

Predicting Motivation to Change

by

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Abstract

Motivation to decrease alcohol consumption has been a focus of past research with college students. However studies on the predictors of motivation among college students have produced mixed results. There is some theoretical support that specific types of alcohol-related problems and life satisfaction are related to the degree to which a drinker is motivated to change. The literature appears to lack studies that have investigated the effects of specific types or groupings of alcohol-related problems on motivation to change. The present study investigated the role specific types of alcohol-related problems play in predicting motivation, as well as testing a model that includes life satisfaction as a predictive factor of motivation. Structural equation modeling revealed that abuse/dependence alcohol-related problems and life satisfaction fit a mediational model predicting motivation. The model suggests that the predictive value of life satisfaction on motivation is partially mediated by abuse/dependence related problems, and that social and personal alcohol-related problems do not account for any unique variance in motivation. Furthermore depressed life satisfaction predicted greater motivation as well as greater endorsement of abuse/dependence related problems. Clinical implications and further research are discussed.

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INTRODUCTION

Alcohol Use Among College Populations

Heavy drinking among college students is a major health concern. The majority of college students (64%) report consuming alcohol in the past month and nearly half (44%) report a binge episode during that time (Substance Abuse and Mental Health Services Administration, 2009). The proportions of college students binge drinking and driving under the influence have increased from 1999 to 2005; more alarming is that the greatest increases were not among young college students but among older students between the ages of 21-24 (Hingson, Zha, & Weitzman 2009), suggesting that students may be developing dangerous and stable drinking habits. Among college students who drink regularly nearly half (47%) of them report experiencing five or more alcohol-related problems in the past year. Binge drinkers are more likely to experience negative effects of drinking that can have long lasting consequences, such as having unprotected sex, legal problems, and being hurt or injured. The effects of heavy alcohol consumption are not limited to the students who are drinking; students who abstain or drink moderately but attend a school with high rates of binge drinking are at a greater risk of experiencing physical and sexual assaults than students who do not drink heavily and attend schools with lower rates of binge drinking (Wechsler, Davenport, Dowdall, Moeykens, & Castillo 1994). It would be valuable to identify which factors enhance motivation to decrease heavy alcohol consumption in college students, so that such factors can be incorporated into future interventions.

Motivation To Change

Historical views of addiction conceptualize motivation to decrease alcohol consumption as problem recognition; an individual must experience problems from their drinking and recognize it as such before they will advocate a desire to reduce their consumption. This is synonymous with the common belief that an individual must “hit rock bottom” before committing to change. Theoretical backgrounds such as these (e.g. Alcoholics Anonymous) hold that a person who abuses or is dependent on alcohol is innately powerless to resist or control their use of the substance. Under this view, the role of intervention is to confront the client about their impaired perspective regarding their substance use and educate them on the reality of their harmful ways (Twelve Steps, 2007). This style of intervention may be met with resistance if the client does not perceive their substance use as harmful or reports high levels of anger (Project Match Research Group, 1998). It is also inappropriate when working with individuals who are neither addicted nor dependent but do engage in risky alcohol consumption, as is the case for many college drinkers.

An alternative view of how to elicit change through interventions is Motivational Interviewing. Motivational Interviewing (MI) is a style of counseling that evokes from the client, rather than distilling, reasons for change and supports the client’s self-efficacy in being capable of change, rather than helpless to the substance. MI does not judge ambivalence as a personality flaw but rather a normal response to a behavior that has both reinforcing and punishing aspects (Miller & Rollnick, 2002). Motivation to alter ones drinking is thought of as a fluid state that waxes and wanes. It is the counselor’s goal to increase motivation. Discussing how the client’s current substance use is

discrepant with their life satisfaction evokes contemplation about their substance use. Discrepancy is not assessed from the interventionist's but the client's point of view. Respecting the client's individuality is a key component of MI; it is understood that what is fulfilling or aversive to one person may not be for another. This style of intervention is widely used and is efficacious with college students (Larimer, Crounce, Lee, & Kilmer 2004).

A conceptual model of intentional behavioral change that is in accord with the spirit of MI is the Transtheoretical model (TTM). Although the model has been applied to a wide range of behaviors, TTM was first conceptualized and is still widely used in the field of substance use. The model does not consider addictive behaviors as a stable characterological flaw. Rather addiction is initiated and ceased by the individual; personal decisions are influenced by social, personality, and many other factors with no single factor solely responsible for decisions made (DiClemente, 2003). TTM defines five stages that an individual advances through when modifying their substance use. The first stage is precontemplation; the client has no intention of changing. The second stage, contemplation, is when an individual has experienced problems from their use and is considering change but is ambivalent about doing so. In the stage of preparation the individual is preparing to change within the next month, even though they may have made unsuccessful attempts in the past. Action is when an individual is currently modifying their behavior. The final stage, maintenance, is when an individual has successfully made a change in their substance use and is working against a relapse (Prochaska, DiClemente, & Norcross 1992).

Increased motivation can be operationalized as progression through the stages of change. If an individual is not motivated to change, precontemplative, it may be detrimental to discuss skills to change the targeted behavior. Without motivation an individual may react with resistance to suggestions of how to decrease substance use. Both TTM and MI focus on the clinician's role in enhancing motivation rather than confronting the client about their substance use.

Alcohol-Related Consequences and Motivation

While MI does not solely focus on the problems that someone has experienced due to their substance use, problems are discussed to create discrepancy between the consequences of the client's drinking and their life satisfaction. Interventions with college students have been most efficacious when MI is paired with personalized feedback that contains information about negative consequences the student has experienced from drinking, risk factors for heavy drinking, and college drinking norms (Walter, Vader, Harris, Field, & Jouriles 2009). Discussing negative consequences appears to be an integral component of efficacious alcohol interventions but the literature is inconclusive on how experiencing and/or discussing problems increases motivation to change in college students.

Among adults who meet the criteria for alcohol dependence, greater frequency of negative consequences were related to increased motivation to change; however not all consequences were responsible for this relationship. Certain consequences, including physical consequences, were negatively related to overall motivation to change (DiClemente, Doyle, & Donovan 2009). This supports the hypothesis that consequences

play a role in motivation but that the relationship is more complex than the simple accrual of consequences, as “hitting rock bottom” theories may have considered.

The literature on college alcohol use is inconclusive pertaining to the relationship between negative consequences and motivation. Among students mandated to receive a brief alcohol intervention, students who reported more alcohol-related problems also reported greater motivation to change compared to their peers who reported fewer problems (Shealy, Murphy, Borsari, & Correia, 2007). This supports a relationship between past problems and college students’ motivation. Increased alcohol consumption was also related to higher levels of motivation to change, and subjects who reported fewer binge episodes were most likely to be in the precontemplation stage. However the action stage had similar relationships with alcohol measures as did the contemplation stage, suggesting that these stages could not be readily distinguished from one another within the study.

Caldwell (2002) found that alcohol-related problems among referred students were related to how much the student considered their drinking to be a problem but was only modestly related to interest in change. There were low-consequence drinkers who reported a greater interest in change than their high-consequence peers. However many high-consequence drinkers reported efforts to change although they did not acknowledge their drinking as a problem. The discrepancy between acknowledgement of problems, identification of drinking as a problem, and motivation to change may reflect that the dissonance of the cost and benefits of heavy drinking is not great enough for some students to move toward change; however for some students experiencing a few

problems, or perhaps specific types of problems, is salient enough to report a desire to change.

The impact of alcohol-related problems may be influenced by history of alcohol consumption. Barnett et al. (Barnett, Goldstein, Murphy, Colby, & Monti 2006) found that among referred students, those who reported less alcohol use and fewer problems related to their use were more likely to report intentions to change their drinking after a university sanction. These neophyte drinkers perceived the incident that led to their referral as more aversive than heavier, more experienced, drinkers. Heavier drinkers may have greater positive, than negative, experiences from their drinking. The positive experiences may nullify the dissonance between their use and negative drinking outcomes or it may be that the referral is simply not punishing enough to motivate change as it does in lighter drinkers, suggesting that predicating motivation may be moderated by history of alcohol use.

In past studies a total tally of problems is associated to motivation to change. This assumes that college students consider all consequences equally; however heavy drinking college students do not perceive all alcohol-related problems as aversive or probable. Among heavy drinkers consequences that have been considered aversive by researches, such as vomiting and blacking out, have been perceived neutrally or even positively (Mallett, Bachrach, & Turrisi 2008). It has also been indicated that they believe they are at little risk of experiencing alcohol-related problems from their current level of drinking, however they report experiencing problems when drinking the current amount in the past (Mallett, Lee, Neighbors, Larimet, & Turrisi 2006). It appears that college students do not always create salient associations between their alcohol consumption and

alcohol-related problems. It may be that the experience of only certain, but not all, consequences affect student's life satisfaction and thus do not prompt contemplation about changing their drinking behaviors.

Life Satisfaction

Studies with college students are inconclusive about the relationship between alcohol consumption and life satisfaction. Greater alcohol use, both in frequency and quantity of alcohol consumed, has been associated with higher levels of current and anticipated life satisfaction. However students who reported high levels of alcohol related problems had lower reports of life satisfaction (Molnar, Busseri, Perrier, & Sadava, 2009). In light of few, or possibly certain, alcohol-related problems students may continue to drink as life satisfaction remains unchanged.

Other studies have found that life satisfaction and alcohol consumption is moderated by gender. Among female undergraduates, abstainers had higher reports of present and anticipated life satisfaction while other domains of life satisfaction (social, family, dating, academic) were unrelated to alcohol use. Conversely there was a positive linear relationship between heavy drinking and social satisfaction among male students. However there was a limit to this positive relation, as male students who reported more than four binge episodes per week reported lower social satisfaction. No other relations were found between alcohol measures and reported and anticipated life satisfaction among males. Across all students there was a negative relationship between alcohol-related problems and life satisfaction (Murphy, McDevitt-Murphy & Barnett, 2005). High reports of social satisfaction among male students may attenuate the salience of

some alcohol-related problems, but it does appear that experiencing alcohol-related problems is related to decreased life satisfaction.

Shealy et al. (2007) looked at motivation to change, levels of life satisfaction and alcohol consumption. High levels of motivation to change were related to lower levels of life satisfaction and greater alcohol consumption. While the study also looked at the relationship between alcohol-related problems and motivation to change, a lack of statistical power precluded analyses of potentially more complex relationships among alcohol use, alcohol related problems, life satisfaction, and motivation to change. Previous studies have begun to delineate the relationship between life satisfaction and drinking measures on motivation to change, but none have tested a more comprehensive model that incorporates the effects of these multiple factors in producing motivation.

Current Study

The experience of negative alcohol-related consequences is often conceptualized as, and has some evidence for being, the catalyst of motivation to change alcohol consumption; however studies on the relationship between problems and motivation among college students have produced mixed results. There is some theoretical support that specific types of problems are related to the degree to which a drinker is motivated to change. The literature appears to lack studies that have investigated the effects of specific types or groupings of alcohol-related problems on motivation to change. Given the relationship between life satisfaction and motivation to change, it would also be valuable to identify if types of alcohol-related problems are related to life dissatisfaction, and if so does that dissatisfaction predict motivation to change. Specific problems identified to create dissonance and predict motivation can be incorporated into future

interventions to promote contemplation and change among students. It should also be determined if certain alcohol-related problems are associated with lower levels of motivation, as incorporation of these problems in an intervention could bring about greater resistance.

The current study sought to delineate the role that specific types of negative alcohol consequences play in motivating high-risk college students, who were referred to participate in a brief alcohol intervention, to decrease their alcohol use. Furthermore, the study tested a model that identifies life satisfaction as a mediating factor between alcohol-related problems and motivation to change.

METHODS

Participants

Participants were 590 students attending a large southeastern public university who were referred to participate in a brief alcohol intervention in response to a violation of the university's alcohol policy. The mean age was 20 years old. The majority of the participants were White (98%) males (78%), and were not affiliated with a Greek organization (62%).

Measures

Daily Drinking Questionnaire (DDQ); Collins, Parks & Marlatt, 1985) is an open-ended calendar in which participants report the average number of drinks they have consumed for each day of the week for the past 28 days, in addition to the amount of time they spent drinking on those days. The DDQ was used to assess other aspects of participants' current drinking patterns including: average alcohol consumption per week and per day, maximum consumption, and number of binge episodes in the past 28 days. A binge episode was defined as 5 or more drinks for males and 4 or more drinks for females (Wechsler, Dowdall, Davenport, & Rimm, 1995). The DDQ has been shown to be reliable and valid among college students (Collins et al., 1985).

Rutgers Alcohol Problems Index (RAPI), White & Labouvie, 1989) is a 23-item screening measure that assesses the frequency of alcohol related problems among adolescents and young adults in the past 28 days. Responses can be scored on a 5-point Likert scale, from none (0) to over 10 times (4). Alternatively, the RAPI can be scored dichotomously to indicate the absence or presence of a problem. A factor analysis suggests that the dichotomously scored RAPI fits a three-factor model among

undergraduates. The three factors have been titled Abuse/Dependence Symptoms, Personal Consequences and Social Consequences. Abuse/Dependence Symptoms consist of consequences reflecting tolerance, personal changes and familial problems. Personal Consequences have the strongest correlation with drinking consumption and include consequences that only affect the student drinking, such as neglecting responsibilities. Social Consequences consist of consequences that affect the drinker as well as those around him or her, but they are more common and less severe than the consequences in Abuse/Dependence Symptoms (Martens, Neighbors, Dams-O'Connor, Lee & Larimer, 2007).

Readiness to Change Questionnaire (RTCQ; Rollnick, Heathers, Gold, & Hall, 1992) is a 12-item questionnaire based on TTM's stages of change that measures motivation (RTC) among alcohol users. Principal component analysis has confirmed three factor structures corresponding to precontemplation, contemplation and action among the 12 items (Rollnick et al., 1992). The questionnaire can also be scored as a unitary scale that makes use of all 12 items. Magnitude of the continuous construct was positively related to reductions in alcohol consumption as well as reported intentions to reduce alcohol intake at a 6-month follow-up (Budd & Rollnick, 1996). The continuous scoring method has been used with binge drinking college populations (McNally & Palfai, 2001 & Collins, Carey & Otto, 2009). All responses are rated on a 5-point Likert scale, from strongly disagree (1) to strongly agree (5).

Temporal Satisfaction With Life Scale (TSWLS; Pavot, Diener, & Suh, 1998) is a self-report measure that was developed to assess current and expected life satisfaction among adults, including college students. *Extended Satisfaction With Life Scale*

(ESWLS; Alfonso, Allison, Rader, & Gorman, 1996) is used to measure domains of life satisfaction that are significant to undergraduate students: social life, education, family, and dating relationships. The six domains of life satisfaction from both scales were assessed by 5-items tailored for each domain. Responses to all life satisfaction items were scored on a 7-point Likert scale that ranged from strongly disagree (1) to strongly agree (7). The TSWLS and ESWLS have demonstrated good psychometric properties among college populations (Shealy et al., 2007, Murphy et al., 2005).

Data Editing

A series of preliminary analyzes were run to screen for missing data as well as potential outliers. Among the 590 subjects, 42 had missing data values on one or more variables of interest, i.e. life satisfaction indices, number of past-month binge episodes, and alcohol-related problems. Independent samples t-tests were run to assess if there were statistically significant differences on the variables of interest between subjects with no missing values and subjects with missing values. No significant differences were observed between the two groups. Therefore the subjects with missing values were deleted from the sample as their omission did not dramatically reduce the sample size nor was there evidence to believe subjects with missing values were systematically different than the rest of the sample. There was one outlier ($z \geq \pm 3.29$) on the variable number of past month binge episodes. The outlying case was assigned a value one unit larger than the next most extreme score (Tabachnick & Fidell, 2007, p. 73). All analyzes were performed with SPSS and AMOS version 18.

RESULTS

Group Differences

Independent samples t-tests indicated significant group mean differences as a function of gender and history of binge episodes (Table 1). Male subjects reported significantly greater frequency of binge episodes and social alcohol-related problems and endorsed lower education life satisfaction than women, $p < .05$. However there were no significant differences in endorsement of RTC. Subjects who reported a binge episode in the past month endorsed significantly greater RTC and frequency of all three alcohol-related problems: abuse/dependence, personal, and social consequences, $p < .01$. Additionally binge drinkers reported lower life satisfaction on all indices of the construct, $p < .01$.

Confirmatory Factor Analysis

A Confirmatory Factor Analysis (CFA) was performed using maximum likelihood estimation to test if five different life satisfaction indices: general, social, education, family, and future defined one theoretical latent variable, Life Satisfaction. Several fit indices were used to assess the model. A chi-square statistic () was computed to measure the difference between the model's predicted covariance matrix and the observed matrix. However a chi-square statistic is sensitive to sample size; with a large data set chi-square is prone to be significant. A significant chi-square suggests that the null hypothesis, which states that the model fits the data, be rejected even if the difference between the matrices is negligible. Therefore the root mean square error of approximation (RMSEA), which measures the amount of error in a model and the comparative fit index (CFI), which indicates the degree to which the tested model is

better than a model assuming the variables are uncorrelated, were also computed. A RMSEA statistic of less than .08 and a CFI greater than .94 indicate a good fit (Kline, 2005).

All standardized factor loadings for the CFA were significant ($p \leq 0.001$) and ranged from .48 - .94 (Figure 1). All standardized residuals were acceptable as well (< 1.96 , Schumacker & Lomax, 2004). Model fit was good, $\chi^2(5, N=548) = 12.97, p=.02$, CFI= .99, and RMSEA = .05; this suggests that the five life satisfaction indices do define one theoretical construct and that it is acceptable to use the latent variable Life Satisfaction in additional analyzes.

Predicting RTC

A series of Pearson correlations were computed to determine if it was appropriate to test a mediation model predicting RTC that included the latent variable Life Satisfaction and three observed variables measuring different types of alcohol-related problems. All variables were significantly correlated with each other and in the direction hypothesized, except for binge drinking and social and future life satisfaction (Table 2). Alcohol-related problems and binge drinking were all positively correlated with each other (r 's ranging from .21 to .37) and RTC (r 's ranging from .17 to .25) and inversely correlated with indexes of life satisfaction (r 's ranging from -.05 to -.30). Indexes of life satisfaction were positively correlated with each other (r 's ranging from .29 to .69) and inversely correlated with RTC (r 's ranging from -.11 to -.20).

Hypothesized Model

Structural Equation Modeling (SEM) was performed using maximum likelihood to test the hypothesized model. The same three fit indices and cut off scores, as were

used for the CFA, were used to assess the model. The model included the three observed alcohol-related problems as exogenous variables predicting RTC and Life Satisfaction, and the latent variable Life Satisfaction predicting RTC. The hypothesized model did not fit the data well, $\chi^2(24, N=558) = 340.25, p < .001, RMSEA = .16, CFI = .76$, and the direct effect of social consequences on RTC was statistically insignificant ($p = .94$) (Figure 2). A regression model was then tested to assess which variables and paths were appropriate to include in the model.

Regression Model

The regression model included the latent variable Life Satisfaction and the three observed alcohol-related problems as exogenous variables predicting RTC. The model had a poor fit, $\chi^2(27, N=548) = 422.96, p < .001, RMSEA = .16, CFI = .70$. The standardized path coefficients from abuse/dependence, personal problems, and Life Satisfaction to RTC were statistically significant ($p < .05$), but the path coefficient from social problems was insignificant ($p = .92$), suggesting that the social problems variable may not predict RTC. Therefore the observed variable social problems was omitted from the model. Additionally the modification indices suggested the addition of paths between Life Satisfaction and abuse/dependence and personal alcohol-related problems. The modification indices indicated that the direction of the paths be from Life Satisfaction to alcohol-related problems, rather than from alcohol-related problems to Life Satisfaction which was hypothesized, to have the greatest change in χ^2 .

First Alternative Model

In the first alternative model the latent variable Life Satisfaction was an exogenous variable with paths to abuse/dependence, personal alcohol-related problems

and RTC and abuse/dependence and personal alcohol-related problems were endogenous variables with paths to RTC. The fit of the model improved from the regression model but was still inadequate, $\chi^2(18, N=548) = 137.55, p < .001, RMSEA = .11, CFI = .89$. All standardized path coefficients were statistically significant with a $p < .05$ criterion. However as the fit of the model was poor an additional modification was required. Due to the large sample size it is more probable that a trivial result will be statistically significant than if working with a smaller sample size (Kline, 1998), therefore the variable personal alcohol-related problems was omitted from the model as the path coefficient from it to RTC was the only coefficient in the model with a p-value greater than 0.01.

Final Alternative Model

The second and final alternative model included a path from Life Satisfaction to abuse/dependence alcohol-related problems, as well as paths from Life Satisfaction and abuse/dependence to RTC (Figure 3). The fit of the final alternative model was good, $\chi^2(13, N=548) = 29.62, p < .001, RMSEA = .05, CFI = .98$, and was markedly improved from the first alternative model. Although the variable personal alcohol-related problems had been omitted, the total amount of variance in RTC that the final alternative model predicted was the same as the first alternative model ($R^2 = .14$). All direct and indirect paths in this model were significant, indicating that abuse/dependence alcohol-related problems and Life Satisfaction fit a mediational model predicting RTC. The model suggests that the predictive value of Life Satisfaction on RTC is partially mediated by abuse/dependence related problems and that personal alcohol-related problems do not account for any unique variance in RTC when abuse/dependence and Life Satisfaction

are in the model. Furthermore depressed Life Satisfaction predicts greater RTC as well as greater endorsement of abuse/dependence related problems and higher abuse/dependence problems predict greater RTC.

Analysis of Gender Moderating the Prediction of RTC

Simultaneous Analysis of Male and Female Subjects

Separate correlation matrixes (Table 3) and SEM analyzes were computed for male and female subjects to assess for possible moderation of model fit due to gender. The correlation matrix for males was similar to the entire sample, however the only life satisfaction indices that were significantly correlated with number of binge episodes were family and education. The female correlation matrix was also similar to the matrix for the entire sample except that social and family life satisfaction were not significantly correlated with number of binge episodes and that education life satisfaction was not significantly correlated to RTC.

In order to test for significant path differences between male and female subjects, the original hypothesized model was simultaneously fit to the gender subsamples by performing a multigroup SEM. The fit of the original hypothesized unconstrained model was poor, $(48, N=426) = 380.15, p < .001, RMSEA = .11, CFI = .75$. Subsequently the final alternative model was examined, the fit of the unconstrained model was good,

$(26, N=426) = 41.59, p = .03, RMSEA = .03, CFI = .98$. Next the final alternative model was constrained so that parameter estimates for each path were forced to be equal across male and female subjects. The constrained model did not have as good of a fit as the unconstrained model, $(29, N=426) = 49.16, p = .01, RMSEA = .04, CFI = .98$.

Additionally the difference in χ^2 between the constrained and unconstrained model was

approaching statistical significance ($\Delta = 7.57, p = .056$) suggesting that the model may differ significantly between men and women.

Predicting RTC with Separate Gender Subsamples

Similar to the entire sample, the original hypothesized model had a poor fit for male, $\chi^2(426, N=548) = 246.63, p < .001, RMSEA = .15, CFI = .77$, and female subjects, $\chi^2(24, N=122) = 133.23, p < .001, RMSEA = .19, CFI = .70$. Consequently the final alternative model, based on the results from the entire sample, was tested. The fit of the final alternative model was improved from the original hypothesized model for both male, $\chi^2(13, N=426) = 19.89, p = .10, RMSEA = .04, CFI = .99$ (Figure 4), and female subjects, $\chi^2(13, N=122) = 21.63, p = .06, RMSEA = .07, CFI = .96$ (Figure 5). However the direct effect of abuse/dependence and the indirect effect of Life Satisfaction on RTC among female subjects were statistically insignificant ($p = .23$ & $.12$). These results suggest that abuse/dependence problems did not mediate Life Satisfaction predicting RTC nor did those problems directly predict RTC among female subjects. Therefore the final alternative model is not a suitable model for female subjects, suggesting that female and male subjects differ in regards to a suitable structural model.

Analysis of Drinking History Moderating the Prediction of RTC

Simultaneous Analysis of Binge and Non-Binge Subjects

Separate correlation matrixes (Table 4) and SEM analyzes were computed for subjects reporting at least one binge episode in the past 28 days and those that did not report any binge episodes in the past 28 days. The correlation matrix for binge subjects was similar to the matrix computed for the entire sample aside from only one life satisfaction index, education, being significantly correlated with number of binge

episodes. However amongst non-binge subjects different trends were observed. Number of binge episodes and alcohol-related problems were not negatively correlated with all indexes of life satisfaction, however most correlations were not statistically significant (r 's ranging from $-.003$ to $.14$), and no variable was significantly correlated with RTC among non-bingers.

A multigroup SEM was performed to test for significant path differences between binge and non-binge subjects. The fit of the unconstrained original hypothesized model was poor, $(48, N=451) = 316.63, p < .001, RMSEA = .10, CFI = .78$. Therefore the final alternative model was examined. The fit of the unconstrained final alternative model was good, $(26, N=451) = 38.05, p = .06, RMSEA = .03, CFI = .99$. Finally a constrained model was tested to assess if a significant decrement in fit between binge and non-binge subjects exists. The constrained alternative model had a worse fit than the unconstrained model for the two subgroups, $(29, N=451) = 53.85, p = .003, RMSEA = .04, CFI = .97$. Additionally the difference in χ^2 between the constrained and unconstrained model was statistically significant ($\Delta \chi^2 = 15.8, p < .0001$) suggesting that there may be a significant difference in fit of the model between binge and non-binge subjects.

Predicting RTC with Separate Binge Drinking Subsamples

Similar to the entire sample, the original hypothesized model had a poor fit for binge, $(24, N=451) = 264.83, p < .001, RMSEA = .15, CFI = .77$, and non-binge subjects, $(24, N=94) = 51.82, p < .001, RMSEA = .11, CFI = .83$. Therefore the final alternative model, based on the results from the entire sample, was tested. An improved model fit was observed for both binge, $(13, N=451) = 21.78, p = .06, RMSEA = .04$,

CFI = .99 (Figure 6), and non-binge subjects (13, N=94) = 16.19, $p = .24$, RMSEA = .05, CFI = .98 (Figure 7). However among non-binge subjects none of the paths were statistically significant. Therefore non-binge subjects differed from binge subjects in regards to a suitable structural model. Furthermore these results suggest that among students who report non-hazardous drinking, variance of RTC cannot be accounted for by Life Satisfaction or abuse/dependence problems.

DISCUSSION

Study Findings

The current study is the first investigation on the influences of specific types of alcohol related problems and life satisfaction in predicting RTC among high-risk college students referred for a brief alcohol intervention. As discovered in the hypothesized model not all paths from alcohol-related problems were statistically significant to RTC or life satisfaction in high-risk college students (Figure 2). Therefore there is evidence suggesting that specific types of alcohol-related problems have unique relationships with RTC. Furthermore, in the tested models only the scales assessing abuse/dependence and personal alcohol-related problems were statistically significant predictors of RTC. However results did not support a causal relationship of alcohol-related problems leading to decreased life satisfaction. However the final alternative model supported the addition of a path from life satisfaction to abuse/dependence problems, suggesting that depressed life satisfaction predicts increased abuse/dependence problems (Figure 3). Results from the final alternative model suggest that both life satisfaction and abuse/dependence problems predict RTC. Further abuse/dependence problems partly mediate the relationship between life satisfaction and RTC. Examination of the path differences between the genders and between binge and non-binge subjects provides evidence that the fit of the final model is moderated by both gender and drinking history, with the models for male and binge drinkers providing stronger fits than the models for female and non-binge drinkers, respectively. In conclusion, results suggest life satisfaction and abuse/dependence alcohol-related problems fit a mediation model predicting RTC among male and binge drinking subjects.

Possible Explanations for Final Alternative Model

In this study number of binge episodes and alcohol-related problems were positively correlated with each other, and both were inversely correlated with measures of life satisfaction. Additionally non-binge subjects endorsed significantly greater life satisfaction on all measures of the construct than binge subjects. This suggests that college students with depressed life satisfaction are more likely to endorse binge drinking and experience alcohol-related problems as compared to peers who report greater life satisfaction. This finding is consistent with previous research that has found alcohol-related problems to be negatively correlated with life satisfaction (Shealy, et al., 2007) although it is contradictory to those studies that found alcohol consumption to have a positive relationship with life satisfaction (Molnar, Busseri, Perrier & Sadava, 2009 & Molnar, et al., 2009). However those studies finding positive relationships between alcohol consumption and life satisfaction differed from the current study in that random samples of college students were used. The current study specifically looked at high-risk drinkers and thus the relationship may be different due to the manner in which high-risk drinkers consume alcohol or the reasons they have for drinking. Even within the current study there was evidence to support that drinking history moderated the relationship of these variables, as evidenced by the insignificant correlation matrix, weak strength of the final alternative model, and significantly greater life satisfaction among non-binge subjects. It may be that non-binge subjects do not consume enough alcohol or experience enough problems for there to be significant correlations among the variables. However even among binge drinkers only one correlation between number of binge episodes and life satisfaction indices was statistically significant (education, see Table 4), suggesting

that frequency of heavy drinking alone does not explain the differences in life satisfaction but that group differences may be partly explained by alcohol-related problems.

Correlation matrixes and fit of the final model were also moderated by gender. The model had a poorer fit for female subjects; however this result may in part be due to male subjects reporting significantly greater number of binge episodes than female subjects. Additionally different life satisfaction indices were significantly correlated with number of binge episodes depending on gender of the subsample. This suggests that the relationship between consumption and life satisfaction is moderated by gender. It may be that life satisfaction is mediated by different factors for female and male students. It may also be that males and females experience different problems from their drinking or have different motives or stressors for drinking alcohol.

The traditional masculine role promotes heavier drinking more than the traditional female stereotype, thus men may be less willing to consider change as they experience more pressure to drink heavily (Borsari & Carey, 2006). Therefore it may be that men need to experience greater or more severe problems (abuse/dependence symptoms) from alcohol as well as decreased life satisfaction before they will consider decreasing their use. Whereas for women experiencing depressed life satisfaction may be a stronger motivating factor for her to want to make changes in her life, including decreasing alcohol consumption. In other words, females may be sufficiently motivated to reduce alcohol use before severe problems related to alcohol use emerge, thus precluding the role of alcohol-related problems as a mediator between life-satisfaction and RTC.

Furthermore only one measure of alcohol-related problems was used, the RAPI. Although the RAPI has empirical support of being a reliable and valid measurement of

negative alcohol consequences among college students, there are other types of negative consequences not captured by the questionnaire that are experienced by female drinkers. It may be that a similar model to the final model found in this study, but with different types of alcohol-related problems, fits the female data. Previous research has suggested that female students perceive more disapproval from peers for alcohol sanctions (Carey & DeMartini, 2001) and that heavy drinking among women is culturally disapproved of more than heavy drinking by men (Wilsnack & Wilsnack, 1997). Thus social disapproval not measured by the RAPI may be a greater motivator of change for women than abuse/dependence symptoms. Also women may experience more problems from other's drinking than men, such as unwanted sexual advances (Wechsler, 1995). Therefore women may be motivated to change their own drinking by witnessing or being adversely affected by someone else's intoxication, whereas once again data from the current study suggest that men are more likely to be motivated to decrease their drinking after experiencing alcohol related problems.

The inverse relationship between alcohol variables and life satisfaction can be accounted for by at least three explanations. Firstly, drinking may widen the discrepancy between the student's actual and ideal level of life satisfaction, with the acute and residual negative effects of alcohol use being responsible for the failure to achieve the ideal levels. This relationship between ideal and actual life satisfaction has been of clinical interest in numerous interventions including MI. There are four basic principles of MI: (1) expressing empathy, (2) developing discrepancy, (3) rolling with resistance and (4) supporting self-efficacy (Miller & Rollnick, 2002). The second principle identifies how the client's drinking is discrepant with their personal values. Clinically this

discrepancy can be highlighted by having the client identify the problems that their drinking has caused and by the clinician purposefully reflecting what the client has said to clarify how their drinking contrasts with their goals and values. The objective of this principle is for the client to identify and endorse reasons for them to change their drinking. The current results are consistent with this clinical perspective in suggesting that low levels of life satisfaction are related to increased motivation to change alcohol use, with specific alcohol-related problems mediating the relationship.

A second possible explanation for the relationship observed between drinking variables and life satisfaction is that alcohol use is a coping strategy for students with depressed life satisfaction. Additionally that relationship may be accounted for by both explanations; alcohol use may be a maladaptive coping strategy for low life satisfaction, and using alcohol in this way can lead to greater life dissatisfaction due to the occurrence of alcohol-related problems. Therefore depressed life satisfaction may be both the antecedent and consequence of heavy college drinking. If true, the relationship between life satisfaction and alcohol consumption creates a self-sustained cycle of risky use.

There is some empirical support to suggest that students who consume alcohol to cope with negative affect drink in a manner that is more risky than their peers who consume the same amount but for different motives (e.g. to celebrate or socialize with friends). Previous research has suggested that although alcohol consumption significantly predicts alcohol-related problems, a significant amount of variance is not accounted for by consumption alone (Borsari, Neal, Collins, & Carey, 2001). One study found that the expectancy that alcohol will reduce tension was the strongest predictor of problematic drinking among college students (Brown, 1985). Additionally in other

studies using college students, drinking for negative reinforcement (i.e., drinking to cope with negative affect) significantly predicted alcohol-related problems (Carey & Correia, 1997; Martens, Cox, & Beck, 2003; Novik, Howard, & Boekeloo, 2011). Therefore there is evidence suggesting that drinking to reduce tension may lead to alcohol-related problems

In the current study, results of the mediation model propose that diminished life satisfaction predicts greater abuse/dependence alcohol-related problems and that the two variables when compounded together predict the greatest variance in RTC. This finding further suggests that the second or third previously mentioned explanation for the relationship between problems and life satisfaction is occurring; alcohol is used as a coping strategy for students with depressed life satisfaction. The relationship between coping-related drinking motives and alcohol-related problems does not appear to be unique to college students. Studies have found that among adolescent and adult samples, subjects who endorse coping with negative affect as a motive to drink reported more solitary and problematic drinking (Cooper, Frone, Russell, & Mudar, 1995; Cooper, Russell, Skinner, & Windle, 1992).

Results of the mediation model do not provide evidence that all alcohol-related problems predict RTC. Rather results of this study suggest that only abuse/dependence alcohol-related problems predict RTC, while social and personal problems do not. This finding supports the hypothesis that different types of alcohol-related problems have unique contributions to the prediction of RTC. Previous research suggests that alcohol-related consequences that researchers consider aversive or problematic are not always assessed as so by college students (Mallett, et al., 2008). It may be that college students

disapprove of abuse/dependence consequences more than less severe personal and social consequences. As such abuse/dependence consequences may be more aversive and salient to students, leading them to consider changing their drinking patterns and increasing RTC.

Clinical Implications

Treatment matching states that a one-size-fits-all intervention is bound to be ineffective with most clients and that it is important for interventionists to consider the unique experiences of their clients (Dimeff, Baer, Kivlahan, & Marlatt, 1999). Research supports the utility of matching interventions to clients' stage of change and personality variables (Conrod, Stewart, Pihl, Côté, Sylvana, Veronique, 2000, Conrod, Castellanos-Ryan, Mackie, 2011, Giovazolias & Davis, 2005). Specifically Conrod et al (2011) found that among adolescents personality-matched interventions significantly reduced drinking rates at the 6-month post intervention follow-up and alcohol-related problems at the 24-month follow-up. Additionally subjects in the treatment matching condition with elevated Anxiety-Sensitivity traits reported fewer coping motives at the 24-month follow-up. This provides further support for treatment matching as well as the possible influence of coping motives on alcohol-related problems, as the reduction in motives may have influenced the decrease in problems.

Considering the time restrictions and unique sample of college students referred to a brief alcohol intervention, it is valuable to study what may be most effective for most clients. The results of this study suggest a starting point for discussing alcohol use with high-risk male college students; abuse/dependence consequences should be the first types of problems discussed, as they were the only type of alcohol-related problems that

significantly predicted RTC in the tested model.

Additionally, the lack of support for alcohol-related problems predicting life satisfaction suggests that alcohol-related problems are not the origin of life dissatisfaction but rather life satisfaction predicts abuse/dependence problems. This is consistent with previous research that suggests that among college students, the expectancy that alcohol will reduce negative affect strongly predicts problematic drinking (Brown, 1985, Carey & Correia, 1997). As so, life satisfaction may not be best discussed as a consequence of alcohol use. It may be more constructive to enhance motivation by discussing how alcohol use impedes the student from changing the parts of their life that they are dissatisfied with. Also as alcohol consumption alone does not explain risky drinking; it may be useful for researchers and clinicians to assess what reasons their clients have for drinking as well as in what manner they do drink.

Moreover interventions may best serve clients by including a discussion of adaptive coping strategies. It may be that individuals whose drinking is negatively reinforced have not learned or acquired alternative methods of coping with stress. Therefore these individuals may fit a coping deficits model of alcohol use, as they do not have alternative methods of mitigating their distress (Bandura, 1969).

Limitations and Future Directions

The cross sectional design of the study allows for the measurement of statistical associations among variables. However due to RTC, life satisfaction indices, and alcohol-related consequences being simultaneously measured, course of endorsement for each variable cannot be determined. Therefore results of this study cannot be interpreted as cause and effect relationships; specifically the results cannot ascertain that low life

satisfaction leads to abuse/dependence problems and RTC. A follow-up study that collects longitudinal data for the variables of interest will need to be performed to confirm the sequence in which the variables may impact each other.

Additionally a longitudinal study that measures the current variables as well as alcohol expectancies and alcohol-related problems beyond the past 28 days will considerably add to the research. Data collected for this study only included past-month problems. The inclusion of problems experienced before the past month may also influence the relationship between life satisfaction and RTC.

In the current study, the findings were discussed in the context of clinical theory and research on the relationships among life satisfaction, alcohol-related consequences and readiness to change being due to tension reduction expectancies. However, this study cannot confirm that relationship as data on alcohol expectancies and reasons to drink were not collected. The model needs to be further tested in studies that include alcohol expectancies and motives.

In addition to conducting longitudinal follow up studies, studies should also be conducted with both referred and non-referred subjects. As noted, the relationship between alcohol use and life satisfaction is not consistent between studies, and results tend to vary depending on whether participants are referred or recruited from more general samples of students. A single study making use of both sets of students would help determine which variables are moderating the relationships. A model of change could also be tested for use in secondary prevention efforts for students who are not referred for a specific intervention. Although non-referred drinkers may endorse less risky drinking than their referred peers, they still are at risk of experiencing, or have

already experienced, problems from their use. Therefore a model for this specific sample, as well as a more comprehensive model that addresses both referred and non-referred students, may aid in developing intervention prevention efforts that motivate students to maintain moderate drinking or change risky drinking.

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APPENDIX

Table 1:
Summary of Descriptive Data for Sample and Subsamples

Variable	N	Range	Total Mean(SD)	Men (N= 426) Mean(SD)	Women (N= 122) Mean(SD)	Binge (N= 451) Mean(SD)	Non-Binge (N=94) Mean(SD)	t (df)
Past-month Alcohol use								
No. of binge episodes	545	0-20	5 (4.5)	5.4 (4.6)	3.7 (3.8)	6 (4.3)	-	30.1(450)**
Alcohol-related problems								
Abuse/Dependence	548	0-13	1.4 (2.3)	1.4 (2.3)	1.3 (2.2)	1.6 (2.4)	0.39 (1.1)	7.7(310)**
Personal	548	0-9.5	1.3 (1.8)	1.4 (1.9)	1.2 (1.5)	1.5 (1.9)	0.4 (0.9)	7.9(272)**
Social	548	0-13.5	0.96 (1.5)	1 (1.5)	.75 (1.1)	1 (1.5)	.04 (0.9)	5.4 (233)**
Life Satisfaction								
General	548	9-35	29.3 (4.4)	29.2 (4.6)	29.9 (3.9)	29 (4.5)	30.5 (4.5)	-2.8(543)**
Social	548	6-35	29.5 (4.7)	29.3 (4.8)	30.0 (4.1)	29.3 (4.8)	30.4 (3.9)	-2.2 (543)**
Family	548	7-36	30.7 (5.0)	30.6 (5.0)	31.0 (5.0)	30.5 (5.0)	31.7 (4.8)	-2.2 (543)**
Education	548	13-35	29.3 (3.9)	29.1 (3.9)	29.9 (3.8)	29 (3.8)	30.1 (4.1)	-2.2 (543)**
Future	548	8-35	27.7 (4.4)	27.7 (4.5)	27.9 (4.1)	27.5 (4.4)	28.7 (4.2)	-2.3 (543)**
Readiness to Change	548	-12-27	6.6 (6.9)	6.2 (7)	6.4 (6.4)	6.8 (6.6)	3.6 (7.8)	4.2 (543)**

Note: * = p<.05, **=p<.01 **

Levene's test for equality of variances

Table 2:
Correlations Among Entire Sample

Variable	1	2	3	4	5	6	7	8	9
Past-month Alcohol use									
1 No. of binge episodes									
Alcohol-related problems									
2 Abuse/Dependence	.28 ^{***}								
3 Personal	.37 ^{***}	.45 ^{***}							
4 Social	.21 ^{***}	.43 ^{***}	.44 ^{***}						
Life Satisfaction									
5 General	-.12 ^{***}	-.29 ^{***}	-.28 ^{***}	-.30 ^{***}					
6 Social	-.05	-.25 ^{***}	-.14 ^{***}	-.27 ^{***}	.69 ^{***}				
7 Family	-.12 ^{***}	-.22 ^{***}	-.14 ^{***}	-.17 ^{***}	.46 ^{***}	.29 ^{***}			
8 Education	-.14 ^{***}	-.19 ^{***}	-.22 ^{***}	-.17 ^{***}	.53 ^{***}	.39 ^{***}	.32 ^{***}		
9 Future	-.06	-.15 ^{***}	-.13 ^{***}	-.20 ^{***}	.54 ^{***}	.45 ^{***}	.29 ^{***}	.37 ^{***}	
10 Readiness to Change	.18 ^{***}	.25 ^{***}	.22 ^{***}	.17 ^{***}	-.20 ^{***}	-.20 ^{***}	-.19 ^{***}	-.11 ^{***}	-.19 ^{***}

* = $p < .05$, ** = $p < .01$

Table 3:
Correlations Among Gender Subsamples

Note: Values below the diagonal are from Male subjects; values above the diagonal are from Females.

Variable	1	2	3	4	5	6	7	8	9	10
Past-month Alcohol use										
1 No. of binge episodes		.31 ^{***}	.40 ^{***}	.36 ^{***}	-.26 ^{***}	-.16	-.07	-.22 [*]	-.23 ^{***}	.22 [*]
Alcohol-related problems										
2 Abuse/Dependence	.27 ^{***}		.50 ^{***}	.60 ^{***}	-.40 ^{***}	-.33 ^{***}	-.38 ^{***}	-.38 ^{***}	-.33 ^{***}	.24 ^{***}
3 Personal	.36 ^{***}	.44 ^{***}		.46 ^{***}	-.37 ^{***}	-.21 [*]	-.25 ^{***}	-.40 ^{***}	-.39 ^{***}	.31 ^{***}
4 Social	.18 ^{***}	.40 ^{***}	.43 ^{***}		-.52 ^{***}	-.38 ^{***}	-.36 ^{***}	-.41 ^{***}	-.49 ^{***}	.31 ^{***}
Life Satisfaction										
5 General	-.08	-.26 ^{***}	-.26 ^{***}	-.26 ^{***}		.69 ^{***}	.46 ^{***}	.58 ^{***}	.51 ^{***}	-.24 ^{***}
6 Social	-.02	-.23 ^{***}	-.12 [*]	-.24 ^{***}	.69 ^{***}		.30 ^{***}	.48 ^{***}	.47 ^{***}	-.26 ^{***}
7 Family	-.12 [*]	-.18 ^{***}	-.11 [*]	-.12 [*]	.46 ^{***}	.29 ^{***}		.37 ^{***}	.26 ^{***}	-.32 ^{***}
8 Education	-.11 [*]	-.14 ^{***}	-.18 ^{***}	-.11 [*]	.52 ^{***}	.36 ^{***}	.30 ^{***}		.39 ^{***}	-.17
9 Future	-.02	-.10 [*]	-.08	-.14 ^{***}	.55 ^{***}	.45 ^{***}	.30 ^{***}	.37 ^{***}		-.31 ^{***}
10 Readiness to Change	.18 ^{***}	.25 ^{***}	.21 ^{***}	.14 ^{***}	-.20 ^{***}	-.19 ^{***}	-.16 ^{***}	-.10 [*]	-.16 ^{***}	

* = p < .05, ** = p < .01

Table 4:

Correlations Among Drink History Subsamples

Note: Values below the diagonal are from Binger Drinkers; values above the diagonal are from Non-Binger Drinkers.

Variable	1	2	3	4	5	6	7	8	9	10
Past-month Alcohol use										
1 No. of binge episodes		-								
Alcohol-related problems										
2 Abuse/Dependence	.22 ^{***}		.14	.10	-.03	-.10	.04	.03	-.02	.05
3 Personal	.31 ^{***}	.43 ^{***}		.50 ^{***}	-.11	.05	-.02	-.09	-.04	.06
4 Social	.16 ^{***}	.43 ^{***}	.42 ^{***}		-.15	-.05	-.14	-.19	-.16	-.004
Life Satisfaction										
5 General	-.08	-.30 ^{***}	-.27 ^{***}	-.31 ^{***}		.61 ^{***}	.57 ^{***}	.59 ^{***}	.45 ^{***}	-.14
6 Social	-.01	-.25 ^{***}	-.13 ^{***}	-.28 ^{***}	.70 ^{***}		.30 ^{***}	.40 ^{***}	.43 ^{***}	-.17
7 Family	-.09	-.23 ^{***}	-.13 [*]	-.16 ^{***}	.43 ^{***}	.28 ^{***}		.36 ^{***}	.44 ^{***}	-.19
8 Education	-.12 [*]	-.20 ^{***}	-.22 ^{***}	-.15 ^{***}	.51 ^{***}	.38 ^{***}	.30 ^{***}		.41 ^{***}	-.02
9 Future	-.01	-.15 ^{***}	-.12 ^{***}	-.19 ^{***}	.55 ^{***}	.45 ^{***}	.25 ^{***}	.36 ^{***}		-.18
10 Readiness to Change	.12 [*]	.25 ^{***}	.22 ^{***}	.17 ^{***}	-.20 ^{***}	-.20 ^{***}	-.18 ^{***}	-.12 ^{***}	-.18 ^{***}	

* = p < .05, ** = p < .01

Figure 1:
Confirmatroy Factor Analysis of Life Satisfaction Indices

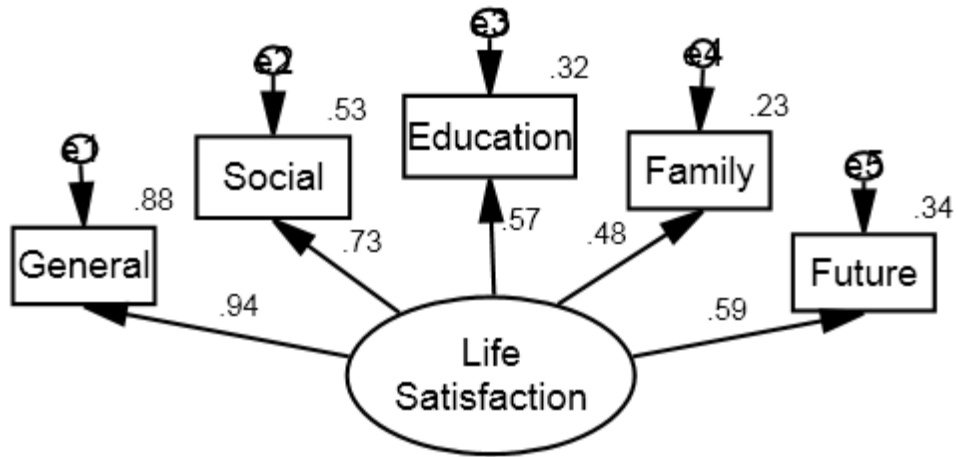


Figure 2:
Hypothesized Model

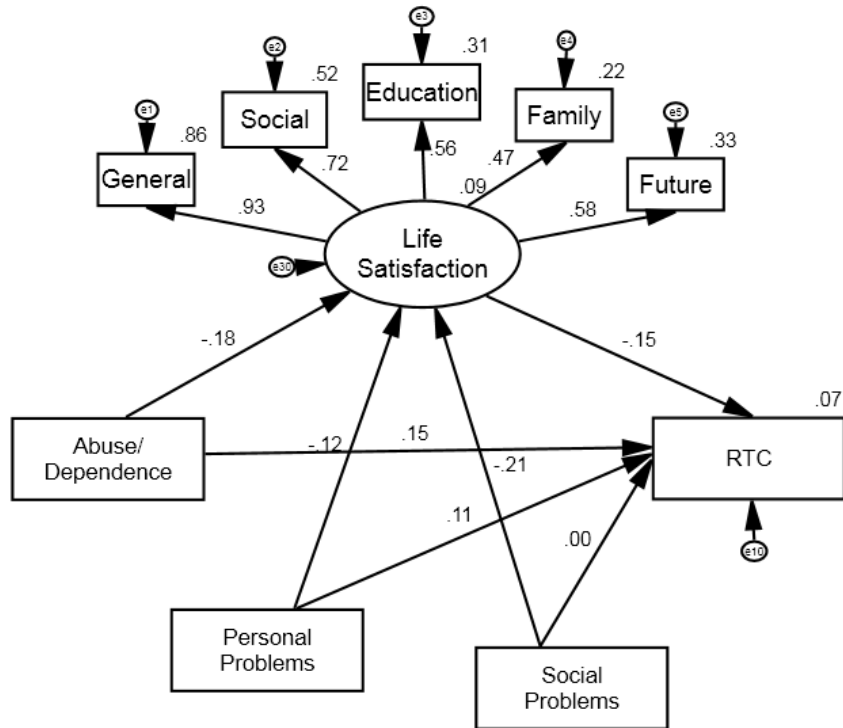


Figure 3:
Final Alternative Model

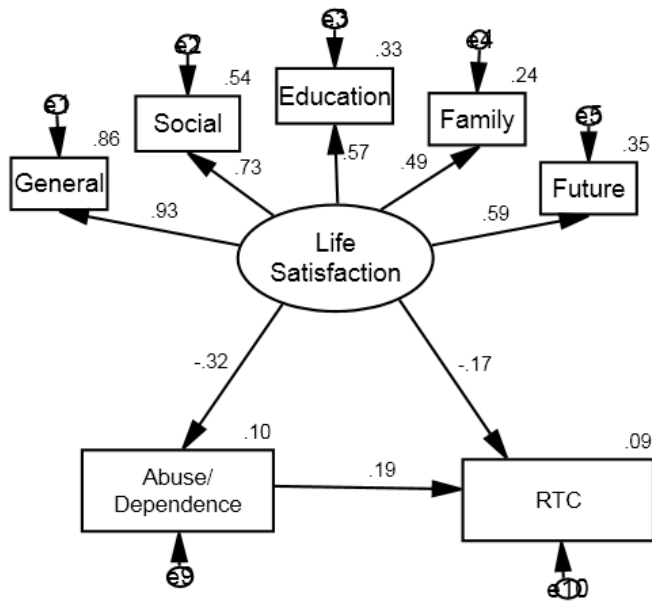


Figure 4:
Final Alternative Model Fit to Male Data

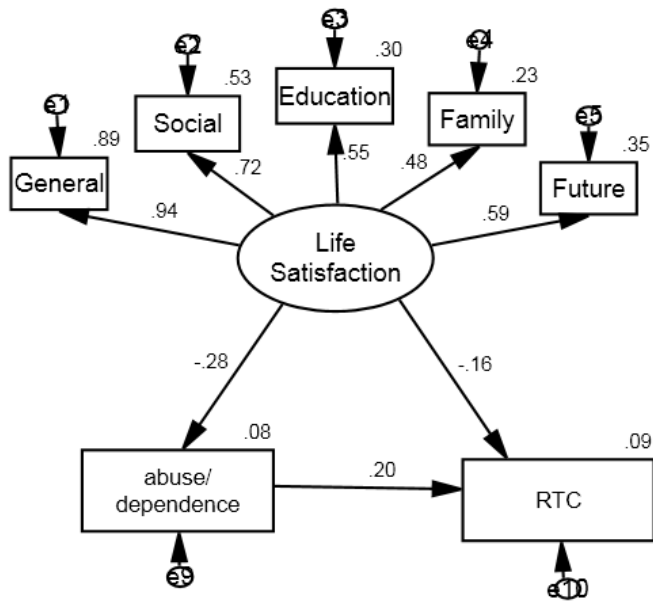


Figure 5:
Final Alternative Model to Female Data

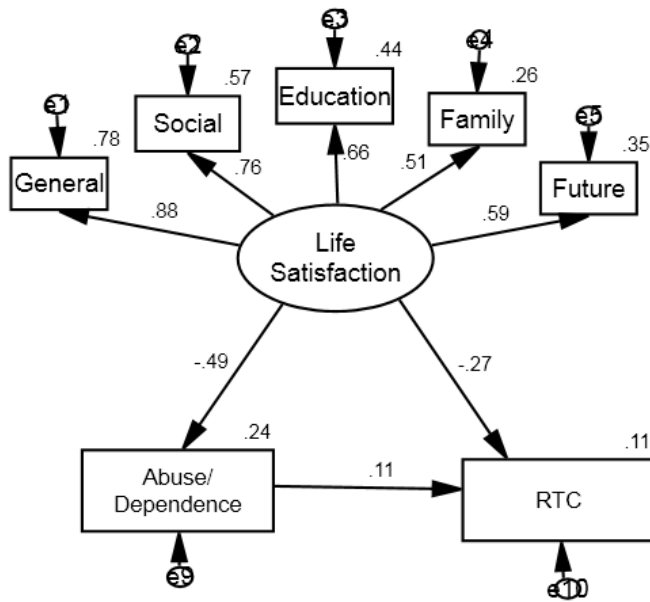


Figure 6:
Final Alternative Model Fit to Binge Drinkers Data

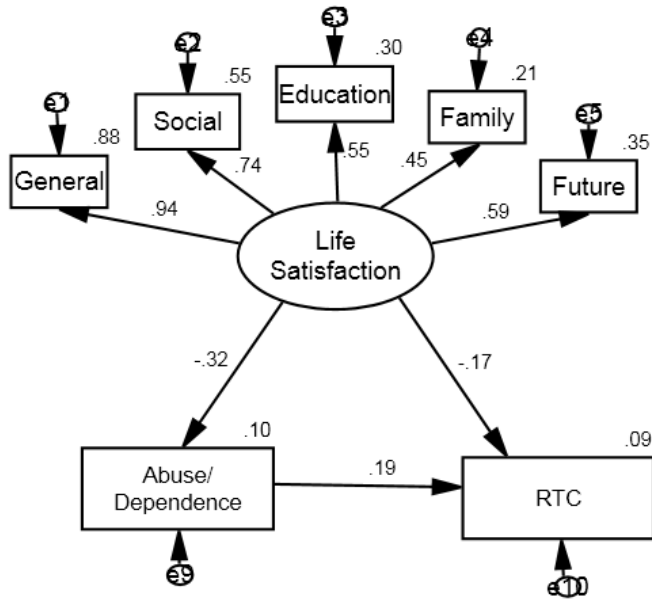


Figure 7:
Final Alternative Model Fit to Non-Binge Drinkers Data

