EXAMINATION OF THE RUTGERS ALCOHOL PROBLEM INDEX: TESTING THE UNIDIMENSIONAL PROPERTIES OF THE FACTOR STRUCTURE

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ABSTRACT

As part of the Rutgers Health and Human Development Project, White & Labouvie (1989) developed and published the Rutgers Alcohol Problem Index (RAPI). They cited a need for a valid and reliable means of assessment of adolescents experiencing problem drinking patterns, and thus at risk for future alcohol use disorders. The twenty-three item measure was reported to screen accurately for adolescents that reported experiencing negative consequence of alcohol use and would benefit from further intervention.

Since the time of the initial publication, the RAPI has become a common tool in both clinical and research settings. The acceptance of the RAPI as a unidimensional measure of negative consequence of alcohol use appears to have been relatively unchecked beyond the initial report. The lack of rigorous follow-up on the RAPI is disturbing in light of its wide use in adolescent, young adult and alcohol literature. The present study was designed to investigate the factor structure reported in the original paper, using a sample selected to remove variance associated with both age and gender. A sample comprised of college-aged males who have reported a history of alcohol use was targeted. Exploratory Factor Analyses with a subsequent Confirmatory Factor analysis were conducted on the 23-items or the RAPI. Additionally, a proposed nomenclature of factored items was discussed to support continued investigation of the psychometrics of the RAPI.

Post-Hoc analysis were used to test alternative hypothesis of item responses between participants who reported experiencing no current and past alcohol use problems verses participants who did report current and past problems due to alcohol use. Difference testing of item responses was used to identify items which discriminate between those reporting no current or past problems and those that do report positive alcohol use problems. Discussion of the

significance of items that were found to discriminate between types of drinkers and the usefulness of these items within the RAPI will be addressed.

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INTRODUCTION

The research community has adopted the Rutgers Alcohol Problem Index (RAPI) as a valued tool. The simplest literature search on an internet database (e.g., PsychInfo, 2006) will return nearly 100 hits referencing the White & Labouvie (1989) article, the source document for the RAPI. The RAPI's primary use in published articles is as a dependant measure of alcohol related problems, from which inferences are made regarding models of behavior. While examination of the global use of the RAPI in clinical settings is hindered by the independent and often isolated practices employed by clinicians, heuristic use of the RAPI provides a glimpse of current clinical prevalence.

Issues involving the RAPI have drawn attention towards a need to investigate the psychometrics and logic behind the measure. Foremost is the need to confirm the factor structure reported by White & Labouvie (1989). The only published validation study of the 23-item RAPI factor structure was the original report of negative consequences experienced by adolescents as a result of alcohol use (White & Labouvie, 1989). Examination of the psychometrics of the RAPI with young adults has not been conducted, although the RAPI is often used with this population (Larimer, Turner, Mallett & Geisner, 2004; Neal et al, 2006; Borsari & Carey, 2000; Baer, Kivlahan, Blume, Mcknight & Marlatt, 2001). Since the original publication of the RAPI, improved statistical procedures have become more common and will aid in the continued validation of the RAPI.

White & Labouvie's (1989) use of principal components analysis (PCA) sought to group items of negative consequences of alcohol use together based on item response, without a theoretical account of how they correlated. This tactic is an excellent first step in data reduction (DeCoster, 1998). While the PCA can provide a structure equation for data, the functional use of

the paradigm must still be tested. The use of exploratory factor analysis (EFA) which tests the goodness of fit of a predicted model is needed. Additionally, confirmation of the EFA goodness of fit measure is desired to demonstrate the stability of a paradigm. These steps were not undertaken with the development RAPI, and thus leave a question as to the validity of the proposed unidimensional factor structure reported.

Brief examination of the RAPI for content structure, using the naked-eye, can parcel the items in a variety of theoretically sound factors (e.g., Aggression). The ease of extraction of face valid factors from the RAPI draw into question the sensitivity of the unidimensional model to the best explanation what the RAPI is measuring and how it can be used. As can be seen by the number of questions initially used in the development of the RAPI (53 items), the construct of negative consequences from drinking is vast. The RAPI's use as a screening instrument does not require it to demonstrate selectivity to each type of behavior prevalent within a domain. However, sensitivity to differing types of behavior within the domain of negative consequences of adolescent and young adult consumption of alcohol is important to understanding the psychometrics of the RAPI. Understanding of how and what the RAPI measures is essential in determining its continued use as a measure of alcohol related behavior.

This study examines several methodology problems encountered in the initial White & Labouvie (1989) article that led to the report that the RAPI is best used as a unidimensional measure of negative consequences experienced by adolescents and young adults. Additionally, this study will report on exploratory factor analysis [i.e., principal components analysis (PCA), exploratory factor analysis (EFA)] and confirmatory factor analysis (CFA) that will be used to examine the factor structure from the 23-items of the RAPI, in a controlled sample of young men (21-24 years old). Following the structural analysis of the RAPI with PCA, EFA & CFA

methods, Post-Hoc analysis of differences between self-reported types of drinkers were analyzed and used to consider alternative explanations of item significance and RAPI usefulness.

RAPI Use in Research

In this section, some of the ways in which the RAPI has been used in research literature will be reviewed. The reviewed studies in this section are meant to be a brief overview of various approaches in which the RAPI is currently being used. These reviews should not be considered either comprehensive or collaborative accounts of the RAPI proliferation in research settings, but used to gauge the varied range in which the RAPI is used.

Danielson, Overholser & Butt (2003) reported using RAPI scores to classify ninety-eight inpatient adolescents, located in a Midwestern psychiatric hospital, as heavy (n=36) or, light/non-drinkers (n=62). The authors defined heavy drinking as "one who experiences problems because of a drinking habit", and light/non-drinkers as "one who does not drink or drinks without experiencing significant problems. A cut-off score of 15-endorsed items from the RAPI was used to classify drinking status. The cut-off methodology used in this study does not adhere to the standard scoring of the RAPI. The resulting groups based on RAPI scores were then used to examine levels of depression measured by the Children's Depression Inventory (CDI; Kovacs, 1985). Heavy drinkers were found to have higher levels of reported depression than those of light/non-drinkers. This study suggests that the RAPI has predictive value within adolescent psychiatric populations.

Bosari & Carey (2000) reported using the RAPI as a categorical variable in a brief motivational interview study with college students who had reported at least two episodes of binge drinking. The RAPI was used with several other screening instruments [e.g., Alcohol Use

Disorders Identification Test (AUDIT; WHO Brief Intervention Study Group, 1996)] to provide feedback on their alcohol-related behavior, as compared to matched norm groups. The RAPI was employed to provide feedback on the level of alcohol-related problems that each participant had reported. Results found that the participants who received feedback with the RAPI reduced the frequency of alcohol use and binge drinking episodes, and the overall quantities of alcohol consumed.

Cautin, Overholser & Goetz, (2001) have used the RAPI to examine anger expression in adolescent psychiatric inpatients. Using a factorial design, differentiation of adolescents was conceptualized by the level in which they expressed anger. A significant finding was reported with adolescents with higher levels of externalized anger reporting higher levels of alcohol related problems, as measured by summed RAPI scores, than adolescents with low levels of externalized anger. This report was place in the context of adolescent risk of suicide. Cautin et al (2001) concluded that adolescents with higher levels of alcohol related problems were more likely to externalize their anger, leading to a lower risk for suicide.

Neal et al (2006) began an investigation of the psychometrics of the RAPI using recently graduated high school students (17-19 years old), scheduled to matriculate to university student status. Participants were assessed semi-annually over a four year period. The first assessment attained information regarding behavior during their senior year of high school and the second assessment collected data on behavior during their first semester of college. After reporting confirmation of the unidimensional structure of the RAPI, the researchers used Item-Response Theory methods to reduce the RAPI to 18-items. The 18-item measure proposed by Neal et al (2006) was reported to remove instabilities based on gender. A cutoff score of 8-items or greater being endorsed was proposed as an indicator of further need of assessment. Unfortunately,

results of the EFA and CFA conducted by this research team were not published, as the purpose of their report was to present the findings associated with the IRT modeling. While an excellent addition to the literature regarding the RAPI, this study examines the use and interpretation of the RAPI in methods not commonly used in the procedures associated with the measure. Although as reported earlier, at least one other research group (Danielson et al, 2003) have chosen to score the RAPI by only the number of items endorsed.

RAPI Use in Clinical Settings

It is often difficult to assess how the RAPI is used in clinical settings, although it does appear to have wide acceptance. Since the RAPI is considered a screening instrument and not intended for diagnosis, its contribution in clinical decision-making maybe obscured by later use and report of diagnostic assessments. However, several events indicate that the RAPI has become a common screening tool in clinical settings. The National Institute of Alcohol Abuse and Alcoholism (NIAAA, 2006) listed the RAPI as a valid measure of negative consequences of adolescent alcohol abuse; as the primary representative of the U.S. government in alcohol related topics, this source of information bears a great deal of weight. Non-government organization references to the positive use of the RAPI abound, with agencies such as Aspen Education Group (2006) endorsing its use for clinicians and laymen alike. Additionally, published research in areas such as motivational intervention (Marlatt, Baer, Kivlahan, Dimeff, Larimer, Quigley, Somers & Williams, 1998; Collins, Carey & Sliwinski, 2002), provided evidence of the use of the RAPI in clinical settings.

Motivation for using the RAPI

Aside from the good psychometrics reported by White & Labouvie (1989; NIAAA, 2006), the use of the RAPI in both clinical and research settings can be attributed to economics and ease of use. White & Labouvie have not copyrighted the RAPI instrument and have generously offered its use to all, with the unchecked condition that group norms be submitted to them for the continued standardization of the measure. For clinicians, researchers, and students the use of a published measure at no direct cost is not easily passed upon. The RAPI is also reported to be valid even if administered by non-licensed personnel or even self-administered. Scoring is simply accomplished by summation of responses. Results are obtained by the comparison of the summed score to that of published norms (Rutgers Center of Alcohol Studies, 2006). The entire process of administration and scoring takes a short time (15-20 minutes).

The growing use of the RAPI in alcohol-related fields is a positive indication that the effort to standardize identification, prevention and treatment of adolescent and young adult alcohol-related problems is growing. Given that the RAPI has gained a significant presence in research and clinical settings of alcohol-related behavior, it is warranted to re-examine its development and validity with new samples (Neal et al, 2006). Moreover, it has been sixteen years since the initial publication, since this time several new measures have been published with claims of similar (if not better) ability to identify adolescents at risk for problems stemming from both alcohol and drug use. A comparison of the intent of several of these measures to that of the RAPI and the re-examination of the ability of the RAPI to function as a screening device will be helpful in the determination of its continued role.

Development of the RAPI

White & Labouvie (1989) developed the RAPI as a measure of negative consequences of alcohol consumption during adolescence, which are related to later problem behaviors. As a project within a longitudinal study, The RAPI was constructed by recruiting subjects via random telephone calls over a three year time period ranging from 1979-1981, within the state of New Jersey. Initial interviews identified households with at least one eligible adolescent, by calculating age via birth dates. Adolescents who were reported to have serious physical or mental handicaps or currently seeking psychological care were excluded from the participant recruitment pool.

The Rutgers sample consisted of 1380 participants. Three age-based cohorts were used for initial testing at time period-one: ages 12 (n= 163 males / 159 females), 15 (n= 215 males / 212 females) & 18 (n= 198 males / 207 females). Each cohort was tested again after three years: ages 15, 18 & 21. Interviewers made home visits to invite possible participants into the study. Willing participants were required to travel to a testing center where a trained interviewer administered questionnaires to participants. Testing sessions were self-paced and lasted from 5-6 hours, as participants were asked to contribute to multiple studies. Participants (n=1308) were retested after a three year period, providing a 95% retest rate.

Participants were asked for self-ratings from a list of 53-problems related to alcohol use. The items were selected by surveying the content of questionnaires in a variety of studies of adolescent and alcohol use (See: Cahalan, 1970; Donovan and Jessor, 1978; Filmore, 1974; Mayer and Filstead, 1980). Item 53 (i.e., “Used false Identification”) was eventually dropped from analysis due to the restrictive nature of the age-related question with the selected population (White et al, 1989). At time period-one each participant was instructed to indicate on a five point

Likert scale, how often or how many times an event had occurred while they were consuming alcohol (0=never to 4=always) or because of their alcohol consumption (0=never to 4=more than 10 times). Three years later, at time period two, each participant was asked about identical problems associated with alcohol-use in a retrospective manner over the previous three years. Participants were asked to report quantity and frequency counts of types of alcohol consumed (i.e., beer, wine, hard liquor) and frequencies of getting "drunk". These reports were combined into one score of alcohol use intensity yielding internal consistency estimates of .91 for time-period-one and .87 at time period-two.

The five most common types of problems associated with alcohol consumption, were: (1) "getting into fights" (2) "causing shame or embarrassment (3) "neglecting one's responsibilities" (4) "noticing a change in one's personality and (5) "having a bad time". Participants were also asked to report occurrences of (1) neglectful behaviors (e.g., "Not able to do homework or study for a test"), (2) Aggressive behaviors (e.g., "Got into fights, acted bad or did mean things"), (3) physiological reactions to alcohol consumption (e.g., "Had withdrawal symptoms, that is, felt sick because you stopped or cut down on drinking") and (4) changes in socialization (e.g., "Relatives avoid you") due to alcohol consumption. Additionally, several of the least likely problems to occur were defined: (1) "having withdrawal symptoms", (2) "feeling one is going crazy" and (3) "feeling physically or psychologically dependant on alcohol".

Initial Rutgers Data Analysis (1989)

White and Labouvie (1989) reported a principal component analysis with subsequent PROMAX rotations for sub-samples of users at time-one (n=906) and time-two (n=1116) was used, with scree testing identifying three to four factors within the 52-items completed by the

participants. A decision was made to report the three factor model, as the factor loading from this model would be the most likely to be replicable. Reliability estimates ranges from .77 to .82, while correlation coefficients between the three factors ranged between .43 and .59 at time period-one and .45 and .55 at time period-two.

Table 1: Marker items for White & Labouvie's (1989) three problem dimensions (Reprinted).

Loadings		
T1	T2	Item
		FI
0.5	0.67	Drove a car or a motorcycle
0.69	0.73	Spent a whole weekend drinking
0.54	0.55	Had a drink before or instead of breakfast
0.52	0.53	Missed a day (or part of day) of school or work
0.53	0.61	People told you about things you said or did that you cannot remember
0.51	0.48	Suddenly found yourself in a place that you could not remember getting to
0.75	0.63	Left a party because there was no alcohol
		FII
0.49	0.62	Not able to do your homework or study for a test
0.51	0.49	Got into fights, acted bad or did mean things
0.6	0.55	Worried or felt guilty about your drinking
0.53	0.5	Caused shame or embarrassment to someone
0.75	0.62	Friends or neighbors avoided you
0.66	0.66	Felt paranoid or "up tight"
0.56	0.48	Felt that you needed less alcohol than you used to use in order to get the same effect
0.53	0.53	Tried to control your drinking by trying to drink only at certain times of the day or certain places
		FIII
0.83	0.73	Lost a job
0.73	0.82	Been in an alcohol treatment program
0.63	0.65	Charged with driving under the influence
0.56	0.63	Sought advice about your drinking
0.51	0.51	Felt you were going crazy
0.75	0.65	Was told by a physician to stop or cut down drinking
0.44	0.51	Was told by a friend or neighbor to stop or cut down drinking

Rutgers Alcohol Problem Index

White & Labouvie (1989) reported the development of a unidimensional scale from the a 52-item inventory with coefficient loadings > .50 on first component and < .35 on the second and third components at the initial testing (T1) and at the year three retesting (T2) was used to identified the items with the greatest alcohol-use intensity score. Alcohol-use intensity scores remained stable over a three year period and were reported to load strongly on one-dimension of problems associated with alcohol use. The reliability of the 23-items was .92 at time period-one and .93 at time period-two. Eight items from the three factor model were included in the RAPI, resulting in moderately strong correlations ranging from .62 to .87 at time period-one and .73 to .84 at time period-two between the RAPI and the three factor model.

The total score from the 52-items, at both time periods were then correlated with each of the three problem factors (FI: r1=.85 and r2=.83; FII: r1=.87 and r2=.84; FIII: r1=.62 and r2=.72) and the RAPI (r1=.98 and r2=.97). The scores from the RAPI were found to be analogous to the scores based on the 52 item questionnaire assessing alcohol related problems and able to differentiate between the three-problem dimensions identified. White & Labouvie (1989) concluded that the RAPI is an effective tool in identifying the global construct of alcohol related problems in adolescents and due to its brevity is the most effective means of testing.

RAPI Psychometrics

Age and sex norms for adolescents and young adults (14-21) have been developed by White & Labouvie (1989) and updates have been reported by Rutgers Center of Alcohol Studies (2006). Initial reports were based on non-clinical samples and reported that females were more like likely to report not experiencing any problems associated to consuming alcohol and males

were more than twice as likely to report having ten or more alcohol related problems than females. Invariance in the reports of frequency and intensity of RAPI items for the 12 year old sample limited the development of appropriate norms. White & Labouvie (1989; Rutgers Center of Alcohol Studies, 2006) reported that the coded numbers (0-4) are added together across items to form a scale ranging from 0 to 69. It was also reported that it can be normed on any sample. In a clinical sample (age 14 to 18) means ranged from 21 to 25 and in a non-clinical sample (age 15 and 18) means ranged from 4 to 8 depending upon age and sex.

Coefficient stability for intensity of alcohol use and all measures of problem behavior were displayed by age and sex over a three year period. Instability was reported in the 12-year old girl group, where the variance was suggested to be the result of the infrequency of reports of alcohol use by this group at initial testing. Correlations between problem drinking and alcohol use intensity over the three year period showed similar results, with low reports of use at initial testing. Lack of significance in reported occurrence of measures between time periods was found in the 12-year old girl cohort. The explanation used to account for the invariance in problem use and alcohol use intensity was the low use of alcohol reported by the cohort at both times of examination.

Investigation into the role of age and gender in the reports of both frequency and intensity of the three factored items and the RAPI items was conducted through the use of two 3 X 2 X 2 ANOVAs [AGE (T1) X Gender X Occasion; AGE (T1) X Gender X Intensity]. Significant main effects were reported for age, gender and occasion for the FI, FII and RAPI items. Interactions of (age X gender) and (age X occasion) were also reported. Males tended to score higher on all four measures (FI, FII, FIII and RAPI) with variance displayed as age increased and with increases in occasion of negative consequences. A main effect for sex was reported for the FIII grouping,

with older males reporting significantly higher mean levels of problem behavior. White & Labouvie note that the age-related increases are most robust between the ages of 12-18 years, with an apparent leveling off from 18-21.

In an abstract report (White, Labouvie, Filstead, Conlin, Pandina & Parella, 1988) presented at the annual meeting of the Research Society on Alcoholism validation material for the RAPI was presented. The RAPI test scores of a clinical sample of 119 adolescents were compared to the test scores of 718 non-clinical adolescents. The clinical sample scores were significantly higher than non-clinical sample scores. The authors concluded that the RAPI was able to discriminate between problem and non-problem drinking during adolescences.

Comparing the RAPI to Other Measures of Adolescent Substance Use

Since the initial publication of the RAPI, continued interest in identifying dimensions of adolescent and young adult substance use has spurred many new measures that are reported to be effective as screening tools. It therefore is important to provide an understanding of what characteristics of the RAPI distinguish it from other measures in current use. Some of the more recent measures have had the advantage of rigorous statistical analyses to support their psychometrics. Some of the statistical analyses used on these various measures were not commonly use at the time of the development of the RAPI, and as a result have yet to be reported. Brief descriptions of four measures within the same domain as the RAPI (adolescent and young adult problems related to alcohol consumption) are provide below as a method of comparison. Within these descriptions and a brief summary statement, the unique qualities inherent to the RAPI will provide a justification for the reexamination and continued use of the measure, upon confirmation of factor stability.

Drug Use Screening Inventory – Revised (DUSI-R)

The DUSI-R (Tarter, 1990) is a multi dimensional screening/diagnostic tool used to measure the severity of 10 problem areas. The 159-item measure is designed to be used with preadolescents to adults (10 years and upwards), as a self-report instrument. The instrument may be self-administered or done in an interview format, each taking approximately 20-minutes. The DUSI-R assesses the severity of both drug & alcohol abuse, and preferred substance with which the greatest concern is directed towards. An adolescent version of the DUSI-R exists and has been reported to be both a reliable and valid measure AUD in adolescents (Kirici, Mezzich & Tarter, 1995). The original paper introducing the DUSI-R (Tarter, 1990) is presently cited on fifty-two occasions by PsychInfo (2006), providing evidence of prevalence. The DUSI-R is a copyrighted measure, with cost posted as $3.00 per paper version. Computer administration and scoring are available at the cost of $495.00.

Personal Experience Screening Questionnaire (PESQ)

This instrument is a brief 40-item measure that can provide an indication of problem severity for substance abuse. It has been reported as being both reliable and valid for adolescents (12-18) as an indicator of the need for further assessment of alcohol use disorders (AUD). This self-administered item takes approximately 10-minutes to complete, with an additional 5-minutes needed to score. Winters (1992) reported that norms have been established for subgroups, including juvenile offenders and adolescents in addition treatment programs. The psychometrics

of the PESQ has been supported with numerous reliability and validity studies (Winters, Weller & Meland, 1993; Winters, Remafedi & Chan, 1996; Winters, 1992). This copyrighted measure is priced at $70.00 for 25-administrations. A PsychInfo (2006) database search resulted in few direct references to the PESQ.

Problem Oriented Screening Instrument for Teenagers (POSIT)

Developed from the same sample pool as the Drug Use Screening Inventory- Revised (DUSI-R), the POSIT (Rahdert, 1991) was designed to address 10 areas of adolescent functioning. The 139-item true/false measure has cut-off scores which indicate the need for further assessment of problems within the 10 domains examined, one of which is an alcohol and other drug scale. Administration requires approximately 20-30 minutes and 2-5 minutes for scoring with templates. The POSIT is not copyrighted and can be used free of charge, with acknowledgement to author provided on publications. A Psychinfo (2006) search currently returns 45 references to the POSIT.

Adolescent Alcohol Involvement scale (AAIS)

Unlike the aforementioned screening instruments, the AAIS (Mayer, & Filstead, 1979) was designed specifically to address alcohol history; including consumption, effects, beliefs and context. This brief 14-item measure has been reported to be significantly related to AUD diagnosis (Martin & Winters, 1998). As one of the earliest screening measures of adolescent AUD, norms have been reported for clinical and non-clinical samples between the ages of 13-19. Both test-retest and internal consistency reliability and predictive validity reports have been favorable. However, there are several problems with the tool, in particular the lack of age-

specific norms, limited socio-economic and racial distributions in normative samples, and lack of a clear gold standard for validity assessment and cut-points (Moberg, 2005; Farrow, Smith & Hurst, 2002). As a result, the utility of the AAIS in detecting possible AUD maybe limited in heterogeneous young adult groups. Current Psychinfo (2006) listings only reveal 22 citations connected to the original publication by Mayer & Filstead (1979).

Distinctions of the RAPI

White & Labouvie (2004) reported that the RAPI has good convergent validity with the AAIS & DSM-III-R [r>.7 in a clinical sample] (Winters, K.C., 2007; APA, 1987). As an instrument used in a screening assessment of adolescences and young adults presenting for possible AUD, the RAPI can be very useful. The specific nature of the RAPI give it an advantage over screening tools such as the DUSI-R and POSIT, in both the brevity of the measure and the concentration to a specific clinical concern. The multidimensional features of the DUSI-R and POISIT are good for general screening purposes. However, the need for multi-dimensional measures as screening tools in clinical settings may not be advantageous. In clinical settings screening measures should not be used for diagnostic purposes, but only to indicate the need for further evaluation. The reported parsimony of the RAPI, as to that of the DUSI-R and the POSIT support its continued role as a screening measure in clinical settings. The RAPI's advantage over the AAIS may lie in the content sensitivity. The RAPI's larger inventory provides a wider coverage of the domain and increases the likelihood of a positive identification. In order to test this postulate the factor structure of the RAPI must be examined.

Limitations of the RAPI

What the RAPI actually measures is not as clear as it has been presented. White & Labouvie (1989) propose that the RAPI provides a unidimensional measure of the negative consequence of behavior related to alcohol consumption by adolescents, and is best used as such. Evidence ranging from methodology to statistical analysis, suggests that the interpretation by White & Labouvie needs to be reexamined. The strong coefficients from the initial Rutgers PCA do indicate that items within the RAPI belong to the same or similar construct. How each of the RAPI items is related is not readily clear when taken in the context of the White & Labouvie (1989) findings. A discussion of evidence that suggest another interpretation of the RAPI will note concerns that may have led to a misinterpretation of the factor structure of the RAPI.

A current limitation for the RAPI is that little investigation has been conducted into the validity of the unidimensional qualities (Neal et al, 2006). White & Labouvie (1989) reported that the covariance between each of the 23-items, from their studies, was so high that the best use of the RAPI would be found as a global measure of problem behavior related to alcohol use. However, the face validity of the 23-item RAPI suggests several clear factors. Items such as "Got into fights with other people (friends, relatives, strangers)", "Had a fight, argument or bad feeling with a friend", and "Had a fight, argument or bad feeling with a family member" [RAPI Items 2, 17, 18] appear to be representative of an aggression factor. Whereas, "Not able to do your homework or study for a test", "Missed out on other things because you spent to much money on alcohol", and "Neglected your responsibilities" [RAPI Items 1, 3, 6] appear to belong to a neglectfulness factor. Additional groupings can be hypothesized from the RAPI items, with each appearing to maintain enough independence to be considered factors accounting for the

construct of negative consequences experience by adolescents as a result of alcohol consumption.

Why additional factors were not identified within the 23-RAPI items may be tied to several events. First, a true factor analysis of the RAPI was not completed in the White & Labouvie (1989) report. A PCA conducted on the 52-items used by the Rutgers and Human Development Project identified three to four factors within those items. Unlike the PCA, the RAPI inventory was group based on the items from the 52-item list which met an arbitrarily set coefficient criterion at T1 and T2 (three year retest). This is not a factor analysis. This frequency count only infers that the 23 items contained in the RAPI as it has been used for the last sixteen years, are less sensitive to age related changes than the items that were dropped.

To further complicate the interpretation of the validity of the RAPI, the coefficient criterion that items were to meet included identifying items that only loaded strongly on one factor from the PCA at both time periods. This procedure led to the conclusion that the RAPI items were each strong indicators of problems associated with alcohol use at both time periods, and each was adequately independent to one domain of behavior. At the time of the Rutgers' study certain statistical practices were not commonly used. In particular, confirmatory factor analysis (CFA) was not commonly used until the mid 1990's [L. Lecci (Lecture notes, 2003), Bentler, 1992; Aiken, 1991]. The only reported evidence that the factor models identified by the Rutgers Human Development Project PCA have been replicated was reported by Neal et al (2006), although the actual statistics were not presented.

The initial Rutgers PCA scree test suggested that up to four factors could be extracted from the measure. White & Labouvie (1989) chose to use the three factor model in a conservative attempt to assure replication of the factor structure. This was cited as the reason for

the use of the three factor model over that of the four factor model. Current practices would require that the PCA factor structure be confirmed, prior to using it for content validity of another model. This is a major concern with the RAPI development, as strong instability by age and gender are evident in the sample.

As reported by White & Labouvie (1989), both gender and age differences were reported in occasion and intensity of problem behaviors associated with alcohol use. Most notably, was the high variance seen within the entire sample, and the invariance between the 18 year old and 21 year old samples. White & Labouvie acknowledge that a trend exists where an increase in age raises the mean score for the RAPI, FI and FII factors, but not the FIII. It should be expected that an increase in the occurrence of behavior, such as "Drove a car or motorcycle under the influence of alcohol" (FI), should increase as a function of age, due to the restriction of driving privileges and access to means until the later teen or young adult years. Increases in alcohol-related problem behavior can also be explained as an interactive developmental event (Baer, 2002; Kidorf, Sherman, Johnson & Bigelow, 1995). As adolescents transition to older cohorts they face biological and social challenges not encountered at earlier times. While alcohol may be a relevant factor in a behavior, the perception of an adolescent to the causal attributes related to their actions is uncertain at best. At the very juncture that an adolescent is being asked to attribute causation for their behavior, it is common for these same behaviors to occur without the influence of alcohol (e.g., Fights), maybe as a factor of mental disease or limited social development.

A concern in the interpretation of the entire White & Labouvie (1989) analysis was created by the exclusion criterion used. The initial Rutgers Health and Human Development Project PCA, as detailed by White & Labouvie (1989), reported that 154 participants were

excluded due to lack of reported alcohol use at both time periods. The development of the RAPI used the same criterion. Lost here is the instability of drinking behavior of adolescents. While these exclusions do not damage the direct findings for this sample, in may limit the generalizability of the RAPI to only adolescents who report alcohol use over at least a three-year period.

The lack of drinking experience reported by the lower age cohort and the restrictive nature of the behaviors in question for the group (e.g., “Missed out on other things because you spent to much money on alcohol”) suggest poor content validity across age and socio-economic status. The gender differences identified also suggest that the lack of experience by females, especially when considered by age, will cloud the issue of content validity for this type of examination. Additionally support for this contention is the report of age and gender invariance past 18 years of age. This suggests that the behaviors under examination are more relevant for the older age cohort.

The high covariance between the individual items of the RAPI was reported (White & Labouvie, 1989) to limit the discriminate validity of any face valid subscales in predicting specific types of problems behaviors. So while the White & Labouvie have increased the specificity to detecting a global measure of problem behavior, they have also lowered the sensitivity needed to decrease the likelihood of detecting false negatives. In other words, the RAPI increases the likelihood that an individual with high levels of a specific problem behavior and low levels of others may be overlooked with a global assessment score; when in fact, they do display problem behaviors related to alcohol use.

Current Study

As noted earlier, what has been provided in the analysis conducted by White and Labouvie (1989) are reliability counts and frequency of behaviors. When correlated with alcohol use, reliability and frequency counts are helpful in the identification of alcohol related problems for the sample investigated. However, lacking in their report is a confirmation of the factor structure on which the RAPI is based. The sample used by White & Labouvie (1989) was vast, containing both males and females, ranging in ages from 12 – 21 years in age. With such a large population to account for in the reported behaviors, how well does the RAPI help in the identification of alcohol related problems for distinct groups of young drinkers?

The main effects between both age and sex, reported by White & Labouvie (1989), hint that the behaviors experienced across these variables are not the same. A study of the unidimensional characteristic of the RAPI with age and gender controlled in a group that contains robust reports of negative consequences of drinking is needed. Such a task will provide a relatively stable problem-drinking structure to examine and remove unwanted noise which clouds significant differences in sub types of problems being experience.

While the RAPI was reported as a unidimensional measure of negative consequences of adolescent and young adult alcohol use in relation to problem behaviors, this study will demonstrate that several types of negative consequences will be markers of sub-groups of problem behaviors. The identification of sub-groups into the dimensions of the RAPI, in a carefully selected sample, will increase the understanding of the measures ability to screen for at-risk responders who display select forms of behaviors. This approach does come with some risk and concern for misinterpretation. Reise, Waller & Comrey (2000) warn that breaking scales with a strong common factor into sub-scales can be problematic, resulting in a diminished

measure. Reise et al (2000) also note that investigation into factor structures that do not generalize across different samples (e.g. men or women) or are not as advertised are common reasons to revise a scale. It is the intention of this author not to revise the RAPI scale, but to simply further the study of its qualities. It is believed that the original report completed by White & Labouvie (1989) provided good direction, but was limited in several areas which can now be controlled in a new analysis. Specifically, it is postulated that the heterogeneity of the original sample created high variability in both drinking histories and types of problem behaviors experienced. Both sex and age differences were identified in the first study. This study limited sample selection to males between the ages of 21-24 and report current occasions of alcohol consumption.

Reports (Bosari et al, 2000; Marlatt et al, 1998; Collins et al, 2002) have shown that the RAPI is currently used with college-age participants. This study will follow suit, with the additional criteria that participants must be of legal age to consume alcohol. Since none of the 23-RAPI items are dependent on the legal status of ages above 21, this limitation will provide a sample with a more homogenous drinking history, and thus a greater likelihood of providing a stable factor structure of negative consequences related to alcohol consumption within this specific subpopulation. Variance in types of negative consequence can then be attributed to idiosyncratic behavior, not to age or gender.

The purpose of this study was spread over two sample sets, split from a large participant pool. The analysis used to test each hypothesis was conducted on a predetermined sample set. An exploratory factor analysis (EFA) was used to extract multiple factors within the 23-item RAPI scale from sample set-1. Subsequently, a confirmatory factor analysis, on sample set-2, was used to measure the goodness of fit of the EFA multi-factor structure extracted from sample set-1. As

a discussion topic a proposal of the nomenclature that best describes any factors structures reported will be addressed.

The RAPI has continuously been used as a measure of alcohol related behavior, since its publication. The prevalence of this measure provides some support for its content validity (Neal et al, 2006). To be useful as a tool for detecting problematic behavior arising from or in conjunction with alcohol consumption, the RAPI must be able to discriminate between clinical and non-clinical samples. As noted earlier, several studies have reported good discrimination between these groups in previous studies (White et al, 1988; Danielson et al, 2003). Post-Hoc analysis was used in this study to replicate the assertion that the RAPI is able to discriminate between clinical and non-clinical samples. This study also examined the internal psychometrics of the RAPI to identify which items provided the best discriminative ability between clinical and non-clinical samples. It is expected that the RAPI will demonstrate the ability to distinguish between self-reported clinical and non-clinical participants, through the use of the summed score of RAPI items. It is also expected that only a handful of items in the RAPI measure will demonstrate the ability to discriminate between the groups.

METHOD

Participants

Data were obtained from a sample of college-age males (21-24 years) who consented to complete a screening package for a grant funded project (An Alcohol Myopia Explanation of Sexual Aggression, NIAAA 5 R01-AA13471, Principal Investigator: Nora E. Noel, 2002) at the University of North Carolina Wilmington. Each participant provided his date of birth (age

verification) via driver's license, primary ethnic background, relationship status (e.g., married) and current educational level completed.

Experimenters / Recruiters

The author of this paper, a Masters level graduate student in psychology, acted as a project coordinator and actively participated and supervised recruitment, administration of questionnaires and data analysis for the parent NIAAA grant (Noel, 2002). Support staff were used for recruiting, administering of the questionnaire and data entry. The additional staffers were upper-level Bachelor of Arts candidates and Masters of Arts candidates who earn course credit for their participation. Each recruiter was trained by the author, in methods of recruiting and procedures used in the collection of data.

Materials

The RAPI was the primary tool for this study, as developed by White & Labouvie (1989). The 23-items were presented as one part of a screening package. The use of a modified Quantity-Frequency Index was used to collect data related to alcohol use during the previous three months. Additionally, a demographic questionnaire was used to collect relevant personal data.

Responses from each participant were coded in order to ensure continued confidentiality. Data were entered into statistical analysis spreadsheet. Specifically, age, marital status (MARST), educational status (EDU), employment (EMP), ethnicity (ETH), current days drinking over the last ninety (DAYSDR), current problems with Alcohol (CURPROB), and past problems with alcohol (PSTPROB), and scores from each of the 23-RAPI items were entered. Items that were

not recorded or legible were entered as non-responses. RAPI items that were recorded as non-responses, in any manner, resulted in the exclusion of all data from that participant in this report.

All data were collected by self-report. The Age variable was limited to the values of 21, 22, 23 & 24. Each participant was required to provide a valid state or university ID to verify their age was within the range of 21 – 30 years, as a criterion for participation in the NIAAA study. Marital status was reported on a five- category list (Married, Single, Divorced /Separated, Steady Dating Situation, or Other). Educational status was reported on an eight- category list (Less Than High School, High School Graduate, College Freshman, College Sophomore, College Junior, College Senior, Graduate Student, or Other). Employment status was reported on a four-category list (Employed Full-time, Employed Part-time, Full-time Student, or Unemployed [no current school or work]). Primary ethnic status was asked as an open-ended question, with response being categorized by the experimenter.

Drinking Data were collected by self report via a modified Quantity-Frequency Index (QFI; adapted from Cahalan, Cisin and Crossley, 1969). Specific questions were drawn from the QFI for use in this study. Selection of participants for this study was based on self-report of current alcohol use; any participant who reported never consuming alcohol or no current use over the past three months was excluded from this study. Participants were asked to report the number of days that they had consumed an alcoholic beverage over the past thirty. Responses were recorded as number of days. Participants were also asked to report on current and past drinking or drug problems. Dichotomous responses of “N” or “Y” were provided for the participant. If a “Y” response was provided, further explanation as to the type of drug, and the initiation of the problem was requested.

The 23- RAPI items were recorded on a five- point scale, as reported by the participants. The pre-assigned values of 1= never, 2= once, 3= 2 to 3 times, 4= 4 to six times, and 5= more than 7 times were used. All 23- items from the RAPI were responded to on this scale, in order for the participant data to be included in this study.

SAS 9.1 TS Level 1M3 XP_HOME platform and Microsoft Excel were used for the data analysis in this study. The Random Number Generator Pro program was used to select sub-samples from the participant data pool.

Procedure

Participants were enlisted through encounters with experimenters trained in laboratory recruiting practices, responses to advertisements (flyers) and class announcements. Recruitment of participants has been conducted within the tri-county region surrounding the city of Wilmington, North Carolina. When in the field, experimenters approached participant(s) who appeared to meet the establish criterion (i.e., male). After a brief introduction the participant was asked to complete the screening package (the RAPI was one of several items within the screening packet), for which he was mailed a check for $15.00. If the participant agreed to complete the screening package at that time, they were provided a place to sit, a clipboard and a pencil. The experimenter then read aloud the informed consent approved by the University of North Carolina Wilmington IRB. Upon completion of the informed consent, the participant was provided a numbered packet and instructed to complete each page to the best of their ability. Participants were instructed not to place any identifying marks on the screening packet in order to protect their confidentiality.

Upon completion of the screening packet participants were asked to complete a check request with complete name and mailing address. This document was immediately stored separately from the screening packet to insure the participants confidentiality. Due to the ongoing nature of the study, participants were only fully debriefed if they indicated that they wished to conclude their involvement in the study with the screening packet. After answering questions that would not interfere with the remaining procedures of the primary study, experimenters dismissed the participants.

Participants that were not able to immediately complete the screening packet in the field were asked for a contact phone number and a codename; so that alternative screening arrangements could be made. These participants and those responding to flyers or "word of mouth" were scheduled by an experimenter to attend a screening session at UNCW to complete the screening packet. Each participant who completed the informed consent received $15.00 for completing the screening packet.

DATA ANALYSIS PLAN

Two samples of data were drawn from the pool of participants that met the criteria needed for inclusion into the study. The participant pool was split in half to obtain the two sample sets. Randomization was conducted by the use of the Research Randomizer (Urbaniak & Plous, 2007). All participants were randomly assigned to one of the two samples split from the participant pool.

Tables

Each sample has the following tables. Frequency reports were tabled for Age, marital status, educational status, employment status, and ethnicity and will be displayed by domain with frequency of occurrence and the percentage of the sample used listed. Each of the 23- RAPI items were also tabled by self-reported values (1-5), frequency of occurrence, and the percentage of the sample used. The calculation of Means was used as a descriptive measure of our sample. Age, each of the 23- RAPI items, the RAPI score total from the sample, DAYSDR, CURPROB, and PSTPROB were displayed with standard deviations, range values, and Skewness. Based on the examination of the 23- RAPI items, transformation of the data to log values was made to provide the closest proximity to normality of the distributions.

Factor Analysis

The first sample (S1) was used for an exploratory analysis of the 23- RAPI items. The SAS: PROC Factor program was executed to provide a principal component analysis (PCA), an orthogonal exploratory factor analysis (EPA) with Varimax rotations, and an oblique exploratory factor analysis with Promax rotations. Items were required to have a factor load of >.35 to be retained on a factor. Additionally, factors were only retained after meeting the criteria of having at least five items loading onto the factor with a coefficient of >.35. Items were allowed to be retained on only one factor. Determination of the factor to which an item was retained was based on the strength of the coefficient loading, in which the highest factor load was retained. These criteria were set to exceed the minimum standard requirements accepted for factor analysis (Decoster, 1998; Hanneman, 2007), with the intention of retaining a replicable factor structure.

Factors with eigenvalues <1.0 were not considered in the analysis. Scree test were used and displayed to confirm the factor structure with the highest likelihood of replication.

The second sample (S2) was used for a confirmatory factor analysis (CFA), based on the results of the S1 factor analysis. The SAS: PROC CALIS program was used to test the fit measures of the factor patterns retained from S1. The 23-RAPI items were rank-ordered by factor and then by coefficient load for each factor retained. Coefficient values of items were only entered for the factor that the item was retained. As a default from the SAS programming, the covariance matrix was expressed as a Lower Triangular Matrix for the CFA. Due to an undersized Jacobian determinant, the SAS program defaulted to use the Hessian algorithm 11. Additionally Heywood constraints were used to restrict diagonal analysis of items across factors. This step was employed to lessen the influence of extreme values found in the non-normative data.

Post-Hoc Analysis

The full sample of the RAPI data (n=568) was used to test the discriminative abilities of the RAPI. T-test were run using the RAPI Total score (RAPITOT) to test for differences between participants who reported having current problems (CURPROB) related to alcohol consumption and those who reported no current problem. The same T-test model was also used to test for differences between participants who report past problems (PSTPROB) related to alcohol consumption and RAPITOT. Each of the 23- RAPI items was used in T-tests to seek differences between the two groups in the CURPROB category. Identical T-tests were conducted of the PSTPROB group, using the 23-Items of the RAPI. Modified Bonferroni Adjustments were used to set α-levels for each T-Test conducted.

RESULTS

The total sample used for this study consisted of 606 college-age male participants. Data from thirty-eight participants was excluded from the pool of 606, due to breaches in study criteria: two due to age range restrictions; 12 due to reports of no drinking over the previous ninety days; and 24 due to incomplete or non-interpretable RAPI data. The exclusions left a sample of 568 college-age male participants ranging in age from 21-24 years of age (M=21.87, SD=1.01) [Table 2]. The majority of the sample reported being “single” (72.04%) or being in a “steady dating situation” (24.42%). Most participants reported current enrollment in college, with the majority being of Junior (38%) and Senior (48.67) status. Most reported being employed Part-time (38.69%) or Full-time Students (36.93%). The vast majority of the participants were Caucasian (86.64%).

Table 2: Distribution characteristics of Age variable (N=568).

Analysis Variable : Age				
Mean	Std Dev	Minimum	Maximum	Skewness
21.87	1.01	21	24	0.85

Table 3: Frequency Report of Participant Ages

Age	Frequency	Percent	Cumulative Frequency	Cumulative Percent
21	274	48.24	274	48.24
22	150	26.41	424	74.65
23	86	15.14	510	89.79
24	58	10.21	568	100.00

Table 4: Frequency Report of Participant Marital Status.

Marital Status	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Married	6	1.06	6	1.06
Single	407	72.04	413	73.10
Divorced/ Separated	3	0.53	416	73.63
Steady Dating Situation	138	24.42	554	98.05
Other	11	1.95	565	100.00

Frequency Missing = 3

Table 5: Frequency Report of Participant Education Level.

Education Status	Frequency	Percent	Cumulative Frequency	Cumulative Percent
< High School	2	0.35	2	0.35
High School Graduate	19	3.35	21	3.70
College Freshmen	16	2.82	37	6.53
College Sophomore	52	9.17	89	15.70
College Junior	184	32.45	273	48.15
College Senior	252	44.44	525	92.59
Graduate Student	20	3.53	545	96.12
Other	13	2.29	558	98.41
No Answer	9	1.59	567	100.00

Frequency Missing = 1

Table 6: Frequency Report of Participant Employment Status.

Employment Status	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Employed Full-time	62	10.95	62	10.95
Employed Part-time	219	38.69	281	49.65
Full-time Student	209	36.93	490	86.57
Unemployed	25	4.42	515	90.99
Full-time student & Employed Part-time	50	8.83	565	99.82
No answer	1	0.18	566	100.00

Frequency Missing = 2

Table 7: Frequency Report of Participant Ethnicity

Ethnicity	Frequency	Percent	Cumulative Frequency	Cumulative Percent
African-American	19	3.43	19	3.43
American Indian/ Alaska Native	5	0.90	24	4.33
Asian/ Pacific Islander	8	1.44	32	5.78
Hispanic	7	1.26	39	7.04
Caucasian	480	86.64	519	93.68
Biracial	15	2.71	534	96.39
Other	20	3.61	554	100.00

Frequency Missing = 14

All data for analysis used Log transformations to approximate normality of distribution. Data are presented in non-transformed format, unless specified. A split-half design was used for further analysis, resulting in two samples with 264 participants. Chi Square test revealed no significant differences based on demographic characteristics between the two samples (Tables 8-12).

Table 8. T-Test Report of Participant Age by Set.

Variable	Set	N	Mean	Std Dev	Std Err	Min Age	Max Age
Age	1	284	21.88	1.05	0.06	21	24
Age	2	284	21.87	0.98	0.06	21	24
Age	Diff (1-2)		0.01	1.01	0.09		

T-Test

Variable	DF	t-Value	Pr>|t|
Age	566	0.17	0.8687

Table 9. Chi Square Report of Participant Marital Status by Set

Frequency Percent Row Pct Col Pct

Table of Marital Status by Set

Marital Status	Set		Total
	1	2	
Married	4 0.71 66.67 1.41	2 0.35 33.33 0.71	6 1.06
Single	193 34.16 47.42 68.20	214 37.88 52.58 75.89	407 72.04
Divorced/ Separated	3 0.53 100.00 1.06	0 0.00 0.00 0.00	3 0.53
Steady Dating Situation	75 13.27 54.35 26.50	63 11.15 45.65 22.34	138 24.42
Other	8 1.42 72.73 2.83	3 0.53 27.27 1.06	11 1.95
Total	283 50.09	282 49.91	565 100.00

Frequency Missing = 3

Table 9. Cont.

Statistics for Table of Marital Status by Set			
Statistic	DF	Value	Prob
Chi-Square	4	8.0647	0.0892
Likelihood Ratio Chi-Square	4	9.3238	0.0535
Mantel-Haenszel Chi-Square	1	3.1444	0.0762
Phi Coefficient		0.1195	
Contingency Coefficient		0.1186	
Cramer's V		0.1195	

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Table 10. Chi Square Report of Participant Education Level by Set.

Frequency Percent Row Pct Col Pct	Table of Education Level by Set		
Education Level	Set		Total
	1	2	
< High School	2 0.35 100.00 0.70	0 0.00 0.00 0.00	2 0.35
High School Graduate	11 1.94 57.89 3.87	8 1.41 42.11 2.83	19 3.35
College Freshmen	8 1.41 50.00 2.82	8 1.41 50.00 2.83	16 2.82
College Sophomore	26 4.59 50.00 9.15	26 4.59 50.00 9.19	52 9.17
College Junior	92 16.23 50.00 32.39	92 16.23 50.00 32.51	184 32.45
College Senior	120 21.16 47.62 42.25	132 23.28 52.38 46.64	252 44.44
Graduate Student	12 2.12 60.00 4.23	8 1.41 40.00 2.83	20 3.53

Table 10. Cont.

Other	7 1.23 53.85 2.46	6 1.06 46.15 2.12	13 2.29
No Answer	6 1.06 66.67 2.11	3 0.53 33.33 1.06	9 1.59
Total	284 50.09	283 49.91	567 100.00

Frequency Missing = 1

Statistics for Table of Education by Set.

Statistic	DF	Value	Prob
Chi-Square	8	4.9203	0.7661
Likelihood Ratio Chi-Square	8	5.7200	0.6786
Mantel-Haenszel Chi-Square	1	0.0491	0.8246
Phi Coefficient		0.0932	
Contingency Coefficient		0.0928	
Cramer's V		0.0932	

Table 11. Chi Square Report of Participant Employment by Set.

Frequency Percent Row Pct Col Pct	Table of Employment by Set		
Employment	Set		Total
	1	2	
Employed Full-time	32 5.65 51.61 11.27	30 5.30 48.39 10.64	62 10.95
Employed Part-time	109 19.26 49.77 38.38	110 19.43 50.23 39.01	219 38.69
Full-time Student	96 16.96 45.93 33.80	113 19.96 54.07 40.07	209 36.93
Unemployed	16 2.83 64.00 5.63	9 1.59 36.00 3.19	25 4.42
Full-time student & Employed Part-time	30 5.30 60.00 10.56	20 3.53 40.00 7.09	50 8.83
No answer	1 0.18 100.00 0.35	0 0.00 0.00 0.00	1 0.18
Total	284 50.18	282 49.82	566 100.00
Frequency Missing = 2			

Table 11. Cont.

Statistics for Table of Employment by Set.			
Statistic	DF	Value	Prob
Chi-Square	5	6.4049	0.2688
Likelihood Ratio Chi-Square	5	6.8326	0.2334
Mantel-Haenszel Chi-Square	1	1.4552	0.2277
Phi Coefficient		0.1064	
Contingency Coefficient		0.1058	
Cramer's V		0.1064	

Table 12. Chi Square Report of Participant Ethnicity by Set.

Frequency Percent Row Pct Col Pct	Table of Ethnicity by Set		
Ethnicity	Set		Total
	1	2	
1	9 1.62 47.37 3.25	10 1.81 52.63 3.61	19 3.43
2	1 0.18 20.00 0.36	4 0.72 80.00 1.44	5 0.90
3	4 0.72 50.00 1.44	4 0.72 50.00 1.44	8 1.44
4	5 0.90 71.43 1.81	2 0.36 28.57 0.72	7 1.26
5	240 43.32 50.00 86.64	240 43.32 50.00 86.64	480 86.64
6	7 1.26 46.67 2.53	8 1.44 53.33 2.89	15 2.71
7	11 1.99 55.00 3.97	9 1.62 45.00 3.25	20 3.61
Total	277 50.00	277 50.00	554 100.00
Frequency Missing = 14			

Table 12. Cont.

Statistics for Table of Ethnicity by Set			
Statistic	DF	Value	Prob
Chi-Square	6	3.4050	0.7566
Likelihood Ratio Chi-Square	6	3.5754	0.7339
Mantel-Haenszel Chi-Square	1	0.3539	0.5519
Phi Coefficient		0.0784	
Contingency Coefficient		0.0782	
Cramer's V		0.0784	

Sample 1

Data from 284 participants (M age=21.88, SD=1.05) was used to conduct an exploratory factor analysis. Along with a PCA, both orthogonal and oblique rotations were calculated in the EFA. The results from both the orthogonal and oblique rotations had no major difference in factor structure. This report details the findings from the oblique rotations, which best accounted for the data presented, due to the high covariance between items.

Item distribution

Univariate analyses were conducted on the 23-Rapi items from sample-1. Means, standard deviations and Skewness for all items are reported in Table 13. Several items did not display good characteristics of normality after log transformation. Item -7 (M=1.13, SD=0.53) was limited in range from 1 to 4, and had a Skewness of 4.49. The Skewness of Item-7 after log transformation improved to 3.76. Item-10 (M=1.33, SD=0.87) covered the full range of responses, and had a Skewness of 2.85 which improved to 2.29 after log transformation. Item-18 (M=1.37, SD=.90) covered the full range of responses, and had a Skewness of 2.68 which improved to 2.06 after log transformation. Item-20 (M=1.44, SD=0.99) covered the full range of responses, and had a Skewness of 2.38, which improved to 1.83 after log transformation. Item-22 (M=1.44, SD=1.04) covered the full range of responses, and had a Skewness of 2.33, which improved to 1.93 after log transformation. Item-23 (1.54, SD=1.06) covered the full range of responses, and had a Skewness of 2.09, which improved to 1.52 after log transformation. Each of these items appears to occur at low frequencies of behavior, with little variation in this sample. However, for the purpose of this study no items were excluded from further analysis based on

these results. This decision was made to conform to the intent of this study to provide an analysis of the full RAPI scale, as it has been used.

Table 13: Means, Standard Deviations, Skewness and Kurtosis reports for RAPI Items in SET-1.

Univariate Measures Set-2 (N=284)						
	Mean	SD	Skewness	Kurtosis	Log Skewness	Log Kurtosis
Item-1	2.69	1.36	0.26	-1.05	-0.37	-1.26
Item-2	2.47	1.38	0.44	-1.02	-0.09	-1.53
Item-3	2.33	1.45	0.58	-1.09	0.19	-1.65
Item-4	2.44	1.57	0.57	-1.23	0.19	-1.65
Item-5	2.17	1.24	0.81	-0.26	0.18	-1.41
Item-6	2.74	1.43	0.23	-1.19	-0.35	-1.33
Item-7	1.13	0.53	4.49	21.48	3.76	13.43
Item-8	2.54	1.62	0.40	-1.46	0.10	-1.76
Item-9	2.06	1.55	1.03	-0.59	0.78	-1.20
Item-10	1.33	0.87	2.85	7.63	2.29	3.92
Item-11	2.06	1.42	1.02	-0.39	0.61	-1.28
Item-12	1.75	1.23	1.55	1.22	1.06	-0.41
Item-13	2.49	1.39	0.42	-1.05	-0.11	-1.52
Item-14	1.91	1.21	1.26	0.67	0.63	-1.03
Item-15	2.05	1.32	0.95	-0.35	0.47	-1.37
Item-16	1.67	1.13	1.75	2.13	1.14	-0.08
Item-17	2.12	1.20	0.82	-0.27	0.21	-1.42
Item-18	1.37	0.90	2.68	6.76	2.06	2.96
Item-19	1.68	1.17	1.65	1.61	1.18	-0.18
Item-20	1.44	0.99	2.38	4.89	1.83	1.95
Item-21	2.52	1.37	0.42	-1.00	-0.16	-1.46
Item-22	1.44	1.04	2.33	4.30	1.93	2.15
Item-23	1.54	1.06	2.09	3.48	1.52	0.91

Factor Analysis

An exploratory factor analysis, using the SAS 9.1 TS Level 1M3 XP Home platform command PROC Factor was computed on data set-1. Three types of analysis were run through this command, each treating the item relatedness in a different manner. Eigenvalues for the factor analyses were set to extract factors with loadings >1.0. For the purpose of this study, only coefficient loadings >0.35 will be retained as loading on a factor. Additionally, in order to retain a factor a criterion minimum of five items must load onto the proposed factor. The exclusion of a factor based on this criterion will result in a reanalysis of the data with a limit on the number of factors to include.

Principal Component Analysis

The first output data were the result of a PCA, which suggested that five factors could be retained. However, four of the five factors did not meet the minimum criteria of at least five items loading to each factor and have been excluded from this analysis. Factor-1 consisted of all 23-items of the RAPI scale. After setting the extraction limit to one factor, the range of the coefficients was 0.36 to 0.65. Item-7 was the weakest coefficient from Factor-1 and Item-6 was the strongest. Factor-1 accounted for 7.45% of the variance. Correlations between the variables ranged from small (<0.01) to moderate (<0.63) [Table 15] suggesting that each variable was measuring unique characteristics within the domain of Factor-1. A scree plot analysis supported the results and interpretation of the PCA. The scree plot and the factor pattern of the PCA are displayed in Figure 1 and Table 14.

Oblique Factor Analysis

The correlation matrix of all RAPI items in sample-1 (Table 15) indicates moderate overlap between items. The overlap and possible shared domain space of the item measurements indicated that an oblique rotation was needed to account for the covariance. Therefore, an exploratory factor analysis with PROMAX rotations was preformed on data set-1. The PROMAX rotation sequence provides a model in which item covariance between factors is weighted to account for the maximum variance accountability without the removal of any item until final calculations have been completed.

Figure 1: Scree Plot of PCA Eigenvalues on Set-1.

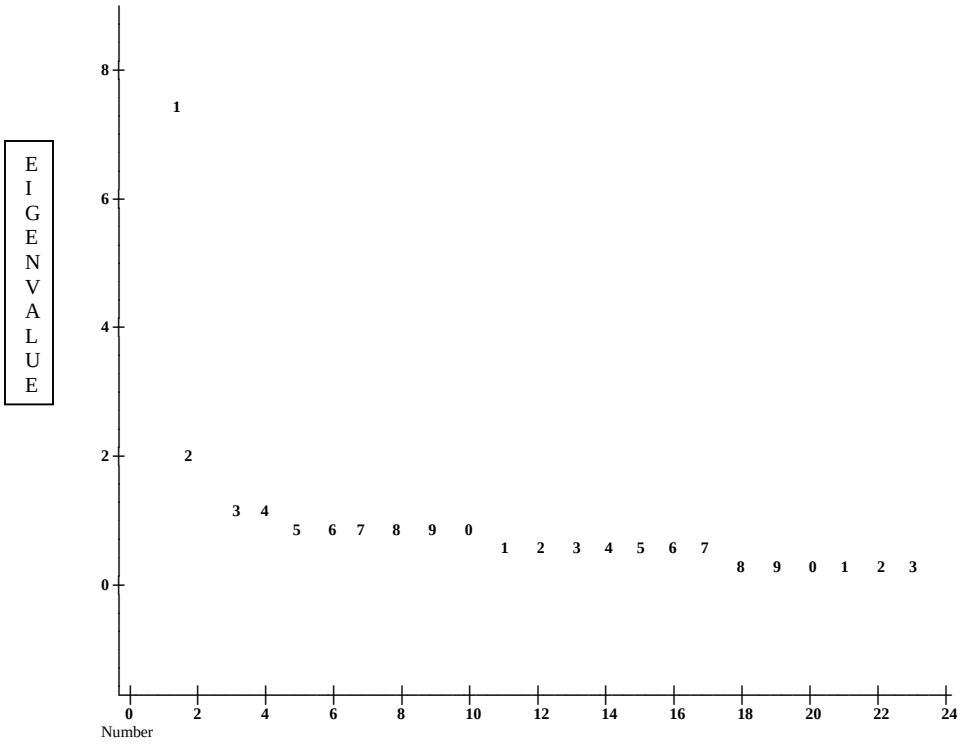

Table 14: Factor Loading for Set-1 PCA.

Items		Factor-1 Correlations
Item-1	Not able to do your homework or study for a test	0.51
Item-2	Got into fights with other people (friends, relatives, strangers)	0.61
Item-3	Missed out on other things because you spent to much money on alcohol	0.58
Item-4	Went to work or school high or drunk	0.48
Item-5	Caused shame or embarrassment to someone	0.63
Item-6	Neglected your responsibilities	0.66
Item-7	Relatives avoid you	0.36
Item-8	Felt that you needed more alcohol than you used to in order to get the same effect	0.63
Item-9	Tried to control your drinking (tried to drink only at certain times of the day or in certain places, that is, tried to change your pattern of drinking)	0.49
Item-10	Had withdrawal symptoms, that is, felt sick because you stopped or cut down on drinking	0.50
Item-11	Noticed a changed in your personality	0.59
Item-12	Felt you had a problem with alcohol	0.65
Item-13	Missed a day (or part of day) of school or work	0.61
Item-4	Went to work or school high or drunk	0.64
Item-15	Suddenly found yourself in a place that you could not remember getting to	0.59
Item-16	Passed out or fainted suddenly	0.40
Item-17	Had a fight, argument or bad feeling with a friend	0.63
Item-18	Had a fight, argument or bad feeling with a family member	0.58
Item-19	Kept drinking when you promised yourself not to	0.58
Item-20	Felt you were going crazy	0.53
Item-21	Had a bad time	0.52
Item-22	Felt physically or psychologically dependant on alcohol	0.56
Item-23	Was told by a friend, neighbor or relative to stop or cut down drinking	0.63

Correlations																							
	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15	R16	R17	R18	R19	R20	R21	R22	R23
R1	1.00	0.32	0.33	0.40	0.26	0.37	0.04	0.35	0.27	0.12	0.24	0.24	0.50	0.20	0.34	0.24	0.26	0.20	0.23	0.16	0.25	0.17	0.18
R2	0.32	1.00	0.32	0.28	0.51	0.41	0.10	0.26	0.24	0.22	0.36	0.28	0.38	0.30	0.45	0.24	0.62	0.32	0.27	0.26	0.28	0.20	0.21
R3	0.33	0.32	1.00	0.30	0.34	0.46	0.15	0.42	0.31	0.27	0.31	0.31	0.36	0.30	0.39	0.31	0.28	0.24	0.27	0.18	0.24	0.29	0.22
R4	0.40	0.28	0.30	1.00	0.24	0.25	0.11	0.25	0.22	0.21	0.20	0.18	0.38	0.25	0.33	0.27	0.20	0.32	0.21	0.23	0.21	0.13	0.20
R5	0.26	0.51	0.34	0.24	1.00	0.41	0.23	0.33	0.27	0.24	0.29	0.34	0.40	0.31	0.47	0.28	0.51	0.34	0.27	0.27	0.24	0.26	0.32
R6	0.37	0.41	0.46	0.25	0.41	1.00	0.17	0.49	0.33	0.26	0.40	0.36	0.43	0.38	0.31	0.21	0.38	0.25	0.32	0.20	0.38	0.29	0.34
R7	0.04	0.10	0.15	0.11	0.23	0.17	1.00	0.18	0.15	0.24	0.24	0.22	0.15	0.22	0.06	0.11	0.17	0.37	0.18	0.21	0.13	0.22	0.38
R8	0.35	0.26	0.42	0.25	0.33	0.49	0.18	1.00	0.33	0.32	0.26	0.39	0.42	0.37	0.32	0.21	0.34	0.29	0.30	0.21	0.34	0.32	0.38
R9	0.27	0.24	0.31	0.22	0.27	0.33	0.15	0.33	1.00	0.32	0.29	0.27	0.19	0.45	0.22	0.09	0.23	0.17	0.25	0.18	0.24	0.18	0.20
R10	0.12	0.22	0.27	0.21	0.24	0.26	0.24	0.32	0.32	1.00	0.32	0.41	0.18	0.26	0.19	0.02	0.21	0.26	0.28	0.24	0.16	0.53	0.32
R11	0.24	0.36	0.31	0.20	0.29	0.40	0.24	0.26	0.29	0.32	1.00	0.46	0.19	0.32	0.27	0.13	0.36	0.27	0.35	0.39	0.29	0.33	0.36
R12	0.24	0.28	0.31	0.18	0.34	0.36	0.22	0.39	0.27	0.41	0.46	1.00	0.32	0.51	0.27	0.21	0.28	0.32	0.34	0.43	0.21	0.54	0.49
R13	0.50	0.38	0.36	0.38	0.40	0.43	0.15	0.42	0.19	0.18	0.19	0.32	1.00	0.37	0.42	0.26	0.31	0.26	0.34	0.20	0.24	0.23	0.30
R14	0.20	0.30	0.30	0.25	0.31	0.38	0.22	0.37	0.45	0.26	0.32	0.51	0.37	1.00	0.35	0.27	0.34	0.28	0.37	0.24	0.37	0.29	0.41
R15	0.34	0.45	0.39	0.33	0.47	0.31	0.06	0.32	0.22	0.19	0.27	0.27	0.42	0.35	1.00	0.42	0.41	0.28	0.25	0.24	0.23	0.14	0.28
R16	0.24	0.24	0.31	0.27	0.28	0.21	0.11	0.21	0.09	0.02	0.13	0.21	0.26	0.27	0.42	1.00	0.21	0.14	0.18	0.16	0.15	0.14	0.18
R17	0.26	0.62	0.28	0.20	0.51	0.38	0.17	0.34	0.23	0.21	0.36	0.28	0.31	0.34	0.41	0.21	1.00	0.46	0.27	0.28	0.41	0.23	0.29
R18	0.20	0.32	0.24	0.32	0.34	0.25	0.37	0.29	0.17	0.26	0.27	0.32	0.26	0.28	0.28	0.14	0.46	1.00	0.32	0.32	0.35	0.36	0.41
R19	0.23	0.27	0.27	0.21	0.27	0.32	0.18	0.30	0.25	0.28	0.35	0.34	0.34	0.37	0.25	0.18	0.27	0.32	1.00	0.34	0.25	0.38	0.50
R20	0.16	0.26	0.18	0.23	0.27	0.20	0.21	0.21	0.18	0.24	0.39	0.43	0.20	0.24	0.24	0.16	0.28	0.32	0.34	1.00	0.27	0.39	0.45
R21	0.25	0.28	0.24	0.21	0.24	0.38	0.13	0.34	0.24	0.16	0.29	0.21	0.24	0.37	0.23	0.15	0.41	0.35	0.25	0.27	1.00	0.26	0.28
R22	0.17	0.20	0.29	0.13	0.26	0.29	0.22	0.32	0.18	0.53	0.33	0.54	0.23	0.29	0.14	0.14	0.23	0.36	0.38	0.39	0.26	1.00	0.48
R23	0.18	0.21	0.22	0.20	0.32	0.34	0.38	0.38	0.20	0.32	0.36	0.49	0.30	0.41	0.28	0.18	0.29	0.41	0.50	0.45	0.28	0.48	1.00

Table 15: Correlation Matrix of RAPI Items for Set-1.

The EFA initially suggested that four factors be retained in the PROMAX model, with the eigenvalue default set at 1.0. However, Factor-4 did not meet the study criterion of at least five items loading onto the factor and was excluded on this basis. As a result of the exclusion of Factor-4, the EFA was recalculated as a three factor model. The three factor model pattern suggested that all 23-items loaded as follows:

Table 16: Factor loading for Three Factor Model from Set-1.

Coefficient	Factor 1
0.53	Item-7 | Relatives avoid you
0.62	Item-10| Had withdrawal symptoms, that is, felt sick because you stopped or cut down on drinking
0.57	Item-11| Noticed a changed in your personality
0.70	Item-12| Felt you had a problem with alcohol
0.60	Item-19| Kept drinking when you promised yourself not to
0.61	Item-20| Felt you were going crazy
0.75	Item-22| Felt physically or psychologically dependant on alcohol
0.72	Item-23| Was told by a friend, neighbor or relative to stop or cut down drinking
	Factor 2
0.64	Item-1 | Not able to do your homework or study for a test
0.67	Item-3 | Missed out on other things because you spent to much money on alcohol
0.46	Item-4 | Went to work or school high or drunk
0.67	Item-6 | Neglected your responsibilities
0.64	Item-8 | Felt that you needed more alcohol than you used to in order to get the same effect
0.64	Item-9 | Tried to control your drinking (tried to drink only at certain times of the day or in certain places, that is, tried to change your pattern of drinking)
0.64	Item-13| Missed a day (or part of day) of school or work
0.63	Item-14| Wanted to stop but couldn't
0.54	Item-16| Passed out or fainted suddenly
	Factor 3
0.75	Item-2 | Got into fights with other people (friends, relatives, strangers)
0.71	Item-5 | Caused shame or embarrassment to someone
0.64	Item-15| Suddenly found yourself in a place that you could not remember getting to
0.76	Item-17| Had a fight, argument or bad feeling with a friend
0.49	Item-21| Had a bad time
0.59	Item-18| Had a fight, argument or bad feeling with a family member

The variance accounted for when ignoring the other factors was 2.56 for Factor-1, 2.52 for Factor-2, and 2.31 for Factor-3. However, in recognition of the moderate covariance between items, the better measure of variance account for is when the other factors are ignored. This measure returned accounted variance measures 5.13 for Factor-1, 4.98 for Factor-2, and 5.28 for Factor-3.

Sample 2

Data from the remaining 284 participants (M age=21.87, SD=0.98) was used to conduct a confirmatory factor analysis. Univariate analyses were conducted on the 23-Rapi items from sample-2 with descriptive data in Table 17.

Item distribution

Several items did not display good characteristics of normality after log transformation. Item -7 (M=1.11, SD=0.52) covered the full range of responses, and had a Skewness of 5.62 and a kurtosis of 34.92. The Skewness of Item-7 after log transformation improved to 4.47 and the kurtosis reduced to 20.20. Item-10 (M=1.37, SD=0.97) covered the full range of responses, and had a Skewness of 2.65 and kurtosis of 6.05, which improved to 2.24 and 3.48 after log transformation. Item-18 (M=1.24, SD=.62) was limited in the range of response from 1 to 4, and had a Skewness of 3.01 and a kurtosis of 9.25, which improved to 2.32 and 4.40 after log transformation. Item-20 (1.34, SD=0.89) covered the full range of responses, and had a Skewness of 2.78 and kurtosis of 7.29, which improved to 2.19 and 3.46 after log transformation. Item-22 (M=1.37, SD=0.93) covered the full range of responses, and had a Skewness of 2.68 and kurtosis of 6.37, which improved to 2.18 and 3.35 after log transformation. Item-23 (1.41,

SD=0.91) covered the full range of responses, and had a Skewness of 2.45 and kurtosis of 5.58, which improved to 1.82 and 2.01 after log transformation. Each of these items appears to occur at low frequencies of behavior, with little variation in this sample. Additionally, high Skewness and kurtosis values displayed by several of the items indicated a non-normal distribution, which will distort several of the outcome measure used in this study (e.g., χ^2 reports may appear more robust than they would with a normal distribution). However, for the purpose of this study no items were excluded from further analysis based on these results. This decision was made to conform to the intent of this study to provide an analysis of the full RAPI scale, as it has been used.

Table 17: Means, Standard Deviations, Skewness and Kurtosis reports for RAPI Items in SET-2.

Univariate Measures Set-2 (N=284)						
	Mean	SD	Skewness	Kurtosis	Log Skewness	Log Kurtosis
Item-1	2.71	1.46	0.23	-1.31	-0.26	-1.48
Item-2	2.39	1.33	0.54	-0.86	-0.02	-1.48
Item-3	2.51	1.50	0.44	-1.23	0.00	-1.64
Item-4	2.27	1.49	0.80	-0.84	0.37	-1.47
Item-5	2.04	1.18	0.85	-0.26	0.30	-1.46
Item-6	2.83	1.47	0.15	-1.29	-0.40	-1.31
Item-7	1.11	0.52	5.63	34.92	4.47	20.20
Item-8	2.47	1.60	0.54	-1.32	0.20	-1.67
Item-9	1.95	1.45	1.17	-0.24	0.89	-0.98
Item-10	1.37	0.97	2.65	6.04	2.24	3.48
Item-11	1.87	1.33	1.35	0.51	0.91	-0.79
Item-12	1.63	1.13	1.83	2.32	1.29	0.20
Item-13	2.58	1.39	0.35	-1.10	-0.21	-1.44
Item-14	1.89	1.26	1.26	0.38	0.76	-0.96
Item-15	2.09	1.34	0.92	-0.44	0.46	-1.38
Item-16	1.58	1.09	1.97	3.00	1.39	0.52
Item-17	2.05	1.08	0.82	-0.04	0.15	-1.34
Item-18	1.24	0.62	3.01	9.25	2.32	4.40
Item-19	1.64	1.10	1.72	2.06	1.16	-0.14
Item-20	1.35	0.89	2.78	7.29	2.19	3.46
Item-21	2.39	1.29	0.50	-0.84	-0.09	-1.46
Item-22	1.37	0.93	2.68	6.37	2.18	3.35
Item-23	1.41	0.91	2.45	5.58	1.82	2.01

Confirmatory Factor Analysis

The SAS 9.1 TS Level 1M3 XP Home platform command PROC CALIS was used to compute a Confirmatory Factor Analysis on the transformed data from set-2. Two models were tested using the CFA methods. The first model tested was extracted from the results of the sample-1 PCA, while the second model tested was from the three factor model extracted from sample-1. The factor loadings from the PCA and the three factor solution from sample-1 were programmed into separate PROC CALIS computations to mimic the solutions retained from the sample-1 PCA and EFA.

The results of the CFA of the PCA model were interpreted using several different computations which each provide fit estimates of the proposed model to the data from sample-2, using various measures to account for sample distribution. The first two results examined were the Chi Square, which was significant (χ^2=699.71, DF=230, p<.0001), and the Goodness of Fit measure (GFI=.7937) values for the PCA. The 3:1 ratio of the Chi Square to the DF values suggests the proposed unidimensional model does not account well for the data. The GFI confirms the poor fit of the proposed model, but is prone to similar inflated values as the χ^2 outcomes. As mentioned earlier, it was expected that the χ^2 outcomes would be inflated due to the non-normality of the sample distribution. therefore confirmation of fit was examined with several indices that better account for non-normal distributions. Several fit indexes support the conclusion that the unidimensional model was a poor fit to the data tested. Bentler's Comparative Fit Index (B-CFI=.7970), Bollen's (1988) Non-normed Index Delta2 (Delta2=.7990), and Bentler & Bonett's (1980) Non-normed Index (B&B NNI=.7768) each conclude that the proposed model is a poor fit to the tested data. Variants of each of the fit models were also computed using formulas for normative data. However, these results are not

displayed as they are considered of less value due to the inclusion of the non-normalized items discussed in the sample descriptions.

The three factor model fit results were examined using the same indices as with the PCA. For the three factor model The Goodness of Fit measure was (GFI=.8702). The Chi Square (χ^2=454.49, DF=186, p<.0001) was significant. The χ^2: DF values resulted in a ratio of 2.4:1. The Chi Square: DF indicates that the three factor model was a significant improvement over the one factor model [$\chi^2_{PCA} - \chi^2_{3\ factor} = \chi^2_{diff}$: $DF_{PCA} - DF_{3\ factor} = DF_{diff}$; $\chi^2_{diff} = 245.22$, $DF_{diff} = 44$, p<.0001], yet still a poor fit to the data tested. The GFI, Bentler's Comparative Fit Index (B-CFI=.8840), Bollen's (1988) Non-normed Index Delta2 (Delta2=.8873), and Bentler & Bonett's (1980) Non-normed Index (B&B NNI=.8422) also supported that the three factor model was a better fit to the data. Variants of each of the fit models were also computed using formulas for normative data; However, these results are not displayed as they are considered to be of less value due to the inclusion of the non-normalized items discussed in the sample descriptions.

Nomenclature

The last objective of this study was to provide a nomenclature for the factor structure extracted from the RAPI, through EFA and validated with a CFA. Although the three factor model was demonstrated to be a poor fit to the data, this task was completed as an academic task, with the intention of advancing theoretical knowledge of the RAPI. The development of a face valid nomenclature is critical when suggesting a model of behavior. If extracted items do not hold some form of shared characteristic, aside from statistical grouping, then it is possible that the model is reliable, but not valid for the intended construct being investigated. The three factor

model extracted in this study appears to be comprised in a fashion that does allow for the assignment of a face valid nomenclature.

Factor-1 is comprised of eight items that all meet criteria needed for identification of alcohol dependence by the DSM-IV-TR (APA, 2002; Martin & Winters, 1998). Items 7 & 23 address reduction activities due to alcohol consumption. Item-10 directly assesses withdrawal effects felt from alcohol consumption. Items 11, 12, 20 & 22 are concerned with Psychological and physical problems experienced with alcohol consumption. Item-19 addresses the use of alcohol for longer periods than intended. As a result of the clustering of these items on an established classification, Factor-1 will be assigned the same name Dependence.

Factor-3 items (6) neatly clustered on another DSM-IV classification from the same domain. Items 2, 5, 17, 18 & 21 all match the criteria for social/ interpersonal problems. Item-15 described the effect of hazardous use of alcohol. Social/ Interpersonal problems and Hazardous use are both criteria needed for the DSM-IV classification of Alcohol Abuse. As such, Factor-3 will now receive the designation of Abuse.

Factor-2 items also correspond with the DSM-IV classification that Factors 1 & 3 match. However, Factor-2 items are spread over both the domain of Dependence and Abuse. Items 1, 4, 6 & 13 met the criteria needed for Role impairment. Item-8 describes behavior associated with tolerance. Items 9 & 14 involve attempts to quit or cut-down alcohol use. Item-16 queries the effect of hazardous alcohol use. For the purpose of this study, Factor-2 will be designated as A&D.

Overlap between RAPI items from the factor analysis conducted in this study and the DSM-IV classifications of Alcohol Abuse and Dependence occurred with several items. RAPI items from Abuse (7 & 23) and A&D (3) both match the DSM-IV criteria of "reduced

activities…" needed for the diagnosis of Alcohol Dependence. RAPI item-16 from A&D and RAPI item-15 from Abuse both match the DSM-IV criteria of "Hazardous use of alcohol" needed for a designation of Alcohol Abuse. The remainder of the RAPI items grouped in the factors that they were assigned, do not overlap with any DSM-IV alcohol use classifications.

Table 18: Table of proposed nomenclature by RAPI items.

ALCOHOL DEPENDENCE	Factor-1 (Dependence)	Factor-2 (A&D)	Factor-3 (Abuse)
Tolerance		8,	
Withdrawal	10,		
Using more than intended	19,		
Quit/ Cut down		9, 14,	
Reduced activities	7, 23	3	
Psychological/ Physical problems	11, 12, 20, 22,		

ALCOHOL ABUSE			
Role impairment		1, 4, 6, 13	
Hazardous use		16	15
Social problems			2, 5, 17, 21, 18

Post-Hoc Analysis

Data from 568 participants (M age=21.87, SD=1.01) was also used to conduct difference testing between the RAPI measure data and self-reports of current and past alcohol related problems. The CURPROB category contained three groups. CP1 (n=523; M age= 21.86, SD=1.02), CP2 (n=40; M age=22.00; SD=0.99) and CP3 (n=5; M age=22.20; SD=1.10). CP1 represented self-reports of no current problems related to alcohol consumption, CP2 represented self-reports of current problems with alcohol consumption, and CP3 consisted of participants with missing data. CP3 data were removed from further analysis. The PSTPROB category contained three groups. PP1 (n=519; M age= 21.88, SD=1.03), PP2 (n=35; M age=21.77; SD=0.81) and PP3 (n=14; M age=21.93; SD=1.07). PP1 represented self-reports of no current problems related to alcohol consumption, PP2 represented self-reports of current problems with alcohol consumption, and PP3 consisted of participants with missing data. PP3 data were removed from further analysis

The first T-Test was conducted between the RAPI total score (RAPITOT) and the self-report of current problems (CURPROB) related to alcohol use, and reject Ho: $t(561)= -7.42$, $p> .0001$. Sixteen of the RAPI items were found to differentiate between self-reports of clinical and non-clinical status (Table 19). Six of the items with significant T-Test were from the Factor-1 loading, six were from the Factor-2 loading and four were from the Factor-3 loading. When examined as either Abuse or Dependence items; six items met the Abuse criteria, while ten items met Dependence criteria.

Examination of differences between the participants who reported past occurrences of problems with alcohol (PSTPROB) were tested. A T-test was run between RAPITOT and self-reports of PSTPROB, and rejected Ho: $t(36.6)= -3.21$, $p> .0028$. Only four of the 23-RAPI items

were found to be significantly different when examined by PSTPROB (Table 21). Three of the RAPI items that were found to differentiate between PSTPROB, were items that loaded onto Factor-1. The last of the four items had loaded onto Factor-2. Three of the items providing differentiation matched the criteria for Dependence and one item matched for Abuse.

Table 19: T-test result for RAPI items by current problem category.

Current Problem T-Tests						
Variable	Method	Variances	DF	t Value	Pr > |t|	Bonferroni Adjusted α
Item-6	Satterthwaite	Unequal	52	-6.23	<.0001	0.0022
Item-8	Pooled	Equal	561	-4.21	<.0001	0.0023
Item-12	Pooled	Equal	561	-10.27	<.0001	0.0024
Item-14	Pooled	Equal	561	-6.25	<.0001	0.0025
Item-19	Satterthwaite	Unequal	42	-4.17	0.0001	0.0026
Item-22	Satterthwaite	Unequal	41	-5.54	<.0001	0.0028
Item-23	Satterthwaite	Unequal	41	-4.44	<.0001	0.0029
Item-3	Pooled	Equal	561	-3.7	0.0002	0.0031
Item-10	Satterthwaite	Unequal	41	-4.05	0.0002	0.0033
Item-2	Pooled	Equal	561	-3.51	0.0005	0.0036
Item-13	Pooled	Equal	561	-3.24	0.0013	0.0038
Item-17	Pooled	Equal	561	-2.92	0.0036	0.004
Item-9	Pooled	Equal	561	-2.9	0.0039	0.0045
Item-11	Pooled	Equal	561	-2.84	0.0047	0.005
Item-15	Pooled	Equal	561	-2.83	0.0049	0.0056
Item-5	Pooled	Equal	561	-2.81	0.0051	0.006
Item-20	Satterthwaite	Unequal	43	-2.55	0.0143	.0070 NS
Item-21	Pooled	Equal	561	-1.95	0.052	.0080 NS
Item-1	Pooled	Equal	561	-1.93	0.0542	.0100 NS
Item-7	Satterthwaite	Unequal	41	-1.87	0.0687	.0125 NS
Item-18	Satterthwaite	Unequal	43	-1.52	0.136	.0167 NS
Item-16	Pooled	Equal	561	-0.94	0.3456	.0250 NS
Item-4	Pooled	Equal	561	0.04	0.9674	.0500 NS

Table 20: T-test result for RAPI items by past problem category.

Past Problem T-Tests						
Variable	Method	Variances	DF	t Value	Pr > |t|	Bonferroni Adjusted α
Item-12	Pooled	Equal	552	-4.93	0.0001	.0022
Item-22	Satterthwaite	Unequal	35.8	-3.83	0.0005	.0023
Item-6	Pooled	Equal	552	-3.29	0.0011	.0024
Item-23	Satterthwaite	Unequal	36.9	-3.34	0.0019	.0025
Item-9	Pooled	Equal	552	-2.97	0.0031	.0026 NS
Item-14	Pooled	Equal	552	-2.87	0.0043	.0028 NS
Item-10	Satterthwaite	Unequal	35.9	-2.91	0.0061	.0029 NS
Item-20	Pooled	Equal	552	-2.68	0.0075	.0031 NS
Item-11	Pooled	Equal	552	-2.63	0.0087	.0033 NS
Item-8	Pooled	Equal	552	-2.59	0.0099	.0036 NS
Item-5	Pooled	Equal	552	-2.37	0.0181	.0038 NS
Item-2	Pooled	Equal	552	-2.12	0.0343	.0040 NS
Item-19	Pooled	Equal	552	-1.91	0.0562	.0045 NS
Item-18	Pooled	Equal	552	-1.48	0.1381	.0050 NS
Item-13	Pooled	Equal	552	-1.40	0.1634	.0056 NS
Item-17	Pooled	Equal	552	-1.38	0.1689	.0060 NS
Item-3	Pooled	Equal	552	-1.36	0.1754	.0070 NS
Item-15	Pooled	Equal	552	-1.32	0.1883	.0080 NS
Item-21	Pooled	Equal	552	-1.15	0.2495	.0100 NS
Item-7	Satterthwaite	Unequal	35.8	-0.98	0.3338	.0125 NS
Item-1	Pooled	Equal	552	-0.88	0.3783	.0167 NS
Item-4	Pooled	Equal	552	-0.35	0.7292	.0250 NS
Item-16	Pooled	Equal	552	-0.06	0.9508	.0500 NS

DISCUSSION

The primary objective of this study was to explore the factor structure of the Rutgers Alcohol Problem Index using both an exploratory and confirmatory factor analysis. The results of the exploratory factor analysis conducted in this study were to be used to demonstrate that the unidimensional factor structure, proposed by the originators of the measure (White & Labouvie, 1989), can in fact be expressed as a multiple factor model. The multiple factor structure proposed will provide specificity to sub-types of negative behaviors encountered within the domain of negative behaviors related to alcohol consumption by adolescent and young males.

As to the first goal of this study, the Exploratory Factor Analysis (EFA) did extract a three factor model from the 23-items of the RAPI. An oblique rotation was used (reported as a PROMAX rotation) to account for the moderate amount of covariance shared by the 23-Items of the RAPI. Factor-1 contained 8-items and accounted for 5.35% of the variance found in sample-1. Factor-2 contained 9-items, and accounted for 5.28% of the variance in sample-1. Factor-3 contained 6-items, and accounted for 4.42% of the variance in sample-1. However, support was also found for the unidimensional model proposed by White & Labouvie (1989) when a Principal Components Analysis (PCA) was conducted. The PCA suggested that all 23-Items of the RAPI should be considered part of one domain. The PCA model does not address the issue of covariance between the items.

The second goal of this study was to perform a Confirmatory Factor Analysis (CFA) on the second half of the data collected, using the results from the PCA and EFA from sample-1, in order to provide evidence as to the strength of each model. The CFA results showed that both the unidimensional and the three factor models were poor fits to the data tested. As a result, this study suggests that the RAPI has poor construct validity towards the measurement of negative

consequences of alcohol related behavior for the sample tested in this study. The effort to provide a homogeneous sample to reduce variations in drinking behavior based on age and gender, has not improved the construct validity of the RAPI. Given that neither the unidimensional nor the three factor model displayed a good fit to the data tested, the usefulness of the RAPI as a valid measure of negative consequences of alcohol consumption with young male adults should be questioned.

The results of this study are difficult to interpret, due to both methodological irregularities and departure from statistical assumptions. The RAPI was initially designed and tested for use with adolescent populations. This study was designed to work with a young adult population, as this has become a regular source of use with the RAPI. Although several researchers (Neal et al, 2000; Larimer et al, 2004; Borsari et al, 2000; Baer et al, 2001) have provided studies which support the use of the RAPI with college students, this study has identified several items that are problematic with the cohort used here. RAPI Items 7, 10, 18, 20, 22 & 23 were all heavily positively skewed and had high kurtosis values, which continued after the distribution was re-expression to Log values. Departures from assumptions of normality are common practice in psychological studies (McDonald & Marsh, 1990), but it does warrant a cautionary note to the interpretation of the findings.

Item-7 (“Relatives avoid you”) and Item-18 (“Had a fight, argument or bad feeling with a family member) had 29.40% and 82.57% of the sample report no occasions of the behaviors. This may be reflective of the separation and lack of direct contact experienced by the young adult population, from family members. Thus a floor effect has occurred with these questions, resulting in them being less useful for the age group (21-24) in question. Item-20 (“Felt you were going crazy”), Item-22 (“Felt physically or psychologically dependant on alcohol”) and Item-23

("Was told by a friend, neighbor or relative to stop or cut down drinking") had 80.99%, 82.22% and 75.88% of the sample respond at zero occasions of the behaviors occurring. Again this creates a floor effect, which makes the usefulness of these questions difficult to interpret for this 21-24 age male cohort. Previously reported models of adolescent and young adult behaviors (e.g., Kidorf et al, 1995; Baer, 2002) have linked "normed" or "group" behavior as a key factor in drinking patterns. In this case, questions 20, 22 & 23 may be less likely to occur in a population that commonly views heavy drinking and the consequences of such, as normal behavior.

Continued academic inquiry to the usefulness of the RAPI directed this researcher to develop a nomenclature for the three factor model, although this model was deemed to be a poor fit towards the data tested. Therefore, this venture is strictly for academic inquiry, and not meant for clinical interpretation. The face validity of the nomenclature proposed (Factor-1= Dependence, Factor-2=Abuse & Dependence, Factor-3=Abuse) fits the established definitions of criteria set for DSM-IV classification of substance use disorders (SUD). While the RAPI will not be capable of being used as a diagnostic instrument, the possibility that this measure can accurately distinguish between types of SUD may aid both clinicians and researchers alike, if additional model testing results in better fits to data.

The post-hoc analyses conducted were used to test the ability of the RAPI and its individual items to discriminate between self-reported problems with alcohol use and no reports of alcohol related problems. The RAPI total score taken from the full sample of participants (n=568) was able to discriminate between participants who report both current and past problems with alcohol use. Examination by item found that sixteen of the twenty-three items were sensitive to differences in participant reports of current problems with alcohol verses reports of

no current problems with alcohol. The distribution of the sixteen items able to discriminate between the current problem conditions was spread across the three factor model (Factor-1=6, Factor-2=6, Factor-3=4). RAPI items were not as successful in discriminating between participants who reported past problems with alcohol and no past problems with alcohol. Only four of the twenty-three RAPI items were significant in there ability to discriminate between the past problems with alcohol category; of the four items that did discriminate, three were items from Factor-1. The remaining item was from Factor-2.

The results from the post-hoc analysis have increased the difficulty in the interpretation of the EFA and CFA data. While the CFA demonstrated a poor fit to the data, indicating poor construct validity as a measure of negative consequences of alcohol consumption by young adult males, the post-hoc t-test confirms many reports (White et al, 1989; Collins et al, 2002; Larimer et al, 2004) that the RAPI has good predictive validity. This study has found that sixteen of the RAPI items provided the ability of the total RAPI score to differentiate between self reported current drinking problems. Each of these sixteen items was able to differentiate between current and no current problems, as reported by participants. While the RAPI total score was also found to discriminate between self reports of past problems with alcohol consumption, only four items from the full measure contributed to this effect. It appears that the RAPI does provide good predictive validity towards something related to alcohol problems, but with the report of poor construct validity it can not be said from this study what has actually been measured. The differing results from two types of validity measures may be addressed theoretically in this paper, but not empirically tested. Three explanations, not necessarily mutually exclusive, can provide a starting point towards the continued investigation into the validity of the RAPI.

If accepting of the poor construct validity result, it is then unclear what the RAPI in measuring. The acceptance of the good predictive validity displayed, in conjunction with the poor construct validity, may suggest that what is being measured is under the influence of a confounding variable. For example, in the case of self-reports of behavior, the differentiation effect might be the result of a participant's willingness to report the behavior. This may also be moderated by a participant's understanding of the content being investigated. If, for example, a participant perceives their alcohol consumption to be similar to those around them, they may be less inclined to report having a problem (Baer, 2002; Kidorf et al, 1995).

The next plausible explanation for the different interpretations of the measure of validity within the RAPI is connected to a third form of validity. Not investigated in this paper is the content validity of the RAPI. The initial list of negative consequence related to alcohol consumption tested and reported by White & Labouvie (1989) consisted of 53-items. The large set of items first tested indicates a vast domain being measured. In fact, the initial PCA reported as many as four distinct factors over two different time periods. The data reduction procedure undertaken by White & Labouvie (1989) grouped items most commonly reported and restricted inclusion by limiting covariance. While this procedure resulted in a measure with good reliability measurements and a strong unidimensional loading, it is possible that the measure lost a good deal of ability in examining the full range of the domain in question. Additionally, this study capitalized on a population not likely to experience the same set of issues as the original sample. The poor construct validity in the sample tested in this study may indicate that the content of the RAPI is no longer sensitive enough to produce a stable factor structure for a domain with multiple factors.

The last explanation as to the varying results reported in this study is directly related to the aforementioned content problem. This study met most of the criteria needed to run the statistical procedures used. However, the small number of subjects used and the non-normalized distribution of several items may have contributed to the mixed results. In particular, the non-normal distribution encountered most likely had the effect of increasing the robustness of multiple factors, while weakening the stability of a unidimensional structure. While it is unlikely that an increase in the number of participants would normalize the distribution of the troubled items reported, an increase in the number of subjects could still be useful. The use of several of the statistical tests reported would be aided by an increased participant pool. MacDonald et al (1990) reports that test, such as Bollen's (1988) Non-normed Index Delta2 and Bentler & Bonett's (1980) Non-normed Index can correct for the noise create from a non-normalized distribution, but these effects do not occur with samples below 600+ samples. This study reported these test results with a sample of 284 participants. An increase in a participant pool would not affect the lack of a wide content base, but would aid in the ability of the test to detect more sensitive structure details.

CONCLUSION

The value of this study should not go unnoticed, as the results do provide new information towards the understanding of the Rutgers Alcohol Problem Index. This measure, as reported by White & Labouvie (1989), has become a common tool used in the investigation of alcohol related behavior. Its initial use as a screening measure of negative consequences experienced by adolescents who consume alcohol has morphed to include adolescents and adults [as well as other drug use (Ginzler, Garrett, Baer &

Peterson, 2007)]. The limited psychometric testing reported on the RAPI, on any population has left its use open to criticism. This study sought to test the psychometrics of the RAPI with a young adult population.

The results of this study suggest that the RAPI has poor construct validity as a measure of negative consequences of alcohol related behavior for young adult males. Post-hoc analysis did reveal that the RAPI does provide predictive validity towards the differentiation between self reported current problems and past problems with alcohol. These mixed results do indicate a need for further investigation into the psychometrics of the RAPI. This does not lessen the importance of what was revealed in this study. The RAPI's ability to discriminate between current and past alcohol problems supports previous claims (White et al, 1989; Collins et al, 2002; Larimer et al, 2004) that it is a useful screening tool for alcohol related problems.

It is the suggestion of this author that the RAPI continue to be used with young adult populations as a screening measure of alcohol related behaviors. However, it is important not to draw any conclusions as to the meaning of RAPI scores or item responses beyond that of classification of problem status. Since the RAPI is so widely used in both research and clinical settings, this conclusion will require vigilant efforts of those who report findings not to make esoteric claims as to the functional use of the RAPI, without strong psychometric support.

When assessing the information contained in this document, it is important to recognize that additional research must be conducted on this topic before conclusive support can be given to any of the empirical evidence presented in this study. Post-hoc analysis of the 17-items with normalized distributions should be conducted. Such a reanalysis would reshape the three factor model reported in this paper, as four of the five items lacking normal distributions are located in Factor-1. The reanalysis of the 17-items would most likely provided greater support for the

unidimensional use of the RAPI. Reports (NIAAA; Larimer et al) of an 18-item version of the RAPI have supported its validity and use with adolescent and young adult participants. Comparison of that model against the result of this study will be an important step to validating both models with this population. However, the elusive 18-item version was unable to be located for this study.

This study limited itself to males between 21-24 years of age. An examination of females of the corresponding age group should be conducted. The initial report by White & Labouvie (1989) and numerous other reports (Neal et al, 2000) would suggest that little variance, on this measure, should be found based on gender and this age group. While drinking and quantities frequencies may differ by gender, the RAPI may demonstrate that similar negative consequences are experienced by both genders.

In conclusion, this study has reported extracting a three factor model from the original 23- Items of the RAPI, in an exploratory factor analysis. While the three factor model did show significant improvement to data fit over that of the one factor model, in a CFA, neither model provided good fits to the data tested. Interest in the three factor model should not be relinquished as a result of the current poor fit to the tested data. The improvement of fit of the three factor model to the one factor model, suggest that the RAPI may provided useful understanding of etiological variances encountered by those who report negative consequences experienced when consuming alcohol.

It is the impression of this author that the RAPI does not have good construct validity for the measure of negative consequences of alcohol consumption when used with young adult males (21-24) as either a unidimensional model or a multi factorial model. Continued use of the RAPI should be limited to that of a screening measure of problem status related to alcohol use in

clinical settings, as to such a time that additional psychometric data expands its tested usefulness. As a research tool, the three factor model proposed in this study should be used to increase the applications of the RAPI as both an outcome measure and a theoretical map of alcohol related behavior.

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APPENDICES

Appendix A. RUTGERS ALCOHOL PROBLEM INDEX

Use the following code:

1 = None
2 = Once
3 = 2-3 times
4 = 4-6 times
5 = More than 7 times

HOW MANY TIMES HAS THIS HAPPENED TO YOU WHILE YOU WERE DRINKING OR BECAUSE OF YOUR DRINKING DURING THE LAST YEAR?

1 2345 Not able to do your homework or study for a test
1 2345 Got into fights with other people (friends, relatives, strangers)
1 2345 Missed out on other things because you spent too much money on alcohol
1 2345 Went to work or school high or drunk
1 2345 Caused shame or embarrassment to someone
1 2345 Neglected your responsibilities
1 2345 Relatives avoided you
1 2345 Felt that you needed more alcohol than you used to in order to get the same effect

1 2345 Tried to control your drinking (tried to drink only at certain times of the day or in certain places, that is, tried to change your pattern of drinking)

1 2345 Had withdrawal symptoms, that is, felt sick because you stopped or cut down on drinking
1 2345 Noticed a change in your personality
1 2345 Felt that you had a problem with alcohol
1 2345 Missed a day (or part of a day) of school or work
1 2345 Wanted to stop drinking but couldn't
1 2345 Suddenly found yourself in a place that you could not remember getting to
1 2345 Passed out or fainted suddenly
1 2345 Had a fight, argument or bad feeling with a friend
1 2345 Had a fight, argument or bad feeling with a family member
1 2345 Kept drinking when you promised yourself not to
1 2345 Felt you were going crazy
1 2345 Had a bad time
1 2345 Felt physically or psychologically dependent on alcohol
1 2345 Was told by a friend, neighbor or relative to stop or cut down drinking