The researcher did not comment on or interpret the gender disparities in usage and subsequent decline in number of girls consuming alcohol beyond the last years of adolescence.

The University of Namibia (UNAM, 1999) indicated that 53% of the youth consume alcohol. Weekly (2-3 days per week) and daily figures for alcohol use amounted to 28.4%, which means that one out of four Namibian youths use alcohol regularly, while 6.8% are already heavy drinkers using alcohol every day.

2.1.2 Drinking-Related Problems

Considering the large percentage of school learners and college students who drink heavily, it should not be surprising that alcohol-related problems are also high. Problem behaviors associated with using alcohol are of concern both because of their immediate consequence to the individuals and because they could indicate emerging patterns of excessive alcohol use that may continue after school and or college/university.

Various studies (Globetti *et al.* 1988) have reported the following percentage ranges for alcohol-related problems among students: drinking and driving, 33% to 41%; destruction of property, 6% to 7%; loss of friends, 7% to 8%; academic problems, 17% to 23%; problems with authorities, 3% to 15%; and student judiciary problems, 20% to 60%.

Much of the alcohol literature distinguishes between "normal" drinking and "problem" drinking, often with the implication that there is no middle ground between these two drinking patterns. But just as drinking levels range from abstinence to chronic heavy drinking, so is there a range of problems associated with drinking. For example, although alcohol-related problems tend to increase with level of consumption, even low levels of consumption can result in alcohol problems. Also, because high school and college students are young, it is expected that most of their alcohol-related problems are acute (accidents, intoxication, driving while intoxicated) rather than chronic (neurological impairment, etc.).

2.1.3 Trends in drinking problems

Parallel to the modest decline in drinking among adolescents noted above, some problems associated with alcohol consumption, particularly those related to drinking and driving, have declined. Others, however, have increased. Hanson & Engs (1992) surveyed about 4,000 students in 1982, 1985, 1988, and 1991. Of 17 drinking problems they asked about over this decade, 10 showed significant increases and 4 showed significant decreases; 3 of the 4 decreases involved driving-related problems.

Despite these mixed findings regarding trends in alcohol-related problems, college administrators have perceived the situation as improving. In 1979 and 1985, Gadaletto & Anderson (1986) asked college administrators on two occasions about their perceptions of alcohol problems on their campuses. The percentage who believed that alcohol problems had declined over the past several years rose fourfold between the two surveys, from 7% to 28%, whereas the percentage who believed that alcohol problems had increased fell by nearly half, from 54% to 30%.

2.1.4 Intoxication

Occasional intoxication is the norm in the college-age group. Samson, Maxwell & Doyle (1989) found that 85% of undergraduates reported having been intoxicated at least once. Of those who reported having been intoxicated, regular drinking was also common, with the men consuming an average of 8.4 drinks per week and the women an average of 4.6 drinks.

Among underage students, 48% of the men and 37% of the women reported drunkenness at least once in the past month; in addition, 11% of the men and 6% of the women said they had been drunk four or more times in the past month (Kozicki, 1986).

2.1.5 Problem drinking and alcoholism

In a significantly large survey sample, 91% of the men and 53% of the women (72% combined) scored 7 or more on the Cahalan Scale of Problem Drinking, a score indicative of problems with alcohol (Samson *et al.* 1989). Twenty percent of the men and 15% of the women gave at least two positive responses on the CAGE alcoholism screening questionnaire, a finding that strongly suggests alcoholism or alcohol problems (Kozicki, 1986).

Nevertheless, only 3% of the men and 2% of the women believed that they had a drinking problem. In a study of problem drinking among college first-years, 40% of the students had high-risk scores on either of two alcohol-problem screening instruments (the CAGE and the Perceived-Benefit-of-Drinking Scale).

2.1.6 Academic performance

Heavy drinking can interfere with academic performance. One poll of adolescents at college found that one third of the respondents reported that excessive drinking had caused them to skip classes. A survey of college and university administrators in 1985

indicated that alcohol was a factor in 29% of academic problems and in 21% of cases of dropping out of school (Samson *et al.* 1989).

2.1.7 Drinking and driving

Drunk driving or drinking while driving can result in arrest for driving under the influence or in accident-related injuries and fatalities. Fifty-seven percent of the students admitted having driven a car at least once while intoxicated, and 21% had done so seven or more times. Not surprisingly, students who are heavy drinkers or who score high on an alcohol-abuse scale are more likely to report dangerous driving behaviors or driving while intoxicated (Sarvela *et al.* 1988).

Three studies have asked college students about drinking and driving behaviors over the past year (Hanson & Engs, 1986). The percentage who said they drove after drinking ranged from 29% to 67%; the range for driving while drinking was 24% to 40%, and for driving when they knew they had too much to drink, percentages ranged from 16% to 42%.

2.1.8 Criminal behavior

Alcohol is disproportionately present when adolescents are involved in crime. At one university, alcohol was involved in more than half of the cases of breaking and entering, more than half of the cases of sex offenses, and nearly half of the cases of malicious mischief (Werner & Greene, 1992). A number of studies have presented data and raised

issues in regard to the role of alcohol in acquaintance rape (Abbey, 1991). Surveys indicate that about one fourth of acquaintance rapes involve the use of alcohol by the victim, the assailant, or both (Koss *et al.* 1987).

2.1.9 Other problems

In addition to the problems discussed above, college surveys have asked about other alcohol-related consequences. Among students in one survey, the leading behavioral complications associated with drinking during the previous year were "had a hangover," 65%; "got nauseated and vomited," 49%; and "did something after drinking that was later regretted," 36% (Gliksman, 1988).

Gliksman (1988) questioned students with regard to drinking problems just before they entered college and again after 7 months' attendance. Students reported significantly more problems after 7 months in the university, with the men reporting increases in more types of problems than the women reported. Although some of the problems were relatively minor and transitory (e.g., had a hangover), others were serious and could signify long-term consequences (e.g., "I have had trouble with the law because of drinking"; "I have received a lower grade as a consequence of drinking too much").

2.1.10 Illicit Drugs

The findings on illicit drug use among college students are organized into prevalence of use and patterns of use. Although illicit drug use is certainly associated with a variety of problems, very few of the studies reviewed specifically addressed this topic.

2.1.11 Use Prevalence

The survey of first-year students in Massachusetts colleges found that marijuana was the most commonly used drug after alcohol: 35% of the men and 28% of the women had used marijuana at least once in the past year. The next most frequently used drugs were psychedelics (6% of the men and 3% of the women) and cocaine (4% of men and 2% of women) (Blum, 1969).

In a sample of nearly 1,000 students at the University of Wisconsin at Madison, surveyed in 1989, the use of an illicit drug at least once increased from first-year students to seniors: cannabis, from 56% to 70%; hallucinogens, from 6% to 20%; amphetamines, from 8% to 16%; and cocaine, from 8% to 29%. In addition, that survey also found that students who met lifetime criteria of the Diagnostic and Statistical Manual of Mental Disorders (DSM-III) for alcohol misuse, compared with students who did not meet the criteria, were

- significantly more likely to have used an illicit drug, particularly cannabis.
- were more likely to have tried cannabis at an early age.
- were more likely to have used cannabis in the previous 6 months.
- had a higher frequency of cannabis use in the previous 6 months. (MacDonald *et al.* 1991).

Whereas annual use of alcohol declined from 97% to 90% for men and from 96% to 85% for women, the use of illicit drugs declined by about half or more: marijuana, from 64% to 35% for men and from 55% to 28% for women; and cocaine, from 14% to 4% for men and from 8% to 2% for women. Use at least weekly also dropped; in the case of marijuana, from 17% to 5% (Greenfield, 1989).

2.1.12 Use Patterns

Among Rutgers undergraduates surveyed in 1987, 32% reported marijuana use at least once in the past year, 11% used it once or more per month, 10% reported cocaine use at least once in the past year, fewer than 2% reported using it once or more per month (Greenfield, 1989).

In a study of recreational drug use among students at a large southwestern American university conducted in 1985/1986, Greenfield determined that 29% of students had never tried marijuana, 47% were past users, and 8% had used it two or more times a week. More than half (53%) had never used cocaine, 35% were past users, and the remainder (12%) used cocaine once a week or less.

2.2. Understanding alcohol use behavior

2.2.1 Correlates of Substance Use and Problems

Research findings correlates of substance use and problems among college students are generally grouped into the following topics: demographic characteristics, previous

substance use, personality factors, year in school/college and motivations and attitudes. Virtually all of the research reports on correlates of substance use and related problems focus on alcohol rather than illicit drugs. Where findings on illicit drugs are available on a specific topic, they are summarized following the discussion of alcohol.

2.2.2 Demographic and Background Characteristics: Gender

A consistent finding is that college men are more likely than college women to use alcohol, to drink greater quantities and more frequently, and to have more alcohol-related problems. By contrast, women are more likely than men are to be abstainers, particularly upon entering college.

In yet another survey, similar proportions of men and women drank at least once a year (87% and 85%, respectively), but men were three times more likely to be heavy drinkers (22% v 7%). Engs & Hanson (1988) provide a thorough review of research on gender differences in drinking patterns and problems among college students.

However, the gap between men and women in drinking patterns and problems found in earlier studies has decreased in recent years. In follow-up samples of the 1992 NHSS survey, use of alcohol in the past year was virtually the same for men and women (89% v 88%) (Johnston *et al.* 1992). The FIPSE survey conducted in 1989 found that the same percentage of men and women (14%) reported binge drinking, although as the frequency

of binge drinking increased, the difference between the men and the women became more pronounced.

The narrowing gap in the drinking practices of men and women is probably attributable to changing norms surrounding drinking by women and the movement toward greater equality between men and women in behaviors once regarded as gender specific (Engs *et al.* 1988). Drinking by men and women increases as young adults enter their first year of college, in terms of both initiation of use and frequency of use, but the increases appear to be greater for women than for men.

Consequently, by the end of their first year, differences in drinking patterns between men and women that existed during high school have diminished. Some studies indicate that the greater effect of environmental influences on women than on men produces greater change in women's drinking patterns following the transition from high school to college. Although college men typically report higher levels of alcohol consumption than women do, this appears to result from the large proportion of men who are heavy drinkers.

At light-to-moderate drinking levels, the proportions of men and women are quite similar. In addition, when body weight is taken into account, much of the difference between men and women in quantity of alcohol consumed disappears (Ratliff & Burkhardt, 1984). Thus, except for heavy drinking, the drinking patterns of college men

and women, at least in terms of amount consumed, may be more similar than is commonly assumed.

Among undergraduates at Southwest Texas State University, Berkowitz & Perkins (1987) found notable differences between women and men in the correlates of drinking problems. Women who reported having a current or past drinking problem differed significantly from women who did not report a drinking problem on the following variables: perceived parental rejection, poor mother-daughter relationships, perceived parental depression, maternal drinking problems, physical abuse by a parent, unhappy childhood, suicidal thoughts, feeling more worthless than valuable, feeling more troubled than serene, and feeling more tired than refreshed.

For men, significant differences between problematic drinkers and non-problematic drinkers were found for the following variables: paternal and maternal over-permissiveness, frequent parental anger, frequent conflicts with parents, frequent conflicts between parents, engaging in delinquent behavior, feeling more unproductive than productive, and feeling more tired than refreshed. Note that all of the variables associated with problem drinking were different for men than for women except for one: feeling more tired than refreshed.

Although it appears that the drinking patterns of men and women are converging, this may not be true for rates of alcohol problems reported by men and women. Perkins *et al.*

(1991) reported on a 10-year trend study of gender patterns on the consequences of alcohol abuse among college students at a New York college. The 1989 survey revealed large gender differences on a number of consequences of alcohol abuse (e.g., damage to property, impaired driving, physical injury to others), but on several items few or no gender differences were found (e.g., unintended sexual activity, memory loss, physical injury to self).

Traditional gender differences in alcohol problems do appear to have persisted over a 10-year period; however, the tendency to focus on problems that are characteristic of men rather than of women may distort the picture. According to Perkins *et al.* (1991) if more attention were focused to such problems of women as depression, damage to interpersonal relationships, physical or sexual assault, or unwanted pregnancy, it is likely that higher estimates of the nature and extent of drinking problems among women would be obtained. If more attention were to be given to problems that are less public and that are less likely to involve legal action, then differences between men and women may narrow substantially.

2.2.3 Race/ethnicity

Racial or ethnic differences in college students' drinking have received relatively little attention. For African Americans, studies of drinking in the general population indicate that, compared with White Americans, the African Americans are more likely to be

abstainers, to begin drinking later, and to have somewhat lower drinking levels, particularly among young adults.

Studies further indicate that the lower levels of drinking by African Americans may be related to their affiliation with conservative Protestant denominations that proscribe or at least discourage alcohol use. Despite their lower overall consumption levels, however, African American men have higher rates of alcohol-related problems than do White American men, possibly because of their lack of access to adequate healthcare or because of a health system insensitive to their needs.

In one study, Barnes & Welte (1986) compared alcohol and drug use by African American students at historically Black colleges with African American students at traditionally White colleges and compared them with White American students at traditionally White colleges. The finding indicated that African Americans at the historically Black colleges had lower rates of alcohol and drug use than did African American or White American students at White colleges. It was suggested that, compared with White colleges, historically Black colleges provide their African American students with a greater sense of self-esteem and self-worth, which helps prevent heavy alcohol and drug use.

In Barnes & Welte's survey (1986) of college students in New York State, Whites Americans were more likely to drink and to drink at higher levels than other racial or ethnic groups. Current use (use of alcohol in the past 30 days) was reported by 87% of Whites, 64% of Hispanics, 59% of African Americans, and 35% of Asian Americans.

Barnes & Welte further examined ethnic and gender differences among students at a Texas university in which the majority of students were Mexican American. The proportion of students who drank alcohol was similar among Mexican American and African American men (93% v 89%), but Mexican American women were much less likely to be drinkers than African American women were (63% v 80%).

In general, Mexican American and African American men exhibited similar drinking behaviors (drinking, frequency of drinking, beverage preference), although there were differences in preferred drinking companions and drinking locations. More differences and more pronounced differences were found between African and Mexican American women, particularly in regard to prevalence of drinking, frequency of drinking, and location of drinking.

The results of a study of racial differences in alcohol intoxication and marijuana use among students at two southeastern colleges presented a somewhat more complicated picture than that reported in other studies. White American students reported higher levels of alcohol intoxication than did Black students (Johnson, 1973).

White American women were significantly more likely to report intoxication than were Black American women, but no significant racial differences were found for men. Black American students reported significantly higher levels of marijuana use than did White American students; again, Black and White American men did not differ in marijuana use, but Black American women were significantly more likely to smoke marijuana than were White American women. White American men and Black American women were more likely than the other two groups to use both alcohol (to the point of intoxication) and marijuana.

2.2.4 Religion

Hanson & Engs (1987) examined the relationship between religion and problem drinking among students at an arts college. On five different measures of problem drinking, students who identified themselves as Protestant or Roman Catholic were one and a half to two times more likely than Jewish students to report some type of problem drinking. Protestants and Catholics were similar on problem drinking measures, except that Catholics reported considerably higher levels of heavy social drinking.

Problem drinking was also more likely if the student was from a Protestant or Catholic religious tradition than from a Jewish tradition or was not strongly attached to a particular religious faith.

Hanson & Engs (1987) furthermore examined religious affiliation and drinking among college students in a nationwide survey conducted in 1985. The percentages of drinkers by religious affiliation were Roman Catholics, 90%; Protestants whose religion permits drinking, 76%; Protestants whose religion prohibits drinking, 60%; and Jews, 85%. In terms of strength of religious ties, two thirds of those for whom religion was very important drank, compared with 90% of those for whom religion was not important.

A survey of alcohol, drug, and psychiatric disorders among Jewish and Christian university men who reported a religious preference found that the two groups did not differ on the quantity and frequency of alcohol consumption, but Christian men were more likely than Jewish men to report at least one episode of heavy drinking and alcohol-related problems, and they were also more likely to acknowledge a family history of alcoholism. No differences were found between the groups for lifetime drug use or drug-related problems or for family histories of psychiatric disorders (Monteiro & Schuckit, 1989).

2.2.5 Early substance use

A relatively high proportion of college students begin drinking and using drugs before entering college, many even before high school. In a survey of more than 4,000 undergraduates in the State University of Florida, most had already had their first drink by the time they entered college: 14% had had their first drink in elementary school, 34% in middle school, 45% in high school, and only 7% in college (Gonzalez, 1987).

Several studies (e.g. Barnes *et al.* 1986) have determined that age of first use of alcohol is significantly related to alcohol consumption and alcohol-related problems among college students: The earlier the first drink, the higher the quantity/frequency of alcohol consumed per month and the greater the number of alcohol-related problems.

Similarly, Barne & Welte (1986) sin a survey of nearly 2,000 college students and young adults in New York State, found that beginning drinking at an early age was a strong predictor of heavy drinking and alcohol problems.

2.2.6 Other demographic or background variables

In addition to the variables discussed above, other demographic or background variables have been found to be related to alcohol or drug use. To identify which socio-demographic variables distinguished between current abstainers and current drinkers (use of alcohol in the past 30 days), Barnes (1984) applied discriminate analysis to the survey responses of students attending New York State colleges.

Compared with current drinkers, current abstainers were more likely to be non-White, older (22 years or older), married women, living with their parents, employed 35 or more hours per week, foreign students, and attending college in New York City. High levels of alcohol use among this sample were associated with younger age of first drink, being male, being White, not living with parents, and living in upstate New York.

Maney (1990) found that the typical heavy drinker at a large eastern university was a male junior or senior with low academic scores who reported a relatively low sense of general well-being, low self-esteem, and more negative attitudes toward responsible alcohol consumption. Family history of alcoholism and assertiveness were not significantly associated with alcohol consumption, a finding also reported in a nationwide survey of college students.

Other researchers have reported a positive association between family history of alcohol problems and alcohol use among young people. In a sample of nearly 2,000 college students and young adults in New York State, Barnes & Welte (1986) found that having a heavy drinking father (particularly for men) was a strong predictor of heavy drinking and alcohol problems. Perkins (1991) reported that problem drinking among college students is predicted by having parents who are heavy social drinkers or who have been diagnosed or treated for alcoholism.

With regard to illicit drugs, Brownson (1992) surveyed college students to determine demographic variables associated with recreational substance use (marijuana and cocaine). Compared with non-users of marijuana, students who had used it were significantly higher in parental income, lower in high school academic performance, and more liberal in political orientation.

None of the demographic variables examined were able to discriminate cocaine users from non-users. When the usage scores for marijuana and cocaine were combined to form a composite group of recreational substance users, the composite group of users were more liberal in political orientation, higher in parental income, and more likely to be male than were the composite group of non-users (Brownson, 1992).

2.2.7 Personality Factors

The possibility that certain personality traits are associated with particular patterns of substance use has been examined by a number of researchers. In most cases, however, the studies examine different sets of personality traits, which preclude the possibility of comparing results across studies for specific traits.

Brook, Whiteman, Gordon, Brook & Cohen (1990) reported that students who exhibited high levels of trait anxiety or trait anger were at high risk of experiencing educational, legal, physical, and other psychosocial problems related to drinking; curiosity was not significantly related to alcohol problems. It was further found that self-reported life satisfaction was positively associated with low-to-moderate substance use (licit and illicit) among college students.

A consistent finding across a number of studies is the importance of sensation seeking as a factor in understanding drinking behavior. Ratliff & Burkhart (1984) concluded that sensation seeking was more strongly related to drinking problems among college

students than was stress relief or the desire to escape difficulties. In addition, sensation seeking was also found to be strongly characteristic of heavy drinking men and women, with disinhibition being particularly significant in discriminating heavy drinkers from light drinkers.

In a small study (N=55) examining the personality traits of college women who drank, heavy-drinking women expressed a greater degree of fear of failure and a greater degree of sensation seeking than did light-moderate drinkers. A survey of UCLA undergraduates (Shell *et al.* 1992) found that the two personality traits that had the greatest influence on drinking were extraversion and sensation seeking.

2.2.8 Year in College and academic performance

As noted above, most young people entering college have at least tried alcohol and other drugs, but the social context and experiences of their first year in college may have a significant impact on the further development of drinking and drug use patterns that may lead to problems. Harford, Weschler & Muthen (2002) investigated alcohol and drug use among first-year students entering four colleges in New York in the first term and again among the first-year students and the upper-class men and women the third term.

Entering first-year students reported using alcohol and drugs at significantly lower levels than the other classes (82% for alcohol, 34% for drugs). By the third term, however, virtually no differences were found in the level of alcohol and drug use among the

second-semester first-years and the other classes (range of 95% to 99% for alcohol and 43% to 49% for drugs, mainly marijuana).

Among first-year students at 14 Massachusetts colleges, about half said that they were drinking more in college than they did in high school and nearly a fifth said that they were drinking much more in college. It appears that the first year in college is a time of particularly high risk for beginning substance use or for shifting to higher levels of use. Other studies have found that although seniors drink as often as they did earlier, the amount they drink is less.

Mixed results have been found for the relationship between substance use and academic achievement. Wiggins & Wiggins (1987) found no correlation between drinking and academic achievement among students at the University of North Carolina, whereas Maney (1990) reported that heavy drinkers tended to have lower academic success than more moderate drinkers.

Brownson (1992) found that college students who used marijuana were more likely to have had lower academic results in high school than non-users, but no significant association was noted between cocaine use and academic achievement.

Even if there is a significant relationship between academic success and substance use, the direction of the relationship is not always clear. Low academic achievement may

lead to alcohol or drug use to help the person deal with the negative feelings associated with academic problems; on the other hand, heavy drinking or drug use may result in impairments in cognitive or emotional functioning that lead to poor grades.

2.2.9 College Residence

Entrance into college often involves a change in residence. Young people leave home and take up residence in college residence halls or off-campus housing. Several studies have examined the influence of college residence on drinking patterns and problems among students.

For instance, O'Hare (1990) concluded that residence was significantly related to drinking level among students at Rutgers University. Heavy-moderate and heavy drinking were highest among students living on campus and lowest among those living at home. Abstinence was highest among students living at home and lowest among those living independently off campus.

Barnes & Welte (1986) found that heavy drinking and alcohol problems were no more likely to occur among college students than among young adults not in college. For the college students, however, living on campus was strongly associated with heavy drinking and with alcohol problems.

Other researchers have looked more specifically at the relationship between drinking behavior and membership in on-campus residence. Berkowitz & Perkins (1986a) reported on the results of a questionnaire survey of students attending the annual conference of a large national college. Two thirds of the on-campus residences had a bar. The large majority (85%) of on-campus social activities included alcohol. At these functions, 93% of the members drank and 87% of the invited women drank; surprisingly, respondents said that only 5% of the members and 6% of the women guests became intoxicated.

Globetti (1988) found that virtually all (98%) of the student residents at a southern university drank alcohol, compared with 79% of residents of on-campus housing and 81% of residents of off-campus housing. Frequency and quantity of alcohol consumption were also highest among the residents. Student residents were significantly more likely than the other two residence groups to have experienced drinking-related problems or complications during the previous year.

Differences in drinking patterns and drinking problems by residence were much more evident for women than for men. Men in different housing situations exhibited similar patterns of drinking and similar drinking problems, but campus women were much more likely than women in other residence settings to drink spirits and to have engaged in fighting and damaging property in association with drinking (Globetti *et al.* 1988).

A study of 2,000 men and women entering the University of Virginia (Engs & Hanson, 1988) found that those who planned to join a student society were about twice as likely as other students to be frequent to heavy drinkers; 70% v 40% for men and 33% v 15% for women. Another report on this sample indicated that the higher the level of alcohol use, the greater the intention of joining a student society (Engs & Hanson, 1988).

In addition, dangerous driving behaviors occurred disproportionately among students planning to join an on-campus residence. The positive association between intention to join a student society and high levels of drinking has been found in other studies as well. Saltz & Elandt (1986) reported that first and second-year students who reported not drinking in high school were more likely to begin drinking in college if they were members of an on-campus residence.

2.2.10 Motivations, Reasons, and Attitudes

Research on alcohol and illicit drugs has identified a number of motivations for use, including curiosity, a desire to alter consciousness, exploration of the self, facilitation of social interaction, stimulation of artistic creativity, enhancement of sensory experience and pleasure. Use at levels likely to cause problems has been associated with such motivations as "boredom, rebellion against societal expectations, peer pressure, and relief from physical and emotional pain." (Haden & Edmundson 1991, p.304) The actual relationship of these motivations to substance use are often asserted rather than proved, however.

The main reasons for drinking can be categorized as personal (e.g., to escape, to forget, to produce mood changes) and social (e.g., to be sociable, to go along with others, to facilitate social interaction). In addition, a significant proportion of students also say they drank to get drunk. Those who drink for personal reasons tend to drink more than those who drink for social reasons (Haden & Edmundson, 1991).

Haden & Edmundson (1991) noted that the students in their study used illicit drugs out of personal motivations, whereas the strongest predictor of alcohol use was social motivation. Attitudes toward alcohol also affect drinking behavior; for example, students at a southern university with more permissive attitudes toward excessive drinking were more likely than others to be heavy drinkers.

Recent studies on drinking motivations and attitudes can be divided into those that examine substance use itself and those that examine problems associated with substance use.

2.2.11 Substance use

A number of studies (Deykin *et al.* 1987; Wood *et al.* 1992) have identified self-medication as a factor in substance use. In one study of major depressive disorder and alcohol or drug abuse among college students, the depressive disorder generally occurred before the onset of alcohol or drug abuse (though not necessarily before the

first use of alcohol or drugs), suggesting that alcohol or drugs are used to help regulate the painful effects of depression or other emotional disturbances (Deykin *et al.* 1987).

Many researchers have focused less on reasons for drinking or abstaining and more on why people who do drink limit their drinking in general or in specific situations where drinking is encouraged. Because so many adolescents drink, reasons for limiting drinking may have more relevance for prevention programs than reasons for drinking at all.

Greenfield, Guydish & Temple (1989) sought to answer this question in a survey of nearly 2,500 students at nine West Coast universities. Factor analysis of 22 reasons for limiting drinking yielded four factors: Self-Control ("I've seen the negative effects of someone else's drinking," "I like to feel in control of myself"); Upbringing ("I was brought up not to drink," "My religion discourages or is against drinking"); Self-Reform ("I've become concerned with how much I've been drinking," "Someone suggested that I drink less"); and Performance ("Drinking reduces my performance in sports," "Drinking interferes with my studies").

Lower levels of drinking and drinking problems were associated with stronger endorsement of Self-Control and Upbringing, whereas more problems were associated with stronger endorsement of self-reform. It is reasonable to assume that a person

concerned with how much he or she drinks is already drinking at a level likely to result in problems.

In another study, resistance to peer pressure to drink was more strongly related to what the authors defined as environmental factors (year in school, living unit, social ease) than to background factors (childhood religion, parents' drinking habits) (Shore *et al.* 1983). Desire to refrain from drinking was also significantly related to present environmental factors (gender, social ease, best friend's drinking) rather than to previous family influences (Shore *et al.* 1983).

According to Shore *et al.* (1983) resistance to pressure to drink increased with greater social ease, whereas desire to refrain from drinking decreased with greater social ease. Students who are at ease in social situations apparently feel comfortable saying no to their companions' pressures to drink, but the same social ease also leads them to want to drink.

Perkins & Berkowitz (1986) found that college students' personal attitudes toward drinking behavior were more moderate than were their perceptions of campus norms regarding drinking. For instance, only 10% of the students personally believed that "a frequent 'drunk' is okay if that's what the individual wants to do," but 30% said that this was the campus norm. The greater the discrepancy between personal attitudes and

perceptions of campus drinking norms, the less drinking occurred. By contrast, the greater the congruence between attitudes and perceptions, the more drinking occurred.

Perkins & Berkowitz (1986) assert that attendance at large social functions partially explains this relationship. Students with congruent attitudes and perceptions were more likely to attend large social functions. They reported higher levels of drinking than those who attended smaller social gatherings. In short, greater alcohol consumption is facilitated by the greater availability of alcohol at larger than at smaller functions. Perkins & Berkowitz (1986) reached the general conclusion that most students approve of moderate drinking and disapprove of excessive drinking.

A similar conclusion was reached in a study of attitudes toward alcohol and drug use among students at a southern university (Bachman *et al.* 1991). Most students perceived the use of drugs to be risky and dangerous. Although alcohol and marijuana were perceived as posing the least risk compared with other drugs, higher levels of use of each was associated with increased perceived levels of risk. For instance, 25% viewed trying marijuana as posing great risk, but the percentage increased to 71% for regular marijuana use.

By contrast, merely trying cocaine, crack, heroin, or barbiturates was perceived as highly risky by the majority of students. More than half of the students generally agreed that the use of drugs in private or in public should be prohibited. Since about 1980, the

attitudes of high school and college students toward drugs have become more conservative (Bachman *et al.* 1991). These negative attitudes toward drug use are therefore not surprising.

2.2.12 Substance use problems

Hughes & Dodder (1986) reported that the strongest predictor of problem drinking among college students was the quantity and frequency of alcohol use. Pre-college drinking was the second most important correlate. Religiosity and parental attitude had little association with drinking, either on quantity and frequency of drinking or on problem drinking.

In a survey of Irish-American college students, those who were problem drinkers adhered more strongly than non-problem drinkers to beliefs that might lead to or reinforce problem drinking. Brook *et al.* (1990) concluded that motivations for drinking made relatively little contribution to explaining patterns of alcohol use compared with attitudinal, behavioral, and demographic variables. They also concluded that drinking motivations may have theoretical importance, but because they appear to have a modest impact on drinking and are difficult to modify, their relevance for developing intervention strategies is questionable.

Young people entering college as first-year students appear to be at a particularly high risk of developing alcohol problems because they are entering an environment in which

most people use alcohol, in which alcohol is readily available, and in which alcohol is an important part of the college socialization process.

Engs & Hanson (1988) noted that the culture of the campus, the opportunity to be independent of daily parental control, the need to conform, and the insecurity of a new and intimidating setting all make a freshman particularly vulnerable [to beginning or, more likely, increasing alcohol use].

For adolescents the drugs of choice are alcohol and cigarettes, with marijuana second, followed by some other hard drugs. Unfortunately, compared with our knowledge of adolescent alcohol use, we know little about the extent of illicit drug use among adolescents and even less about the problems associated with such use within this population.

Despite the decrease in illicit drug use among college students (and among adolescents and young adults generally), rates of illicit drug use in this population remain higher in the United States than in any other industrialized country and are also higher than the rates that existed before the initial rise in drug use in the 1960s (Bachman *et al.* 1991).

2.2.13 Relationship of Drinking and Smoking To Self-Concept

Self-concept and self-esteem measures have consistently been associated with adolescent use and abuse of substances. The popularity of these variables in empirical

studies and their routine inclusion in drug education and treatment programs leads one to assume that the parameters of this construct are well understood.

Self-esteem is narrowly defined as "pride in oneself" (Morris, 1976) while self-concept is defined in broader terms. Concept refers to a "general idea or understanding" of oneself (Morris, 1976). The positive suggestion attached to self-esteem creates the impression of a more specific and directional entity, while self-concept suggests a more comprehensive and global denotation of self-perception (Morris, 1976).

Self-concept was selected as the more appropriate variable to study in relation to adolescent use of substances because of the wider parameters suggested in the definition. However, this research maintains that self-concept, as it relates to adolescent drug use and abuse, is still a vague entity. The resulting subjectivity and confusion leaves those responsible for planning drug use prevention and treatment with little direction or understanding of the underlying dimensions that compose this complex construct.

2.2.14 Self-Concept and Adolescent Use of Substances

Theories of individual development assume that identity formation involves creation and maintenance of a steady self-concept. The hypothesis that people seek out experiences that sustain this self-identity and reject experiences that create cognitive dissonance is known as consistency theory (Lecky, 1969). The belief that experiences are interpreted in a fixed direction, according to the ingrained attitudes that shape the self-concept, led

theorists to assert that changes in self-concept are difficult to achieve (Combs & Snygg, 1959; Sullivan, 1953).

In contrast, Samuels (1977) stated that the human organism naturally strives for self-esteem or a sense of pride in oneself. Samuels advised that the major task of teachers, therapists, and others who work with low-esteem adolescents is to help them to overcome the negative self-labeling habits and provide for the substitution of positive, self-enhancing messages.

Consistency theory has served as the basis of several investigations of self-concept and adolescent drug use. In relation to substance abuse, consistency theory asserts that adolescents engage in behaviors that are consistent with their self-concept and reject behavior that are incongruent. Advocates of consistency theory emphasize that adolescents drink alcohol or use drugs if substance use is congruent with their ideal self-perception. Chassin, Tetzloff, & Hershey's (1985) study of male adolescents supported the basic tenets of consistency theory. Their results indicated that males who have a self-image that incorporates drinking and drug use acceptance have higher levels of substance use.

The self-referenced level of esteem has been related to the degree of involvement in adolescent drug use. Pandina & Schuele (1983) found that a high level of self-esteem was associated with inhibited use of cannabis in early and late adolescence. The results

of other studies support the relationship between high self-esteem and lower levels of drug and alcohol use (Selnow, 1985; Kaplan, 1978). A similar study examined the psychological dimensions of depression, anxiety, and self-esteem and found that higher levels of depression and anxiety and lower self-esteem related to positive attitudes toward drugs and increased willingness to take drugs (Blau *et al.* 1988).

Containment theory (Reckless, 1961) is also used to explain the association between adolescent drug use and self-concept. Containment theory emphasizes that behavior can be understood as a reaction of either conformance or rejection of external control agents or development and adherence to one's own internal control. A study of adolescent drug use indicated that those who scored higher on external containment (external locus of control) had lower self-esteem measures and higher drug use rates.

It was hypothesized that use of drugs was an extension of an ingrained pattern of reliance on external controls to deal with life's challenges. Those adolescents who scored higher on internal containment (internal locus of control) had higher levels of self-esteem and lower self-reported drug use (Gold & Coghlan, 1975-76).

2.2.15 Relationship of Drinking and Smoking To Health Locus of Control

Considerable research has focused on the relationships of alcoholism with locus of control and self-esteem. Nearly all definitions of alcoholism include low self-esteem and

beliefs about loss of control over drinking and inefficacy at preventing relapse once abstinence is attained (Cox, 1979; Hinrichsen, 1976).

Findings on locus of control led to the hypothesis that alcoholics would be more externally oriented than non-alcoholics (Joe, 1971). Subsequent research has not consistently supported this hypothesis, whether measuring locus of control generally or drinking-related control specifically. Compared to non-alcoholics, alcoholics were sometimes more internal (Goss & Morosko, 1970; Gozali & Sloan, 1971; Oziel, Obitz, & Keyson, 1972), sometimes no different (Donovan & O'Leary, 1975), and sometimes more external (Donovan & O'Leary, 1978; Naditch, 1975).

A belief in one's self-efficacy at maintaining abstinence has been implicated as an important factor in relapse prevention (Marlatt & Tapert, 1993), although there is limited research to support this view (Evans & Dunn, 1995). Studies of self-esteem consistently have reported lower group means for alcoholics compared to non-alcoholics; nonetheless, many individual alcoholics were found to have very high self-esteem (Berg 1971; Charalampous, Ford & Skinner, 1976).

Hinrichsen (1976) argued that differences in samples and stages of treatment for alcoholism may account for differences in reported locus of control. Subsequent research has demonstrated greater internality with longer successful involvement in treatment (Abbott, 1984; Oziel & Obitz, 1975; Walker *et al.* 1979). Bean (1975), in an

analysis of Alcoholics Anonymous (AA), posited three stages of development in the career of an alcoholic-active drinking, acute or early recovery, and late recovery. Bean associates progress with change from denial to other defenses that are more mature and less distorting.

Supportive of this view, higher (presumably defensive) self-esteem has been found in active drinkers not seeking treatment compared to those in treatment (Charalampous, Ford & Skinner, 1976). Brownell *et al.* (1986) posited a three-stage model of change in addictions-decision and commitment to change, initial change, and maintenance of change; it is argued that different variables are relevant at different stages of an addict's natural history.

Despite arguments for a stage conceptualization of alcohol involvement, research typically has settled for accessible in-patients in detoxification programmes. Two important groups, active alcohol abusers and long-term recovering abstainers, have been largely neglected in this literature. Active abusers, who deny that their drinking is a problem and have made no commitment to change, are likely to differ in self-esteem and beliefs about drinking-control from those seeking treatment for their drinking.

Identifying and accessing active abusers is a difficult research problem; however, individuals apprehended for driving while under the influence of alcohol have been

suggested (Zung, 1980). Brownell *et al.* (1986) criticize the lack of research on those successfully abstaining after extended exposure to treatment.

Compared to those entering treatment, this group can be expected to have regained self-esteem and beliefs in their control over drinking and their efficacy at maintaining abstinence. Relevant research has found evidence of improved well-being and functioning in long-term recovering abstainers (Kurtines *et al.* 1978; Mellor, Conroy & Masteller, 1986).

Sense of control has been recognized over the past decades as a psychological construct with important implications for health (Folkman, 1984; Steptoe & Appels, 1989). Sense of control may mediate associations between socio-economic status and well-being (Lachman & Weaver, 1998), and be responsible in part for the adverse effects of work environments on cardiovascular disease risk (Bosma *et al.* 1997).

Perceived control is relevant to adaptation to illness and stressful medical and surgical interventions (Miller & Mangan, 1983; Wallston, 1992). Lack of control is associated with heightened physiological stress response in animals and humans, poor tolerance of pain, and worse mental health (Maier & Watkins, 1998; Steptoe, Cropley & Joeke, 1999).

Skinner (1996) has detailed the wide variety of constructs that fall under the rubric of control. In the taxonomy, health locus of control is a domain-specific control construct that reflects beliefs in different types of means-ends relationships. That is, health locus of control refers to beliefs in different classes of potential causes of desirable and undesirable health outcomes. Three cause loci are distinguished in multidimensional locus of control models: internal or agent-related causes, external causes that are determined by powerful others and chance.

One of the predictions to emerge from this model is that people with high internal health locus of control will engage in health-promoting activities, while the reverse will be true of those with strong beliefs in chance (Wallston, 1992). Yet despite investigations, the surveyed literature remains inconclusive (Norman & Bennett, 1996; Reich, Erdal & Zautra, 1997). Strickland (1978) reviewed early work using uni-dimensional internal-external expectancy, and argued that precautionary behaviours such as not smoking were more common among individuals with strong internal beliefs.

Inverse associations between smoking and internal locus of control have been confirmed in some subsequent studies, but not others (Callaghan, 1998; Calnan, 1989; Jensen, Counte & Glandon, 1992). Regular physical exercise has been associated positively with internal health locus of control and negatively with chance and powerful other locus (Calnan, 1989; Duffy, 1997; Norman, Bennett, Smith & Murphy, 1997), but null

findings have also been reported (Callaghan, 1998; Laffrey & Isenburg, 1983; Rabinowitz, Melamed, Weisburg, Tal & Ribak, 1992).

Healthy food choices have also shown inconsistent associations with health locus of control (Duffy, 1997; Schank & Lawrence, 1993). Relationships between dental health behaviour and internal health locus of control have been more consistent (Jensen *et al.* 1992; Macgregor, Regis & Balding, 1997), while results for alcohol consumption are mixed (Bennett, Norman, Murphy, Moore & Tudor-Smith, 1998; Callaghan, 1998; Calnan, 1989).

Strickland (1978) and also Wallston (1992) have both argued that internal health locus of control will exert a stronger influence over health behaviour among individuals who value their health highly compared with those with other priorities in life, but this notion has received only limited support (Bennett *et al.* 1997, 1998; Norman *et al.* 1997; Wurtele, Britcher & Saslawsky, 1985).

It may be that this literature reflects the genuine state of affairs, with health locus of control having little consistent association with health behaviour. However, given the success of control and other generalized expectancy constructs in predicting health (Scheier & Carver, 1992), it is worth considering alternative explanations for the state of the evidence. Four factors appear relevant.

The first concerns the conceptual basis of the health locus of control measures that are typically utilized. Marshall (1991) has argued that internal health locus of control is a mixture of beliefs in personal control over illness management, illness prevention, mastery and self-blame. Chance health locus of control may not only index belief in fate, but belief in genetic factors and environmental determinants over which the individual has limited control. If only some of these constructs are relevant to health behaviour, the influence of control beliefs may be weakened.

Secondly, many studies of health locus of control and behaviour have lacked statistical power, with samples of only moderate size (Callaghan, 1998; Laffrey & Isenburg, 1983; Rabinowitz *et al.* 1992; Schank & Lawrence, 1993; Wurtele *et al.* 1985). Larger studies have often assessed samples that varied widely in age, socio-economic status or health status (Bennett *et al.* 1994; Calnan, 1989; Regis, Macgregor & Balding, 1994).

Health behaviours are determined by a cascade of factors from broad cultural, demographic and economic influences such as religion, legislation and wealth, through individual factors such as age, gender, health status and family patterns, to psychological determinants such as health beliefs and attitudes (Conner & Norman, 1996; Steptoe & Wardle, 1996). In heterogeneous samples, the impact of health locus of control may be obscured by other factors.

A third problem in this field of research has been the choice of measure of association. Relationships between health locus of control and health behaviour have typically been assessed with product-moment correlations and linear regression models. The results have been interpreted as low, accounting for a very small proportion of the variance, and therefore of minor importance (Bottorff, Johnson, Ramer & Hayduk, 1996; Calnan, 1989; Norman *et al.* 1997).

However, Rosenthal and Rubin (1982) pointed out that correlations and measures of variance accounted for do not convey the real-world importance of associations. The correlation between smoking and lung cancer is less than .2, yet few dispute the importance of smoking in this condition. The clinical trial that conclusively established the favorable effects of aspirin on survival in coronary heart disease reported a correlation of only 3%, while an important trial of the drug AZT in prolonging survival for people with AIDS found an association that accounted for only 5% of variance (Rosenthal, 1990).

Clinical epidemiologists typically use measures of association such as odds ratios and relative risk to estimate the impact of exposures (Elwood, 1992). The odds ratio is one of a number of tests of the potency of risk factors, and can be used for outcomes such as health behaviours (Kraemer *et al.* 1999).

Finally, it should be recognized that health behaviours vary in a number of ways, including whether they are risk enhancing (e.g. smoking) or health-promoting (e.g. regular exercise) activities, whether they are carried out primarily for health purposes (e.g. breast self-examination) or are determined by multiple health and non-health factors (e.g. alcohol consumption), and whether or not they have strong cultural determinants (e.g. dietary habits).

Chance health locus of control beliefs were predicted to be related negatively to health maintenance behaviours (such as healthy eating) and associated positively with health risk behaviours (e.g. smoking, alcohol consumption and not using seat belts). Powerful others health locus of control occupies a more ambiguous position. On the one hand, individuals with strong beliefs in powerful others in the health domain might be expected to follow public health recommendations; on the other hand, such individuals might take fewer behavioural precautions, believing that any health problems that arise could be effectively managed by expert health professionals.

Of all the value-expectancy constructs, researchers have tended to focus on a single one; internal-external locus of control. Internal-external locus of control is a variable reflecting generalized behavioral expectancies (Jessor *et al.* 1977). Reinforcement is either under the control of the individual (termed internal) or outside forces such as fate, luck, chance, or powerful others (termed external) (Wallston & WaUston, 1978).

Wallston & Wallston (1976) developed the health locus of control and later the multidimensional health locus of control scale (WaUston *et al.* 1978), applying Rotter's (1954) general concept to health-related behaviours. In a review of the relationship between locus of control beliefs and health, they found that 'internals' generally show more health promoting behaviour than 'externals' (WaUston & WaUston, 1978)[16]; however, the failure to find a strong and consistent relationship underscored the necessity of considering more than just locus of control.

Wallston & Wallston (1976) cautions that locus of control is only one of a complex of factors (e.g., the value of health; motivation; social supports; previous behaviour; perceived costs and benefits of special actions), which individually or in interaction with one another explain the variance in health-related behaviors.

In studies of the relationships between health beliefs and behaviour, there has been a general emphasis on people's expectations concerning the consequences of their actions and habits. It is well known, for instance, that cigarette smokers acknowledge (albeit to a lesser extent than non-smokers) that smoking is damaging to health (for example Mausner & Platt, 1971). Marsh (1984) suggests that among the possible reasons for such apparent discrepancy between attitudes and behaviour are the following:

- Individuals may differ in how much they feel in control of their own health and able to control their behaviour and lifestyle.

- Perceived costs for physical health may be counterbalanced by perceived benefits in terms of personal mood and social relationships.
- Health itself is only one of a number of values that can motivate health-related behaviour.
- Health and illness themselves may be conceptualized differently by different individuals.

Such considerations may be relevant not only to adults' attitudes, but also to the systems of beliefs, held by young people around the time that they or their peers are starting to smoke. Beliefs in the addictiveness of smoking may be acquired early, and lead to subjective interpretations of psychological effects as signs of dependence (Eiser, 1985; Eiser *et al.* 1987; Marsh, 1984).

With children between 7 and 11 years old, Eiser *et al.* (1986) found clear beliefs in the effects of smoking on mood and concentration, with 11-year-olds particularly convinced of the potential of smoking for controlling negative mood. Other research testifies to the variety of ways in which adolescents and younger children can conceptualize health and illness processes (Eiser, 1985).

For instance, Millstein, Adler & Irwin (1981, p. 838) argue that "relatively few children or adolescents define illness in terms of diagnosis", and that, for adolescents particularly, "changes in social functioning" may be more salient. Mechanic & Hansell (1987)

similarly suggest that adolescents' evaluations of their physical health depend primarily on feelings of well-being and competence in domains such as school and sports.

Age differences have been observed in the reasons offered by children for becoming ill, with a greater appreciation of physiological process, and less emphasis on notions of infection, or of illness as a punishment for disobedience (Bennett *et al.* 1998). Such developing notions of disease etiology imply varying conceptions of how and to what extent health and illness may be predictable and controllable through one's own behaviour or that of others.

This relates directly to the concept of locus of control which has been applied to a wide range of health issues. In general, internal locus of control has been associated with greater knowledge of disease (Wallston *et al.* 1976); ability to stop smoking (Steffy *et al.* 1970); ability to lose weight (Balch & Ross, 1975) and compliance with medical regimens (Lewis *et al.* 1978; see reviews by Strickland, 1978; Wallston & Wallston, 1978).

Despite the theoretical and empirical evidence that locus of control is an important determinant of health beliefs, little attention has been paid to identifying the antecedents of such beliefs. Exceptions are reports by Tolar (1978) and DeVellis *et al.* (1980), who both showed that early and repeated experience of illness and injury, were subsequently associated with more external beliefs.

In a more extensive study, Lau (1982) questioned 257 undergraduates about their recall of early child health habits and illness experiences, and related these to current locus of control beliefs. Lau reported that beliefs in self-control over health were positively related to early health habits (e.g. teeth cleaning) and experience with medical professionals.

2.2.16 Relationship of Drinking and Smoking To Attitudes and Beliefs

“Healthy people 2000” documented that many behaviors that influence risk for chronic disease in later years begin during adolescence (US Department of Health, 2000). This is especially true for cigarette smoking, which accounts for an estimated 390,000 deaths annually (US Department of Health, 2000). An estimated 70% of adolescent smokers are likely to become regular smokers as adults (Chassin *et al.* 1990).

As a result, smoking intervention programs have given considerable attention to adolescent smokers (Glynn, 1989; Office of Educational Research, 1991; Peck *et al.* 1993). Although overall smoking rates among adolescents have remained the same nationally since 1984, smoking intervention programs have been shown to reduce smoking among specific groups of adolescents (Miller & Slap, 1989). Yet, despite tremendous efforts through intervention programs, cigarette smoking remains a serious problem among adolescents, with an estimated 3.2 million public school students smoking (Bonaguro & Bonaguro, 1989).

The strategies of most smoking interventions are based on the use of psychosocial models of human behavior (Becker, 1974; Brownson *et al.* 1992; Ajzen & Fishbein, 1980; Rosenstock, 1974; Chassin *et al.* 1990). For example, the theory of Reasoned Action assumes that intentions to smoke, as well as smoking initiation, are predictable from attitudes toward smoking and by normative beliefs about smoking. According to this model, development of effective smoking interventions requires an understanding of beliefs and attitudes toward smoking risks and their relationship to smoking behavior.

Given that many adult smokers adopt lifetime smoking behaviors during their adolescent years and that the stage model of smoking suggests that adolescents develop attitudes and beliefs about smoking before they develop the smoking habit, (Leventhal & Cleary, 1980) it is necessary to explore the attitudes and beliefs adolescents have toward smoking in order to gain insight into future smoking behavior. A review of the literature shows that such studies with representative samples are limited.

Why people smoke and smokers' views about smoking are issues that have attracted much attention within the last few years. Some researchers have focused on the role of peers (Mosbach & Leventhal, 1988) and of parents (Murphy & Price, 1988). Other researchers have asked smokers to attribute their smoking to different reasons--for example, pleasure, relaxation, or weight control. These researchers have often been

guided by attribution theory (Heider, 1958; Jones & Davis, 1965; Kelley, 1973) and, specifically, by the fundamental attribution error (Jones & Nisbett, 1972).

When this theory has been applied to smokers, researchers have predicted that smokers would attribute their own smoking to external causes (e.g., peers, advertisements, pleasure), whereas non-smokers would attribute people's smoking to internal causes.

Research findings, however, either have been inconsistent or have not supported attribution theory. Eiser, Sutton, & Wober (1978), studying an English sample, found evidence in support of attribution theory, but Sadava & Weithe (1985), using a Canadian sample, did not.

In a more recent study of an American sample, Jenks (1992) found that smokers cited psychological addiction as their major reason for smoking, followed by relaxation, physical addiction, and pleasure. Weight control was the least important reason for those sampled. Thus, these smokers attributed their smoking firstly to internal factors. The smokers in the Jenks' study also said that it was difficult to quit smoking and that they believed they would probably experience major health problems from smoking.

Whereas previous studies have focused on smokers or compared smokers with non-smokers, the present study compared the subjects' views about their own smoking with their perceptions about others' smoking. One would expect an individual with a certain

characteristic to view others who share the same quality as being similar to him or herself. Pettigrew (1979), using the fundamental attribution error (Jones & Nisbett, 1972) to explain the actions of people in groups, noted that members of a group tend to attribute their own characteristics to similar others. Pettigrew called this tendency the ultimate attribution error.

There is evidence to the contrary, however. A study of the elderly (Harris & Associates, 1975) found that the subjects perceived their own situations as different from those of the elderly in general. The subjects perceived themselves as more open-minded, better at fulfilling their obligations, and in better health than others their age. This type of effect was also observed in a study of gay men (Jenks & Newman, 1991). The subjects perceived their behavior as incongruous with societal stereotypes of homosexuals, but they perceived other gay men's behavior as conforming to these stereotypes.

When people have little information about others, even those who share a characteristic, they often resort to stereotypes to explain the behavior of these others. Baxter & Goldberg (1987) found that their subjects saw themselves as less predictable and more variable than they saw others of the same sex and similar age. These researchers argued that, "even when individuals appear to make the same dispositional attribution for them as for another, they may still perceive substantial differences in behavioral consistency between themselves and others" (p. 443).

Attitudes toward alcohol use consistently predict use (Burden & Maisto, 2000; Hawkins *et al.* 1992; Petraitis *et al.* 1995). However, alcohol use occurs in an environmental context that includes a wide range of alternative behavioral choices. Evaluating attitudes toward both alcohol use and the complementary alcohol-free state may enhance prediction of use. In this regard, attitude toward drug-free experience represents one's evaluation of experience incurred while not under the influence of alcohol or any recreational drug.

An individual's evaluation of the drug-free state may influence alcohol-use decisions, enhancing or minimizing the behavioral expression of attitudes toward alcohol. Thus, attitude toward drug-free experience may moderate the alcohol attitude-behavior relationship. Attitude toward drug-free experience, the complement of attitudes toward alcohol use, may be understood as the broader evaluative context of the immediate attitude toward alcohol use (Petraitis *et al.* 1995).

Previous research on attitudes toward behavioral alternatives attempted to model the decision-making process by examining attitudes toward multiple options. For example, attitude toward driving under the influence of alcohol as well as specific behavioral alternatives have been examined (e.g., calling a taxi, asking for a ride from a friend, etc.) (Turrisi & Jaccard, 1992). However, drug-free experience (and attitudes toward it) is more than just a single behavioral alternative.

Rather, research indicates that attitude toward drug-free experience represents an evaluation of experience delimited only by the exclusion of intoxicated states (i.e. sober experience). Thus, the construct represents an evaluative tendency towards one's non-intoxicated experience. Attitude toward drug-free experience may be associated with life satisfaction and subjective well-being, and is moderately correlated with positive affect and perceived stress (Simons & Carey, 1998).

Attitude toward drug-free experience may influence alcohol-use decisions in multiple ways. First, a negative attitude toward drug-free experience may provide a stimulus for using a drug to cope with an aversive internal state. That is, attitude toward drug-free experience may be associated with use controlled by negative reinforcement. Second, attitudes toward drug-free experience may influence the allocation of time and resources for engaging in drug-free vs. drug-related activities.

In this regard, evaluation of reinforcement from drug-free activities has been shown to enhance prediction of drug and alcohol use (Correia *et al.* 2002; 1998). Similarly, experimental studies have shown that availability of alternative reinforcers can affect preference for alcohol consumption (Vuchinich & Tucker, 1988).

Previous research indicated that attitude toward drug-free experience was associated with marijuana use frequency over and above attitude toward marijuana use (Simons & Carey, 1998). Furthermore, attitude toward drug-free experience moderated the

marijuana attitude-behavior relation such that the marijuana attitude-behavior relationship was strongest among participants with relatively negative attitudes toward drug-free experience.

Attitude toward drug-free experience had little effect at low levels of marijuana attitude but a substantially larger effect at positive attitudes toward marijuana. Thus, a positive attitude toward drug-free experience acted as a protective factor reducing the risk associated with positive attitudes toward marijuana use. A similar relationship was observed for marijuana-related problems (Simons & Carey, 1998).

2.2.17 Factors Responsible For Alcohol Drinking and Tobacco Smoking

Studies of adolescents have shown that cigarette smoking and alcohol use are related to a number of psychosocial and demographic factors. In addition, substantial positive associations have been reported between smoking, drinking, and the use of illegal drugs. Several theoretical perspectives have been used to account for these relationships.

Some researchers have suggested that adolescents who smoke or drink are more likely than non-smokers and non-drinkers to engage in various other deviant activities. According to these researchers, adolescent smoking and alcohol use coexist with other deviant behaviors as part of a problem behavior syndrome (Jessor & Jessor, 1977).

The subculture perspective (Cohen, 1955; Coleman, 1961; Johnson, 1973; Sutherland & Cressey, 1978; Akers, 1985) maintains that deviant behavior is learned through interaction with others, and involves communication, sanctioning, and modeling. Adolescents are more likely to engage in deviant behavior when they associate with others who: (1) engage in deviant behavior (e.g., substance abuse); (2) share views and definitions favoring such behavior; and (3) apply sanctions when their views pertaining to the behavior are ignored or disrespected (Sutherland & Cressey, 1978; Akers, 1985).

According to the social control view, deviant behavior results from insufficient social control of deviant acts which individuals are motivated to perform (Hewitt, 1970; Hirschi, 1969). Hirschi's social bonding theory states that four elements of social integration act as a constraining influence on adolescent deviance:

(1) attachment to parents and peers (which enhances sensitivity to others' conventional opinions); (2) commitment to conventional lines of action (in the form of ambitions and aspirations); (3) involvement in conventional activities (which limits the opportunity to think about or engage in deviant acts); and (4) belief that one is morally obligated to respect conventional values and norms (regardless of personal advantage).

Although it is frequently assumed that adolescent smoking and drinking occur in deviant contexts, empirical findings suggest that this is not always the case. Therefore, an alternative view might define adolescent smoking and drinking as part of a life-style encompassing behaviors, attitudes, and outlooks relevant to health.

According to the life-style perspective presented by Bruhn (1988), an "illness-lifestyle" is characterized by a number of factors, including external beliefs (e.g., external locus of control, fatalism), shyness and social withdrawal, psychological distress (e.g., depression, anger), low skills, and "risk seeking health behaviors" (e.g., smoking and alcohol use) that are learned through parent and peer modeling, information acquired through the mass media, and life changes, and which increase the risk of developing illness.

The life-style perspective makes three assumptions that are relevant for our discussion: (1) different forms of substance abuse are inter-correlated as part of a person's "risk-seeking"; (2) different forms of substance abuse have many (if not most) of their predictors in common; and (3) these predictors include affective, cognitive, and behavioral factors of various kinds.

Although attempts have been made to elaborate and refine these theoretical perspectives through empirical testing (Akers, Krohn, Lanza-Kaduce & Radosevich, 1979), most empirical research on the use of tobacco and alcohol among adolescents has only indirect bearing on existing theory.

According to the empirical literature, adolescent tobacco and alcohol use is associated with a number of different factors. First, it appears that smoking and drinking often coincide with and provide a gateway to the use of other drugs. For example, Mills and

Noyes (1984) showed that drug use is both sequential and cumulative. When young people become dependent on a new drug, they do not abandon the old one; instead, they add the new drug to their repertoire.

It seems that alcohol often paves the way for the use of other drugs, such as marijuana, cocaine, and heroin (Kandel, 1975). Studies also indicate that cigarette smoking serves as an opening into a culture of hard drugs (Welte & Barnes, 1987; Yamaguchi & Kandel, 1984). These findings support the notion of a problem behavior syndrome.

From the subculture perspective, these findings can be interpreted as demonstrating that membership in a sub cultural group increases the likelihood of numerous forms of deviance. It might also be argued, based on the life-style framework, that correlations between different forms of substance abuse signify the presence of an illness-lifestyle comprising various health-risk elements.

Second, a number of studies support the proposition of subculture theorists that membership and participation in deviant subcultures increases the likelihood of deviance. For example, parents' attitudes toward drug use and parental smoking and drinking habits correlate with the use of tobacco and alcohol among adolescents (Barnes, 1984). Peer attitudes and their substance use also correlate with adolescent smoking and drinking (Barnes & Welte, 1986).

Third, in line with Hirschi's social control theory, the empirical literature suggests that the use of alcohol and tobacco is related to aspects of social bonding. Thus, research shows that adolescent problem drinkers tend not to engage in school work and sports (involvement), get low grades and express negative attitudes toward school (commitment), and interact poorly with parents (attachment) (Bachman, Johnston & O'Malley, 1981).

Similar results have been obtained for adolescent cigarette smoking. For example, Young & Rogers (1986) found a negative relationship between smoking and school performance. In addition, Lanse *et al.* (1972) reported that students who do not participate in extracurricular activities smoke cigarettes more than twice as frequently as do others.

Research also shows a negative correlation between adolescents' sport participation and cigarette smoking (Buhrmann, 1977). However, there are indications that social bonding variables relate to adolescent substance abuse in different ways.

For example, in a study by Krohn *et al.* (1983), it was found that attachment to friends resulted in more smoking, whereas attachment to parents was either unrelated or negatively related to smoking. In the same study, as well as in a study by Bachman *et al.* (1981), involvement in paid work appeared to increase smoking.

Fourth, a number of studies have shown that adolescents' use of tobacco and alcohol is related to various factors that can be seen as elements of an illness-lifestyle (Bruhn, 1988). Thus, a positive correlation frequently is reported between depression and anxiety on one hand and the use of alcohol on the other (Deykin, Levy & Wells, 1987). In a study by Thorlindsson, Vilhjalmsón & Valgeirsson (1990), it was found that anxiety, depression, and psycho-physiological symptoms were all significantly associated with cigarette smoking and alcohol use.

Additionally, studies have found an inverse relationship between self-esteem and alcohol use (Kaplan & Pokorny, 1976). It has also been demonstrated that external locus of control predicts cigarette smoking (Brunswick & Messeri, 1984).

Finally, several socio-demographic factors have been found to correlate with cigarette smoking and alcohol use among adolescents. Research shows that the use of alcohol is related to gender (Bachman *et al.* 1981), and socio-economic status (Kandel *et al.* 1976). These studies show fairly consistently that males, residents of urban areas, and groups of lower socio-economic status tend to use more alcohol than do others. Also, relationships are frequently reported between smoking and socio-demographic variables (Welte & Barnes, 1987), although results vary somewhat from study to study. Lanse *et al.* (1972) and O'Connell *et al.* (1981) reported that males tend to smoke more than females.

Other research (Welte & Barnes, 1987) has documented more smoking among females. While such discrepancies may be due to differences in survey methodology or population characteristics, a closer analysis suggests that large-scale changes in smoking habits have occurred among the sexes. Not only have females caught up with males, but in some instances have surpassed them.

Although most of the above correlates can be conceptualized as antecedents to cigarette smoking and alcohol use, it should be noted that the vast majority of adolescent studies are cross-sectional and do not specifically address issues of causality. Available longitudinal data have not provided clear evidence of causal patterns (Downs, 1985). In view of this fact, predictor variables are at this stage best treated as correlates of smoking and drinking.

2.2.18 Adolescents and predictability of smoking

In the field of health education there is optimism about the evidence available on the variables predicting smoking onset. In particular peer influences, smoking attitudes, self-efficacy and self-esteem are factors commonly addressed in theoretically based prevention programmes for youth (Glynn, 1989).

According to the findings of cross-sectional studies, much of the variance in smoking behaviour can indeed be explained by the variables (Pederson & Lefcoe, 1987). The implicit assumption of this type of research is that factors which are found to be

associated with smoking behaviour at a specific point in time are implicated in causing or protecting against uptake of smoking. However, some longitudinal analyses concentrating on the transition from non-smoker to smoker yield somewhat conflicting findings.

Graham, Marks & Hansen (1991) showed that it is difficult to predict the onset of smoking over a period of 1 or 2 years from factors used in cross-sectional surveys. If a model explains two-thirds of the variance in smoking but only predicts a few percent of the variance in smoking over an extended period of time, the value of this model is limited (Randall & Wolff, 1994).

Smoking prevention programmes concentrate on children before they start to smoke (Flay, 1985). It is therefore important to know to what extent, the factors which the prevention programmes aim to influence are precursors of onset a few years later. Much of the confusion concerning the value of individual factors and, subsequently, on the predictability of onset is due to differences in research designs and analytic strategies.

Most studies have used a cross-sectional design to investigate the relations between predictor variables and smoking behaviour. A drawback of cross-sectional research is that only the correlates of differences in smoking status can be discussed. More definite conclusions cannot be drawn about the causal interpretation of an empirical association (Conrad, Flay & Hill, 1992).

It remains unclear to what extent, for example, a change in attitude is accompanied by a change in behaviour rather than preceding it (Sutton, 1992). In fact, no information is gathered on the variables associated with the onset of cigarette use. Thus, cross-sectional studies are helpful in generating hypotheses but do not allow firm conclusions about predictors of onset.

One of the features of prospective research is that somewhat stronger conclusions can be drawn about the causality of an empirical association although they do not rule out the possibility that the association is due wholly or partially to some other variable(s). Nevertheless, the development of prospective designs to examine precursors of smoking onset does not necessarily exclude difficulties with the interpretation of outcomes.

A limitation of many longitudinal studies concerns the use of cross-sectional analytical strategies; pre-test scores on predictor variables being related to post-test smoking status. Another widely employed method is to include pretest smoking status as one of the determinants of post-test smoking status. A disadvantage of the latter approach is that only changes in smoking status are predicted. The conclusions from this type of analyses are less specific because different smoking groups are included.

The causes of smoking onset might be different from the causes of maintenance or quitting. Some researchers have stated, therefore, that the process of transition from one

smoking category to another should be predicted (Leventhal & Cleary, 1980). To predict onset, one should select the non-smokers at a given time-point and investigate the factors preceding the change from non-smoking to experimental or regular smoking.

Longitudinal studies on potential determinants of smoking have mainly used a design with baseline measurement and a follow-up survey (for example, Charlton & Blair, 1989). Some of these researchers carried out analyses in which the effects of factors measured at time one on smoking at time two were examined for the total sample.

Earlier smoking status accounted for most of the variance in changes in smoking status at a later wave (Collins *et al.* 1987). This effect was strongest in the case where the time-lag between the waves did not extend 1 or 2 years (Pederson *et al.* 1987, for a study over 5 and 8 years). The effects of other variables, after earlier tobacco use entered the equation, were modest.

Studies focusing on the transition from non-smoker to smoker, however, have not offered a completely different picture. Although some factors have consistently found to be predictive of onset, such as environmental factors, smoking-related beliefs and attitudes, and socio-demographics (Conrad *et al.* 1992), the absolute effects have been small.

Furthermore, one should bear in mind that most of these studies followed youngsters for only a short period of time. The limited time-span of the majority of prospective research and the low predictive value of the models tested in these studies leads to serious doubts about what we know about the factors leading to smoking onset.

2.2.19 Smoking and Personal Control Beliefs

Substance use, both licit and illicit, remains alarmingly high in this country. Despite available information on its potential for dangerous and sometimes unpredictable effects, many Namibian adolescents continue to engage in this health-damaging behavior. Every week the media is saturated with reports of the harmful effects of cigarettes, alcohol, and drug use. Health care remain busy, however, as the use of dependence-producing substances continues to increase at a troubling rate.

What are the factors behind those health-damaging behaviors? For some time now a commonly held belief among researchers and health care professionals has been that drug users and cigarette smokers possess characteristics differentiating them from nonusers, but it has been difficult to identify these characteristics.

Researchers have examined a myriad of personality factors thought to be associated with substance use in an effort to understand this phenomenon, such as insecurity and fear of loss of control (Brehm & Back, 1968); alienation and personal values (Blum, 1969); social and interpersonal attitudes (Judd & Gunderson, 1970); personality hardiness

(Carlisle, 1986); extraversion, liberalism, and spontaneity (Coan, 1973); depression and sociopathy (Caster & Parsons, 1977); to name just a few.

Why is perceived locus of control an important variable to consider when studying health-damaging behaviors? To begin with, the implication that internal-external (I-E) expectancies are related to health behaviors has been demonstrated in several pieces of research (Strickland, 1978). Results suggest that beliefs about internal versus external control are related in significant and dramatic ways to health-related behaviors (Kirscht, 1972).

As many health actions depend on voluntary behaviors, and many health programs are predicted on an assumption of controllability, expectancies about control are important to consider. Much of the research on internal-external expectancies and health attitudes and behaviors has focused on prevention of illness and health facilitating behaviors. These studies cover a broad range of topics including health knowledge, precautionary health practices, reactions to physical disorders, and psychological responses to issues of health and illness.

The findings from these studies have demonstrated more adaptive functioning for those individuals with internal, as opposed to external, expectancies. Researchers have postulated that internals are more sensitive to health messages, tend to have increased knowledge about health conditions, attempt to improve physical functioning, and

through their own efforts may be less susceptible to physical and psychological dysfunction (Strickland, 1978). In short, internals are most often thought to be more likely to assume responsibility for their health and well-being.

Given that internals are thought to take more responsibility for their health, we would expect that those individuals who engage in health-damaging behaviors would tend to be external. However, there has been considerable contradiction concerning this issue based on research of substance abusers. Whereas some researchers have found alcoholics to be more external than control subjects (Naditch, 1975), others have found alcoholics to be more internal (Goss & Morosco, 1970).

Still others have found that I-E differentiates among alcoholics, with internals having less maladaptive tendencies. These researchers suggest that internal alcoholics experience a greater sense of control over stressful events and interpersonal and intrapersonal events than externals (Donovan & O'Leary, 1975).

2.2.20 Patterns, Beliefs and Drinking Contexts of Alcohol

The social contexts in which drinking occurs and individual beliefs regarding drinking effects have repeatedly emerged as significant predictors of frequency and quantity of drinking and drunkenness. For the most part, these different classes of influences have been examined separately without attention to how beliefs about drinking may be related

to the number and different kinds of social settings in which the individual might consume alcohol (Beck & Summons, 1987).

A notable exception is found in a series of studies where the social contexts of drinking and the expected outcomes of that drinking were examined and found to represent conceptually distinct models of alcohol consumption patterns (Beck & Summons, 1987). These studies, conducted primarily with non-probability samples of adolescent and college student populations, argue for the primacy of the social context model in accounting for drinking patterns in these groups.

In this thesis, the researcher extends these analyses by examining a comprehensive model that takes into account the interrelationships between drinking contexts and beliefs as these dimensions affect a variety of drinking patterns.

2.3 Models of Drinking Behavior

There would seem to be ample theoretical justification for including both drinking contexts and beliefs in a model of alcohol consumption (Beck & Summons, 1987). Attention to "context" has typically focused on both the physical setting in which drinking occurs (with primary reference to alcohol availability in particular settings), and the number and relationship of drinking companions present in those settings.

However, there is also good reason to consider the normative structure of the environments in which drinking occurs (Simpura, 1991). Since social and cultural norms inform individuals' beliefs as well as their behaviors, it is clear that these concepts are more interrelated than distinct. Thus, it is asserted in this thesis that the notion of "contexts" is conceptually more complex than generally portrayed.

Attention to social contexts requires discussion of the influence of interpersonal relationships and context-specific interactions between individuals in drinking settings, and their expected and experienced drinking outcomes, which in turn may aggravate or inhibit drinking problems. As a result, the effects of contexts on drinking behavior cannot be neatly explained.

2.3.1 Drinking Contexts

Research on drinking contexts has repeatedly associated drinking patterns with the physical setting in which drinking occur, the occasion for drinking, and the relationships of individuals present in the social setting. Indeed, these three factors interact and considering any of them individually may provide misleading indications of their influence on alcohol consumption.

For example, Harford & Grant (1987) argue that while parties (which are generally private, rather than public, settings) repeatedly emerge as contexts for heavier drinking, this finding should not be taken as an indication that private settings represent heavier

drinking contexts. Rather, more attention should be paid to the indirect effects of the number of drinking companions, and forms of social interaction occurring in large groups.

Contexts exert a direct influence on drinking behavior by dictating the availability of alcohol (Harford, 1979), as well as by carrying norms for both the appropriateness of serving certain alcoholic beverages (Klein & Pittman, 1990), and the quantities in which they are consumed (Single & Worley, 1993). Several studies have suggested that alcohol-related problems are linked to prescriptive norms concerning drinking (Glassner & Berg, 1980).

There is also ample evidence that drinking patterns are influenced by drinking companions. For example, in a 1969 study, Americans reported drinking more than usual when with close friends but less than usual when with family members, neighbors, or people from church (Cahalan *et al.* 1969). Hatford (1983) considered separately the effects of companions and drinking locations on the drinking behaviors of men and women.

His results showed that location contributed little to an explanation of men's drinking, whereas both location and companions interacted significantly to explain women's drinking. Similarly, when Riley *et al.* (1948) distinguished between "social reasons" (i.e., contexts) and "individual reasons" (i.e., expectancies) for drinking, they discovered

that men's drinking was more influenced by expectancies, whereas women's drinking was more influenced by contexts.

However, studies using social context variables in analyses of problem drinking have too often confused the effects of contexts with those of alcohol expectancies. For example, Glynn *et al.* (1983) found that men who drank to reduce negative affect, for social enhancement, or in contexts of "masculine activities" had more drinking problems than men who drank for other reasons (to stimulate appetite or because they thought it was healthy) or in other contexts (with friends or acquaintances either out or at home).

Likewise, while studies by Beck & Summons (1987) have suggested that contexts discriminate between problem and non-problem adolescent drinkers, the measures used to represent "contexts" in these studies confuse situational attributes with expectancy states.

That is to say, their measures combine drinking locations and companions with respondents' reasons or motivations for drinking. In an analysis using such measures, Thombs *et al.* (1993) found that their social context variables explained 70% of the variance in alcohol use intensity, while their more conservative expectancies measures explained only 48% of the variance. Further, alcohol use intensity (quantity and frequency of consumption and drunkenness) was used as a proxy for problem drinking.

It is certainly the case that norms and expectations about drinking operate within the framework of particular physical and social settings (Kilty, 1980). Nevertheless, there is reason to suspect that the physical and social environment explains less about problem drinking than it does about the quantity of alcohol consumed.

2.3.2 Drinking Expectancies

Alcohol expectancy researchers have presented evidence that both heavy drinkers and problem drinkers tend to have more and greater expectations regarding positive drinking outcomes than do lighter and non-problem drinkers (Critchlow, 1987). While it is evident that alcohol expectancies, as compared to demographics, are better predictors of both heavy drinking and problem drinking (Brown, 1985), it is less apparent whether expectancies effectively discriminate between these two groups.

The research literature on alcohol expectancies is, to date, largely psychological. More attention should be paid to people's beliefs about alcohol and their reasons for drinking in particular situations, thus facilitating a more comprehensive model of alcohol consumption and problem drinking.

For example, when we speak of people's "reasons" for drinking, we make use of concepts such as justifications and accounts (for example, Scott & Lyman, 1968), and "vocabularies of motive" (for example, Mills, 1940), with their connections to drinking

behavior. Likewise, attention to beliefs about drinking reflects overall concern with the impact of prevailing social and situational norms upon individual behavior.

Hirschi (1969) posited that belief in conventional norms was a key dimension of the social bond between the individual and society. Belief in the legitimacy of norms should inhibit their violation. Extending that idea, the current research explores the extent to which an individual's beliefs about alcohol consumption influence drinking outcomes.

While this research study appreciates the difference in emphasis between the psychologically-oriented expectancies approach and sociological orientation, it is more concerned about the effects that individual attitudes toward alcohol consumption have on drinking outcomes and less concerned about the dispositional or situational genesis of those attitudes.

Of particular concern are two drinking outcomes: heavy drinking and problem drinking. In general, consideration of heavy drinking merely reflects quantity/frequency measures of alcohol consumption, while problem drinking takes into account negative drinking outcomes, including role impairment and psychological dependence on alcohol. Current models of drinking behavior often either equate or fail to distinguish between problem and heavy drinking (or worse, between problem and non-problem drinking).

Sociological analysis has played a conspicuous role in confounding the distinction between problem and heavy drinking by adopting a "social problems" approach to alcohol consumption in general. In effect, such models posit a false connection between patterns of consumption and problem drinking (Roman, 1982).

Left unquestioned, these models obstruct a sociological understanding of alcohol consumption by failing to account for those cases in which individuals: (a) exhibit problem consequences with comparatively low or inconsistent levels of consumption; (b) sustain patterns of heavy (or "deviant") drinking over long periods of time without negative consequences; or (c) exhibit remission from alcohol-related problems in the absence of external intervention, including those cases where "normal" drinking patterns are resumed (Cabalan, 1988).

Adolescents and young adults in the general population, high school, and college abuse alcohol at substantial rates, often with serious negative psychological, interpersonal, and community consequences (Johnston, O'Malley & Bachman, 1996). Because of the situational variability in youthful drinking patterns, research have focused on cognitive (Brown, Christiansen & Goldman, 1987) and situational (Carey, 1993) aspects of alcohol abuse.

Connecting young people's positive expectancies of moderate drinking with specific situational drinking risks could have valuable implications for theoretical formulations of youthful drinking, prevention policy, and intervention strategies.

...the second part, on which the theoretical formulation of the present study is based, provides an overview of the Theory of Planned Behavior, and presents a new theoretical model of adolescent alcohol consumption.

2.1. Expectancy Theory

2.1.1. Main tenets of Expectancy Theory

Expectancy theory provides a multifaceted framework with which to empirically examine the interrelations of behavioral, psychological, and cognitive aspects of drinking as it is related with the social environment (Henderson et al., 2002).

With its emphasis on how cognitive factors influence their consequences, expectancy theory has had a profound impact on the alcohol expectancy literature. In 1967, Mowrer et al. (1967) first revealed that clinical expectations of alcohol's effects are negatively related to heavy alcohol consumption and problem drinking in both adults and adolescents (p. 107).

Expectancies have also been associated differentially with harm. For example, the expectancy of social consequences has been found to correlate with both patterns of

3. Theoretical Framework

This chapter provides an overview of two particular theories relevant to the study of human behavior. The first part deals with Expectancy Theory and offers insight into the theory's main constructs. The second part, on which the theoretical foundation of the current study is based, provides an overview of the Theory of Planned Behavior, and presents a case for its usefulness as an adequate theoretical framework.

3.1. Expectancy Theory

3.1.1 Main constructs of Expectancy Theory

Social learning theory provides a multidimensional framework with which to empirically examine the interrelatedness of behavioral, physiological, and cognitive aspects of drinking as they interact with the social environment (Henderson *et al.* 1994).

With an emphasis on how cognitive factors mediate these connections, survey evidence over the past decades, based largely on the Alcohol Expectancy Questionnaire (AEQ) (Brown *et al.* 1987), has revealed that drinkers' expectancies of alcohol's effects are consistently related to heavy alcohol consumption and problem drinking in both adults and adolescents (Brown, 1985).

Expectancies have also been somewhat differentially predictive. For example, the expectancy of social assertiveness has been found to correlate with trait measures of

social anxiety (Leonard & Blane, 1988), and the expectancy of tension reduction with problem-prone drinking (Brown, 1985).

In general, alcohol expectancies also appear to function as a mediating factor between sensation seeking and alcohol consumption (Henderson, Goldman, Covert, & Carnevalla, 1994), including risk taking while driving (McMillen, Smith, & Wells-Parker, 1989), and may be associated with negative or avoidant coping behaviors in college students (Evans & Dunn, 1995).

Because alcohol's reinforcing effects can persist despite repeated negative consequences (Henderson *et al.* 1994), the assessment of drinkers' expectancies may be significant for a wide array of social work clients, given the frequent co-occurrence of psychosocial problems with substance abuse (Weisner & Schmidt, 1993).

3.1.2 Social Drinking Contexts and the Role of Expectancies

Although long-term risk for the development of alcoholism demands some concern, most problems associated with abusive drinking in young people have long been understood to be transitory (Chen & Kandel, 1995), and concerns about the many potential negative consequences of excessive drinking have focused largely on social drinking contexts (Harford & Grant, 1987).

On the whole, heavy drinking, although associated with a range of potential negative consequences, is nevertheless more likely to be associated with positive social encounters than with negative ones (Carey, 1993; 1995).

Despite the theoretical importance of linking expectancy constructs to specific behavioral contexts, there is little research examining the relationship between specific alcohol expectancies and different drinking situations. Experimental evidence (Wilson & Abrams, 1977) has demonstrated the expectancy effect in a social context by showing that even believing that one has consumed alcohol can result in physiological and behavioral responses commensurate with actual consumption, and this effect appears to be more pronounced in group versus solitary settings (Sher, 1985).

However, aside from some preliminary survey evidence that the expectancy of social assertiveness is associated with drinking in bars and other public venues (Brown, 1985), little survey research has been conducted to examine whether specific alcohol expectancies vary with different drinking situations.

3.1.3 Expectancies of Alcohol and a Control Substance

Researchers have defined alcohol expectancies as the effects individuals anticipate they will experience after drinking alcohol (Brown *et al.* 1980). Alcohol-related expectancies can include behavioral, psychological and emotional effects (Leigh, 1989). Examples of expectancies include the belief that alcohol will make a person more talkative, worry

less and feel better. Alcohol-related expectancies can be considered desirable (e.g. expectations of increased or improved functioning) or undesirable (e.g. expectations of decreased or impaired functioning).

Using self-report expectancy measures such as the Alcohol Expectancy Questionnaire (AEQ; Brown *et al.* 1980), researchers have shown that alcohol expectancies are related to adult alcohol drinking patterns (Christiansen & Goldman, 1983). Research has also examined alcohol expectancies held by adolescents.

For example, Christiansen & Goldman (1983) found that both older and younger adolescents endorsed similar expectancies for alcohol; however, older adolescents endorsed a larger number of expectancies and drank more. Also, Christiansen, Goldman & Inn (1983) and Christiansen & Goldman (1983) found that expectancies endorsed by adolescents predicted alcohol-use patterns better than demographic information (i.e. age and parental drinking histories). In addition, alcohol expectancies were predictive of alcohol use over a 1-year follow-up (Christiansen *et al.* 1983). Expectancies are also predictive of drinking problems in adolescents (Brown, Creamer & Stetson, 1987).

Since the research of Christiansen & Goldman (1983) suggested that expectancies develop prior to adolescence and prior to any personal drinking experiences, the next logical step for researchers was to examine the alcohol expectancies of younger children to assess the age at which expectancies emerge.

Using an adaptation of the AEQ for adolescents, the Children's Alcohol-Related Expectancy (CARE) procedure, Miller, Smith & Goldman (1990) found that late-elementary-aged children endorsed more desirable expectancies than early-elementary aged children and that there was a notable increase in endorsement of desirable expectancies in the third and fourth grades. Kraus, Smith & Ratner (1994) also found results similar to those of Miller *et al.* (1990).

Although only a few studies have assessed children's expectancies (for example, Kraus *et al.* 1994), related research on attitudes and knowledge has found that children think and learn about alcohol at an early age. Specifically, elementary-aged children report negative attitudes toward drinking alcohol (Pisano & Rooney, 1988) and can distinguish alcoholic from non-alcoholic beverages (Jahoda, Davies & Tagg, 1980). Further, some research has found that children are not aware of alcohol regulations, but do have some knowledge of the effects of alcohol and adults' motivations for drinking (Huetteman, Sarvela & Benson, 1992).

A survey of students (Johnston, O'Malley & Bachman, 1992) found that only a small percentage of students drink alcohol prior to seventh, eighth and ninth grades, the grade levels during which the initiation of alcohol drinking increased. Thus, the findings of Miller *et al.* (1990) and Kraus *et al.* (1994) were important because they indicated that young children endorse expectancies at an age when most children have not begun drinking alcohol.

However, Miller *et al.* (1990) and Kraus *et al.* (1994) did not control for beverage type. Thus, it is unclear if the children would have endorsed the same expectancies for a nonalcoholic beverage. Further, the questionnaire used by Miller *et al.* (1990) and Kraus *et al.* (1994) assessed primarily desirable expectancies.

3.2 Relationship of Drinking to Intentions

3.2.1 The Theory of Planned Behaviour

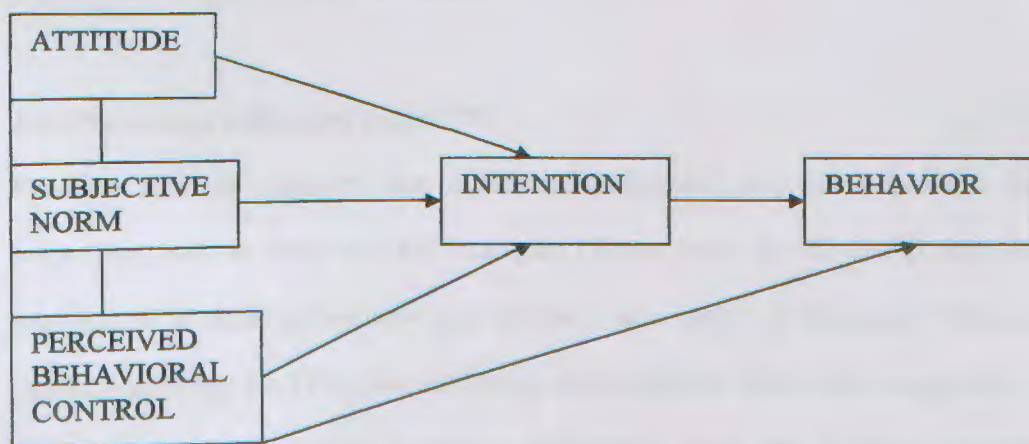
The Theory of Planned Behaviour (TPB) is one of the more widely used frameworks for understanding and predicting health behaviours (Conner & Sparks, 1996). The TPB postulates that behaviour can be predicted by intention to perform that behaviour, which in turn can be predicted by the attitude towards performing that behaviour, the subjective norm (SN; which refers to the perceived social pressure to perform or not to perform the behaviour), and finally the degree of perceived behavioural control (PBC; which is the perceived ease or difficulty in performing a behaviour, thought to reflect past experience and anticipated barriers and facilitators).

Ajzen (1991) suggests that the control component will predict both behavioural intention and, where the individual is correct in perceiving that they have high levels of control over the behaviour, it will also predict behaviour. The theory postulates that attitudes can be predicted by the summed product of behavioural beliefs and outcome evaluations, where behavioural beliefs are a person's beliefs about the likelihood of salient outcomes

from performing behaviour, and outcome evaluations are assessments of whether these outcomes would be positive or negative.

According to the theory, the subjective norm component can be predicted by the summed product of normative beliefs and motivation to comply with each referent group. Normative beliefs reflect whether a person thinks certain referent groups consider that he or she should or should not perform behaviour, and motivation to comply is whether or not a person feels that they should do what the various referent groups think that they should. PBC is based upon an evaluation of the power of factors to facilitate or inhibit the performance of the behaviour each weighted by their frequency of occurrence.

Below is a graphic presentation of the Theory's main constructs.



3.2.2 The TPB applied to alcohol use

The TPB has been successfully applied to the prediction of a number of health behaviours (Godin & Kok, 1996). Behavioural intention is normally well predicted by the three components, while behaviour is well predicted by PBC and intention (Armitage & Conner, 2001).

The TPB (Ajzen & Madden, 1986) has been applied to drug use, including alcohol (Rise & Wilhelmsen, 1998) and tobacco (Hanson, 1997). Ajzen's (1991) suggestion that the TPB is open to further expansion, if further predictors can be identified, has led to the consideration of a number of additional predictors within the context of the TPB. The present study attempted to investigate the role of the three TPB predictors of intention. The variables examined here were related to normative influences, which have been considered problematic for the TPB (Conner & Sparks, 1996), perceived behavioral control, and attitude towards the behavior.

3.2.3 Normative influences in the TPB

Previous research suggests that normative influences play an important role in behaviours such as drug use. For example, Leitner *et al.* (1993) found that 90% of respondents in their survey saw peer pressure as a cause of drug use. Despite this, studies employing the TPB generally report that subjective norms (the component of the model held to encapsulate normative influences) were the weakest predictor of intentions.

In a meta-analysis that examined 185 independent empirical tests of the TPB across a range of behaviours, Armitage & Conner (2001) report subjective norms to be the weakest predictor of intentions across all the behaviours reviewed. In relation to normative influences, the TPB appears to produce findings in conflict with predictions. Several authors have suggested that the manner in which the normative component is conceptualized within the TPB does not account for all the various ways that social influence can be exerted (for example, Conner & Armitage, 1998).

Normative influences may emanate from a variety of sources and vary in nature depending on the source. Cialdini Reno & Kallgren (1990) refer to the normative beliefs used in the usual applications of the TPB as injunctive social norms as they concern others' social approval or disapproval, and distinguish them from descriptive social norms (which describe perceptions of what others do) and moral or personal norms (i.e., personal rules of conduct).

Although the majority of studies using the TPB as conceptual framework employ measures of injunctive norms, some have also examined moral or descriptive norms. Perceptions of others' behaviour have been found to contribute to the prediction of intentions independently of perceived injunctive norms (for example, Conner & McMillan, 1999).

In relation to cannabis use, Conner & McMillan (1999) found descriptive norms to explain approximately 2% unique variance in intentions over and above the traditional TPB variables. It has been suggested that the underlying construct of normative pressure can be tapped into by both injunctive and descriptive norms.

Ajzen (1991) suggests that moral norms may directly influence intentions, and found the addition of moral norms significantly increased the amount of variance explained in intentions to perform dishonest behaviours by 3-6%. Several other studies have reported that the inclusion of moral norms adds significantly to the prediction of intentions over and above the other components of the TPB (for example, Bagozzi, Baumgartner & Yi, 1989).

Moral norms should have an especially important influence on the performance of behaviours with a moral or ethical dimension (Ajzen, 1991). The morality of drug use is a concern of young people, for example, Chassin, Tetzloff & Hershey (1985) found that adolescents evaluated drug use as either a moral or a personal issue and rarely as a social-conventional one.

Wicker (1969) is of the opinion that a measure of moral norm is capable of explaining variance in intentions to use cannabis. Whether moral norms are relevant to the formation of intentions to use legal drugs such as alcohol is an issue addressed in the present study.

3.3 Relationship of Smoking/Drinking to Academic Achievement

To reduce smoking rates among teenagers, it is important to create fewer new smokers among teenagers, to increase the number of teenage smokers who quit, or both. Despite a consistent decline in smoking rates among the adult population in recent years, smoking among teenagers has increased.

There have been numerous studies examining the prevalence of teenage smoking, (Eiser, Sutton, & Wober, 1978) but few have focused on quitting behavior, including successful or unsuccessful attempts. Understanding this behavior may provide insights for future policy formulation on tobacco control for teenagers.

Factors that influence teenagers to smoke are complex and numerous. They include socio-demographic characteristics, family background, school performance, and other social and environmental factors. Among these factors, some are predetermined, such as age, gender, and ethnicity. Others can be affected through program implementation or policy initiatives such as prohibition of cigarette sales to minors or education about the effects of smoking.

It has generally been accepted that a student's school performance is inversely related to smoking status. That is, the better a student does scholastically; the less likely she or he is to become a smoker. School performance can be viewed as a broad indicator that

reflects traits such as general educational commitment, motivation, competence in learning and value judgment, and academic success (Christiansen & Goldman, 1983).

Recently the public has become increasingly concerned about alcohol abuse among adolescents. Research on students attending four-year colleges has shown a particularly high prevalence of drinking-related problems, including sexual assault, vandalism, driving under the influence, fighting, and other behaviors that are best characterized as antisocial in nature (Berkowitz & Perkins, 1986a).

Alcohol abuse has received increased attention by school and college administrators as alcohol-related problems have increased on college campuses. Changes in the legal drinking age, community pressures, liability issues, and concern for student welfare have caused administrators to address student alcohol abuse and concomitant problems more aggressively than in the past.

A survey was conducted with administrators of 267 community, technical, and junior colleges conducted by Anderson & Pressley (1991). When asked a variety of questions regarding the negative impact that alcohol use has on the social, personal, and educational problems of students, majority of this group consistently replied that they did not know what impact the use of alcohol had on these problems.

A research project conducted by Graham; Marks & Hansen (1991) also attempted to address this issue. In a study of students attending community colleges, they found high rates of alcohol consumption with a host of negative consequences for this behavior. These included high rates of reported hangovers, driving under the influence, nausea or vomiting, thoughts of suicide, and sexual assault.

Additionally, the authors stated that the high quantities of alcohol consumed were likely to impair the current learning ability of students. While this is a reasonable assumption, the authors failed to report evidence that this was indeed occurring in their sample.

3.4 Relationship of Drinking to Normative Pressures

Adolescents continue to use and abuse alcohol at alarming rates. In one survey, almost one third of high school seniors met the accepted criteria of problem or binge drinking, defined as five or more consecutive drinks on at least one occasion in the previous 2-weeks (Bukstein, 1994). In another report, 27.9% of seniors, 21.1% of 10th graders, and 13.4% of 8th graders reported binge-drinking behavior (Homonoff, Martin, Rimpas, & Henderson, 1994).

In addition, although illicit drug use is declining, alcohol use among adolescents continues and is beginning at increasingly younger ages (Dielman, 1994). Hawkins, Abbott, & Catalano (1994) found that 70% of adolescents reported they had used alcohol by the time they were 12 years old.

These trends are troubling, particularly given the demonstrated links between problem drinking and serious health, social, and behavioral problems in adolescents. Adolescent problem drinking behavior has a strong association with teenage pregnancy, delinquency, school misbehavior, aggressiveness, impulsiveness, and dropping out of school (Hawkins, Catalano, & Miller, 1992). In addition, problematic use of alcohol during adolescence directly increases the risk of accidents, homicides, and sexually transmitted diseases, including AIDS (Zabin, Hardy, Smith, & Hirsch, 1986).

Counselors in both school and community settings find them involved in primary and secondary prevention efforts when working with youth. As the gatekeepers for prevention efforts, it is beneficial for counselors to be knowledgeable about past and current substance abuse prevention efforts.

Historically, prevention efforts have been focused primarily either on internal factors believed to influence youth substance use (e.g., self-concept and refusal skills) or on a limited number of external antecedents (e.g. peer pressure) (Ellickson, Bell & McGuigan, 1993). The emphasis on the socializing power of an adolescent's peers regarding deviant behavior has become particularly ingrained in the prevention literature.

Peer influence theorists suggest that an adolescent's selection of peers has a strong impact on the teen's likelihood to engage in problem drinking (Hansen, Johnson, Flay,

Phil, Graham, & Sobel, 1988). School-based prevention research has successfully examined peer influence as it contributes to problem drinking. A growing awareness in the prevention field, however, is that researchers now need to examine the social and environmental context in which peer relationships are formed (Dielman, 1994).

Association with drug-using peers is one of the strongest single predictors of substance use among youth and adolescents (Hawkins *et al.* 1992). Adolescent perceptions of peer norms regarding the use of alcohol have been found to account for 10% to 40% of the variance in adolescents' use and misuse of alcohol. Relationships with pro-social peers (i.e., peers who have positive social and psychological capabilities and responsibilities) may serve as protective agents against problem drinking (Hawkins *et al.* 1992).

Catalano & Hawkins (1996) examined the influence of pro-social peer relationships and found significant relationships between pro-social opportunities, pro-social involvement, pro-social bonding and an absence of antisocial behavior including substance use.

This study, taking into account all the relevant indicators and predictors of drinking among adolescents, adopts the TPB and examines the role of the predictor variables and its relative weight in influencing intentions to drink. As indicated earlier, self-reported drinking status was not treated as outcome variable and as such limits the scope to fully assess the TPB's utility.

4. Empirical Conceptualization

4.1 Research Methodology

This section of the report discusses issues related to the methodology adopted in this research, and focuses on key methodological aspects. Essentially it focuses on (a) the research problem, (b) the research design (c) data collection, and (d) analysis and interpretation.

4.1 (a) Research Problem

The problem under investigation in this study was: "What are the strongest predictors of drinking intentions amongst adolescents?" To investigate this problem the researcher assessed the relative contribution of the Theory of Planned Behavior (TPB) constructs in the formation of drinking intentions. The key constructs of the TPB are: subjective norms, attitudes and perceived behavioural control. Each of these variables is measured by both direct and indirect composite statements formulated in the questionnaire (*cf.* questionnaire construction in Appendix).

4.1 (b) Research Design

Most TPB studies adopt research designs that enable them to conduct multiple regression analyses in their attempts to understand human behaviour. By definition, research design comprises the research aim, data/information sources, and considerations of reliability and validity (Mouton & Marais, 1996).

The Research Aim:

As stated earlier, the aim of the research was two-fold. Firstly, this study attempted to assess the predictive utility of the Theory of Planned Behavior in explaining adolescent intentions to drink. Secondly, the study aimed to gain an understanding of the factors that are significant in determining alcohol intentions amongst a selected group of Namibian adolescents in a less developed context.

Data/information sources:

Data was collected from 100 Senior Secondary School learners in Windhoek by means of indirect observation, more specifically through the use of questionnaires and solicitation interviews with the sample population. A random sample of 100 learners was drawn from a school register, and after that the learners were informed about the nature, scope and purpose of the study. They were informed by the researcher that their participation was voluntary, and should they wish not to take part in the questionnaire survey they could indicate so. All learners selected as part of the random sample of 100 agreed to take part in the study (*cf.* 4.1.c below). The next section on reliability reports briefly on the nature, credibility and relevance of the questionnaire, and sample representativeness.

Reliability and Validity:

The predictor variables of the TPB were measured both directly and indirectly. To predict intention the three component variables were measured by means of direct assessment. For the same component predictor variables indirect assessment was used to confirm findings on direct measures and to allow for interpreting variation in findings between direct and indirect measures.

The predictor variables in this study were assessed by means of both direct and indirect assessment. Direct measurement indices for predictor variables were subjected to test for internal consistency, and for the indirect measures correlations were run with direct measures. TPB studies usually obtain internal consistency values of 6 or >6. For indirect measures a correlation coefficient of .5 ($p < .001$) is usually obtained. Direct measures were subjected to internal reliability assessment and indirect measures were correlated with their corresponding direct measurements.

Direct measure of attitude: The stem, "In general I think drinking is..." was rated on a series of four 7-point evaluative semantic differential scales with the following endpoints: stressful/relaxing; good/bad; waste of time/useful; gives me confidence/destroys me. To control for response bias items with positive and negative endpoints were mixed in the questionnaire and recoded upon data entry so that high scores indicated a positive attitude. The mean response across the four items was used as a direct measure of attitude. The internal reliability of this measure, as assessed by Cronbach's alpha, was .784.

Indirect measure of attitude: Based on optimal scaling analysis that determines the proper scoring scheme (Ajzen, 1991), outcome evaluation was scored in a bipolar fashion, from -3 (extremely undesirable) to +3 (extremely desirable). To produce a belief-based estimate of attitude, belief strength and outcome evaluation, measures were multiplied and the resulting products were summed. The correlation between the direct and this belief-based measure of attitude was .294.

Direct measure of subjective norm: Three items, interspersed among other questions, assessed subjective norms. The mean score, across the three items, with a Cronbach's alpha coefficient of .929, served as a direct measure of subjective norm.

Indirect measure of subjective norm: Three normative referents of relevance were identified during the elicitation discussions with learners: parents, friends, and teachers.

For each of these referents, questions assessed normative belief strength and motivation to comply. The products of normative belief strength and motivation to comply were summed across the three referents to obtain a belief-based estimate of subjective norm. This measure had a correlation of .204 ($p < 0.01$) with the direct subjective norm measure.

Direct measure of perceived behavioural control: Three items were designed to assess perceived behavioural control. The mean score, across the three items, with a Cronbach's alpha of .907, served as a direct measure for perceived behavioural control.

Indirect measure of perceived behavioural control: This construct, as measured by control belief strength and control belief power, was assessed by eight items in the questionnaire. The content of these items were obtained through elicitation discussions with learners. The products of control belief power and control belief strength were summed across to obtain a belief-based measure of perceived behavioural control. This measure had a correlation of ($p < 0.01$) with the direct perceived behavioural control measure.

4.1 (c) Data Collection (sample size and collection)

Sample size

Required sample size is determined by statistical power analysis. This requires the specification of the study design and the expected effect size. Most studies using the TPB approach made use of a study sample of around 80 people. A sample size of >80 allows for a moderate effect size, i.e. multiple R of approximately 0.3. The researcher attempted to obtain a sample of greater than 80, anticipating that some learners might decline to participate. A total of 100 learners were asked to participate, and all indicated willingness to be part of the study.

Sample selection and composition

Most studies using the TPB as conceptual framework used random sampling methods. The sample selected for this study consisted of 100 learners from a Senior Secondary school in Windhoek, and learners were randomly selected from a school class register. To allow for a balanced sample 47 boys and 51 girls were selected. The sample composition was as follows: 47 boys (27 were 16 years of age and 20 were 18 years of age) and 51 girls (23 were 16 years of age and 28 were 18 years of age).

4.1 (d) Analysis and Interpretation

The statistical programmes SPSS and S Plus (including structural equation modelling and path analysis) were used in the analysis. Regression analysis through S Plus was used to determine the best fitting model, whilst fit statistics were computed to assess the model's predictive utility. The model proved a good fit for the data. Fit statistics

associated with the measurement model, proportions of variance extracted for the constructs and reliabilities are presented in the data presentation chapter.

C. Data entry and analysis

1. Data management:

All data obtained through the completed questionnaires were entered into one SPSS file, listing all the variables (questionnaire items) in the same order in which they appeared in the questionnaire, making data entry quick and less demanding. Use was made of SPSS syntax files to sort and compute composite variables.

2. Data screening:

Distribution of each variable was inspected to ensure that data entry errors are noted where responses are not in the range represented by the response format. Previous studies adopting the TPB approach indicated that highly skewed distributions require the use of nonparametric test instead of a multiple regression approach to the analysis. Distributions were generally found to be normal (see next chapter for normality graphs).

3. Main Analysis:

The method of data analysis used in this study was linear regression and modelling with latent variables. Zero-order correlations were computed and path analysis was conducted.

3.1 Direct measurement of the predictor variables:

The researcher used SPSS to recode negatively worded responses. After this, an item analysis was conducted on the items relating to the direct measures in order to establish internal consistency. It was anticipated that factor analysis would be conducted where low reliability scores were obtained. However, it was found that all internal consistency checks were acceptable (>0.6 as per TPB guideline), and thus all the items were included in the composite variables.

3.2 Indirect measurement of the predictor variables:

Each behavioural belief was multiplied by the score for the relevant outcome evaluation in order to create a new variable that represents the weighted score for each behavioural belief. Similarly, each normative belief was multiplied by the score for motivation to comply, and each control belief score was multiplied by the score representing the influence of the control belief. The weighted beliefs were then summed to create a composite score for attitude, subjective norm and perceived behavioural control.

3.3 Types of analyses conducted

The researcher then calculated a series of simple bivariate and zero-order correlations between direct and indirect measures of the same constructs in order to confirm the validity of the indirect measures. Scores obtained for these measures are reported on in the next chapter.

Using a linear multiple regression procedure, directly measured attitude scores were entered as the dependent variable, and the sum of the weighted behavioural beliefs were entered as the predictor variable. A similar approach was followed to predict directly measured subjective norms and perceived behavioural control.

For the direct measures of the TPB constructs composite variables were constructed, treated as independent, and the variable intention regressed as dependent variable. For the indirect measures simple bivariate correlations were run to confirm its validity. Using multiple regression analysis, the direct measured variables were treated as the dependent variable and the mean scores of the independent variables were treated as predictors.

Furthermore the intention variable was dichotomized using a median split, and a series of t-test and discriminant analysis conducted to identify the most significant beliefs. To further understand the difference between drinkers and non-drinkers, multivariate and univariate menanalysis of variance were conducted by comparing direct measurement of predictor variables intentions.

5. Data Presentation

This chapter presents the obtained findings of the current research and is structured as follows. First an exposition is provided of the methods used to obtain and extract reliable and significant elements for the composite predictor variables. As such, all calculations incidental to such procedure and its findings are reported. Secondly, the main analyses for each of the composite predictor variables are reported.

5.1 Research Participants

Learners (N=98) from a Senior Secondary School in a former black settlement area were recruited for this study. The sample consisted of a group of 16 and 18-year old male and female learners in Grade 11 in the same school. The female sample had a total of 23 that were 16 years of age and 28 that were 18 years of age. The male sample had a total of 27 that were 16 years of age and 20 that were 18 years of age. Two questionnaires were disregarded by the researcher as they were incomplete. The final sample for this study was thus (N=98).

5.2 Demographics

Table 1: Sample composition

Age	Female	Male	Total
16	23	27	50
18	28	20	48
Total	51	47	98

The questionnaire required learners to indicate whether they are current drinkers and the frequency of their drinking. Table 2 below indicates the learners' reporting of their drinking status.

Table 2: Learners' self-reported drinking status

Age	drinking	Not drinking	Total
16	18	32	50
18	24	24	48
Total	42	56	98

As evident from Table 2, there are more learners in the 18-year old age group reporting to being current drinkers. For 16-year olds, a substantial difference exists between those who reported drinking and those who don't. Amongst the 18-year olds, an equal number is reported for drinkers and non-drinkers. To determine if there are any differences between the genders with respect to drinking, gender was cross-tabulated with drinking status (see Table 3).

Table 3: Cases by gender and drinking status

Sex	Drinking beer or alcohol								
	Yes			No			Total		
	Count	Row %	Col %	Count	Row %	Col %	Count	Row %	Col %
Female	27	52.9	64.3	24	47.1	42.9	51	100.0	52.0
Male	15	31.9	35.7	32	68.1	57.1	47	100.0	48.0
Total	42	42.9	100.0	56	57.1	100.0	98	100.0	100.0

Amongst the female respondents, more percentage is reported to be current drinkers (53%). On the other hand, percentage of male respondents as non-drinkers (68%) is higher. Overall, there are more girls who admit to be current drinkers. This is quite a

surprising finding, as normally, boys are reportedly more inclined to be drinkers when compared to girls.

5.3 Results and Preliminary Analysis

5.3.1 Reliability of the data

Reliability refers to the degree to which a measurement instrument produces the same result on repeated measurements. The methods available via the Reliability Analysis procedure are useful for situations in which the true state of the measured objects is not known.

Table 4: Cronbach's Alpha for direct measures of the predictor variables

Variables	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N Items
Overall attitude score	0.784	0.787	4
Overall subjective norm score	0.929	0.929	3
Overall perceived behavioral belief score	0.907	0.918	3
Overall generalized intention score	0.906	0.909	3

The direct measure coefficients of the independent predictor variables reported in Table 4 above for these items is an estimate of the true alpha, which in turn is a lower bound for the true reliability. Earlier TPB studies regard Cronbach values of >0.6 as a proper index for conducting analysis with the items. All direct measures obtained values of >0.7 and were used as in the main analysis.

5.3.2 Correlation analysis of the direct predictor variables

Table 5: Correlation of direct predictor variables and intention

		Correlations			
		Mean overall attitudes scores	Mean overall subjective norm scores	Mean overall perceived behavioural control scores	Mean generalised intention scores
Mean overall attitudes scores	Pearson Correlation	1	.021	-.059	.410**
	Sig. (2-tailed)		.841	.567	.000
	N	98	98	98	98
Mean overall subjective norm scores	Pearson Correlation	.021	1	.105	.267**
	Sig. (2-tailed)	.841		.303	.008
	N	98	98	98	98
Mean overall perceived behavioural control scores	Pearson Correlation	-.059	.105	1	.040
	Sig. (2-tailed)	.567	.303		.696
	N	98	98	98	98
Mean generalised intention scores	Pearson Correlation	.410**	.267**	.040	1
	Sig. (2-tailed)	.000	.008	.696	
	N	98	98	98	98

** . Correlation is significant at the 0.01 level (2-tailed).

With the information presented in Table 5 above we can now proceed to consider the observed relationships. The rules for interpreting a significant result can briefly be summarized as follows: alpha is the theoretical probability of a Type I error, i.e. rejecting the null hypothesis that there is no correlation in the population, when in fact there is no correlation in the population. With alpha value set at .05, when the null hypothesis is true, we will obtain values of r that causes us to erroneously reject the null hypothesis a total of 5% of the time.

Subjective norm and attitude: $r = .021, p > 0.01$. The first step in understanding this value is to obtain the critical value of r from a statistical table. Subsequent to this, one will compare the obtained value of r with the critical value of r . Where the obtained r is smaller than the critical r the null hypothesis is accepted and we conclude that the sample may represent a population where $p=0$. Where the obtained r is greater than the

critical r we reject the null hypothesis and accept the alternative hypothesis, i.e. that r obtained represents a relationship in nature.

The obtained value of r is smaller than the critical value of r , thus we accept the null hypothesis. Important to note is that by accepting the null hypothesis does not mean that we have proven that no relationship exists between the two variables, we have simply failed to convincingly demonstrate that a relationship between the two variables does exist. When we accept the null hypothesis, we are likely (equivalent to the value of beta) to have committed a Type 2 error. Given this, we can now proceed to interpret the remainder of the correlation values.

Subjective norm and perceived behavioral control: $r = .105$, $p > 0.01$. After obtaining r critical, we find that it is greater than the value of r obtained. Thus we accept the null hypothesis and infer that the sample represents a population where $p = 0$, and we conclude that we have failed to prove that a relationship exists between these two constructs.

Subjective norm and intention: $r = .267$, $p < 0.01$. Obtaining the critical value of r we find that it is smaller than the obtained value of r . As such, we reject the null hypothesis and infer that we have proven that the sample does not represent a population where $p = 0$, and that in fact there exists in nature a relationship between these two constructs. When we reject the null hypothesis, we risk the possibility of committing a Type 1 error equal to the value of p .

Attitude and perceived behavioral control: $r = -0.59$, $p > 0.01$. Obtaining the critical value of r and comparing it with the obtained r for these two constructs indicate that critical r is greater. Thus, the null hypothesis is accepted, no relationship between these two constructs has been proven, and the probability of committing a Type 1 error is equivalent to the value of alpha.

Attitude and intention: $r = .410, p < 0.01$. Obtaining the critical values of r and comparing it with the obtained value of r (.410) indicates that r obtained is greater than critical r . As such, the null hypothesis is rejected and we infer that we have established an observed relationship where the sample does not represent a population mean of $p = 0$. The probability of committing a Type 1 error is equivalent to the value of alpha.

Perceived behavioral control and intention: $r = .040, p > 0.01$. Again, comparing critical r and obtained r we find that critical r is the greater value. Given this, we accept the null hypothesis and infer that the sample represents a population where $p = 0$. The probability that we have committed a Type 2 error is equal to the value of β .

In conclusion, we have found from Table 5 above that the only observed relationships obtained are those between attitude and intention, and subjective norm and intention. No relationship between the predictor variables (attitude, subjective norm, perceived behavioral control) could be established.

Table 6: Correlation of indirect predictor variables

		Mean generalized intention scores	Indirect Attitude Score	Subjective Norms Score	Perceived Behavioural Control
Mean generalized intention scores	Pearson Correlation	1	.122	-.022	.260**
	Sig. (2-tailed)		.232	.826	.010
	N	98	98	98	98
Indirect Attitude Score	Pearson Correlation	.122	1	.217*	.155
	Sig. (2-tailed)	.232		.032	.128
	N	98	98	98	98
Subjective Norms Score	Pearson Correlation	-.022	.217*	1	.055
	Sig. (2-tailed)	.826	.032		.590
	N	98	98	98	98
Perceived Behavioural Control	Pearson Correlation	.260**	.155	.055	1
	Sig. (2-tailed)	.010	.128	.590	
	N	98	98	98	98

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Generalized intention and indirect attitude measure: $r = .260, p < 0.01$. The value of obtained r is greater than critical r . The null hypothesis is rejected and we infer that a statistically significant relationship exists between these two measures.

Generalized intention and indirect subjective norm: $r = -.022, p > 0.05$. The value of obtained r is smaller than critical r . The null hypothesis is accepted, and we infer that the sample represent a population where $p = 0$. The probability of committing a Type 1 error is equal to the value of alpha.

Generalized intention and perceived behavioral control: $r = .260, p < 0.01$. The value of r obtained is greater than the critical value of r , and as such we reject the null hypothesis and infer that a significant relationship exists between these two constructs. The probability of committing a Type 2 error is equivalent to the value of β .

Attitude and subjective norm (indirect measures): $r = .217, p < 0.05$. The value of r obtained is greater than the value of r critical. Thus we reject the null hypothesis and infer that a relationship exists in nature between these two constructs. The probability of committing a Type 1 error is equal to 5%, i.e. the value of alpha.

Attitude and perceived behavioral control (indirect measures): $r = .155, p > 0.05$. The value of r obtained is smaller than the value of r critical. Thus, the null hypothesis is accepted and the probability of committing a Type 2 error is equal to the value of β .

Subjective norm and perceived behavioral control (indirect measure): $r = .055, p > 0.05$. The value of obtained r is smaller than the value of r critical. The null hypothesis is accepted and we infer that the sample represents a population mean where $r = 0$. The probability of committing a Type 2 error is equal to the value of β .

In summary then, we find that there exists a significant relationship between intention and perceived behavioral control; and between attitude and subjective norm for the indirect measures.

After correlation coefficients were computed for both the direct and indirect measures of intention and the predictor variables, the researcher conducted correlations between the direct measures with each of their corresponding indirect measures. Note that the TPB claims that the indirect measures are directly related to their corresponding direct measures.

Table 7: Correlations between direct and indirect attitude measures

		Mean overall attitudes scores	Indirect Attitude Score
Mean overall attitudes scores	Pearson Correlation	1	.294(**)
	Sig. (2-tailed)		.003
	N	98	98
Indirect Attitude Score	Pearson Correlation	.294(**)	1
	Sig. (2-tailed)	.003	
	N	98	98

** Correlation is significant at the 0.01 level (2-tailed).

The observed relationship between direct and indirect attitude is presented as follows: $r = .294 < 0.01$. This equation informs us that the critical value of r is smaller than the obtained value of r . Given this, we infer that $p > 0$, and thus, is within the region of rejection. We conclude that the null hypothesis is rejected, and that our obtained value is significantly different from 0.

Table 8: Correlations between direct and indirect subjective norms

		Mean overall subjective norm scores	Subjective Norms Score
Mean overall subjective norm scores	Pearson Correlation	1	.204(*)
	Sig. (2-tailed)		.044
	N	98	98
Subjective Norms Score	Pearson Correlation	.204(*)	1
	Sig. (2-tailed)	.044	
	N	98	98

* Correlation is significant at the 0.05 level (2-tailed).

The observed relationship between direct and indirect subjective norm is presented as follows: $r = .204 < 0.05$. This equation informs us that the critical value of r is smaller than the obtained value of r . Given this, we infer that $p > 0$, and thus, is within in the region of rejection. We conclude that the null hypothesis is rejected, and that our obtained value is significantly different from 0. The probability of committing a Type 1 error is 0.05.

Table 9: Correlations between direct and indirect perceived behavioral control

		Mean overall perceived behavioral scores	Perceived Behavioral Control
Mean overall perceived behavioral control scores	Pearson Correlation	1	.191
	Sig. (2-tailed)		.059
	N	98	98
Perceived Behavioral Control	Pearson Correlation	.191	1
	Sig. (2-tailed)	.059	
	N	98	98

The observed relationship between direct and indirect perceived behavioral control is presented as follows: $r = .191 > 0.05$. This equation informs us that the critical value of r is greater than the obtained value of r . Given this, we infer that $p = 0$, and thus lies outside the region of rejection. We conclude that the null hypothesis is accepted, and that our obtained value is not significantly different from 0. The probability of committing a Type 2 error is equal to the value of β .

Table 10: Correlation between direct and indirect measures of intention

		Mean generalized intention	Ten opportunities to drink
Mean intention	Pearson	1	.211*
	Sig (2-tailed)		.037
	N	98	98
Ten opportunities	Pearson	.211*	1
	Sig (2-tailed)	.037	
	N	98	98

The observed relationship between direct and indirect intention is presented as follows: $r = .211$, $p < 0.05$. This equation informs us that the critical value of r is smaller than the

obtained value of r . Given this, we infer that $p > 0$, and thus lies in the region of rejection. We conclude that the null hypothesis is rejected, and that our obtained value is significantly different from 0. The probability of committing a Type I error is 0.05.

The next step in the procedure was to assess the construct items for reliability and validity. Reliability was assessed for the direct measures by computing correlation coefficients.

Table 11: Inter-item correlation matrix: Direct measure Attitude

	In general I think drinking is (Q 17)	In general I think drinking is (Q 18)	In general I think drinking is (Q 19)	In general I think drinking is (Q 20)
In general I think drinking is (Q17)	1.000	.421*	.416*	.403*
In general I think drinking is (Q18)	.421*	1.000	.575*	.458*
In general I think drinking is (Q 19)	.416*	.575*	1.000	.612*
In general I think drinking is (Q 20)	.403*	.458*	.612	1.000

With the values obtained above, all proving to be significant at $p < 0.01$, we conclude that there is a relatively consistent relationship between each of the measures. These items made up the measures for direct attitude in the questionnaire. The "Q" appearing in brackets after each question is the number of the question in the main questionnaire.

Table 12: Inter-Item Correlation Matrix: Direct Measure Subjective Norm

	Most of my friends think I should not drink	It is expected of me to drink when my friends are drinking	Sometimes don't want to drink not to disappoint I drink
Most of my friends think I should not drink	1.000	.765*	.837*
It is expected of me to drink when my friends are drinking	.765*	1.000	.841*
Sometimes don't want to drink not to disappoint I drink	.837*	.841*	1.000

As in Table 6, Table 12 above shows that all items are highly correlated with each other.

Table 13: Inter-Item Correlation Matrix: Direct Measure Perceived Behavioral Control

	I am confident I can refuse to drink	Whether or not I drink with my friends is up to me	For me to refuse a drink with my friends is
I am confident I can refuse to drink	1.000	.897*	.777*
Whether or not I drink with my friends is up to me	.897*	1.000	.693*
For me to refuse a drink with my friends is	.777*	.693*	1.000

Table 13 above indicates the following; there exists a consistently strong relationship between "I am confident I can refuse to drink" and "whether or not I drink is up to me" and also with "for me to refuse to drink with my friends is ...". The observed

relationships are consistently strong. The same is true for the other items in this construct that measure perceived behavioral control.

Table 14: Inter-Item Correlation Matrix: Direct measure Generalized Intention

	I expect to drink with my friends	Drinking with my friends and stop when they do	Intend to keep friends by drinking regularly with them
I expect to drink with my friends	1.000	.718*	.789*
Continue drinking with my friends and stop when they do	.718*	1.000	.798*
Intend to keep friends by drinking regularly with them	.789*	.798*	1.000

Significant correlations between all the items of generalized intention were obtained, as evident from the Table 14 above.

The association structure of the three predictor variables was explored using Pearson Chi-squared tests for each of the 3 possible pairs of variables. The result is presented below in Table 15, and shows that at the 95% confidence level there is a significant association between all pairs except overall attitude score with subjective norm score.

Table 15: Chi-squared Tests for Association between Pairs of Variables, Direct.

Variables	Pearson Value	Chi-Square	Df	Asymp. Sig. (2-sided)
Attitude and Subjective Norm		328.93	323	0.398
Attitude and Perceived Behavioral Control		454.79	323	0.001
Subjective Norm and Perceived Behavioral Control		342.0	289	0.017

A correlation was computed for individual constructs of the indirect measures and the following were obtained.

Table 16: Belief-based measures

		Many friends and active social life	Get a hangover	Not able to do your responsibilities
Many friends and active social life	Pearson Correlation	1	.550**	-.491**
	Sig. (2-tailed)		.000	.000
	N	98	98	98
Get a hangover	Pearson Correlation	.550**	1	-.245*
	Sig. (2-tailed)	.000		.015
	N	98	98	98
Not able to do your responsibilities	Pearson Correlation	-.491**	-.245*	1
	Sig. (2-tailed)	.000	.015	
	N	98	98	98

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Table 16 presents some interesting results. It indicates that there exists a linear negative relationship between “having many friends and an active social life” and “not being able to do your responsibilities”. Another negative linear relationship observed is between “getting a hangover” and “not being able to do your responsibilities”.

The inference drawn from such a relationship is that as the value in one variable increases/decreases, the value in the corresponding variable decreases/increases. There exists a positive linear relationship between “having many friends and an active social life” and “getting a hangover”. The strongest relationship observed is between “getting a

hangover” and “not being able to do your responsibilities” (-.245). To better understand the nature of these obtained correlations, regression analyses were computed.

The descriptive statistics for the direct measures correlated with its corresponding indirect measures are presented below.

Table 17: Attitude measurement

Descriptive Statistics

	Mean	Std. Deviation	N
Mean overall attitudes scores	2.47	1.611	98
Indirect Attitude Score	13.88	12.173	98

The mean overall attitude score indicates a relatively weak positive attitude towards drinking. Note that the range for scores on the indirect attitude measure is -84 to +84, rated on a -3 to +3 scale, with scores tending towards the negative end indicating a negative attitude, and scores towards the positive end indicating a positive attitude. It is clear from the above that both direct and indirect measures obtained relatively weak positive attitudes towards drinking.

The standard deviation of 1.611 indicates the differences between learner responses and the mean response of 2.47. Note that, the greater the standard deviation, the greater the variability between the scores and the mean.

Table 18: Subjective norm measurement

Descriptive Statistics			
	Mean	Std. Deviation	N
Mean overall subjective norm scores	2.78	1.907	98
Subjective Norms Score	-.91	21.893	98

The range of scores for subjective norm on the direct measure is 0 to 21, rated on a scale of 1-7, with greater scores indicating increased social pressure to perform the behaviour. The mean score of 2.78 indicates that the general response to perceived social pressure is very low. On the indirect measure the range of scores is -63 to +63, with scores tending towards the negative end presenting low social pressure to drink or not, and scores tending towards the positive end presenting higher social pressure to drink. The mean score of -.91 indicates a relatively low social pressure to engage in drinking or not to.

What is statistically interesting about Table 18 is the amount of the standard deviation of responses from the mean in the indirect measure of subjective norm (21.893). This suggests that there exists great variability in the mean response by learners and that there are in fact those who experience a significant amount of social pressure to engage in drinking or otherwise.

Table 19: Perceived behavioural control measurement**Descriptive Statistics**

	Mean	Std. Deviation	N
Mean overall percieved behavioural control scores	4.51	2.089	98
Percieved Behavioural Control	14.17	18.628	98

The Table 19 above indicates that the mean score for the direct measure of perceived behavioral control represents, on average, a very low perceived control over the behaviour in question. Note that the range of scores for the direct measure is 0-21, where lower scores indicate low perceived control over the behaviour, and higher scores indicate greater control over the behaviour. For the indirect measure, the range of scores is -63 to +63, where negative scores indicate low perceived control over the behaviour, and positive scores indicating higher perceived control over the behaviour.

To get to the heart of describing a relationship (i.e. after determining that a relationship does in fact exist by observing the correlation coefficients), such as the one between the predictor and criterion variables in this study, one computes the squared correlation coefficient (also known as **Eta**) through regression analysis.

The result of the squared correlation coefficient is the *effect size* of the independent/predictor variables, i.e. the proportion of variance in the dependent variable accounted for by the predictor variables. It must be borne in mind that as a descriptive statistic, the squared correlation coefficient is only a descriptive statistic and only applies

to the sample in question. Estimation of effect size for the general population requires different procedures.

Linear regression makes two fundamental assumptions. Firstly, Y scores should be spread out equally around Y' and the regression line throughout the relationship between the variables. This assumption is called homoscedasticity, and it occurs when the Y scores are spread out to the same degree at every X . Secondly, the assumption is that the Y scores at each X represent an approximately normal distribution. The data in this study have been tested for these two assumptions and thus regression analysis is the proper procedure to employ. The results of these two assumptions are reported later in this chapter.

5.3.2 Data Analysis

Data were analyzed using linear regression and it will be used to identify significant predictors of generalized intention scores and the extent of influence.

Multivariate Linear Regression

In the linear regression model, the dependent variable (intention) is assumed to be a linear function of one or more independent variables (attitude; subjective norm; perceived behavioral control) plus an error introduced to account for all other factors:

$$y_i = \beta_1 x_{i1} + \dots + \beta_k x_{ik} + \mu_i$$

$y_i = \beta_1 x_{i1} + \dots + \beta_k x_{ik} + \mu_i$ In the above regression equation, y_i is the dependent variable (intention), x_{i1}, \dots, x_{ik} are the independent or explanatory variables, and μ_i is

the *disturbance* or *error term*. The goal of regression analysis is to obtain estimates of the unknown parameters β_1, β_k which indicate how a change in one of the independent variables affects the values taken by the dependent variable.

The usual method of estimation for the regression model is ordinary least squares (OLS). Let $\hat{\beta}_1, \hat{\beta}_k$ denote the OLS estimates of β_1, β_k . The predicted value of y_i is:

$$\hat{y}_i = \hat{\beta}_1 x_{i1} + \dots + \hat{\beta}_k x_{ik}$$

The error in the OLS prediction of y_i called the *residual*, is:

$$e_i = y_i - \hat{y}_i$$

$$e_i = y_i - \hat{y}_i$$

The basic idea of ordinary least squares estimation is to choose estimates $\hat{\beta}_1, \hat{\beta}_k$ to minimize the sum of squared residuals:

$$\sum_1^n e_i^2$$

It can be shown that:

$$b = (X'X)^{-1} X'y$$

$$b = (X'X)^{-1} X'y$$

where X is a $n \times k$ matrix with (i,k) th element x_{ki} , y is a $n \times 1$ vector with typical element y_i , and b is a $k \times 1$ vector with typical element b_k .

5.3.3 Results of regression analysis

Firstly, all direct measures of the predictor variables were entered as independent variables and intention as dependant variable was regressed on them.

Table 20: Regression: Intention on predictor variables

Dependent variable	Dependent variable	Dependent variable	Independent variable
Attitude	Subjective norm	Perceived Behavioural control	Intention

Table 20 above indicates those measures that were used in the regression analysis. As is evident, all three direct measures of the predictor variables were entered using their mean scores obtained. It is expected that the regression analysis would yield an indication of the effect of each independent variable on the intention as outcome variable, and that it would provide us with information about the predictive utility of the TPB model.

Table 21: Model summary: regression analysis

R	R Square	Adjusted R Square	Std error of the estimate
.486	.236	.212	1.890

Table 21 indicates the summarized results of the regression. The strength or consistency of a relationship determines the amount of error in our predictions. The stronger the relationship, the smaller the error. Therefore, the minimum error occurs when R is ± 1 (see the first column), because there is no spread or differences in Y scores at each X ,

and the scatterplot of data itself represents the regression line. The value obtained (.486) thus implies that we can be reasonably sure that our prediction of intention with the three predictor variables is accurate.

For the sample in question, the predictor variables together accounted for 23.6% of the variance in intention (indicated by the R Square value). Computing the proportion of variance accounted for is the equivalent of stating, in a quantitative manner, how useful or important a relationship between two or more variables is. In the first column we saw that the accuracy of our prediction of intention was +.486, implying that we have reasonably accurate predictions of intentions scores, and that the error of our prediction, reported below, is reasonably low.

The proportion of variance accounted for tells us how important a relationship is. The greater the proportion of variance accounted for by a relationship, the more accurately we can identify and predict differences in behavior. The obtained R Squared of 23.6% thus means that we are approximately 24% better of using this relationship than if we did not, and our error of 1.89 is 24% less than we would have without this relationship.

The accuracy of the prediction of intention scores is reflected in the "Std error of the estimate" column. This column describes the average error when using the regression equation to predict scores of the *Y* variable (intention). Thus, using the three predictor

variables in the model to predict a learner's score on intention the conclusion is that we will be wrong by an average of 1.890 points (the value presented in the last column).

Table 22: Analysis of Variance (ANOVA)

Model	Sum of squares	Df	Mean square	F
Regression	104.034	3	34.678	9.703
Residual	335.940	94	3.574	
Total	439.974	97	38.252	

Setting up statistical analysis requires that we examine two hypotheses, i.e. experimental hypotheses that describe the predicted outcome we may or may not find in an investigation. Thus we have two hypotheses, one that states that we *will* demonstrate the predicted relationship, and the other hypothesis is that we *will not* demonstrate the predicted relationship.

The 24% variance accounted for by the three predictor variables is presented as follows: $[F(3,94) = 9.703, p < 0.01]$. The null hypothesis is that the differences between our means are due to sampling error and that all means poorly represent one population mean, i.e. there exists no difference, $p = 0$. Because the F value obtained is larger than the critical value of F (obtained from the F -values table) we reject the null hypothesis, concluding that the different means are unlikely to be representing one population mean.

Thus, we conclude that the F obtained (9.703) is significant and that the three predictor variables produced a significant difference in mean intention scores. Because $\alpha = .05$,

which includes the critical value of F , the probability that a Type 1 error has been committed is $p < .05$.

When the criterion variable is regressed on the three predictor variables the following coefficients are obtained.

Table 23: Regression coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	T	Significance
	B	Std. error	Beta		
Constant	.748	.602		1.242	.217
Mean attitude	.538	.119	.407	4.504	.000
Mean subjective norm	.285	.101	.255	2.815	.006
Mean perceived behavioral control	.038	.093	.037	.407	.685

The regression coefficients (standardized beta) provide a measure of the strength of the independent variables in predicting intentions. We see that intention is influenced by both attitude and subjective norm. The standardized regression coefficient show attitude to be the most significant predictor of intention (beta = .407, $p < 0.01$), followed by subjective norm (beta = .255, $p < 0.01$). Perceived behavioral control did not contribute significantly to the prediction of intention.

The "T" value in the second last column is a measure of the level of significance of an obtained relationship between variables. As with the F value, we have to obtain the

obtained and critical values of T . Once we have both these values, we can make a decision about the significance of the relationship being studied.

If the obtained T value is greater than the critical value of T (obtained from statistical tables) then we reject the null hypothesis and interpret the result as useful. Nonetheless, with alpha value set at 0.05 there is a chance, equal to the value of alpha, that a Type 1 error has been committed, i.e. rejecting the null hypothesis when in actual fact it is true.

With our data the following T values were obtained: Attitude (4.504); Subjective Norm (2.815) and Perceived Behavioral Control (.407). The appropriate critical value of T is 1.671. We can thus now make a decision about the observed relationship. Since the T values of attitude and subjective norm are greater than the critical T values, we can safely state that there is a significant relationship exists between these two variables and intention.

However, the score obtained for perceived behavioral control is less than the critical value of T and as such the null hypothesis is *not* rejected. However, there still exists a chance, equal to α , that we have just committed a Type 2 error.

Subsequent to regression of intention as outcome variable on all the predictor variables, each predictor variable was used separately in a regression analysis to determine the individual predictor variance that could be accounted for. This procedure allows for assessing the relative weight of each predictor variable.

Table 24: Attitude and intention

Variables entered	Variables removed	Method
Mean attitude score	None	Enter

Table 25: Attitude model summary

R	R Square	Adjusted R Square	Std error of the estimate
.410	.168	.159	1.953

There exists a small margin of error in prediction (1.953), and the accuracy of the prediction is relatively strong ($R = .410$). The direct attitude measure accounts for 16.8% of the explained variance in intention.

Table 26: ANOVA statistics for attitude as predictor variable

Model	Sum of squares	Df	Mean square	F	Significance
Regression	73.909	1	73.909	19.383	.000
Residual	366.065	96	3.813		
Total	439.974	97			

The obtained variance of 16.8% with the attitude measure is expressed as $[F(1,96) = 19.383, p < 0.01]$. The obtained value of F is greater than the critical value of $F(6.96)$, and thus conclude that a statistically significant relationship is obtained between direct attitude as a single predictor variable and intention as the criterion variable. The obtained value of F indicates that the probability of committing a Type 1 error is $p < 0.05$.

Table 27: Regression Coefficients: attitude

Model	Unstandardized Coefficients		Standardized Coefficients	T
	B	Std. error	Beta	
Constant	1.698	.363		4.685
Mean attitude	.542	.123	.410	4.403

The standardized regression coefficient obtained shows that the direct measure of attitude ($\beta = .410$, $p < 0.01$) is a significant predictor of intention. The value of T is greater than its critical T value, thus the null hypothesis is rejected and we conclude that a statistically significant relationship exists. The probability of a Type 1 error being committed again equals the value of alpha.

Table 28: Regression coefficients: subjective norm and intention

Variables entered	Variables removed	Method
Mean subjective norm score	None	Enter

Table 29: Subjective norm model summary

R	R Square	Adjusted R Square	Std error of the estimate
.267	.072	.062	2.063

There exist a small margin of error in prediction (2.063), and the accuracy of the prediction is relatively strong ($R = .267$). On its own, this direct attitude measure accounts for 7.2% of the explained variance in intention.

Table 30: ANOVA statistics for subjective norm as predictor variable

Model	Sum of squares	Df	Mean square	F	Significance
Regression	31.472	1	31.472	7.396	.008
Residual	408.502	96	4.255		
Total	439.974	97			

The obtained variance of 7.2% with the attitude measure is expressed as $[F(1,96) = 7.396, p < 0.01]$. The obtained value of F obtained is $> F$ critical and we thus conclude that a statistically significant relationship is obtained between the direct measure of subjective norm as a single predictor variable and intention as the criterion variable. The obtained value of F indicates that the null hypothesis is rejected, and the probability of committing a Type 1 error is $p < 0.05$.

Table 31: Regression Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	T	Significance
	B	Std. error	Beta		
Constant	2.208	.369		5.981	.000
Mean attitude	.299	.110	.267	2.720	.008

The standardized regression coefficient obtained shows that the direct measure of subjective norm ($\beta = .267, p < 0.01$) is a significant predictor of intention. The value of T (5.981) is greater than its critical T value, thus the null hypothesis is rejected and we conclude that a statistically significant relationship exists. The probability of a Type 1 error being committed equals the value of alpha.

Table 32: Perceived behavioral control and intention

Variables entered	Variables removed	Method
Mean perceived behavioral control score	None	Enter

Table 33: Perceived behavioral control model summary

R	R Square	Adjusted R Square	Std error of the estimate
.040	.002	-.009	2.139

There exist a significant margin of error in prediction (2.139), and the accuracy of the prediction is weak. Since the R value falls within the value of $R_{critical}$ we accept that no significant relationship exists between the two measures. The absence of a relationship between these two variables is confirmed by the amount of variance which the predictor variable can account for (.2%).

Table 34: ANOVA statistics for perceived behavioral control as predictor variable

Model	Sum of squares	Df	Mean square	F	Significance
Regression	.703	1	.703	.154	.696
Residual	439.271	96	4.576		
Total	439.974	97			

The obtained variance of .002% with the attitude measure is expressed as $[F(1,96) = .254, p > 0.01]$. The obtained value of $F_{obtained}$ is $< F_{critical}$ and we thus conclude that a statistically significant relationship does not exist between the direct measure of perceived behavioral control as a single predictor variable and intention as the criterion variable. The obtained value of F indicates that the null hypothesis is accepted, and the

probability of committing a Type 2 error, i.e. accepting the null hypothesis when it is false, is equal to the value of *beta*.

Table 35: Regression Coefficients: perceived behavioral control

Model	Unstandardized Coefficients		Standardized Coefficients	T	Significance
	B	Std. error	Beta		
Constant	2.854	.516		5.530	.000
Mean perceived behavioral control	.041	.104	.040	.392	.696

The standardized regression coefficient obtained shows that the direct measure of subjective norm ($\beta = .040, p > 0.01$) is not a significant predictor of intention. The value of T (.392) is smaller than its critical T value, thus the null hypothesis is not rejected and we conclude there is no statistically significant relationship. Thus, the probability of a Type 2 error being committed equals the value of *beta*.

Table 36: Predicting intention from the indirect predictor variables

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.294 ^a	.086	.077	1.548

a. Predictors: (Constant), Indirect Attitude Score

The strength of the relationship and the accuracy of predicting attitude from its indirect measure is presented above. It is evident that there exists a relationship between the two

measures (.294) and that the prediction error is small (1.548). However, the relationship is not statistically significant as it can only explain 8.6% of the variance.

Table 37: ANOVA: indirect measures

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	21.712	1	21.712	9.057	.003 ^a
	Residual	230.148	96	2.397		
	Total	251.860	97			

a. Predictors: (Constant), Indirect Attitude Score

b. Dependent Variable: Mean overall attitudes scores

The .086% variance accounted for by the three predictor variable is presented as follows: [$F(1,97) = 9.057, p < 0.01$]. The null hypothesis is that the differences between our means are due to sampling error and that all means poorly represent one population mean. Because the F value obtained is larger than the critical value of F we reject the null hypothesis, concluding that the mean score is unlikely to be representing one population mean. We accept the alternative hypothesis and conclude that a significant relationship between the two variables is present.

Thus, we conclude that the F obtained (9.057) is significant and that the predictor variable is significant in predicting attitude scores. Because $\alpha = .05$, which includes the critical value of F , the probability that a Type 1 error has been committed is $p < .05$.

Table 38: Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.933	.238		8.125	.000
	Indirect Attitude Score	.039	.013	.294	3.009	.003

a. Dependent Variable: Mean overall attitudes scores

The standardized regression coefficient shows indirect attitude to be a significant predictor of attitude (beta = .294, $p < 0.01$), followed by subjective norm (beta = .255, $p < 0.01$).

The T value obtained is 3.009, which is greater than the critical T . The appropriate critical value of T is 1.671. Since the T value of indirect attitude is greater than the critical T value, we can state that there is a significant relationship between the indirect and direct measures of attitude.

Table 39: Model Summary – Subjective Norms

Model	Variables Entered	Variables Removed	Method
1	Subjective Norms Score	.	Enter

a. All requested variables entered.

b. Dependent Variable: Mean overall subjective norm scores

Table 40: Subjective norm

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.189 ^a	.036	.026	1.882

a. Predictors: (Constant), Subjective Norms Score

The relationship between the direct and indirect measures of subjective norm is significant, as is evident from the *R value (.189)* which is greater than *R critical*. The variance explained by this measure is 3.6%. Although it has been proven that there exists a relationship between these two measures we are not certain about the importance of this relationship.

The usefulness of this relationship is obtained by looking at the R Squared column, which tells us that this indirect measure can only explain <4% of the variance in the direct subjective norm measure (3.6%). Thus we conclude that although there exists a relationship between these two variables it is not statistically significant.

Table 41: ANOVA: Subjective norm

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	12.665	1	12.665	3.574	.062 ^a
	Residual	340.174	96	3.543		
	Total	352.839	97			

a. Predictors: (Constant), Subjective Norms Score

b. Dependent Variable: Mean overall subjective norm scores

The .036% variance accounted for by the three predictor variable is presented as follows: $[F(1,96) = 3.574, p < 0.05]$. The F value obtained is smaller than the critical value of F and as such the null hypothesis is accepted. We conclude that indirect subjective norm is not a significant predictor of subjective norm scores. Type 2 error probability set at beta value.

Table 42: Regressions Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.790	.190		14.662	.000
	Subjective Norms Score	.017	.009	.189	1.891	.062

a. Dependent Variable: Mean overall subjective norm scores

The standardized regression coefficient show indirect subjective norm to be a significant predictor of subjective norms (beta = .189, $p > 0.01$).

The T value obtained is 1.891, which is smaller than the critical T . Since the T value of indirect subjective norm is smaller than the critical T value, we can state that there is a no significant relationship between the indirect and direct measures of subjective norm.

Table 43: Model summary: Perceived behavioural control

Variables Entered/Removed ^b			
Model	Variables Entered	Variables Removed	Method
1	Perceived Behavioural Control ^a	.	Enter

a. All requested variables entered.

b. Dependent Variable: Mean overall perceived behavioural control scores

Table 44: Perceived behavioural control

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.191 ^a	.037	.027	2.061

a. Predictors: (Constant), Perceived Behavioural Control

The relationship between the direct and indirect measures of perceived behavioral control is significant, as is evident from the *R value* (.191) which is greater than *R critical*. The variance explained by this measure is 3.7%. Again, although it has been confirmed that there exists a relationship between these two measures the importance of this relationship is unknown.

With R Squared as reference, we determine what the statistical significance of this relationship is. It tells us that this indirect measure can only explain <4% of the variance (3.7%). Non-significant relationship between variables obtained.

Table 45: ANOVA perceived behavioural control

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	15.504	1	15.504	3.651	.059 ^a
	Residual	407.658	96	4.246		
	Total	423.162	97			

a. Predictors: (Constant), Perceived Behavioural Control

b. Dependent Variable: Mean overall perceived behavioural control scores

The .037% variance accounted for by the three predictor variable is: $[F(1,96) = 3.651, p > 0.05]$. The null hypothesis is accepted. The indirect pbc measure is not a significant predictor of perceived behavioral control scores. Type 2 error probability set at beta value.

Table 46: Regression coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.203	.262		16.037	.000
	Perceived Behavioural Control	.021	.011	.191	1.911	.059

a. Dependent Variable: Mean overall perceived behavioural control scores

The standardized regression coefficient show indirect perceived behavioral control to be a non-significant predictor of perceived behavioral control ($\beta = .189, p < 0.05$). The T value obtained is 1.911, which is smaller than the critical T . Since the T value of indirect perceived behavioral control is smaller than the critical T value, we can state that there is a no significant relationship between the indirect and direct measures of perceived behavioral control.

After each predictor variable was entered separately into the regression, the researcher assessed the relative weight of demographic factors and drinking status in predicting intentions. All the predictor variables plus gender, age and drinking status were used in the following regression model and the following results were obtained.

Table 47: Variables used in the model

Variables entered	Variables removed	Method
Mean attitude score		Enter
Mean subjective norm score		Enter
Mean perceived behavioral control score		Enter
Age		Enter
Gender		Enter
Drinking status		Enter

Table 48: Model summary

R	R Square	Adjusted R Square	Std error of the estimate
.555	.308	.262	1.829

The relationship between the above variables and intention is significant, as is evident from the *R value* (.555) which is greater than *R critical*. The variance explained by this measure is 31%. Again, although it has been confirmed that there exists a relationship between these two measures, the importance of this relationship is unknown.

With R Squared as reference, we determine what the statistical significance of this relationship is. It tells us that this indirect measure can explain 31% of the variance.

Thus we conclude that a statistical significant relationship between these variables exists.

Table 49: ANOVA statistics

Model	Sum of squares	Df	Mean square	F
Regression	135.465	6	22.577	6.747
Residual	304.509	96	3.346	
Total	439.974	97		

The .30.8% variance accounted for by the predictor variables is presented as follows: [F(6,96) = 6.747, $p > 0.05$]. The F value obtained is greater than the critical value of F and as such the null hypothesis is rejected. We conclude that, together, these variables are significant predictors of intention. Type 1 error probability set at $\alpha = 0.05$.

Table 50: Regression coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	T
	B	Std. error	Beta	
Constant	2.620	3.613		.725
Attitude	.409	.124	.310	3.305
Subjective norm	.231	.103	.206	2.244
PBC	.081	.091	.079	.891
Age	-.014	.192	-.007	-.074
Gender	.432	.393	.102	1.099
Drinking status	-1.271	.420	-.297	-3.025

Table 50 indicates the most significant predictors of intention. Looking at the standardized beta coefficients we find that gender (1.009), age (-0.74), and perceived

behavioral control (.891) are not significant predictors of intention. The most significant predictors, in order of importance, appear to be attitude (.310, $p < 0.05$), current drinking status (-3.025, $p < 0.05$), and subjective norm (.206, $p < 0.05$).

Table 51: Model summary

Variables Entered/Removed ^b			
Model	Variables Entered	Variables Removed	Method
1	Many friends and active ^a social life	.	Enter

a. All requested variables entered.

b. Dependent Variable: Mean generalized intention scores

Table 52 Regression: "Many friends and active social life"

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.380 ^a	.144	.135	1.980

a. Predictors: (Constant), Many friends and active social life

The relationship between "many friends and an active social life" and intention is significant, as is evident from the *R value* (.380) which is greater than *R critical*. The variance explained by this measure is 14.4%. Again, although it has been confirmed that there exists a relationship between these two measures, the importance of this relationship is unknown. With R Squared as reference, we determine what the statistical significance of this relationship is. It tells us that this measure can explain 14% of the variance in intention. Thus we conclude that a statistically significant relationship between these two variables exists.

Table 53: ANOVA summary: "Many friends and active social life"

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	63.518	1	63.518	16.198	.000 ^a
	Residual	376.456	96	3.921		
	Total	439.974	97			

a. Predictors: (Constant), Many friends and active social life

b. Dependent Variable: Mean generalised intention scores

The 14% variance accounted for by this variable is presented as follows: [F(1,96) = 16.198, $p > 0.05$]. The F value obtained is larger than the critical value of F and as such the null hypothesis is rejected. We conclude that this measure is a significant predictor of intention. Type 1 error probability set at $\alpha = 0.05$

Table 54: Regression coefficients

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.818	.363		5.006	.000
	Many friends and active social life	.433	.108	.380	4.025	.000

a. Dependent Variable: Mean generalized intention scores

The standardized regression coefficient show this measure to be a significant predictor of perceived behavioral control ($\beta = .380, p < 0.05$). The T value obtained is 4.025, which is greater than the critical T . Since the T value of this measure is $>$ the critical T value, we can state that there is a significant relationship between this measure and intention.

Table 55 Regression summary

Variables Entered/Removed ^b			
Model	Variables Entered	Variables Removed	Method
1	Get a hangover, Not able to do your responsibilities, Many friends and active social life		Enter

a. All requested variables entered.

b. Dependent Variable: Mean generalised intention scores

Table 56 Model summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.448 ^a	.201	.175	1.934

a. Predictors: (Constant), Get a hangover, Not able to do your responsibilities, Many friends and active social life

The relationship between the above entered variables and intention is significant, as is evident from the *R* value (4.5) which is greater than *R* critical. The variance explained by this measure is .201. Again, although it has been confirmed that there exists a relationship between these two measures the importance of this relationship is unknown. With R Squared as reference, we determine what the statistical significance of this relationship is. It tells us that this measure can explain 20% of the variance in intention. Given this, and the small estimate error, we conclude that a statistically significant relationship between these variables and intention exists.

Table 57 ANOVA summary

ANOVA^b

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	88.319	3	29.440	7.869	.000 ^a
	Residual	351.655	94	3.741		
	Total	439.974	97			

a. Predictors: (Constant), Get a hangover, Not able to do your responsibilities, Many friends and active social life

b. Dependent Variable: Mean generalised intention scores

The 20% variance accounted for by this variable is presented as follows: $[F(3,97) = 7.869, p > 0.05]$. The F value obtained is larger than the critical value of F and as such the null hypothesis is rejected. We conclude that these measures are significant predictors of intention. Type 1 error probability set at $\alpha = 0.05$.

Table 58 Regression coefficients

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.635	.483		5.454	.000
	Many friends and active social life	.524	.140	.459	3.736	.000
	Not able to do your responsibilities	-.130	.114	-.120	-1.132	.261
	Get a hangover	-.282	.124	-.251	-2.272	.025

a. Dependent Variable: Mean generalised intention scores

The standardized regression coefficient show that “may friends...” and “get a hangover” are significant predictors of intention ($\beta = .459, p < 0.05$; and $-.251, p < 0.05$). The T value obtained is 3.736 and -2.272 respectively, which is greater than the critical T . Since the T value of both these measures are $>$ the critical T value, we can state that there is a significant relationship between these two measures and intention.

Generalized intention score is a continuous variable with values ranging from 1 to 7 and is the response variable in the linear regression model. The histogram shown below in Figure 1 was used to verify this assumption. The histogram shows that the distribution is positively skewed but given the sample size can be accepted as normal. Figure 2 and Figure 3 shows that overall attitude score and subjective norm score are also positively skewed, whilst Figure 4 indicates that perceived behavioural control score is negatively skewed.

Figure 1: Histogram of Generalized Intention

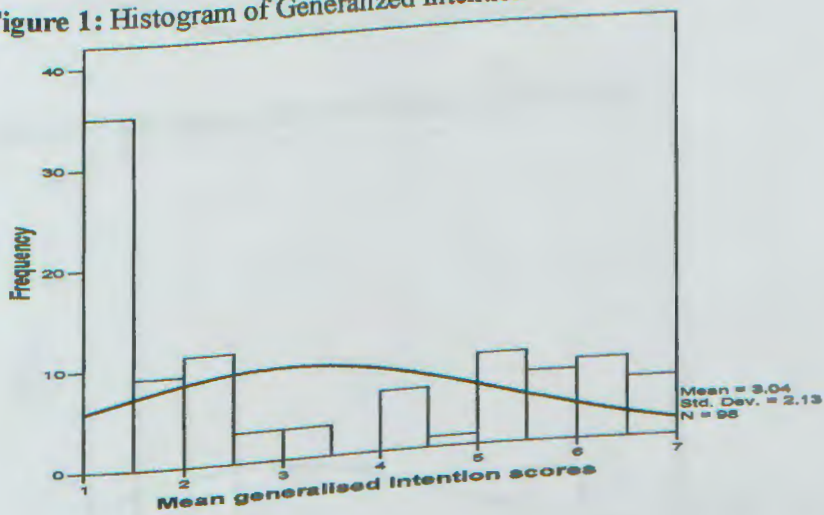


Figure 2: Histogram of Overall Attitude Score

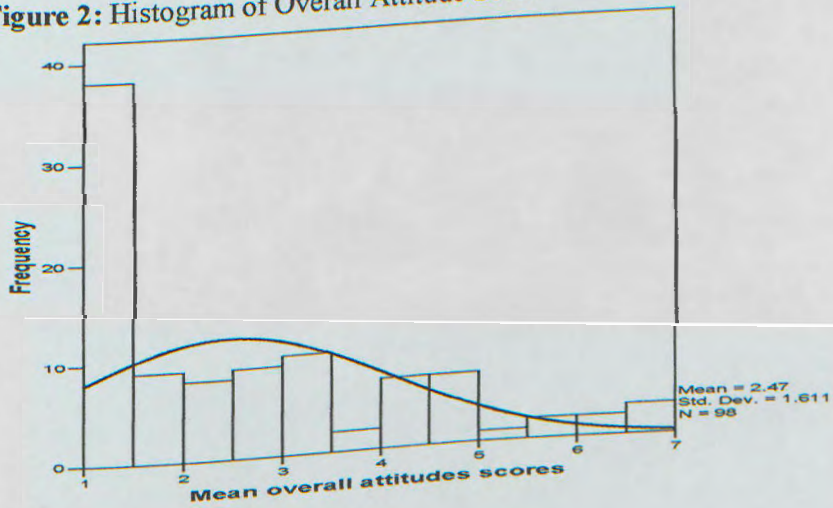


Figure 3: Histogram of Overall Subjective Norm Score

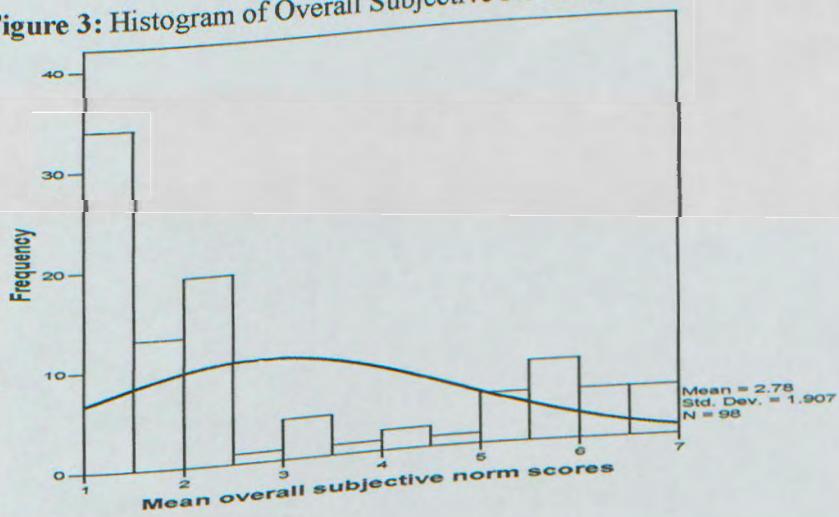
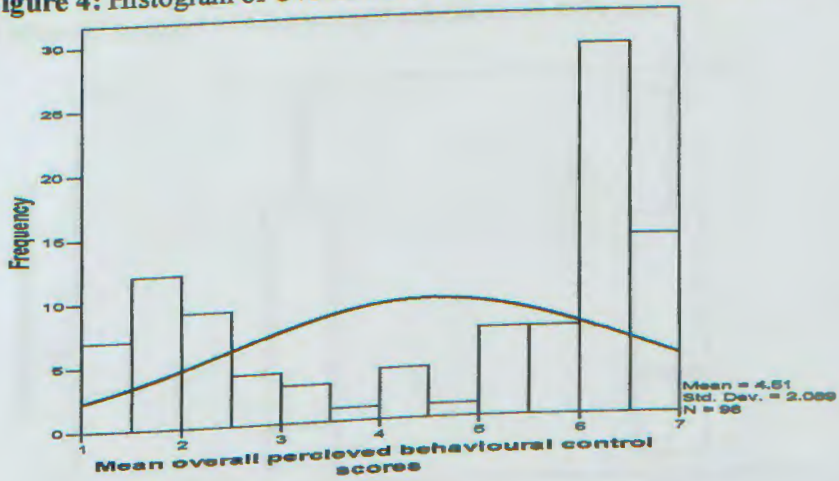


Figure 4: Histogram of Overall Perceived Behavioural Control Score



Box plots were created to investigate the distribution of generalized intention score within the categories of the age, sex and whether drinking or not. These are shown below in Figures 5, 6 and 7.

Figure 5: Boxplot of Generalized intention score by age

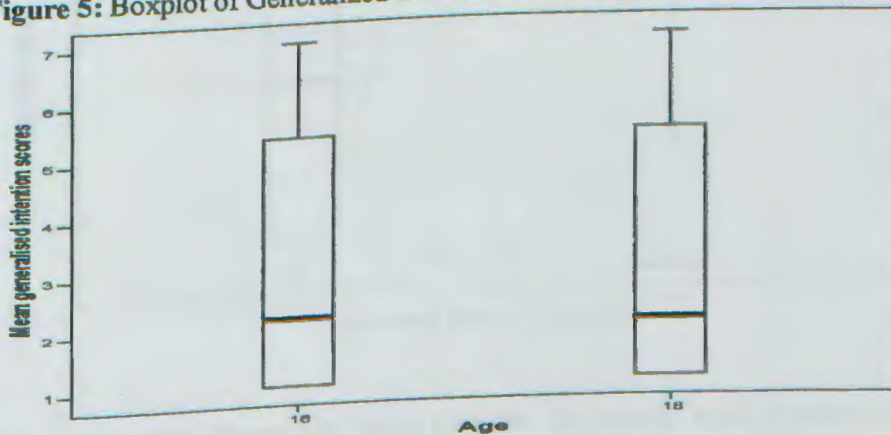


Figure 6: Boxplot of Generalized intention score by sex

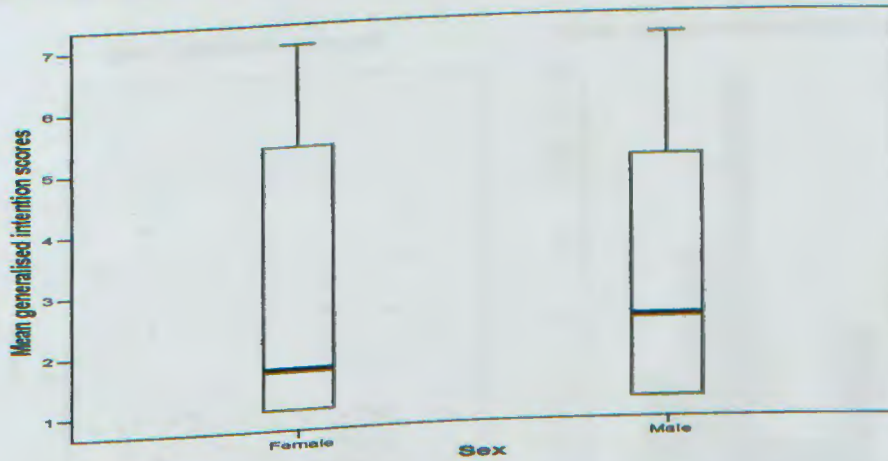
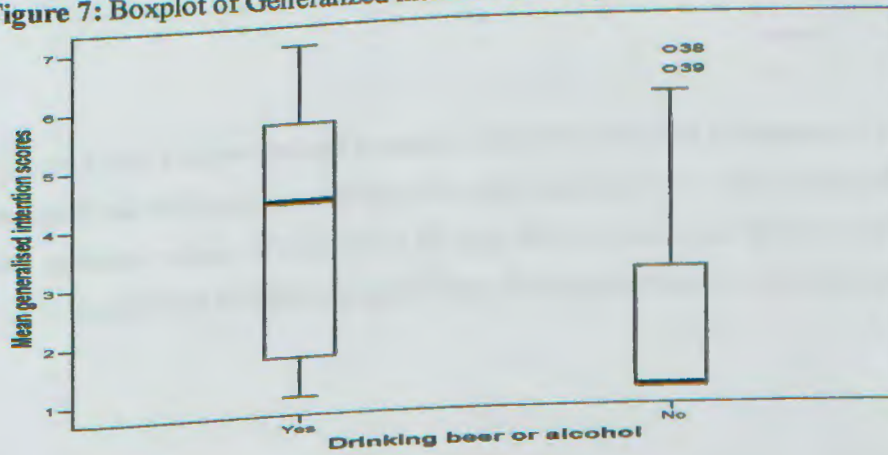


Figure 7: Boxplot of Generalized intention score by status of drinking



The figure above shows that in all cases the median generalized intention score is almost equal for both 16 years and 18 years respondents. Figure 6 shows that the median generalized intention score is higher for males compared to females. Figure 7 shows that the median of generalized intention score is much higher for those respondents who report that they are drinkers.

Figure 8 and Figure 9: Standardized Residuals and Histogram of standardized residuals (direct measures)

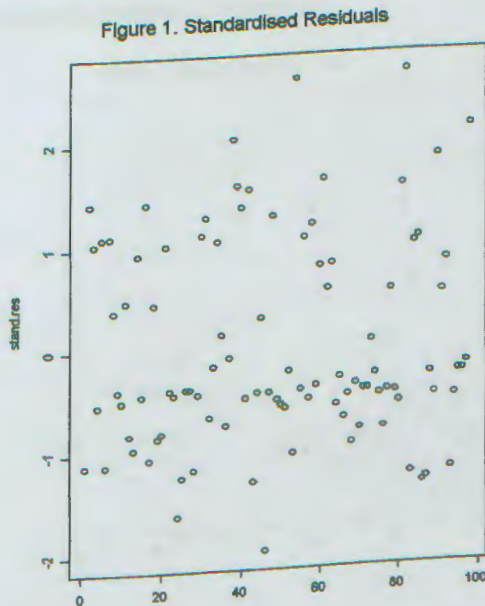
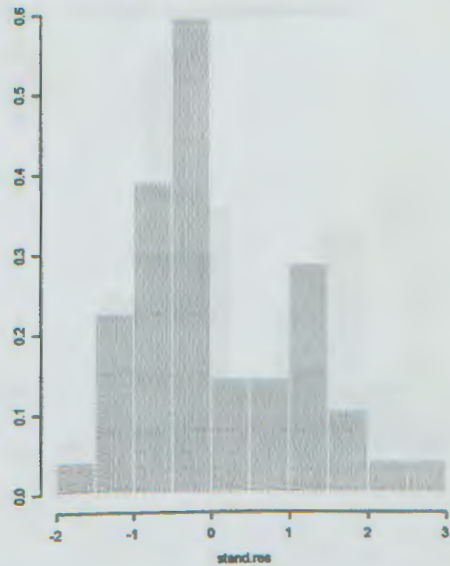


Figure. Histogram of standardised residuals



Figures 8 and 9 above present a scatter plot of standardized residuals and a histogram of standardized residuals, respectively. No systematic pattern can be observed, except for a few extreme values. If the model is true, adjusted residuals have a standard normal $N(0,1)$ distribution for large samples. Here the sample is small but normality exists.

Indirect measurement

Figure 10 and Figure 11: Standardized Residuals and Histogram of standardized residuals (indirect measures)

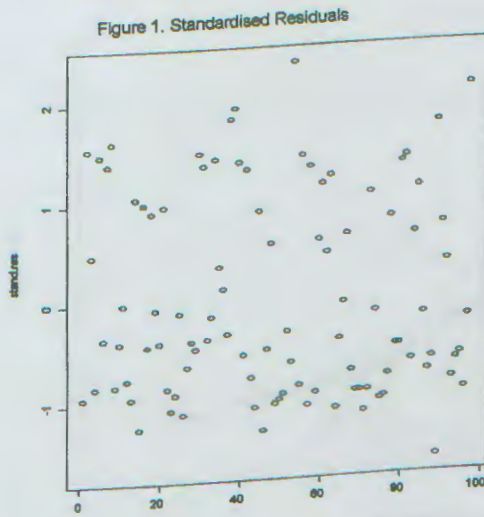


Figure 2. Histogram of standardized residuals

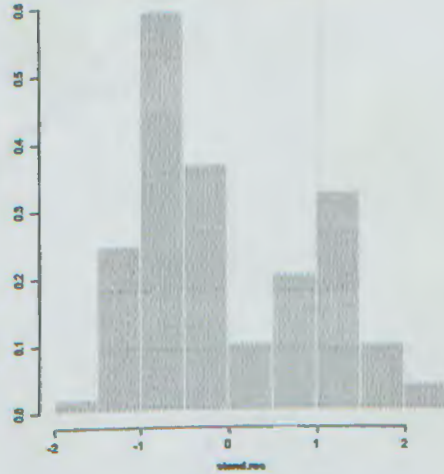


Figure 10 and 11 present a scatter plot of standardised residuals and a histogram of standardised residuals, respectively. No systematic pattern can be observed, except for few extreme values. If the model is true, adjusted residuals have a standard normal $N(0,1)$ distribution for large samples. Here the sample is small but normality exists.

Figure 12: Normal q-q plot

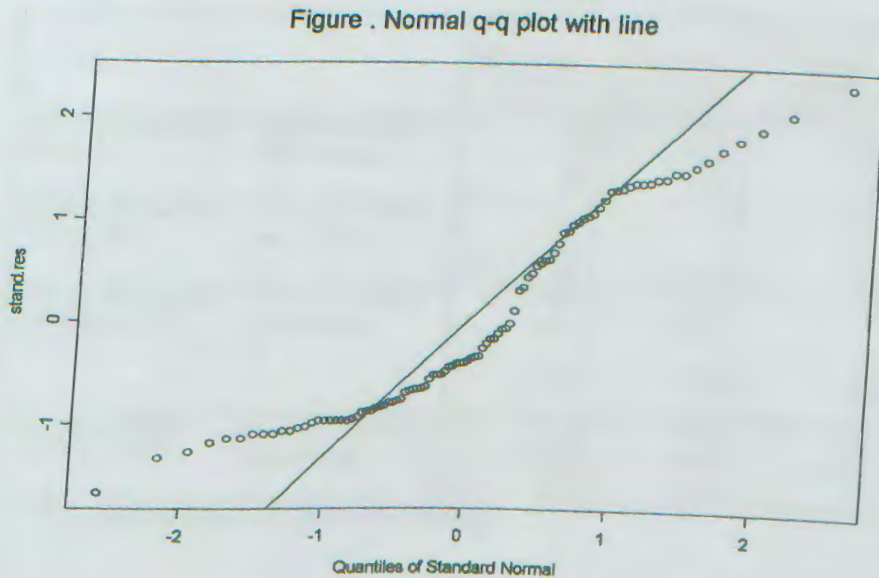


Figure 12 above indicates a quantile-quantile plot (qq-plot) with a line used to assess whether the data (usually residuals) have a given distribution. It can be observed from the qq-plot that the data has an "S" shape, meaning one distribution has longer tails relative to the other. Apart from the departure from the normal(0,1) in the tails the distribution of the standardised residuals is that of a $N(0,1)$.

5.4 Path analysis and Structural modeling

Table 59: Correlations between direct measures

		Correlations			
		Mean overall attitudes scores	Mean overall subjective norm scores	Mean overall perceived behavioural control scores	Mean generalised intention scores
Mean overall attitudes scores	Pearson Correlation	1	.021	-.059	.410**
	Sig. (2-tailed)		.841	.567	.000
	N	98	98	98	98
Mean overall subjective norm scores	Pearson Correlation	.021	1	.105	.267**
	Sig. (2-tailed)	.841		.303	.008
	N	98	98	98	98
Mean overall perceived behavioural control scores	Pearson Correlation	-.059	.105	1	.040
	Sig. (2-tailed)	.567	.303		.696
	N	98	98	98	98
Mean generalised intention scores	Pearson Correlation	.410**	.267**	.040	1
	Sig. (2-tailed)	.000	.008	.696	
	N	98	98	98	98

** . Correlation is significant at the 0.01 level (2-tailed).

Table 60: Path Coefficients.

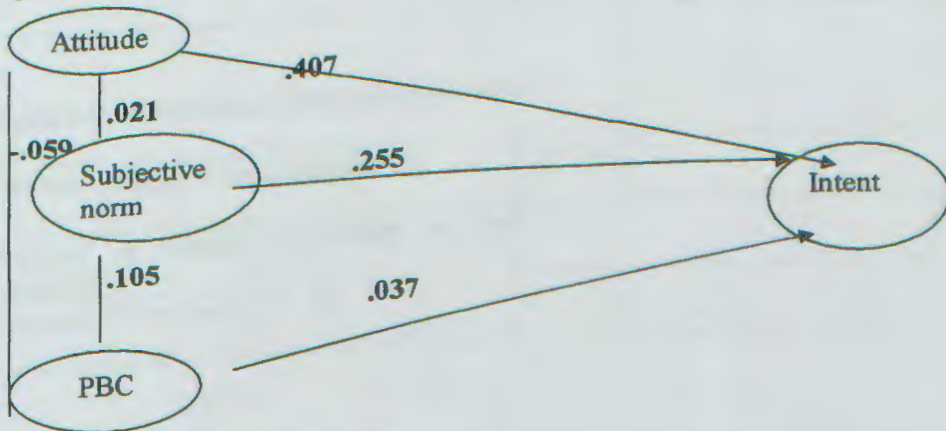
R	R Square	Adjusted R Square	Std error of the estimate
.486	.236	.212	1.890

Table 61: Analysis of variance

Model	Sum of squares	Df	Mean square	F
Regression	104.034	3	34.678	9.703
Residual	335.940	94	3.574	
Total	439.974	97	38.252	

Table 62: Regression coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	T	Significance
	B	Std. error	Beta		
Constant	.748	.602		1.242	.217
Mean attitude	.538	.119	.407	4.504	.000
Mean subjective norm	.285	.101	.255	2.815	.006
Mean perceived behavioral control	.038	.093	.037	.407	.685

Figure 13: Path Analysis results**Observed endogenous variables**

- Intention

Observed exogenous variables

- Attitude
- Subjective norm
- Perceived behavioral control

Unobserved exogenous variables

- Extraneous unknown variable

Table 63: Variable counts

Item	Number
Number of variables in the model	5
Number of observed variables	4
Number of unobserved variables	1
Number of endogenous variables	1
Number of exogenous variables	3

Table 64: Computation of degrees of freedom

Number of distinct sample moments	11
Number of distinct parameters to be estimated	10
Degrees of freedom (11 - 10)	1

Table 65: Result (default model)

Chi Square	.740*
Degrees of freedom	1

This chi-square tests the null hypothesis that the reduced model fits the data as well as does the full saturated model. The non - significant chi - square here indicates that the

fit between the reduced model and the data is not significantly worse than the fit between the full model and the data. It should be mentioned that whilst the non-significance of chi indicates that the reduced model fits the data well, even a well-fitting model will be significantly different from the full model if the sample size is sufficiently large. A good fitting model is one that can reproduce the original correlation matrix from the path coefficients.

Maximum Likelihood estimates

Rather than using ordinary least square methods, which minimizes the squared deviation between values of the criterion variable and those predicted by the model, use was made of maximum likelihood measures to estimate the parameters.

Table 66: Maximum likelihood estimation

Variable	Maximum likelihood estimate
Intention - Attitude	.407
Intention - Subjective norm	.255
Intention - Perceived behavioral control	.037

Note that the path coefficients presented in Table 66 above are exact matches to the path coefficients obtained in the regression analysis.

Table 67: Correlations between exogenous variables

	Estimate
Subjective norm - Attitude	.021
Subjective norm - Perceived behavioral control	.105
Perceived behavioral control - Attitude	-.059

Table 67 above presents the simple correlations between the exogenous variables.

The total effect of one variable on another can be divided into direct effects (no intervening variables involved) and indirect effects (through one or more intervening variable).

The indirect effects are computed as the product of the path coefficient from one variable through another and the path coefficient from that intervening to another (e.g. from pbc through intention, and from intention to behaviour. The direct effect would be the pbc – behaviour path, and the indirect effect would be the product of the pbc – intention and intention to behaviour path).

Table 68: Standardized total effects:

	Attitude	PBC	Intention
Intention	.407	.255	.037

Table 69: Standardized direct effects:

	Attitude	PBC	Intention
Intention	.407	.255	.037

Table 70: Standardized indirect effects:

	Attitude	PBC	Intention
Intention	0	0	0

5.4.1 Model fit summary

Table 71: CMIN

MODEL	NPAR	CMIN	DF	P	CMIN / DF
DEFAULT	7	.740	1	.655	
SATURATED	11	.000	0		
INDEPENDENT	4		7		

NPAR is the number of parameters in the model. In the saturated (just – identified) model there are 11 parameters – 4 variances (one for each variable) and 7 path coefficients. For the tested (default) model there are 7 parameters (4 paths were dropped). For the independent model (one where all the paths have been deleted) there are four parameters (the variances of the 4 variables).

CMIN is a Chi – square statistic comparing the tested model and the independent model with the saturated model. CMIN / DF, the relative chi square, is an index of how much the fit of data to model has been reduced by dropping one or more paths.

Table 72: RMR, GFI

MODEL	RMR	GFI	AGFI	PGFI
Default model	2.60	.912		
Saturated model	.000	1.000		
Independent model				

RMR, the root mean square residual, is an index of the amount by which the estimated variances and co-variances differ from the observed variances and co-variances.

GFI, the goodness of fit index, tells us what proportion of the variance in the sample variance – covariance matrix is accounted for by the model. This should exceed .9 for a good model. For the full model it will be a perfect 1. AGFI (adjusted GFI) is an alternate GFI index in which the value of the index is adjusted for the number of parameters in the model. The PGFI (P is for parsimony) the index is adjusted to reward simple models and penalize models in which few paths have been deleted.

6. Analysis and Interpretation

6.1 Introduction

This section of the report presents interpretations drawn by the researcher based on the data presented in the preceding chapter. It starts out with a discussion of the data preparation for analysis. Ensuing is a discussion on model fit for the data, and it extends into observations about the predictive utility of the original model. The chapter concludes with a discussion on the best predictors of intention and presents a reduced model which is substantiated by the explained variance in the obtained results.

6.2 Measurement model evaluation

In order to assess the adequacy of the measurement model, analysis was performed where all constructs in the model were allowed to correlate freely. Fit statistics (RMSEA, CFI, NFI, and PNFI) associated with the measurement model, proportions of variance extracted for the constructs and reliabilities were calculated.

6.2.1 Fit statistics

An initial matter is whether the maximum likelihood estimates for the measurement model provide satisfactory fit to the data. In this case, the model adequately reflected a good fit to the data (RMSEA =.912)

6.2.2 Structural model results

The next step in the analysis was to test a structural model. This structural model was evaluated to test the validity of the TPB. Using maximum likelihood estimation, the model provided a good fit for the data. It showed significant, though not complete, support for the TPB. Intention was predicted significantly by attitude towards drinking and subjective norms. However, perceived behavioral control was not significant in predicting intention. In predicting behavioral intention, attitude towards drinking contributed more significantly than subjective norm.

To explore the predictive power of the Theory of Planned Behavior, zero-order correlations were first calculated, the results of which were presented in the preceding chapter. Zero-order correlations are conducted where there is only one predictor variable in the model, such as intention (criterion variable) and attitude (predictor variable). In such cases the path coefficient would be the simple zero-order r between the two variables.

These findings indicated that all the direct measured predictor variables did not correlate significantly with each other. The strongest relationship with intention as outcome variable was with attitude followed by subjective norms. These findings were further explored in a multiple regression analysis in which intention was regressed on all three predictor variables simultaneously, and then individually. The resultant products of the

regression analysis were subjected to path analysis and the relative weight of each predictor variable was reported.

Overall, the model's predictive utility for intention to drink was confirmed in this study. The total model, when all predictor variables were treated as independent and generalized intention regressed as dependent variable, accounted for 24% of the variance in intention [$F(3,94) = 9.703, p < 0.01$]. The null hypothesis is that the differences between the means are due to sampling error and that all means poorly represent one population mean. Because the F value obtained is larger than the critical value of F we reject the null hypothesis concluding that the different level means are unlikely to be representing one population mean. Thus, we concluded that the F obtained (9.703) is significant and that the three predictor variables produced a significant difference in mean intention scores. Because $\alpha = .05$, the probability that a Type 1 error has been committed is $p < .05$.

Standardized regression coefficients were computed for the predictor variables and indicated the relative weight of the various predictor variables. The standardized regression coefficients showed attitude to be the most significant predictor (beta = .407, $p < 0.05$), followed by subjective norm (beta = .255, $p < 0.05$). Perceived behavioral control did not contribute significantly to the prediction of intention (beta = .037 $p < 0.05$). Given this, attitude accounted for 41% of the variance, subjective norm 26%, and perceived behavioral control 4%.

When generalized intention was regressed on the direct attitude measure it was found that 17% of the variance in intention could be explained [$F(1,96) = 19.383, p < 0.05$]. Thus, on its own, attitude accounted for a substantially lower percentage of variance in intention than when included in the saturated model.

When generalized intention was regressed on the direct subjective norm measure it was found that 7% of the variance in intention could be explained [$F(1,96) = 5.981, p < 0.05$]. It was noted that even though a significant relationship between subjective norm and intention is observed, this variable proved to be a statistically unimportant predictor of intention on its own as it can only account for 7% of intention variance.

Regression of generalized intention on the direct measure of perceived behavioral control produced an insignificant variance in intention, <4%. It was noted that perceived behavioral control did not prove to be a significant predictor of intention both in the saturated model and on its own.

The direct measure of perceived behavioral control failed to contribute significantly to the prediction of intention, but analysis of the correlations showed significant attitudinal belief correlations with intention.

One of these attitudinal beliefs ["having many friends and an active social life"] proved to be significantly correlated with intention ($r = .380, p < 0.05$). This relationship was

explored in a subsequent regression analysis, and accounted for 14% of the variance in intention [$F(1,96) = 16.198, p < 0.05$]. The regression coefficients of this measure showed an equally significant value [$\beta = .380, p < 0.05$].

The following variables proved to be significantly correlated with intention: "not being able to do your responsibilities" ($r = -.284, p < 0.05$); and "having many friends and an active social life" ($r = .380, p < 0.05$). These variables were entered into a regression model and accounted for 20% of the variance in intention. The strongest predictor proved to be "having many friends and an active social life" ($\beta = .459, p < 0.05$); followed by "getting a hangover" ($\beta = -.251, p < 0.05$). Not being able to do your responsibilities proved to be an insignificant predictor of intention ($\beta = -.120, p > 0.05$).

The variables age, gender and drinking status were combined in a regression analysis with the three predictor variables, and accounted for 31% of the variance in intention [$F(6,96) = 22.577, p < 0.05$]. The significant and strongest predictors of intentions proved to be attitude ($\beta = .310, p < 0.05$); current drinking status ($\beta = -.297, p < 0.05$); and subjective norm ($\beta = .206, p < 0.05$).

The only composite indirect measure that correlated significantly with intention was perceived behavioral control ($r = .260, p < 0.05$). The indirect measures of attitude and subjective norm proved not to be correlated with intention.

Zero order correlations between the indirect predictor variables indicated the following results. Attitude was significantly correlated with subjective norm ($r = .217, p = 0.05$). Attitude was not correlated with perceived behavioral control ($r = .155, p > 0.05$); neither was subjective norm correlated with perceived behavioral control ($r = .055, p > 0.05$).

Zero order correlations between the indirect predictor variables revealed the following results. For the intention statement with generalized intention a correlation coefficient of $r = .211, p < .05$ was obtained. For the attitude measures a correlation coefficient of $r = .294, p < 0.01$ was obtained. For subjective norm a correlation coefficient of $r = .204, p < 0.01$. The only indirect measure that did not obtain a significant correlation with its corresponding direct measure was perceived behavioral control - $r = .191, p > 0.05$.

Indirect attitude accounted for 9% of the variance in intention [$F(1,96) = 9.057, p < 0.05$]. The indirect attitude beta coefficient indicates that it is a significant predictor of intention (beta = .294, $p < 0.05$). The indirect measure of subjective norm accounted for only 4% of the variance in intention and proved to be an insignificant predictor [$F(1,96) = 3.574, p > 0.05$]. Its beta coefficients confirmed its insignificance as a predictor of intention (beta = .189, $p > 0.05$). Likewise, perceived behavioral control proved to be an insignificant predictor of intention [$F(1,96) = 3.651, p > 0.05$].

The indirect measure of attitude, consisting of behavioral beliefs and outcome evaluations, proved to be correlated with intention. For the behavioral beliefs

component, 2 of the 4 items proved to be significantly correlated with intention. Specifically, "having many friends" ($r = .380, p < 0.05$) and "having more confidence" ($r = .333, p < 0.05$) proved to be correlated with intention. The other two behavioral beliefs did not obtain significant correlations with intention – "becoming too dependent" ($r = -.171, p > 0.05$) and "getting a hangover" ($r = .031, p > 0.05$).

The indirect measure of subjective norm, consisting of normative beliefs and motivations to comply, obtained quite distinct results. None of the 4 normative belief items proved to be correlated with intention. "My friends who drink think ..." ($r = .174, p > 0.05$); "my parents would..." ($r = -.048, p > 0.05$); "most grade 11 children..." ($r = -.108, p > .05$); and "teachers at school would..." ($r = -.044, p > 0.05$).

The indirect measure of perceived behavioral control consists of two components. The one component of indirect perceived behavioral control, i.e. control belief strength, proved to be a significant predictor and accounted for 24.4% of the variance in intention [$F(4,93) = 7.524, p < 0.05$]. The beta coefficients show the strongest control belief strength predictors to be "when I have nothing else to do I have to drink" (beta = .360, $p < 0.05$). The other three constructs of control belief strength proved to be insignificant predictors of intention, i.e. "keeping the respect of my friends" (beta = .179, $p > 0.05$); "I can tell my friends..." (beta = -.604, $p > 0.05$), and "sometimes my friends expect me to drink" (beta = .132, $p > 0.05$).

The other component of perceived behavioral control, i.e. control belief power, accounted for 22% of the variance in intention [$F(4,93) = 6.509, p < 0.05$]. The beta coefficients indicated the following as the most significant components of control belief power: "when there are not enough recreational things to do" ($\beta = .333, p < 0.05$). Following this was "willing to drink if that is how I keep my friends' respect" ($\beta = .298, p < 0.05$). The other two components of control belief power proved to be insignificant predictors of intention.

The results indicated that the composite indirect measure of perceived behavioral control accounted for 19% of the variance in intention. Computing the analysis of variance tells us that [$F(1,96) = 3.651, p < 0.01$]. Thus, the null hypothesis is confirmed and we conclude that the F obtained (3.651) is insignificant, and that the perceived behavioral control composite variable produced an insignificant difference in mean intention scores.

In conclusion, we have noticed that the direct measures of the predictor variables proved to be the most significant predictors of intention. Notwithstanding, only two of the three predictor variables proved to be significant in explaining the variance in intention, i.e. attitude and subjective norms. Perceived behavioral control proved to be an insignificant predictor of intention.

For the indirect measures in the saturated model, perceived behavioral control was the only predictor that could significantly contribute to accounting for the variance in

intention. The components that made up the indirect measures had varying effects on the variance in intention, mainly depending in whether they were run separately or as a composite variable in the regression.

7. Conclusion

This study had two objectives; firstly, to assess the predictive utility of the Theory of Planned Behavior in explaining adolescent intentions to drink in a less developed context, and secondly, to gain an understanding of the factors that are significant in determining alcohol intentions in such less developed context. Limitations in the design, as indicated earlier, limit the scope of interpretation of the obtained results. Essentially, it restricts the comparison of current findings to theoretical-based arguments as opposed to empirical-based.

The results of the study provide support for the conceptual model, and confirm the theory's insistence that different predictor variables might have different influences, depending upon the behavior being studied. The conceptual model succeeded in predicting intentions to drink. Specifically, 24% of variance in intention was explained by the model.

As stated, the direct measures as a composite variable regressed on intention proved to explain a significant amount of variance in intention. When individual variables were regressed on intention it was found that direct attitude could explain 16.8% of variance in intention. When subjective norm was regressed on intention, it was found that it could explain <1% of variance in intention, whereas perceived behavioral control could also only account for <1% of the obtained variance in intention. Thus it appears that, by

itself, these variables contribute very little in explaining the variance in intention to drink.

The indirect measures of the predictor variables managed to account for an extremely small amount of variance in intention. When assessed individually, the indirect measures proved to be better predictors of intention. More specifically, we have noted that the components that make up each of the three predictor variables obtained substantial differences in the correlations computed with intention. The significant correlations were confirmed in subsequent regression analysis as significant predictors of intention. The single best indirect measure that accounted for the most significant amount of variance appeared to be perceived behavioral control.

These findings have both theoretical and practical implications. From a theoretical point of view, the differential roles played by controllability and self-efficacy in the prediction of intention provide some justification for their distinction and may suggest that these constructs are not only important in the context of drinking but may be the preferred measure within the Theory of Planned Behavior.

Whilst a number of theorists have distinguished theoretically between these measures in response to criticism regarding the conceptual clarity of perceived behavioral control (Armitage & Conner, 2001), recent attempts to clearly operationalise these variables

have shown that controllability items typically predict intentions only when combined with those of self-efficacy (Armitage & Conner, 2001).

Contrary to previous research, there was no evidence in this study to suggest that attitudes to alcohol are directly related to drinking behavior as measured by current drinking status (drinking attitude and current drinking status obtained insignificant correlations). This could perhaps be explained by the assumption that decision-making in African cultures is governed largely by social factors (Fekadu & Kraft, 2001), and personal considerations will therefore have less relevance particularly in more traditional contexts. Here the emphasis on group rather than individual is accentuated.

However, given the differential roles played by the direct and belief-based measure of attitude in the present study, both cognitive and affective evaluations could co-exist in relation to drinking, with the affective evaluations employed in this study failing to adequately represent attitude. A number of studies have not only reported the discriminant validity of affective and cognitive evaluations but have shown that when these two are weakly correlated, separate measures will enhance the predictive validity of the Theory of Planned Behavior (Manstead & Parker, 1995).

This is likely to be the case for more complex attitudinal reactions, such as those comprising a positive/negative belief system. Giles & Cairns (1995), for example, provided support for a multidimensional representation of the belief-based measure of

attitude in the context of blood donation. The finding here that the more positive beliefs were more significantly correlated with intention than were the negative consequences suggests that attitudes to drinking might also be multidimensional and thus a cognitive evaluation might have enhanced the prediction of intention.

The finding here that the normative component is important in determining intention to drink is perhaps not surprising given the dyadic nature of drinking context amongst adolescents and the findings elsewhere that one's friends has a significant role to play in this decision-making process. However, finding that family influences (e.g. wishing to conform with expectations of parents) are more important adds weight to the suggestion that the normative component will have more relevance where individual decisions are responsive to group norms than in cultures where the decision-making process is more individualistic.

In many studies conducted in the developed world, for example, subjective norms have emerged as the weakest predictor of the intention variable (e.g. Sheppard, Hartwick & Warshaw, 1988) with the result that several investigators have removed it from their analysis (Armitage & Conner, 2001). However, according to Fishbein (2002), "the relative importance of each of the variables is expected to vary as a function of both the behavior and the population under consideration" (p.121) and thus to suggest its removal would be to reduce the model's universal applicability.

From a practical perspective, the finding that parents and teachers play an important role in regulating adolescent drinking intentions might imply that these two referent groups could be encouraged to talk more to adolescents about issues related to drinking. Although media campaigns (for example Coalition on Responsible Drinking in Namibia) are currently promoting abstinence from drinking, these potentially run counter to strong and established cultural constraints. A more realistic approach might be to target adolescents in Life Skills subjects and have frank debates beyond the communication impasse which seems to prevail.

Collectively, the present findings suggest that social science theories which focus on individual decision making are not necessarily at odds with community based approaches to drinking prevention. Indeed, the present findings have not only shown that the Theory of Planned Behavior can be used effectively to predict drinking intentions, but also highlight the extent to which drinking is governed by social influences. The results cast doubt on health promotion activities that focus solely on individualistic models of behavior change, offering empirical evidence instead to support interventions that penetrate community networks.

Whilst critics of the Theory of Planned Behavior may argue that the theory concentrates too heavily on individual factors and ignores macro-social constructs, the present study demonstrated that the theory offers a rigorous empirical tool for demonstrating the validity of their argument. The Theory of Planned Behavior may be one of the

theoretical frameworks on offer that can do justice to the dynamic relationship that exists between individual and collective levels of explanation.

Psychology, 14, 107-102.

Adams, M. W. (1964) *Latent content and manifest content in education: analysis of practice on Abstract 14-52.*

Agnes, L. & Pridmore, M. (1976) *Challenging attitudes and promoting social behaviour: Progression CFTs, 31.* Praeger Press.

Agnes, C. (1974) *The theory of physical education: An experimental, theoretical and human studies Perspective, 30, 179-211.*

Agnes, J. & Madden, T. J. (1966) *Production of self directed behavior: emotional, cognitive and behavioral behavioral control, Journal of Experimental Social Psychology, 22, 411-428.*

Allen, R. L., Koehn, M. D., Lopez-Cabata, J. & Wolkstein, M. (1971) *Social learning and behavior change: A specific case of a physical health. American Psychological Review, 49, 418-424.*

Allen, R. L. (1977) *Deviant behavior: A social learning approach (2nd edn).* Belmont, C.A. Wadsworth.

Andrews, D.S. & Fendley, G. (1971) *Drug use: A social learning of Community Technical and Junior College, George Mason University (VA) and Prince George's College, MD.*

Armstrong, C. J. & Cooper, M. (1971) *Effects of the Theory of Physical Education: A Social Analytic Review. British Journal of Health Psychology, 46, 471-488.*

Bartlett, J. G., Johnson, L. D. & O'Malley, R. M. (1967) *Spelling, reading, and drug use among Hawaiian high school students. Community and health, 1973-1976. American Journal of Public Health, 71, 79-89.*

Bartlett, R. P., Newcomb, L. & Taylor, S. (1971) *An investigation into the role of attitudes as mediators of the cigarette habit in adolescents. American Journal of Psychology, 84, 27-32.*

Baxter, H. M. (1962) *Adolescent alcohol abuse and other problem behaviors: Their relationships and possible control schemes. Journal of Health and Human Services, 21, 125-138.*

Baxter, G. M. & White, J. W. (1966) *Attitudes and acquisition of alcohol use among 10-12th grade students in New York State. Journal of Research on Alcohol, 4(2), 1-12.*

Baxter, T. L. & Skilling, L. P. (1975) *Psychosocial determinants of adolescent drug and alcohol use: a social learning analysis. An analysis of the area above the 1970-1971 and 1971-1972 Psychology Bulletin, 74, 577-587.*

REFERENCES

- Abbey, A. O'Leary, D. Stilianos, K. Hohlstein, L. A. & Kaczynski, R. (1990). Substance abuse prevention for second graders: are they too young to benefit? *Journal of Applied Developmental Psychology*, 11, 149-162.
- Abbott, M. W. (1984). Locus of control and treatment outcome in alcoholics. *Journal of Studies on Alcohol* 45:46-52.
- Ajzen, I. & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. Englewood Cliffs, NJ: Prentice-Hall.
- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50, 179 - 211.
- Ajzen, I. & Madden, T. J. (1986). Prediction of goal directed behavior: attitudes, intentions and perceived behavioral control. *Journal of Experimental Social Psychology*, 22, 453 - 474.
- Akers, R. L., Krohn, M. D., Lanza-Kaduce, L., & Radosevich, M. (1979). Social learning and deviant behavior: A specific test of a general theory. *American Sociological Review*, 44, 636--655.
- Akers, R. L. (1985). *Deviant behavior: A social learning approach* (3rd ed.). Belmont, CA: Wadsworth.
- Anderson, D.S. & Pressley, G. (1991) "Drug and Alcohol Survey of Community, Technical and Junior Colleges", George Mason University (VA) and Nassau Community College (NY).
- Armitage, C. J. & Conner, M. (2001). Efficacy of the Theory of Planned behaviour: A Meta-Analytic Review. *British Journal of Social Psychology*, 40, 471 - 499.
- Bachman, J. G., Johnston, L. D., & O'Malley, P. M. (1981). Smoking, drinking, and drug use among American high school students: Correlates and trends, 1975--1979. *American Journal of Public Health*, 71, 59--69.
- Bagozzi, R. P., Baumgartner, J., & Yi, Y. (1989). An investigation into the role of intentions as mediators of the attitude-behavior relationship. *Journal of Economic Psychology*, 10, 35-62.
- Barnes, G. M. (1984). Adolescent alcohol abuse and other problem behaviors: Their relationships and common parental influences. *Journal of Youth and Adolescence*, 13, 329--348.
- Barnes, G. M., & Welte, J. W. (1986). Patterns and predictors of alcohol use among 7--12th grade students in New York State. *Journal of Studies on Alcohol*, 47(1), 53--62.
- Baxter, T. L., & Goldberg, L. R. (1987). Perceived behavioral consistency underlying trait attributions to oneself and another: An extension of the actor-observer effect. *Personality and Social Psychology Bulletin*, 13, 427-447.

- Bean, M. 1975 Alcoholics Anonymous, Chapter V: A critique of A.A. *Psychiatric Annals* 5:83-109.
- Beck, K., and T. Summons 1987 The social context of drinking among high school drinking drivers. *American Journal of Drug and Alcohol Abuse* 13:181-198.
- Becker, MH: *The health belief model and personal health behavior*. Thorofare, NJ, Charles B Slack, 1974
- Bennett, P. Norman, P., Moore, L., Murphy, S., & Tudor-Smith, C. (1997). Health locus of control and value for health in smokers and non-smokers. *Health Psychology*, 16, 179-182.
- Bennett, P., Norman, P., Murphy, S., Moore, L., & Tudor-Smith, C. (1998). Beliefs about alcohol, health locus of control, value for health and reported consumption in a representative population sample. *Health Education Research*, 13, 25-32.
- Berg, N. L. 1971 Effects of alcohol intoxication on self-concept: Studies of alcoholics and controls in laboratory conditions. *Quarterly Journal of Studies on Alcohol*, 32: 442-53.
- Berkowitz, A.D., & Perkins, H.W. (1986a). Problem drinking among college students: A review of recent research. *Journal of American College Health*, 35, 21-28.
- Berkowitz, A.D., & Perkins, H.W. (1987). Recent research on gender differences in collegiate alcohol use. *American College Health*, 36, 123 - 129.
- Blau, G. M, J. F. Gillespie, R. D. Felner, and E. G. Evans. (1988) Predisposition to drug use in rural adolescents: Preliminary relationships and methodological considerations. *Journal of Drug Education*, 18: 1322.
- Blum, R. (1969). *Students and drugs*. San Francisco: Jossey-Bass.
- Bonaguro EW, Bonaguro JA: Tobacco use among adolescents: directions for research. *American Journal of Health Promotion* 1989; 4:37-41.
- Bosma, H., Marmot, M. G., Hemingway, H., Nicholson, A. C., Brunner, E., & Stansfeld, S. A. (1997). Low job control and risk of coronary heart disease in Whitehall II (prospective cohort) study. *British Medical Journal*, 314, 558-565.
- Bottorff, J. L., Johnson, J. L., Ramer, P. A., & Hayduk, L. A. (1996). The effects of cognitive-perceptual factors on health promotion behavior maintenance. *Nursing Research*, 45, 30-36.
- Brehm, M., & Back, K. (1968). Self image and attitudes toward drugs. *Journal of Personality*, 36, 299-314.
- Brennan, A.F., Walfish, S., & AuBuchon, P. (1986). Alcohol use and abuse in college students: A review of individual and personality correlates. *The international Journal of Addictions*, 21, 449 - 474.

- Brook, J. S., Whiteman, M., Gordon, A. S., Brook, D.W., & Cohen, P. (1990, May). The psychosocial etiology of adolescent drug use: A family interactional approach. *Genetic, Social & General Psychology Monographs*, 116(2).
- Brown, S. (1985) Expectancies versus background in the prediction of college drinking patterns. *Journal of Consulting and Clinical Psychology* 53:123-130.
- Brown, S., Christiansen, B. A., & Goldman, M. S. (1987). The Alcohol Expectancy Questionnaire: An instrument for the assessment of adolescent and adult alcohol expectancies. *Journal of Studies on Alcohol*, 48, 483-491.
- Brown, S., Creamer V, & Stetson B 1987 Adolescent alcohol expectancies as a function of personal and parental drinking patterns. *Journal of Abnormal Psychology* 96:117-121.
- Brown, S., Goldman, M. S., & Anderson, L. R. (1980). Expectations of reinforcement from alcohol: Their domain and relation to drinking patterns. *Journal of Consulting and Clinical Psychology*, 48, 419-426.
- Brownell, K. D., G. A. Marlatt, E. Lichtenstein, and G. T. Wilson 1986 Understanding and preventing relapse. *American Psychologist* 41:765-82.
- Brownson RC, Thompson JJ, Wilkerson JC, et al: Demographic and socio-economic differences in beliefs about the health effects of smoking. *American Journal of Public Health* 1992; 82:99-103.
- Bruhn, J. G. (1988). Life-style and health behavior. In D. S. Gochman (Ed.), *Health behavior: Emerging research perspectives* (pp. 71--86). New York: Plenum.
- Brunswick, A. F., & Messeri, P. A. (1984). Gender differences in the processes leading to cigarette smoking. *Journal of Psychosocial Oncology*, 2(1), 49--69.
- Buhrmann, H. G. (1977). Athletics and deviance: An examination of the relationship between athletic participation and deviant behavior of high school girls. *Review of Sport and Leisure*, 2, 17--35.
- Bukstein, O.G. (1994) Treatment of adolescent alcohol abuse and dependence. *Alcohol, Health and Research World*, 18, 296 - 301.
- Burden JL, Maisto SA. Expectancies, evaluations and attitudes: prediction of college student drinking behavior. *Journal of Studies on Alcohol* 2000; 61(2):323-331.
- Cahalan, D. 1988 Implications of the disease concept of alcoholism. *Drugs & Society* 2:49268.
- Cahalan, D., I. Cisin, I & M. Crossley 1969 *American drinking patterns*. New Brunswick, N.J.:Rutgers Center on Alcohol Studies.
- Callaghan, P. (1998), Social support and locus of control as correlates of UK nurses' health-related behaviours. *Journal of Advanced Nursing*, 28, 1127-1133.

- Calnan, M. (1989). Control over health and patterns of health-related behaviour. *Social Science and Medicine*, 29, 131-136.
- Carey, K. B. (1993). Situational determinants of heavy drinking among college students. *Journal of Counseling Psychology*, 40, 217-220.
- Carey, K. B. (1995). Heavy drinking contexts and indices of problem drinking among college students. *Journal of Studies on Alcohol*, 56, 287-292.
- Carlisle, P. (1986). Personality hardiness: An influencing factor in substance use among college students. Unpublished master's thesis, University of Chicago.
- Caster, D., & Parsons, O. (1977). Relationship of depression, sociopathy, and locus of control to treatment outcome in alcoholics. *Journal of Consulting and Clinical Psychology*, 45, 751-756.
- Catalano, R. F. & Hawkins, J. D. (1996). The social development model: A theory of antisocial behavior. In J. D. Hawkins (Ed.), *Delinquency and crime: Current theories* (pp. 149-197). New York: Cambridge University Press.
- Charalampous, K. D., B. K. Ford, and T. J. Skinner 1976 Self-esteem in alcoholics and nonalcoholics. *Journal of Studies on Alcohol* 37:990-4.
- Charlton, A. & Blair, V. (1989) Predicting the onset of smoking in boys and girls, *Social Science and Medicine*, 29, 813-818.
- Chassin L, Presson CC, Sherman SJ, (1990): The natural history of cigarette smoking: predicting young-adult smoking outcomes from adolescent smoking patterns. *Health Psychology*, 1990; 9:701-716.
- Chassin L., Presson, C.C, Sherman S.J. (1990): Social psychological contributions to the understanding and prevention of adolescent cigarette smoking. *Personality and Social Psychology Bulletin*, 1990; 16:133-151.
- Chassin, L., C. Tetzloff, and M. Hershey (1985) Self-image and social-image factors in adolescent alcohol use. *Journal of Studies on Alcohol* 46: 39-47.
- Chen, K., & Kandel, D. (1995). The natural history of drug Use from adolescents to the mid-thirties in a general population sample. *American Journal of Public Health*, 85, 41-47.
- Christiansen, B. A. & Goldman, M. S. (1983) Alcohol-related expectancies versus demographic/background variables in the prediction of adolescent drinking, *Journal of Consulting and Clinical Psychology*, 51,249-257.
- Christiansen, B. A., Goldman, M. S. & Inn, A. (1983) Development of alcohol-related expectancies in adolescents: separating pharmacological from social-learning influences, *Journal of Consulting and Clinical Psychology*, 50, 336-344.

- Cialdini, R. B., Reno, R. R. & Kallgren, C. A. (1990). A focus theory of normative conduct: Recycling the concept of norms to reduce littering in public places. *Journal of Personality and Social Psychology*, 58, 1015 – 1026.
- Coan, R. (1973). Personality variables associated with cigarette smoking. *Journal of Personality and Social Psychology*, 26, 86-104.
- Cohen, A. K. (1955). *Delinquent boys*. Glencoe, IL: Free Press.
- Coleman, J. (1961). *The adolescent society*. New York: Free Press.
- Collins, L. M., Sussman, S. & Mestel Rauch, J. et al. (1987) Psychosocial predictors of young adolescent cigarette smoking: a sixteen-month three-wave longitudinal study, *Journal of Applied Social Psychology*, 17, 554-573.
- Combs, A. and D. Snygg. 1959 *Individual behavior: A perceptual approach to behavior*. New York: Harper and Row.
- Conner, M. & Armitage, C. J. (1998). Extending the theory of planned behavior: A review and avenues for further research. *Journal of Applied Social Psychology*, 28, 1430 – 1464.
- Conner, M. & McMillan, B. (1999). Interaction effects in the theory of planned behaviour: Studying cannabis use. *British Journal of Social Psychology*, 38, 195 – 222.
- Conner, M. & Norman, P. (1996). Body weight and shape control: Examining component behaviours. *Appetite*, 27, 135 – 150.
- Conner, M. & Sparks, P. (1996). The theory of planned behaviour and health behaviours. In: M. CONNER & P. NORMAN (Eds), *Predicting health behaviour* (pp. 121 – 162). Buckingham, UK: Open University Press.
- Conrad, K. M., Flay, B. R. & Hill, D. (1992) Why children start smoking cigarettes: predictors of onset, *British Journal of Addiction*, 87, 1711-1724.
- Correia CJ, Carey KB, Borsari B. Measuring substance-free and substance-related reinforcement in the natural environment. *Psychology: Addictive Behaviors*, 2002; 16(1):28–34.
- Correia CJ, Simons J, Carey KB, Borsari BE. Predicting drug use: application of behavioral theories of choice. *Addictive Behaviors*, 1998; 23(5):705–709.
- Cox, W. M. 1979 *The alcoholic personality: A review of the evidence*. In *Progress in experimental personality research*, vol. 9, ed B. A. Maher. New York: Academic Press
- Critchlow, B. 1987 Brief report: A utility analysis of drinking. *Addictive Behaviors* 12:269- 273. M.R. De La Rosa & J-L.R. Adrados (Eds.) *Drug Abuse Among Minority Youth: Advances in Research Methodology*.

- Devellis, R. F., Devellis, B. E., Wallston, B. S. & Wallston, K. A. (1980) Epilepsy and learned helplessness, *Basic and Applied Social Psychology*, 1, pp. 241-254.
- Deykin, E. Y., Levy, J. C., & Wells, V. (1987). Adolescent depression, alcohol and drug abuse. *American Journal of Public Health*, 77, 178--181.
- Dielman, T.E. (1994). School - based research on the prevention of adolescent alcohol use and misuse: Methodological issues and advances. *Journal of Research on Adolescents*, 4, 271 - 293.
- Donovan, D., & O'Leary, M. (1975). Comparison of perceived and experienced control among alcoholics and nonalcoholics. *Journal of Applied Psychology*, 89, 726-728.
- Downs, W. R. (1985). Using panel data to examine sex differences in causal relationships among adolescent alcohol use, norms, and peer alcohol use. *Journal of Youth and Adolescence*, 14, 469-485.
- Duffy, M. E. (1997). Determinants of reported health promotion behaviors in employed Mexican American women. *Health Care for Women International*, 18, 149-163.
- Eiser, C. (1985) *The Psychology of Childhood Illness* (New York, Springer-Verlag).
- Eiser, J. R. (1985) Smoking: the social learning of an addiction, *Journal of Social and Clinical Psychology*, 3, pp. 446-457.
- Eiser, C , WALSH, S. & EISER, J. R. (1986) Young children's understanding of smoking. *Addictive Behaviours*, 11, pp. 119-123.
- Eiser, J. R., Morgan, M. & Gammage, P. (1987) Belief correlates of perceived addiction in young smokers, *European Journal of Psychology of Education*, 2, pp. 307-310.
- Eiser, J. R., Sutton, S. R., & Wober, M. (1978). Smokers' and non-smokers' attributions about smoking: A case of actor-observer differences? *British Journal of Clinical and Social Psychology*, 17, 189-190.
- Ellickson, P. L., Bell, R. M. & McGuigan, K. (1993). Preventing adolescent drug use: Long-term results of a junior high program. *American Journal of Public Health*, 83(6), 856-861.
- Elwood, J. M. (1992). *Causal relationships in medicine*. Oxford: Oxford University Press.
- Engs, R.C., & Hanson, D.J. (1988). College students' drinking patterns and problems. In J.S. Sherwood (Ed.), *Alcohol policies and practices on college and university campuses* (pp. 57-68). Washington, DC: National Association of Student Personnel Administrators.
- Evans, D. M., & Dunn, N. J. (1995). Alcohol expectancies, coping responses and self-efficacy judgments: A replication and extension of Cooper et al.'s 1988 study in a college sample. *Journal of Studies on Alcohol*, 56, 186-193.

- Flay, B. R. (1985) Psychosocial approaches to smoking prevention: a review of findings, *Health Psychology*, 4, 449-488.
- Flay, B. R., Hu, F. B. & Siddiqui, O. et al. (1994) Differential influence of parental smoking and friends' smoking on adolescent initiation and escalation of smoking, *Journal of Health and Social Behavior*, 35, 248-265.
- R., Sussman, S., Gavin, M. D., Glowacz, K. M., Sobol, D. F. & Spiegel, D. C. (1988). The television, school, and family smoking prevention and cessation project. *Preventive Medicine*, 17, 585-607.
- Folkman, S. (1984). Personal control and stress and coping processes: A theoretical analysis. *Journal of Personality and Social Psychology*, 46, 839-852.
- Glassner, B., and B. Berg 1980 How Jews avoid alcohol problems. *American Sociological Review* 45:647-664.
- Globetti, G., Stem, J.T., Marasco, F., & Haworth-Hoeppner, S. (1988). Student residence arrangements and alcohol use and abuse: A research note. *Journal of College and University Student Housing*, 18(1), 28-33.
- Glynn T: Elements of school-based smoking prevention program. *J Sch Health* 1989; 59:181-188
- Glynn, R.; J. Locastro, J. Hermos, and R. Bosse 1983 Social contexts and motives for drinking in men. *Journal of Studies on Alcohol* 44:1011-1025.
- Godin, G. & Kok, G. (1996). The Theory of Planned Behavior: A review of its applications to health-related behaviors. *American Journal for Health Promotion*, 11, 87 - 98.
- Gold, S. R. and A. J. Coghlan. 1975-76 Locus of control and self-esteem among adolescent drug abusers: Effects of residential treatment. *Drug Forum* 5: 185-91.
- Gonzalez, G.M. (1987). Alcohol policy development: A necessary component for a comprehensive alcohol education program on campus. In J. S. Sherwood (Ed.), *Alcohol policies and practices on college and university campuses* (pp. 89-95). Washington, DC: National Association of Student Personnel Administrators.
- Goss, A., & Morosko, T. (1970). Relation between a dimension of internal-external control and the MMPI with an alcoholic population. *Journal of Consulting and Clinical Psychology*, 34, 189-192.
- Gozali, J. and J. Sloan 1971 Control orientation as a personality dimension among alcoholics. *Quarterly Journal of Studies on Alcohol* 32: 159-61.

- Graham, J. W., Marks, G. & Hansen, W. B. (1991). Social influence affecting adolescent substance use, *Journal of Applied Psychology*, 26, 291-298.
- Hansen, W. B., Johnson, C. A., Flay, B. R., Phil, D., Graham, J. W. & Sobel, J. (1988). Affective and social influence approaches to the prevention of multiple substance abuse among seventh grade students: Results from Project SMART. *Preventive Medicine* 17, 135-154.
- Hanson and Engs (1987) Religion and collegiate drinking problems over time. *Psychology*, 24, 10 – 12. Also available at <http://www.infm.ulst.ac.uk/~chris/110.pdf>
- Hanson, M. J. S. (1997). The Theory of Planned Behaviour applied to cigarette smoking in African-American, Puerto Rican, and Non-Hispanic White teenage females. *Nursing Research*, 46, 155 – 162.
- Harford, T. 1979 Beverage specific drinking contexts. *International Journal of the Addictions* 14:197-205.
- Harford, T. 1983 A contextual analysis of drinking events. *International Journal of the Addictions* 8:825-834.
- Harford, T., and B. Grant 1987 Psychosocial factors in adolescent drinking contexts. *Journal of Studies on Alcohol* 48:551-557.
- Harris, L., & Associates. (1975). The myth and reality of aging in America. Washington, DC: The National Council on Aging.
- Hawkins JD, Catalano RF, Miller JY. Risk and protective factors for alcohol and other drug problems in adolescence and early adulthood: implications for substance abuse prevention. *Psychology Bulletin*, 1992; 112(1):64-105.
- Heider, F. (1958). The psychology of interpersonal relations. New York: Wiley.
- Henderson, M. J., Goldman, M. S., Coovert, M. D., & Carnevalla. N. (1994). Covariance structure models of expectancy. *Journal of Studies on Alcohol*, 55, 315-326.
- Hewitt, J. P. (1970). Social stratification and deviant behavior. New York: Random House.
- Hinrichsen, J. J. 1976 Locus of control among alcoholics: Some empirical and conceptual issues. *Journal of Studies on Alcohol* 37:908-16.
- Hirschi, T. (1969) Causes of delinquency. Berkeley:University of California Press.
- Homonoff, E., Martin, J., Rimpas, D., & Henderson, M. (1994). It takes a village to raise a child: A model of training for prevention of youth abuse of alcohol and other drugs. *Child and Adolescent Social Work Journal*, 11, 53 – 61.
- Huetteman, J. D., Sarvela, P. D. & Benson, R. (1992) Knowledge and attitudes toward alcohol and tobacco use among elementary children, *Journal of Alcohol and Drug Education*, 38, 61-72.

- Jahoda, G., Davies, J. B. & Tagg, W. (1980) Parent's alcohol consumption and children's knowledge of drinks and usage patterns, *British Journal of Addictions*, 75, 297-303.
- Jenks, R. J. (1992). Attitudes, perceptions, and risk-taking behaviors of smokers, ex-smokers, and non-smokers. *Journal of Social Psychology*, 132, 569-575.
- Jenks, R. J., & Newman, J. H. (1991). Attitudes and perceptions of gay males. *Journal of Psychology and Human Sexuality*, 4, 61-72.
- Jensen, J., Counte, M. A., & Glandon, G. L. (1992). Elderly health beliefs, attitudes, and maintenance. *Preventive Medicine*, 21, 483-497.
- Jessor, R., & Jessor, S. L. (1977). Problem behavior and psychosocial development: A longitudinal study of youth. New York: Academic Press.
- Jessor, R., & Jessor, S. L. (1977). Problem behavior and psychosocial development: A longitudinal study of youth. New York: Academic Press.
- Joe, V. C. 1971 Review of the internal-external control construct as a personality variable. *Psychological Reports* 28:619-40.
- Johnson V, White HR. An investigation of factors related to intoxicated driving behaviors among youth. *Journal of Studies on Alcohol* 1989; 50:320-330.
- Johnson, B.D. (1973). Marijuana users and drug subcultures. New York: Wiley
- Johnston, L. D., O'Malley, P.M. & Bachman, J. G. (1992) Smoking, Drinking and Illicit Drug Use among American Secondary School Students, College Students, and Young Adults, 1975-1991, NIH Publication no. 93-3480 (Washington, De, US Government Printing Office).
- Jones, E. E., & Davis, K. E. (1965). From acts to dispositions: The attribution process in person perception. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (vol. 2, pp. 219-266). San Diego: Academic Press.
- Jones, E. E., & Nisbett, R. E. (1972). The actor and the observer: Divergent perceptions of causality. In E. E. Jones & R. E. Nisbett (Eds.), *Attribution: Perceiving the causes of behavior* (pp. 79-94). Morristown, NJ: General Learning Press.
- Judd, L., & Gunderson, E. (1970). Youth drug use survey: College students. Unpublished manuscript.
- Kandel, D. B. (1975). Stages in adolescent involvement in drug use. *Science*, 190, 912-914.
- Kandel, D. B., Single, E., & Kessler, R. C. (1976). The epidemiology of drug use among New York State high school students: Distribution, trends, and change in rates of use. *American Journal of Public Health*, 66, 43-53.

- Kaplan, H. B., & Pokorny, A. D. (1976). Self-attitudes and alcohol use among adolescents. In F. A. Seixas (Ed.), *Currents in alcoholism* (Vol. 11, pp. 285-298). New York: Grune and Stratton.
- Kelley, H. H. (1973). The process of causal attribution. *American Psychologist*, 28, 107-128.
- Kilty, K. (1980). Situational context and the meaning of drinking. *International Journal of the Addictions*, 15:1021-1033.
- Kirscht, J. (1972). Perceptions of control and health beliefs. *Canadian Journal of Behavioral Science*, 4(3), 226-237.
- Klein, H., and D. Pittman 1990 Social occasions and the perceived appropriateness of consuming alcoholic beverages. *Journal of Studies on Alcohol* 51:59-67.
- Kraemer, H. C., Kazdin, A. E., Offord, D. R., Kessler, R. C., Jensen, P. S., & Kupfer, D. J. (1999). Measuring the potency of risk factors for clinical and policy significance. *Psychological Methods*, 4, 257-271.
- Kraus, D.C., Smith, G. T. & Ratner, H. H. (1994) Modifying alcohol-related expectancies in grade-school. *Journal of Studies on Alcohol*, 55, 532-542.
- Krohn, M. D., Massey, J. L., Skinner, W. F., & Lauer, R. M. (1983). Social bonding theory and adolescent cigarette smoking: A longitudinal analysis. *Journal of Health and Social Behavior*, 24(4), 337-349.
- Kurtines, W. M., L. R. Ball, and G. H. Wood 1978 Personality characteristics of long-term recovered alcoholics: A comparative analysis. *Journal of Consulting and Clinical Psychology* 46:971-7.
- Lachman, M. E., & Weaver, S. L. (1998). The sense of control as a moderator of social class differences in health and well-being. *Journal of Personality and Social Psychology*, 74, 763-773.
- Laffrey, S. C., & Isenburg, M. (1983). The relationship of internal locus of control, value placed on health, perceived importance of exercise and participation in physical activity during leisure. *International Journal of Nursing Studies*, 20, 187-196.
- Lanse, R. E., Banks, F. R., & Keller, M. D. (1972). Smoking behavior in a teenage population: A multivariate conceptual approach. *American Journal of Public Health*, 62, 807-813.
- Lau, R. R. (1982) Origins of health locus of control beliefs, *Journal of Personality and Social Psychology*, 42, pp. 322-334.
- Lecky, P. 1969 *Self-consistency: A theory of personality*. Garden City, N.Y.: Doubleday.
- Leigh, B.C. (1989) Attitudes and expectancies as predictors of drinking habits: a comparison of three scales, *Journal of Studies on Alcohol*, 50, 432-440.

Leitner, M., Shapland, J. & Wiles, P. (1993). Drug usage and drugs prevention: The views and habits of the general public. London: HMSO.

Leonard, K. E., & Blane, H. T. (1988). Alcohol expectancies and personality characteristics in young men. *Addictive Behaviors*, 13, 353-357.

Leventhal, H. & Cleary, P. D. (1980) The smoking problem: a review of the research and theory in behavioral risk modification, *Psychological Bulletin*, 88, 370-405.

Lewis, F. M. , Morisky, D. E. & Flynn, B. S. (1978) A test of construct validity of health locus of control: effects of self-reported compliance for hypertensive patients. *Health Education Monographs*, 6, pp. 138-148.

Macgregor, I. D., Regis, D., & Balding, J. (1997). Self-concept and dental health behaviours in adolescents. *Journal of Clinical Periodontology*, 24(5), 335-339.

Madden, M. J., Ellen, P. S., Ajzen, I. (1992). A comparison of the theory of Planned Behavioral and the Theory of reasoned Action. *Personality and Social Psychology Bulletin*, 18 (1), 3-9.

Maier, S. E, & Watkins, L. R. (1998). Stressor controllability, anxiety, and serotonin. *Cognitive Therapy and Research*, 22, 595-613.

Marlatt, G. A., & Tapert, S. F. (1993). Harm reduction: Reducing the risks of addictive behaviors. In J. S. Baer, G. A. Marlatt, & R. J. McMahon (Eds.), *Addictive behaviors across the lifespan* (pp. 243-273). Newbury Park, CA: Sage Publications.

Marsh, A. (1984) Smoking: habit or choice. *Population Trends* (HMSO), 36, pp. 14-20.

Marshall, G. N. (1991). A multidimensional analysis of internal health locus of control beliefs: Separating the wheat from the chaff?. *Journal of Personality and Social Psychology*, 61, 483-491.

Mausner, B. & Platt, E.S. (1971) *Smoking: a behavioural analysis* (New York, Pergamon).

McMillen, D. L., Smith, S. M., & Wells-Parker, E. (1989). The effects of alcohol, expectancy and sensation seeking on driving risk taking. *Addictive Behaviors*, 14, 477-483.

Mechanic, D. & Hansell, S. (1987) Adolescent competence, psychological well-being, and self-assessed physical health, *Journal of Health and Social Behavior*, 28, pp. 364-374.

Mellor, S., L. Conroy, and B. K. Masteller 1986 Comparative trait analysis of long-term recovering alcoholics. *Psychological Reports* 58:411-8.

Miller SK, Slap GB: Adolescent smoking: a review of prevalence and prevention. *Adolescent Health Care* 1989; 10:129-135

Miller, P.M., Smith, G. T. & Goldman, M. S. (1990) Emergence of alcohol expectancies in childhood: a possible critical period, *Journal of Studies on Alcohol*, 51, 343-349.

- Miller, P.M., SMITH, G. T. & GOLDMAN, M. S. (1990) Emergence of alcohol expectancies in childhood: a possible critical period, *Journal of Studies on Alcohol*, 51, 343-349.
- Miller, S. M., & Mangan, C. E. (1983). Interacting effects of information and coping style in adapting to gynecologic stress: Should the doctor tell all? *Journal of Personality and Social Psychology*, 45,223-236.
- Mills, C. J., & Noyes, H. L. (1984). Patterns and correlates of initial and subsequent drug use among adolescents. *Journal of Consulting and Clinical Psychology*, 52, 231--243.
- Mills, C.W. 1940 Situated actions and vocabularies of motive. *American Sociological Review*
- Millstein, S. G., Adler, N. E. & Irwin, C. E. (1981) Conceptions of illness in young adolescents. *Pediatrics*, 68, pp. 834-839.
- Mooney, D. K., Fromme, K., Kivlahan, D., & Marlatt, G. (1987). Correlates of alcohol consumption: Sex, age, and expectancies relate differentially to quantity and frequency. *Addictive Behaviors*, 12, 235-240.
- Morris, W. 1976 *The American heritage dictionary of the English language*. Boston, Mass.: Houghton Mifflin Company.
- Mosbach, P., & Leventhal, H. (1988). Peer group identification and smoking: Implications for intervention. *Journal of Abnormal Psychology*, 97, 238-245.
- Murphy, N. T., & Price, C. (1988). The influence of self-esteem, parental smoking, and living in a tobacco production region on adolescent smoking behaviors. *Journal of School Health*, 58, 401-405.
- Naditch M. (1975). Locus of control and drinking behavior in a sample of men in army basic training. *Journal of Consulting and Clinical Psychology*, 43, 96.
- Norman, P., & Bennett, P. (1996). Health locus of control. In M. Conner & P. Norman (Eds.), *Predicting health behaviour* (pp. 62-94). Buckingham/Philadelphia: Open University Press.
- Norman, P., Bennett, P., Smith, C., & Murphy, S. (1997). Health locus of control and leisure-time exercise. *Personality and Individual Differences*, 23,769-774.
- O'Connell, D. L., Alexander, H. M., Dobson A. J., Lloyd, D. M., Harges, G. R., Springthorpe, H. J., & Leeder, S. R. (1981). Cigarette smoking and drug use in schoolchildren: II. Factors associated with smoking. *International Journal of Epidemiology*, 10, 223-231.
- Office of Educational Research and Improvement, Programs for the Improvement of Practice: Success Stories from Drug-Free Schools.' A Guide for Educators, Parents, and Policy Makers. Washington, DC, ERIC ED343041, 1991

- O'Hare, T. (1990a). Alcohol expectancies and social anxiety in male and female undergraduates. *Addictive Behaviors*, 15, 561-566.
- Oziel L. J. and F. W. Obitz 1975 Control orientation in alcoholics related to extent of treatment. *Journal of Studies on Alcohol* 36:158-61.
- Oziel, L. J., F. W. Obitz, and M. Keyson 1972 General and specific perceived locus of control in alcoholics. *Psychological Reports* 30:957-8.
- Peck DD, Acott C, Richard P, et al: The Colorado tobacco-free schools and communities project. *Journal of School Health* 1993; 63:214-217
- Pederson, L. L. & Lefcoe, N. M. (1987) Short- and long-term prediction of self reported cigarette smoking in a cohort of late adolescents: report of an 8-year follow-up of public school students, *Preventive Medicine*, 16, 432-447.
- Perkins HW, Berkowitz AD. Collegiate COAs and alcohol abuse: Problem drinking in relation to assessments of parent and grandparent alcoholism. *Journal of Counseling and Development* 69(3):237-240, 1991.
- Petratis J, Flay BR, Miller TQ. Reviewing theories of adolescent substance use: organizing pieces of the puzzle. *Psychology Bulletin* 1995; 117:67-86.
- Pettigrew, T. F. (1979). The ultimate attribution error: Extending Allport's cognitive analysis of prejudice. *Personality and Social Psychology Bulletin*, 5, 461-476.
- Pisano, S. & Rooney, J. (1988) Children's changing attitudes regarding alcohol: a cross-sectional study, *Journal of Drug Education*, 18, 1-11.
- Rabinowitz, S., Melamed, S., Weisberg, E., Tal, D., & Ribak, J. (1992). Personal determinants of leisure-time exercise activities. *Perceptual and Motor Skills*, 75, 779-784.
- Randall, D. M. & Wolff, J. A. (1994) The time interval in the intention-behaviour relationship: meta-analysis, *British Journal of Social Psychology*, 33, 405-418.
- Reckless, W. C. 1961 A new theory of crime and delinquency. *Federal Probation* 25: 42-6.
- Regis, D., Macgregor, I. D., & Balding, J. W. (1994). Differential prediction of dental health behaviour by self-esteem and health locus of control in young adolescents. *Journal of Clinical Periodontology*, 21, 7-12.
- Reich, J. W., Erdal, K. J., & Zautra, A. J. (1997). Beliefs about control and health behaviors. In D. S. Gochman (Ed.), *Handbook of health behavior research: I. Personal and social determinants* (pp. 93-111). New York: Plenum.
- Riley, J.W., C.F. Marden, and M. Lifshitz (1948). The motivational pattern of drinking. *Quarterly Journal of Studies on Alcohol* 9:353-362.

- Rise, J. & Wilhelmsen, B. U. (1998). Prediction of adolescents' intentions not to drink alcohol: Theory of Planned Behaviour. *American Journal of Health Behavior*, 22, 206-217.
- Roman, P. (1988). Women and alcohol use: A review of the research literature. Rockville, Md.:U.S. Department of Health and Human Services.
- Rosenstock, I.M. (1974). The health belief model and preventive health behavior. *Health Education Monograph*; 2:254-386
- Rosenthal, R. (1990). How are we doing in soft psychology? *American Psychologist*, 45,775-777.
- Rosenthal, R., & Rubin, D. B. (1982). A simple, general purpose display of magnitude of experimental effect. *Journal of Educational Psychology*, 74, 166-169.
- Shore, E.R., Rivers, P.C. and Berman, J.J. (1983). Resistance by college students to peer pressure to drink. *Journal of Studies on alcohol*, 44, 352 - 361.
- Sadava, S. W., & Weithe, H. (1985). Maintenance and attributions about smoking among smokers, non-smokers, and ex-smokers. *International Journal of the Addictions*, 20, 1533-1544.
- Saltz, R. & Elandt, D. (1986). College student drinking studies: 1976 - 1985. *Contemporary Drug Problems*, 13, 117 - 159.
- Samuels, S. C. 1977. Enhancing self-concept in early childhood: Theory and practice. New York: Human Sciences.
- Schank, M. J., & Lawrence, D. M. (1993). Young adult women: Lifestyle and health locus of control. *Journal of Advanced Nursing*, 18, 1235-1241.
- Scheier, M. E., & Carver, C. S. (1992). Effects of optimism on psychological and physical well-being: Theoretical overview and empirical update. *Cognitive Therapy and Research*, 16, 201-228.
- Scott, M., and S. Lyman, (1968) Accounts. *American Sociological Review* 33:46-62.
- Selnow, G. W. 1985. Using a stratified approach in substance intervention and prevention programs among adolescents: An empirical analysis. *Journal of Drug Education* 15: 327-41.
- Sher, K. (1985). Subjective effects of alcohol: The influence of setting and individual differences in alcohol expectancies. *Journal of Studies on Alcohol*, 46, 137-146.
- Simons, J., Carey, K.B. (1998). A structural analysis of attitudes toward alcohol and marijuana use. *Personality and Social Psychology Bulletin*; 24:727-735.
- Simpura, J. 1991. Studying norms and contexts of drinking. *Contemporary Drug Problems* 18:477-498.

- Single, E., and S. Worley 1993. Drinking in various settings as it relates to demographic variables and level of consumption: Findings from a national survey in Canada. *Journal of Studies on Alcohol* 54:590-600.
- Skinner, E. A. (1996). A guide to constructs of control. *Journal of Personality and Social Psychology*, 71, 549-570.
- Steffy, R. A., Meichenbaum, D. & Best, J. A. (1970). Aversive and cognitive factors in the modification of smoking behavior. *Behavior Research and Therapy*, 8, pp. 115-125.
- Step toe, A., & Appels, A. (Eds.) (1989). Stress, personal control and health. Chichester: Wiley.
- Step toe, A., & Wardle, J. (1996). The European Health and Behaviour Survey: The development of an international study in health psychology. *Psychology and Health*, 11, 49-73.
- Step toe, A., Cropley, M., & Joekes, K. (1999). Job strain, blood pressure, and responsivity to uncontrollable stress. *Journal of Hypertension*, 17, 193-200.
- Strickland, B. (1978). Internal--external expectancies and health-related behaviors. *Journal of Consulting and Clinical Psychology*, 46, 1192-1211.
- Sullivan, H. S. 1953. The interpersonal theory of psychiatry. New York: Norton.
- Sutherland, E. H., & Cressey, D. R. (1978). *Criminology* (10th ed.). New York: Lippincott.
- Sutton, S. R. (1992). Is taking up smoking a reasoned action, *Addiction*, 87, 21-24.
- Thombs, D., K. Beck, and D. Pleace 1993. The relationship of social context and expectancy factors to alcohol use intensity among 18 to 22 year olds. *Addiction Research* 1:59-68.
- Thorlindsson, T., Vilhjalmsen, R., & Valgeirsson, G. (1990). Sport participation and perceived health status: A study of adolescents. *Social Science and Medicine*, 31, 551-556.
- Tolar, A. (1978). Some antecedents and personality correlates of health locus of control. *Psychological Reports*, 43, pp. 1159-1165.
- Turrisi R, Jaccard J. Cognitive and attitudinal factors in the analysis of alternatives to drunk driving. *Journal for Studies on Alcohol* 1992; 53(5):405-414.
- U.S. Department of Health and Human Services, Center for Substance Abuse Prevention. (1993). Prevention primer: An encyclopedia of alcohol, tobacco, and other drug prevention terms. Rockville, MD: National Clearinghouse for Alcohol and Drug Information.
- Vuchinich RE, Tucker JA. Contributions from behavioral theories of choice to an analysis of alcohol abuse. *Journal for Abnormal Psychology* 1988; 97(2):181-195.

- Walker, R. D., E. C. Nast, E. F. Chaney, and M. R. O'Leary 1979 Changes in drinking related locus of control as a function of length of alcoholism treatment. *Psychological Reports* 44:287-93.
- Wallston, B. S., Wallston, K. A., Kaplan, G. D. and Maides, S. A. (1976). Development and validation of the health locus of control (HLC) scale. *Journal of Consulting and Clinical Psychology*, 44, 580-585.
- Wallston, K. A. (1992). Hocus-pocus, the focus isn't strictly on the locus: Rotter social learning theory modified for health. *Cognitive Therapy and Research*, 16, 183-199.
- Wallston, K. A. and WaUston, B. S. (1978). Preface. *Health Education Monographs.*, 6, 101-105.
- WaUston, B. S. and WaUston, K. A. (1978). Locus of control and health: A review of the literature. *Health Education Monographs*, 6, 107-117.
- Wechsler, H. & Isaac, N. (1992). Binge drinkers at Massachusetts colleges: Prevalence, drinking style, time trends, and associated problems. *JAMA*, 267, 2929 - 2931.
- Weisner, C., & Schmidt, L. (1993). Alcohol and drug problems among diverse health and social service populations. *American Journal of Public Health*, 83, 824-829.
- Welte, J. W., & Barnes, G. M. (1987). Youthful smoking: Patterns and relationships to alcohol and other drug use. *Journal of Adolescence*, 10, 327--340.
- Werner, M.J., & Greene, J.W. (1992). Problem drinking among college freshmen. *Journal of Adolescent Health*, 13, 487-492.
- Wicker, A. W. (1969). Attitudes vs. actions: The relationship of verbal and overt behavioral responses to attitude objects. *Journal of Social Issues*, 25(4), 41-78.
- Wiggins, J.A. and Wiggins, B.B. (1987). Drinking at a southern university: Its description and correlates. *Journal of studies on alcohol*, 48, 319 - 324.
- Wilson, G. T., & Abrams, D. (1977). Effects of alcohol on social anxiety and physiological arousal: Cognitive versus pharmacological processes. *Cognitive Therapy and Research*, 1, 195-210.
- Wurtele, S. K., Britcher, J. C., & Saslawsky, D. A. (1985). Relationships between locus of control, health value and preventive health behaviors among women. *Journal of Research in Personality*, 19, 271-278.
- Yamaguchi, K., & Kandel, D. B. (1984). Patterns of drug use from adolescence to young adulthood: III. Predictors of progression. *American Journal of Public Health*, 74, 673-681.
- Young, T. L., & Rogers, K. D. (1986). School performance characteristics preceding onset of smoking in high school students. *American Journal of Diseases of Children*, 140, 257-259.

Younge, S. L., Oetting, E. R., & Deffenbacher, J. L. (1996). Correlations among maternal rejection, dropping out of school, and drug use in adolescents: A pilot study. *Journal of Clinical Psychology, 52*, 96-102.

Zabin, L. S., Hardy, J. B., Smith, E. A. & Hirsch, M. B. (1986). Substance use and its relation to sexual activity among inner-city adolescents. *Journal of Adolescent Health Care, 7*, 320-331.

Zung, B. J. 1980 Correlates of the Michigan Alcoholism Screening Test (MAST) among DWI offenders, *Journal of Clinical Psychology 40*:607-12.

1. Please DO NOT write your name on this questionnaire.
2. Take your time to think carefully about your responses. Remember, there are no wrong or right answers.

3. How old are you?

4. Are you female or male?

FEMALE

MALE

5. Do you drink beer and/or alcohol?

YES

NO

6. How often do you drink beer and/or alcohol (e.g., once a week, or _____)

7. If I drink I will have many drinks and be
likely

active in social life.

(Likely) 1 2 3 4 5 6 7

8. If I drink too often I may become
likely

dependent on it.

(Likely) 1 2 3 4 5 6 7

9. If I drink I have more confidence
likely

(Likely) 1 2 3 4 5 6 7

Annexure 1. Learner questionnaire

Learner Questionnaire

*Note to
Learners:*

1. Please **DO NOT** write your name on this questionnaire.
2. Take your time to think carefully about your responses. Remember, there are no wrong or right answers.

1. How old are you? _____

2. Are you female or male?

FEMALE

MALE

3. Do you drink beer and or alcohol?

YES

NO

4. How often do you drink beer and or alcohol (e.g. once a week, etc.)

1. If I drink I will have many friends and an
Likely
active social life.

Unlikely 1 2 3 4 5 6 7

2. If I drink too often I may become too
Likely
dependent on it.

Unlikely 1 2 3 4 5 6 7

3. If I drink I have more confidence
Likely

Unlikely 1 2 3 4 5 6 7

4. If I drink I could get a hangover and not
Likely
be able to do the things I am expected to do. **Unlikely** 1 2 3 4 5 6 7
5. When I have nothing else to do I have
Likely
to drink. **Unlikely** 1 2 3 4 5 6 7
6. To keep the respect of my friends I
Likely
have to drink. **Unlikely** 1 2 3 4 5 6 7
7. I can tell my friends that I don't want
Likely
to drink and they will respect that. **Unlikely** 1 2 3 4 5 6 7
8. Sometimes my friends expect me to drink
Likely
when I don't want to drink. **Unlikely** 1 2 3 4 5 6 7
9. Not being able to do your
responsibilities is
Extremely **Extremely** -3 -2 -1 0 +1 +2 +3
undesirable **desirable**
10. Drinking too much and becoming
an alcoholic is **Extremely** -3 -2 -1 0 +1 +2 +3 **Extremely**
undesirable **desirable**
11. Having many friends and an
Active social life is **Extremely** -3 -2 -1 0 +1 +2 +3 **Extremely**
Undesirable **desirable**
12. Having confidence through
Extremely
drinking is **Extremely** -3 -2 -1 0 +1 +2 +3
undesirable **desirable**
13. My friends who drink think I
should not -3 -2 -1 0 +1 +2 +3 **should**
drink when they are drinking
14. My parents would
disapprove -3 -2 -1 0 +1 +2 +3 **approve**
of my drinking alcohol with friends
15. Most Grade 11 children at this school **do not** -3 -2 -1 0 +1 +2 +3 **do**
drink beer and or alcohol

16. Teachers at school would **disapprove -3 -2 -1 0 +1 +2 +3 approve**
of my drinking alcohol with friends
17. In general I think drinking is **stressful 1 2 3 4 5 6 7 relaxing**
18. **good 1 2 3 4 5 6 7 bad**
19. **waste of time 1 2 3 4 5 6 7 useful**
20. **gives me confidence 1 2 3 4 5 6 7 destroys**
me
21. Doing what most Grade 11 children are doing is important to me.
not at all 1 2 3 4 5 6 7 extremely
22. Doing what my friends think I should do is important to me.
not at all 1 2 3 4 5 6 7 extremely
23. Doing what my teachers expect of me is important to me.
not at all 1 2 3 4 5 6 7 extremely
24. The approval of my parents is important to me.
not at all 1 2 3 4 5 6 7 extremely
25. When there are not enough recreational things in my surroundings I am
less likely -3 -2 -1 0 +1 +2 +3 more
likely
to drink
26. I am **less likely -3 -2 -1 0 +1 +2 +3 more**
likely
to drink if my friends respect my decision
27. I am **less likely -3 -2 -1 0 +1 +2 +3 more**
likely
to drink if that is how I get respect
28. I am **less likely -3 -2 -1 0 +1 +2 +3 more**
likely
to drink when my friends are expecting me to
drink.
29. Most of my friends think that I should NOT drink.
Strongly 1 2 3 4 5 6 7 Strongly

- disagree** **agree**
30. I expect to drink with my friends whenever they are drinking beer and or alcohol and having a good time
Strongly disagree 1 2 3 4 5 6 7 **Strongly agree**
31. It is expected of me to drink when my friends are drinking.
Strongly disagree 1 2 3 4 5 6 7 **Strongly agree**
32. I am confident I can refuse to drink with my friends when I don't feel like drinking.
Strongly disagree 1 2 3 4 5 6 7 **Strongly agree**
33. Whether or not I drink with my friends is entirely up to me.
Strongly disagree 1 2 3 4 5 6 7 **Strongly agree**
34. For me to refuse a drink with my friends is
Easy 1 2 3 4 5 6 7 **Difficult**
35. I want to continue drinking with my friends and will only stop when they do.
Strongly disagree 1 2 3 4 5 6 7 **Strongly agree**
36. Sometimes I don't want to drink but I do not want to disappoint my friend so I drink.
Strongly disagree 1 2 3 4 5 6 7 **Strongly agree**
37. I intend to keep my friends by drinking regularly with them.
Strongly disagree 1 2 3 4 5 6 7 **Strongly agree**
38. If you can have 10 opportunities (e.g. party, local performing artist concert) that enables you to drink with your friends, how many of these opportunities would you use?

0 1 2 3 4 5 6 7 8 9 10

Annexure 2.

Questionnaire development:

Following is an exposition of the steps taken by the researcher in developing the questionnaire. Questionnaire development for TPB studies strictly follows set guidelines (see Ajzen, 2001). See Annexure A for the final questionnaire. Below is an exposition of those guidelines set forth by the TPB (Ajzen, 2001).

A. Measurement of Theory of Planned Behaviour variables

1. Measuring behavioural intentions

The TPB has three methods of measuring intentions. Method 1 is called Intention Performance where it is possible to observe actual performance using the same measurement scale, and this direct compatibility could be useful for some studies. In the TPB literature, where most research has been about individual's own health-related behaviour (e.g. smoking, drinking, exercise, etc.) generalized intention (Method 2) is most commonly used.

When investigating the behaviour of, for example, healthcare professionals, Intention Simulation (Method 3) could be a more valid proxy measure for actual behaviour, because it more closely approximates real situations. Given the purpose and nature of the current study, the researcher measured behavioural intention with Method 2, i.e. Generalized Intention.

Following is an exposition of how Generalized Intention is measured in this research, as per TPB guideline.

Method 2: Generalized Intention

1. Procedure:

According to the TPB adequate internal consistency can be demonstrated using three items. The items, shown in Box 1 below, were subjected to an internal consistency measurement and a score of .906 was obtained.

Box 1

1. I expect to drink with my friends whenever they are drinking beer and or alcohol and having a good time. **Strongly disagree 1 2 3 4 5 6 7 Strongly agree**
2. I want to continue drinking with my friends and will only stop when they stop drinking. **Strongly disagree 1 2 3 4 5 6 7 Strongly agree**
3. I intend to keep my friends by drinking regularly with them. **Strongly disagree 1 2 3 4 5 6 7 Strongly agree**

2. Scoring:

The mean of the three intention scores were then calculated to provide an overall score for generalized intention.

1.2 Measuring Attitudes

1.2.1. Direct measurement of attitudes:

1. Procedure:

- Direct measurement involves the use of bipolar adjectives (i.e. pairs of opposites) which are evaluative (e.g. good – bad).
- A single stem is used to construct four items which defines the behaviour under investigation.
- The TPB suggest that the good – bad scale be used as it captures overall evaluation.
- Items are arranged so that the ends of the scales are a mix of positive and negative endpoints¹ (see Box 2)².

Box 2 Example: The target behavior here is drinking.

Drinking alcohol and or beer is

stressful	1	2	3	4	5	6	7	relaxing
good	1	2	3	4	5	6	7	bad
waste of time	1	2	3	4	5	6	7	useful
gives me confidence	1	2	3	4	5	6	7	destroys me

¹ This is a common practice amongst researchers to minimize the risk of response set or a tendency to answer questionnaire items in the same way regardless of their content.

² A 7-option response format most often recommended in the TPB literature.

2. Scoring:

Items that have negatively worded endpoints on the right are recoded, so that higher numbers then always reflect a positive attitude to the target behaviour (e.g. for good – bad an answer of 6 becomes a score of 2. A score of 4 remains a 4). Items on this scale need to be checked for internal consistency and it is vital that items do reflect high internal consistency. For the current scale an internal consistency measure of .784 was obtained.

1.2.2. Indirect measurement of attitude: measuring behavioural beliefs and outcome evaluations.

1. Stages of development:

- a. The researcher conducted an elicitation study with 25 adolescents³ to elicit commonly held beliefs. The content of the behavioural beliefs that are shared by the target population for this study was identified.
- b. Questionnaire items were then constructed to assess the strength of behavioural beliefs.
- c. Questionnaire items were also constructed to assess outcome evaluations.

³ Recommended sample size for TPB elicitation interviews (Godin & Kok, 1996)

2. Procedure:

A. Conducting an elicitation interview

- a. As per TPB guideline, the researcher selected 25 learners from the same school where the study was conducted.
- b. Open-ended questions were constructed and used in a focus group discussion. Responses by the learners were written down by the researcher. See Box 3 for the elicitation questions.

Box 3

Example: Your friends are having a party and they are drinking alcohol and or beer. The target behavior is drinking with your friends. Please tell me what your thoughts are about the following:

- What do you believe are the advantages of drinking with your friends?
- What do you believe are the disadvantages of drinking with your friends?
- Is there anything else you associate with drinking with your friends?

- a. The behavioural beliefs most often mentioned were converted into a set of statements. These statements reflect the beliefs which might affect drinking behaviour amongst the target population, i.e. the adolescents. The TPB suggests that inclusion of 75% of all beliefs stated should give adequate coverage of the belief population being studied.
- b. As per TPB guideline, these items were listed and piloted with 5 learners to check for any difficulties with wording. See Box 4 (p. 203)

Box 4	
Question format, behavioural beliefs	Response format, behavioural beliefs
a. If I drink I will have many friends and an active social life.	Unlikely 1 2 3 4 5 6 7 Likely
b. If I drink too often I may become too dependent on it.	Unlikely 1 2 3 4 5 6 7 Likely
c. If I drink I have more confidence	Unlikely 1 2 3 4 5 6 7 Likely
d. If I drink I could get a hangover and not be able to do the things ...	Unlikely 1 2 3 4 5 6 7 Likely

C. Constructing questionnaire items to assess outcome evaluations

a. Each of the belief statements were converted into the form of an incomplete sentence.

By completing the sentence the learners express a positive or negative evaluation of the belief statement. (see Box 5)

Box 5	
Question format, outcome evaluations	Response format, outcome evaluations
Having many friends that drink and an active social life is	Extremely-3,-2,-1,0, +1,+2,+3 Extremely undesirable desirable
Drinking too much and becoming an alcoholic is	Extremely-3,-2,-1,0, +1,+2,+3 Extremely Undesirable desirable
The confidence through drinking is	Extremely-3,-2,-1,0, +1,+2,+3 Extremely Undesirable desirable
Not being able to do your responsibilities is	Extremely-3,-2,-1,0, +1,+2,+3 Extremely undesirable desirable

Scoring:

For each behavioural belief, the belief score on the unlikely – likely scale was multiplied by the relevant evaluation score on the extremely desirable – extremely undesirable scale (see Box 6 for an example of this scoring procedure, p.205). The resulting products across are summed all the beliefs to create an overall attitude score:

$$\text{Formula: } A = (a \times e) + (b \times f) + (c \times g) + (d \times h)$$

Where

A = total attitude score

a, b, c, and d are scores for each of the four behavioural beliefs

e, f, g, and h are scores for outcome evaluations relating to each behavioural belief.

Using this method,

- A positive (+) score means that, overall; the respondent is in favour of drinking...
- A negative (-) score means that, overall; the respondent is against drinking....

Box 6: Example of scoring procedure

Questions on behavioral beliefs (Box4)	Unlikely 1 2 3 4 5 6 7 Likely
Questions on outcome evaluations (Box5)	Extremely Undesirable -3 -2 -1 0 +1 +2 +3 Extremely desirable

Imagine that a respondent has circled the numbers indicated in bold italics above. The total attitude score would be calculated as:

$$\begin{aligned}
 A &= (5 \times +3) + (2 \times -2) + (6 \times +3) + (2 \times -1) \\
 &= (+15) + (-4) + (+18) + (-2) \\
 &= +27
 \end{aligned}$$

Because there are 4 items, the possible range of total scores is $(7 \times -/+3) \times 4 = -84$ to $+84$. Therefore, the attitude score of the respondent reflects a **weak to moderate positive attitude** (i.e. in favour of drinking).

1.3 Measuring subjective norms

1.3.1 Direct measurement of subjective norm

1. Procedure

- Direct measurement involves the use of questions referring to the opinions of important people in general. (See Box 7).
- Where the response format completes an otherwise incomplete sentence (e.g. I should not / I should...), the items were arranged so that the ends of the scales are a mix of positive and negative endpoints (See Box 7).
- The TPB suggests that where an item is a complete sentence, and the responses range from "Strongly disagree" to "Strongly agree", endpoints should not be mixed.

Box 7

29. Most of my friends think that...

31. It is expected of me to drink when my friends are drinking . . .

36. Sometimes I don't want to drink but I do not want to disappoint my friends so I drink...

2. Scoring

- a. Items that have negatively worded endpoints on the right are recoded, so that high scores consistently reflect greater social pressure to do the target behaviour.
- b. Internal consistency checks were done for subjective norm items and the following internal consistency measure was obtained:

1.3.2 Indirect measurement of subjective norm: measuring normative beliefs and motivation to comply

1. Stages of development:

- a. Categories of individuals who are likely to apply social pressure with respect to the behaviour were identified (friends, parents, and teachers) during the elicitation interview.
- b. Questionnaire items were constructed to assess strength of normative beliefs with respect to each referent group.
- c. Questionnaire items were constructed to assess motivation to comply with pressure from each reference group.

2. Procedure:

- a. An elicitation study was conducted with the same 25 school learners to elicit commonly held beliefs.
- b. Open-ended questions were used with respondents in a focus – group discussion.

Box 8

SN1. Normative beliefs

13. My friends who drink think I
14. My parents would ...
15. Most Grade 11 children at this school
16. Teachers at school would

c. Responses were assorted into themes (normative beliefs) and sources of social pressures extracted were labelled. These sources were then listed in order of most - frequently to least-frequently mentioned.

3. Construct questionnaire items to assess strength of normative beliefs

- a. Reference groups most often selected were listed and converted into stems of normative belief items (See Box 9). The TPB suggest that inclusion of 75% of the groups or individuals listed should give adequate coverage of the sources of social pressure.
- b. Items included either injunctive or descriptive norms, i.e. what important people *think* a person should do (injunctive norms) or what important people *actually* do (descriptive norms). Box 9 illustrates the difference between these two types of items.

Box 9

SN1. Normative beliefs

13. My friends who drink think I
14. My parents would ...
15. Most Grade 11 children at this school
16. Teachers at school would

4. Construct questionnaire items to assess motivation to comply.

a. Each of the sources of social pressure was converted into the form of statements about the importance of the various sources of social pressure (See Box 10). By answering the questions, the respondents indicate the strength of motivation to comply with each reference group or individual.

Box 10

SN2. Motivation to comply

22. Doing what my friends think I should do is

24. The approval of my parents is

21. Doing what most Grade 11 children are doing is

23. Doing what my teachers expect of me is

b. These items were pilot tested with 5 respondents in order to identify any difficulty with wording.

5. Scoring:

For each normative belief, the score on the should / should not or do / do not scale is multiplied by the score relating to the not at all / very much scale (see Box 10). The resulting are summed products across all the beliefs to create an overall subjective norm score:

Formula:
$$N = (a \times d) + (b \times e) + (c \times f)$$

Where

N = total subjective norm score

a, b, and c are scores for each of the three normative beliefs

d, e, and f are scores for motivation to comply relating to each source of social pressure.

Using this method,

- A positive (+) score means that, overall, the respondent experiences social pressure *to drink* with friends.
- A negative (-) score means that, overall, the respondent experiences social pressure *not to drink* with friends.

Box 11, EXAMPLE SCORING PROCEDURES

a. My friends who drink think I	should not -3,-2,-1,0,+1,+2,+3 should drink when they are drinking
---------------------------------	--

d. Doing what my friends think I should do is	not at all 1, 2,3,4,5,6,7 extremely
---	---

Imagine that a participant has responded by circling the numbers indicated in bold italics.

The total normative belief score is calculated as

$$\begin{aligned} N &= (+1 \times 4) + (+3 \times 1) + (+2 \times 2) \\ &= (+4) + (+3) + (+4) \\ &= +11 \end{aligned}$$

The possible range of total scores is -63 to +63. Therefore, the normative belief score of the respondent reflects fairly weak **positive** social pressure (to drink).

1.4 Measuring Perceived Behavioural Control (PBC)

1.1 Direct measurement of Perceived Behavioural Control

1. Procedure

The TPB suggests that items should reflect people's confidence that they are capable of performing the target behaviour. With the use of a TPB questionnaire, this can be achieved by assessing the person's self-efficacy and their beliefs about the controllability of the behaviour.

Self-efficacy is assessed by asking people to report

- How difficult it is to perform the behaviour
- How confident they are that they could do it (See Box 12)

Controllability is assessed by asking people

- Whether performing the behaviour is up to them
- Whether factors beyond their control determine their behaviour (See Box 12)

The TPB suggests that where the response format completes an otherwise incomplete sentence (e.g. difficult / easy), items should be arranged so that the ends of the scales are a mix of positive and negative endpoints (See Box 12). Where an item is a complete sentence, endpoints are not mixed.

Box 12

32. I am confident that I can refuse to drink with my friends when I want to.
 33. Whether or not I drink with my friends is entirely up to me
 34. For me to refuse a drink with my friends is

consistently reflect a greater level of control over the target behaviour. The TPB requires that the subjective norm items have high internal consistency. For the items in this

questionnaire internal consistency checks were done on the subjective norm items and a score of .907 was obtained, reflecting an adequate measure. In order to obtain an overall perceived behavioural control score with this direct measurement the mean of the item scores are calculated.

1.2 Indirect measurement of Perceived Behavioural Control: Measuring control beliefs and their perceived power to influence behaviour.

1. Stages of development

The TPB requires that an elicitation study be conducted to determine commonly held beliefs. Thereafter, questionnaire items have to be constructed to assess strength of these control beliefs and its power to influence actual behaviour.

2. Procedure

As before, an elicitation study was conducted by means of focus group discussions, using open-ended questions to elicit commonly held beliefs: the content of control beliefs that are shared by the target population. Responses were content analyzes into themes (control beliefs). See Box 13 below for the elicitation study questions.

Box 13: Example:

1. What factors or circumstances enable you or make it easy to drink with your friends?
2. What factors or circumstances make it difficult for you to drink with your friends?
3. Are there any other issues you can think of that is relevant to your drinking with your friends?

After the beliefs were identified and recorded, questionnaire items were constructed to assess the strength of these control beliefs. The beliefs most often listed were converted into a set of statements which reflect the beliefs that might make it difficult to perform the target behaviour. See Box 14.

Box 14

When I have nothing else to do I have to drink.
 To keep the respect of my friends I have to drink.
 I can tell my friends that I don't want to drink and they will respect.
 Sometimes my friends expect me to drink when I don't want to drink.

Questionnaire items were also constructed to assess the power of these control factors to influence the behaviour. Control belief statements were converted into the form of an incomplete statement about whether this makes it more or less likely that the person will do the target behaviour, or whether it makes the behaviour more easier or more difficult to do. See Box... Items were pilot tested with 5 learners to identify any difficulties in answering.

Box 15

When there are not enough alternative (other) recreational things in my area, I am ...
 I am ... to drink if that is how....
 I am to drink if my friends respect my decision
 I am to drink

For each control belief, the belief score on the unlikely / likely scale was multiplied by the score relating to the relevant item on the less likely / more likely scale or the difficult / easy scale. The resulting products were summed across all beliefs to create an overall perceived behavioural control score:

Formula: $PBC = (a \times d) + (b \times e) + (c \times f)$

Where PBC = total perceived behavioural control score

a, b, and c are scores for each of three control beliefs

d, e, and f are scores for control belief power relating to each control belief

Using this method,

- A positive score means that, overall, the participant **feels in control** of drinking
- A negative score means that, overall, the participant **does not feel in control** of drinking with friends.

Box 16 When I have nothing else to do I have to drink.	Unlikely 1 2 3 4 5 6 7 Likely
When there are not enough alternative (other) recreational things in my area, I am ...	less -3 -2 -1 0 +1 +2 +3 more likely likely to drink
Imagine that a learner has responded by circling the numbers indicated in bold above The total perceived behavioural control score is calculated as $PBC = (5 \times -3) + (3 \times -2) + (2 \times -3)$ $= (-15) + (-6) + (-6)$ $= -27$	
The possible range of total scores is -63 to +63 Thus, a score of -27 indicates a moderate level of negative control, i.e. not drinking with friends is fairly difficult.	

Annexure 3

Scoring of the questionnaire data:

Question Numbers	Response Format	Items requiring reverse scoring	Items requiring internal consistency analysis	Items requiring multiplication	Constructs measured
1 to 4	1 to 7			1 x 11; 2x10	Behavioural beliefs
9 to 12	-3 to +3			3 x 12; 4 x 9	Outcome evaluations
13 to 16	-3 to +3			13 x 22 14 x 24	Normative beliefs
21 to 24	1 to 7	21, 23		15 x 21 16 x 23	Motivation to comply
5 to 8	1 to 7			5 x 25 6 x 27 7 x 26 8 x 28	Control belief strength
25 to 28	-3 to +3				Control belief power
17 to 20	1 to 7	18, 20	17 - 20		Attitudes, direct measure
29, 31, 36	1 to 7		29, 31 and 36		Subjective norms, direct measure
32 to 34	1 to 7		32, 33, and 34		Perceived behavioural control
30, 35, 37	1 to 7		30, 35, 37		Generalized intention
38	0 to 10				Intention statement

Source: TPB Guidelines for questionnaire construction (Ajzen, 2001)

Annexure 4. Direct measures (regression analysis SPlus file output)

```

S-PLUS : Copyright (c) 1988, 2002 Insightful Corp.
S : Copyright Lucent Technologies, Inc.
Professional Edition Version 6.1.2 Release 1 for Microsoft Windows : 2002
Working data will be in C:\Program Files\Insightful\splus61\users\Jan Swartz
> options()$contrasts
  factor      ordered
"contr.helmert" "contr.poly"
> options(contrasts = c("contr.treatment", "contr.poly"))
> options()$contrasts
[1] "contr.treatment" "contr.poly"
> attach(Finalrev)

> linear.lml <- lm(formula = Finalrev$meangi ~ Finalrev$meana, data = Finalrev,
na.action = na.exclude)
> #t-tests, T-tests, R-square, estimated coefficients etc.
summary(linear.lml, correlation = F)

```

```

Call: lm(formula = Finalrev$meangi ~ Finalrev$meana, data = Finalrev, na.action =
na.exclude)

```

```
Residuals:
```

```

  Min      1Q  Median      3Q      Max
-3.949 -1.24 -0.787  1.531  4.625

```

```
Coefficients:
```

```

              Value Std. Error t value Pr(>|t|)
(Intercept)  1.6983  0.3625      4.6848  0.0000
Finalrev$meana 0.5417  0.1230      4.4026  0.0000

```

```
Residual standard error: 1.953 on 96 degrees of freedom
```

```
Multiple R-Squared: 0.168
```

```
F-statistic: 19.38 on 1 and 96 degrees of freedom, the p-value is 0.00002777
```

```
> #gives coeffi etc.
```

```
anova(linear.lml)
```

```
Analysis of Variance Table
```

```
Response: Finalrev$meangi
```

```
Terms added sequentially (first to last)
```

```

              Df Sum of Sq  Mean Sq  F Value      Pr(F)
Finalrev$meana  1    73.9094  73.90939  19.38265  0.00002777022
Residuals      96   366.0645   3.81317

```

2. Subjective Norms

```

> linear.lm2 <- lm(formula = Finalrev$meangi ~ Finalrev$meansn, data =
Finalrev, na.action = na.exclude)
> summary(linear.lm2, correlation = F)

```

```

Call: lm(formula = Finalrev$meangi ~ Finalrev$meansn, data = Finalrev,
na.action = na.exclude)

```

```
Residuals:
```

```

  Min      1Q  Median      3Q      Max
-2.901 -1.607 -0.94  1.756  4.294

```

Coefficients:

	Value	Std. Error	t value	Pr(> t)
(Intercept)	2.2085	0.3692	5.9815	0.0000
Finalrev\$meansn	0.2987	0.1098	2.7196	0.0078

Residual standard error: 2.063 on 96 degrees of freedom

Multiple R-Squared: 0.07153

F-statistic: 7.396 on 1 and 96 degrees of freedom, the p-value is 0.007759

> #gives coeffi etc.

anova(linear.lm2)

Analysis of Variance Table

Response: Finalrev\$meangi

Terms added sequentially (first to last)

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
Finalrev\$meansn	1	31.4723	31.47233	7.396163	0.007758864
Residuals	96	408.5016	4.25522		

3. Perceived behavioral control

> linear.lm3 <- lm(formula = Finalrev\$meangi ~ Finalrev\$meanpbc, data =

Finalrev, na.action = na.exclude)

> summary(linear.lm3, correlation = F)

Call: lm(formula = Finalrev\$meangi ~ Finalrev\$meanpbc, data = Finalrev,

na.action = na.exclude)

Residuals:

Min	1Q	Median	3Q	Max
-2.139	-1.922	-1.017	2.215	4.078

Coefficients:

	Value	Std. Error	t value	Pr(> t)
(Intercept)	2.8537	0.5161	5.5297	0.0000
Finalrev\$meanpbc	0.0408	0.1040	0.3921	0.6959

Residual standard error: 2.139 on 96 degrees of freedom

Multiple R-Squared: 0.001599

F-statistic: 0.1537 on 1 and 96 degrees of freedom, the p-value is 0.6959

> #gives coeffi etc.

anova(linear.lm3)

Analysis of Variance Table

Response: Finalrev\$meangi

Terms added sequentially (first to last)

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
Finalrev\$meanpbc	1	0.7034	0.703419	0.1537281	0.6958669
Residuals	96	439.2705	4.575734		

4. Attitude and Subjective norm

> linear.lm4 <- lm(formula = Finalrev\$meangi ~ Finalrev\$meana +

Finalrev\$meansn, data = Finalrev, na.action =

na.exclude)

> summary(linear.lm4, correlation = F)

Call: lm(formula = Finalrev\$meangi ~ Finalrev\$meana + Finalrev\$meansn, data =

```
Finalrev, na.action = na.exclude)
Residuals:
```

```
  Min      1Q  Median      3Q      Max
-3.699 -1.097 -0.7366  1.661  4.937
```

```
Coefficients:
```

```
              Value Std. Error t value Pr(>|t|)
(Intercept)  0.9126  0.4429      2.0606  0.0421
Finalrev$meana 0.5347  0.1186      4.5073  0.0000
Finalrev$meansn 0.2894  0.1002      2.8873  0.0048
```

```
Residual standard error: 1.882 on 95 degrees of freedom
```

```
Multiple R-Squared: 0.2351
```

```
F-statistic: 14.6 on 2 and 95 degrees of freedom, the p-value is 2.958e-006
```

```
> linear.lm5 <- lm(formula = Finalrev$meangi ~ Finalrev$meana +
+ Finalrev$meanpbc, data = Finalrev, na.action =
+ na.exclude)
> summary(linear.lm5, correlation = F)
```

Attitude and perceived behavioral control

```
Call: lm(formula = Finalrev$meangi ~ Finalrev$meana + Finalrev$meanpbc, data =
Finalrev, na.action = na.exclude)
```

```
Residuals:
```

```
  Min      1Q  Median      3Q      Max
-3.758 -1.352 -0.7928  1.502  4.816
```

```
Coefficients:
```

```
              Value Std. Error t value Pr(>|t|)
(Intercept)  1.3911  0.5766      2.4124  0.0178
Finalrev$meana 0.5467  0.1236      4.4231  0.0000
Finalrev$meanpbc 0.0655  0.0954      0.6864  0.4941
```

```
Residual standard error: 1.958 on 95 degrees of freedom
```

```
Multiple R-Squared: 0.1721
```

```
F-statistic: 9.874 on 2 and 95 degrees of freedom, the p-value is 0.0001271
```

```
> linear.lm6 <- lm(formula = Finalrev$meangi ~ Finalrev$meana + Finalrev$meansn
+ Finalrev$meanpbc, data = Finalrev,
+ na.action = na.exclude)
> summary(linear.lm6, correlation = F)
```

Attitude, subjective norm, perceived behavioral control

```
Call: lm(formula = Finalrev$meangi ~ Finalrev$meana + Finalrev$meansn +
Finalrev$meanpbc, data = Finalrev, na.action =
na.exclude)
```

```
Residuals:
```

```
  Min      1Q  Median      3Q      Max
-3.594 -1.144 -0.6805  1.615  5.043
```

```
Coefficients:
```

```
              Value Std. Error t value Pr(>|t|)
(Intercept)  0.7475  0.6018      1.2421  0.2173
Finalrev$meana 0.5376  0.1194      4.5040  0.0000
Finalrev$meansn 0.2850  0.1012      2.8149  0.0059
Finalrev$meanpbc 0.0377  0.0926      0.4073  0.6847
```

Residual standard error: 1.89 on 94 degrees of freedom
 Multiple R-Squared: 0.2365
 F-statistic: 9.703 on 3 and 94 degrees of freedom, the p-value is 0.00001219
 > anova(linear.lm6, linear.lm4)
 Analysis of Variance Table

Response: Finalrev\$meangi

Test	Df	Sum of Sq	F Value	Terms	Resid.	Df	RSS
1				Finalrev\$meana + Finalrev\$meansn + Finalrev\$meanpbc	94		335.9400
2				Finalrev\$meana + Finalrev\$meansn	95		336.5328
				Finalrev\$meanpbc -1			-0.5928405 0.1658838

Pr(F)
 1
 2 0.6847222

Attitude and subjective norms

> linear.lm7 <- lm(formula = Finalrev\$meangi ~ Finalrev\$meana + Finalrev\$meansn + Finalrev\$meana:Finalrev\$meansn,
 data = Finalrev, na.action = na.exclude)
 > summary(linear.lm7, correlation = F)

Call: lm(formula = Finalrev\$meangi ~ Finalrev\$meana + Finalrev\$meansn + Finalrev\$meana:Finalrev\$meansn, data = Finalrev,
 na.action = na.exclude)

Residuals:
 Min 1Q Median 3Q Max
 -4.008 -1.067 -0.5209 1.459 5.06

Coefficients:

	Value	Std. Error	t value	Pr(> t)
(Intercept)	0.3764	0.6222	0.6049	0.5467
Finalrev\$meana	0.7577	0.2173	3.4869	0.0007
Finalrev\$meansn	0.4557	0.1688	2.7005	0.0082
Finalrev\$meana:Finalrev\$meansn	-0.0689	0.0563	-1.2235	0.2242

Residual standard error: 1.877 on 94 degrees of freedom
 Multiple R-Squared: 0.2471
 F-statistic: 10.28 on 3 and 94 degrees of freedom, the p-value is 6.431e-006

linear.lm8 <- lm(formula = Finalrev\$meangi ~ Finalrev\$meana + Finalrev\$meansn + Finalrev\$meana:Finalrev\$meanpbc,
 data = Finalrev, na.action = na.exclude)
 > summary(linear.lm8, correlation = F)

Call: lm(formula = Finalrev\$meangi ~ Finalrev\$meana + Finalrev\$meansn + Finalrev\$meana:Finalrev\$meanpbc, data = Finalrev,
 na.action = na.exclude)

Residuals:
 Min 1Q Median 3Q Max
 -3.347 -1.118 -0.7344 1.589 4.999

Coefficients:

	Value	Std. Error	t value	Pr(> t)
--	-------	------------	---------	----------

```

              (Intercept) 0.9270 0.4450      2.0832 0.0399
              Finalrev$meana 0.4496 0.1835      2.4504 0.0161
              Finalrev$meansn 0.2830 0.1011      2.8001 0.0062
Finalrev$meana:Finalrev$meanpbc 0.0195 0.0320      0.6091 0.5439

```

Residual standard error: 1.888 on 94 degrees of freedom

Multiple R-Squared: 0.2381

F-statistic: 9.793 on 3 and 94 degrees of freedom, the p-value is 0.00001104

```

> linear.lm9 <- lm(formula = Finalrev$meangi ~ Finalrev$meana + Finalrev$meansn
+ Finalrev$meansn:Finalrev$meanpbc,
  data = Finalrev, na.action = na.exclude)
> summary(linear.lm9, correlation = F)

```

```

Call: lm(formula = Finalrev$meangi ~ Finalrev$meana + Finalrev$meansn +
Finalrev$meansn:Finalrev$meanpbc, data = Finalrev,
  na.action = na.exclude)

```

Residuals:

```

      Min       1Q   Median       3Q      Max
-3.632 -1.131 -0.7339  1.643  4.992

```

```

Coefficients:
              (Intercept) 0.9233 0.4455      2.0724 0.0410
              Finalrev$meana 0.5367 0.1192      4.5013 0.0000
              Finalrev$meansn 0.2280 0.1773      1.2860 0.2016
Finalrev$meansn:Finalrev$meanpbc 0.0119 0.0284      0.4201 0.6753

```

Residual standard error: 1.89 on 94 degrees of freedom

Multiple R-Squared: 0.2365

F-statistic: 9.708 on 3 and 94 degrees of freedom, the p-value is 0.00001213

```

> linear.lm <- lm(formula = Finalrev$meangi ~ Finalrev$meana + Finalrev$meansn,
  data = Finalrev, na.action =
  na.exclude)
> summary(linear.lm, correlation = F)

```

```

Call: lm(formula = Finalrev$meangi ~ Finalrev$meana + Finalrev$meansn, data =
Finalrev, na.action = na.exclude)

```

Residuals:

```

      Min       1Q   Median       3Q      Max
-3.699 -1.097 -0.7366  1.661  4.937

```

```

Coefficients:
              (Intercept) 0.9126 0.4429      2.0606 0.0421
              Finalrev$meana 0.5347 0.1186      4.5073 0.0000
              Finalrev$meansn 0.2894 0.1002      2.8873 0.0048

```

Residual standard error: 1.882 on 95 degrees of freedom

Multiple R-Squared: 0.2351

F-statistic: 14.6 on 2 and 95 degrees of freedom, the p-value is 2.958e-006

```

> fitted <- fitted(linear.lm)
> res <- resid(linear.lm)
> #standardised residuals
stand.res <- (res - mean(res, na.rm = T))/stdev(res, na.rm = T)
> #z-score, standardised
stand.res.wo.na <- stand.res[!is.na(stand.res)]
> # residuals without any na's
> X2 <- sum(stand.res^2)
> X2

```

```

[1] 97
> 1 - pchisq(X2, 95)
[1] 0.4237166
> summary(res)
      Min.   1st Qu.   Median     Mean   3rd Qu.   Max.
-3.699350 -1.097080 -0.736644  0.000000  1.661042  4.936779
> summary(stand.res)
      Min.   1st Qu.   Median     Mean   3rd Qu.   Max.
-1.986084 -0.588993 -0.395485  0.000000  0.891770  2.650427
> var(stand.res)
[1] 1
> par(mfrow = c(1, 2))
> plot(stand.res)
> # Check the normality of the residuals
title(main = "Figure 1. Standardised Residuals")
> hist(stand.res, nclass = 10, probability = T)
> title(main = "Figure. Histogram of standardised residuals")
> stand.res.dataframe <- data.frame(stand.res, meana, meansn)
> stand.res.dataframe
  stand.res meana meansn
1 -1.12046628  1.00  5.666667
2  1.42037787  1.50  5.666667
3  1.03523054  1.25  4.000000
4 -0.53538235  1.75  1.666667
5  1.09789537  2.00  5.666667
6 -1.12046628  1.00  5.666667
7  1.10514899  2.50  7.000000
8  0.37848117  7.00  5.666667
9 -0.39548457  1.00  1.000000
10 -0.49905338  1.00  1.666667
11  0.47112530  1.00  2.333333
12 -0.82605833  2.50  1.000000
13 -0.96958291  3.00  1.000000
14  0.92629624  4.50  1.000000
15 -0.44726898  1.00  1.333333
16  1.41680365  2.25  2.000000
17 -1.06868187  1.00  5.333333
18  0.44110173  2.50  6.666667
19 -0.86611926  1.00  6.333333
20 -0.81433485  1.00  6.000000
21  1.01067763  1.50  6.000000
  stand.res meana meansn
22 -0.40005959  1.00  3.333333
23 -0.44726898  1.00  1.333333
24 -1.62727219  4.75  2.000000
25 -1.24943105  3.50  5.333333
26 -0.39548457  1.00  1.000000
27 -0.39548457  1.00  1.000000
28 -1.17851181  5.50  2.333333
29 -0.44726898  1.00  1.333333
30  1.10525415  4.50  1.000000
31  1.27238343  4.00  2.000000
32 -0.67254895  4.00  3.000000
33 -0.17473534  3.25  2.333333
34  1.04253674  2.75  2.333333
35  0.12687364  4.25  2.000000
36 -0.75251308  4.00  4.666667
37 -0.09845061  2.00  3.000000
38  2.02538711  1.00  5.000000

```

39	1.57488805	3.75	1.666667
40	1.36049680	3.25	1.666667
41	-0.49632221	2.50	2.333333
42	1.53572274	1.00	7.000000
	stand.res	meana	meansn
43	-1.30841649	4.00	1.333333
44	-0.44726898	1.00	1.333333
45	0.27759926	3.25	6.333333
46	-1.98608365	6.00	2.000000
47	-0.44726898	1.00	1.333333
48	1.26965226	2.50	1.333333
49	-0.51903127	1.25	1.333333
50	-0.57081568	1.25	1.666667
51	-0.60262220	1.00	2.333333
52	-0.24470637	1.00	2.333333
53	-1.04959962	2.00	5.666667
54	2.59501560	1.00	1.333333
55	-0.42818672	2.00	1.666667
56	1.05346974	4.50	1.333333
57	-0.51903127	1.25	1.333333
58	1.17780691	1.00	7.000000
59	-0.39548457	1.00	1.000000
60	0.76821184	3.00	1.333333
61	1.61211264	1.75	1.666667
62	0.54561876	2.25	3.000000
63	0.78639846	5.25	1.666667
	stand.res	meana	meansn
64	-0.59079356	1.50	1.333333
65	-0.32467049	1.00	4.000000
66	-0.71250472	4.50	2.333333
67	-0.49270371	7.00	6.666667
68	-0.96958291	3.00	1.000000
69	-0.39548457	1.00	1.000000
70	-0.82605833	2.50	1.000000
71	-0.44726898	1.00	1.333333
72	-0.44726898	1.00	1.333333
73	0.02508778	6.00	6.333333
74	-0.30553566	3.00	1.333333
75	-0.49905338	1.00	1.666667
76	-0.82605833	2.50	1.000000
77	-0.46724686	1.25	1.000000
78	0.51480473	7.00	1.333333
79	-0.48002371	1.00	5.000000
80	-0.58359253	1.00	5.666667
81	1.54035035	2.00	1.666667
82	2.65042681	1.25	1.666667
83	-1.27755819	4.50	3.666667
84	0.97167008	1.75	2.333333
	stand.res	meana	meansn
85	1.02076759	5.50	2.000000
86	-1.37750019	4.75	5.000000
87	-1.33575316	1.75	5.666667
88	-0.31646866	1.25	2.333333
89	-0.51903127	1.25	1.333333
90	1.80925718	4.00	2.000000
91	0.48116267	4.00	1.333333
92	0.78818972	2.75	1.666667
93	-1.24848284	3.25	2.333333
94	-0.53627798	3.00	1.666667

```

95 -0.30464002  1.75 1.333333
96 -0.30464002  1.75 1.333333
97 -0.22562412  2.00 2.666667
98  2.09630635  3.00 2.000000
> par(mfrow = c(1, 1))
> #normal quantile plot to check for skewness
qqnorm(stand.res)
> #normal probability plot with line
qqline(stand.res)
> title(main = "Figure. Normal q-q plot with line")
> #plot res vs fitted, check constant variance
plot(fitted(linear.lm), stand.res, ylim = c(-3, 3))
> abline(h = c(1.96, -1.96), lty = 3)
> linear.lm <- lm(formula = Finalrev$meangi ~ Finalrev$meana + Finalrev$meansn,
data = Finalrev, na.action =
na.exclude)
> summary(linear.lm, correlation = F)

```

```

Call: lm(formula = Finalrev$meangi ~ Finalrev$meana + Finalrev$meansn, data =
Finalrev, na.action = na.exclude)
Residuals:

```

Min	1Q	Median	3Q	Max
-3.699	-1.097	-0.7366	1.661	4.937

```

Coefficients:
            Value Std. Error t value Pr(>|t|)
(Intercept)  0.9126  0.4429    2.0606  0.0421
Finalrev$meana 0.5347  0.1186    4.5073  0.0000
Finalrev$meansn 0.2894  0.1002    2.8873  0.0048

```

```

Residual standard error: 1.882 on 95 degrees of freedom
Multiple R-Squared: 0.2351
F-statistic: 14.6 on 2 and 95 degrees of freedom, the p-value is 2.958e-006

```

```

> anova(linear.lm, linear.lm6)
Analysis of Variance Table

```

Response: Finalrev\$meangi

	Terms	Resid.	Df	RSS
Test				
1			95	336.5328
2	Finalrev\$meana + Finalrev\$meansn		94	335.9400
+Finalrev\$meanpbc	1	0.5928405	0.1658838	

Pr(F)

```

1
2 0.6847222
> linear.sat <- lm(formula = Finalrev$meangi ~ Finalrev$meana + Finalrev$meansn
* Finalrev$meanpbc, data = Finalrev,
na.action = na.exclude)
> anova(linear.sat, linear.lm)
Analysis of Variance Table

```

Response: Finalrev\$meangi

	Terms	Resid.	Df	RSS
1	Finalrev\$meana + Finalrev\$meansn + Finalrev\$meanpbc		90	325.8236

```
2
Finalrev$meana + Finalrev$meansn 95 336.5328
```

```
Test
1
2
-Finalrev$meanpbc-Finalrev$meana:Finalrev$meansn-
Finalrev$meana:Finalrev$meanpbc-Finalrev$meansn:Finalrev$meanpbc-
Finalrev$meana:Finalrev$meansn:Finalrev$meanpbc
```

```
Df Sum of Sq F Value Pr(F)
1
2 -5 -10.70918 0.5916247 0.7063658
> anova(linear.lm, linear.sat)
Analysis of Variance Table
```

```
Response: Finalrev$meangi
```

	Terms	Resid.	Df	RSS
1	Finalrev\$meana + Finalrev\$meansn	95	336.5328	
2	Finalrev\$meana * Finalrev\$meansn * Finalrev\$meanpbc	90	325.8236	

```
Test
1
2
+Finalrev$meanpbc+Finalrev$meana:Finalrev$meansn+Finalrev$meana:Finalrev$meanpbc
c+Finalrev$meansn:Finalrev$meanpbc+Finalrev$meana:Finalrev$meansn:Finalrev$meanpbc
```

```
Df Sum of Sq F Value Pr(F)
1
2 5 10.70918 0.5916247 0.7063658
```

Annex 3. Indirect measures (regression analysis SPlus file output)

```
> linear.lm1 <- lm(formula = Finalrev$meangi ~ Finalrev$inda,
data = Finalrev, na.action = na.exclude)
> #t-tests, T-tests, R-square, estimated coefficients etc.
summary(linear.lm1, correlation = F)
```

```
Call: lm(formula = Finalrev$meangi ~ Finalrev$inda, data = Finalrev,
na.action = na.exclude)
```

```
Residuals:
```

Min	1Q	Median	3Q	Max
-2.466	-1.912	-0.9121	2.281	4.344

```
Coefficients:
```

	Value	Std. Error	t value	Pr(> t)
(Intercept)	2.7416	0.3264	8.3984	0.0000
Finalrev\$inda	0.0213	0.0177	1.2029	0.2320

```
Residual standard error: 2.125 on 96 degrees of freedom
```

```
Multiple R-Squared: 0.01485
```

```
F-statistic: 1.447 on 1 and 96 degrees of freedom, the p-value is 0.232
```

```
> linear.lm2 <- lm(formula = Finalrev$meangi ~ Finalrev$indn, data = Finalrev,
na.action = na.exclude)
> summary(linear.lm2, correlation = F)
```

```
Call: lm(formula = Finalrev$meangi ~ Finalrev$indn, data = Finalrev, na.action
= na.exclude)
```

```
Residuals:
  Min      1Q  Median      3Q      Max
-2.084 -2.019 -1.043  2.285  4.053
```

```
Coefficients:
              Value Std. Error  t value Pr(>|t|)
(Intercept)  3.0359   0.2165   14.0202  0.0000
Finalrev$indn -0.0013   0.0102   -0.1312  0.8959
```

```
Residual standard error: 2.141 on 96 degrees of freedom
```

```
Multiple R-Squared: 0.0001793
```

```
F-statistic: 0.01722 on 1 and 96 degrees of freedom, the p-value is 0.8959
```

```
> linear.lm3 <- lm(formula = Finalrev$meangi ~ Finalrev$indpbc, data =
Finalrev, na.action = na.exclude)
> summary(linear.lm3, correlation = F)
```

```
Call: lm(formula = Finalrev$meangi ~ Finalrev$indpbc, data = Finalrev,
na.action = na.exclude)
```

```
Residuals:
  Min      1Q  Median      3Q      Max
-3.399 -1.768 -0.7533  1.943  4.853
```

```
Coefficients:
              Value Std. Error  t value Pr(>|t|)
(Intercept)  2.6163   0.2629   9.9518  0.0000
Finalrev$indpbc 0.0297   0.0113   2.6368  0.0098
```

```
Residual standard error: 2.067 on 96 degrees of freedom
```

```
Multiple R-Squared: 0.06753
```

```
F-statistic: 6.953 on 1 and 96 degrees of freedom, the p-value is 0.009763
```

```
> linear.lm4 <- lm(formula = Finalrev$meangi ~ Finalrev$indpbc + Finalrev$inda,
data = Finalrev, na.action = na.exclude)
> summary(linear.lm4, correlation = F)
```

```
Call: lm(formula = Finalrev$meangi ~ Finalrev$indpbc + Finalrev$inda, data =
Finalrev, na.action = na.exclude)
```

```
Residuals:
  Min      1Q  Median      3Q      Max
-3.318 -1.758 -0.6978  1.96  4.717
```

```
Coefficients:
              Value Std. Error  t value Pr(>|t|)
(Intercept)  2.4343   0.3415   7.1279  0.0000
Finalrev$indpbc 0.0282   0.0114   2.4712  0.0152
Finalrev$inda  0.0146   0.0175   0.8367  0.4049
```

```
Residual standard error: 2.07 on 95 degrees of freedom
```

```
Multiple R-Squared: 0.07435
```

```
F-statistic: 3.815 on 2 and 95 degrees of freedom, the p-value is 0.02548
```

```
> linear.lm5 <- lm(formula = Finalrev$meangi ~ Finalrev$indpbc + Finalrev$indn,
data = Finalrev, na.action =
na.exclude)
```

```
> summary(linear.lm5, correlation = F)
```

```
Call: lm(formula = Finalrev$meangi ~ Finalrev$indpbc + Finalrev$indn, data =
Finalrev, na.action = na.exclude)
Residuals:
```

```

Min      1Q  Median      3Q      Max
-3.415 -1.759 -0.7562  1.932  4.829

```

Coefficients:

	Value	Std. Error	t value	Pr(> t)
(Intercept)	2.6096	0.2650	9.8464	0.0000
Finalrev\$indpbc	0.0299	0.0113	2.6388	0.0097
Finalrev\$indn	-0.0031	0.0099	-0.3078	0.7589

Residual standard error: 2.077 on 95 degrees of freedom

Multiple R-Squared: 0.06846

F-statistic: 3.491 on 2 and 95 degrees of freedom, the p-value is 0.03444

```

> linear.lm6 <- lm(formula = Finalrev$meangi ~ Finalrev$indpbc + Finalrev$inda
+ Finalrev$indn, data = Finalrev,
na.action = na.exclude)
> summary(linear.lm6, correlation = F)

```

```

Call: lm(formula = Finalrev$meangi ~ Finalrev$indpbc + Finalrev$inda +
Finalrev$indn, data = Finalrev, na.action =
na.exclude)

```

Residuals:

```

Min      1Q  Median      3Q      Max
-3.335 -1.704 -0.7291  1.962  4.662

```

Coefficients:

	Value	Std. Error	t value	Pr(> t)
(Intercept)	2.4017	0.3494	6.8731	0.0000
Finalrev\$indpbc	0.0284	0.0115	2.4765	0.0151
Finalrev\$inda	0.0164	0.0179	0.9143	0.3629
Finalrev\$indn	-0.0049	0.0101	-0.4860	0.6281

Residual standard error: 2.079 on 94 degrees of freedom

Multiple R-Squared: 0.07667

F-statistic: 2.602 on 3 and 94 degrees of freedom, the p-value is 0.05659

```

> linear.lm7 <- lm(formula = Finalrev$meangi ~ Finalrev$indpbc +
Finalrev$inda:Finalrev$indn, data = Finalrev,
na.action = na.exclude)
> summary(linear.lm7, correlation = F)

```

```

Call: lm(formula = Finalrev$meangi ~ Finalrev$indpbc +
Finalrev$inda:Finalrev$indn, data = Finalrev, na.action =
na.exclude)

```

Residuals:

```

Min      1Q  Median      3Q      Max
-3.314 -1.74 -0.7582  2.054  4.887

```

Coefficients:

	Value	Std. Error	t value	Pr(> t)
(Intercept)	2.6220	0.2634	9.9526	0.0000
Finalrev\$indpbc	0.0284	0.0114	2.4934	0.0144
Finalrev\$inda:Finalrev\$indn	0.0003	0.0004	0.8154	0.4169

Residual standard error: 2.071 on 95 degrees of freedom

Multiple R-Squared: 0.07401

F-statistic: 3.797 on 2 and 95 degrees of freedom, the p-value is 0.02593

```

> linear.lm8 <- lm(formula = Finalrev$meangi ~ Finalrev$indpbc +
Finalrev$inda:Finalrev$indpbc, data = Finalrev,
na.action = na.exclude)
> summary(linear.lm8, correlation = F)

```

```
Call:      lm(formula = Finalrev$meangi ~ Finalrev$indpbc +
Finalrev$inda:Finalrev$indpbc, data = Finalrev, na.action =
na.exclude)
```

Residuals:

```
Min      1Q  Median      3Q  Max
-3.063 -1.697 -0.7964  1.943  4.75
```

Coefficients:

	Value	Std. Error	t value	Pr(> t)
(Intercept)	2.6712	0.2640	10.1187	0.0000
Finalrev\$indpbc	0.0129	0.0160	0.8048	0.4229
Finalrev\$inda:Finalrev\$indpbc	0.0008	0.0005	1.4685	0.1453

Residual standard error: 2.055 on 95 degrees of freedom

Multiple R-Squared: 0.08823

F-statistic: 4.596 on 2 and 95 degrees of freedom, the p-value is 0.01243

```
> linear.lm9 <- lm(formula = Finalrev$meangi ~ Finalrev$indpbc +
Finalrev$indn:Finalrev$indpbc, data = Finalrev,
na.action = na.exclude)
> summary(linear.lm9, correlation = F)
```

```
Call:      lm(formula = Finalrev$meangi ~ Finalrev$indpbc +
Finalrev$indn:Finalrev$indpbc, data = Finalrev, na.action =
na.exclude)
```

Residuals:

```
Min      1Q  Median      3Q  Max
-3.192 -1.728 -0.6104  2.017  4.586
```

Coefficients:

	Value	Std. Error	t value	Pr(> t)
(Intercept)	2.6420	0.2625	10.0634	0.0000
Finalrev\$indpbc	0.0275	0.0113	2.4252	0.0172
Finalrev\$indn:Finalrev\$indpbc	0.0006	0.0004	1.3353	0.1850

Residual standard error: 2.059 on 95 degrees of freedom

Multiple R-Squared: 0.08471

F-statistic: 4.396 on 2 and 95 degrees of freedom, the p-value is 0.01493

```
> linear.lm <- lm(formula = Finalrev$meangi ~ Finalrev$indpbc, data = Finalrev,
na.action = na.exclude)
```

```
>
```

```
> summary(linear.lm, correlation = F)
```

```
Call:      lm(formula = Finalrev$meangi ~ Finalrev$indpbc, data = Finalrev,
na.action = na.exclude)
```

Residuals:

```
Min      1Q  Median      3Q  Max
-3.399 -1.768 -0.7533  1.943  4.853
```

Coefficients:

	Value	Std. Error	t value	Pr(> t)
(Intercept)	2.6163	0.2629	9.9518	0.0000
Finalrev\$indpbc	0.0297	0.0113	2.6368	0.0098

Residual standard error: 2.067 on 96 degrees of freedom

Multiple R-Squared: 0.06753

F-statistic: 6.953 on 1 and 96 degrees of freedom, the p-value is 0.009763

```

> linear.sat <- lm(formula = Finalrev$meangi ~ Finalrev$inda * Finalrev$indn *
Finalrev$indpbc, data = Finalrev,
na.action = na.exclude)
> anova(linear.lm, linear.sat)
Analysis of Variance Table

```

Response: Finalrev\$meangi

	Terms	Resid.	Df	RSS
1	Finalrev\$indpbc		96	410.2615
2	Finalrev\$inda * Finalrev\$indn * Finalrev\$indpbc		90	381.7809

Test

1

2

+Finalrev\$inda+Finalrev\$indn+Finalrev\$inda:Finalrev\$indn+Finalrev\$inda:Finalrev\$indpbc+Finalrev\$indn:Finalrev\$indpbc+Finalrev\$inda:Finalrev\$indn:Finalrev\$indpbc

	Df	Sum of Sq	F Value	Pr(F)
1				
2	6	28.48067	1.118993	0.3576908