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Testing Demographic Differences for Alcohol Use Initiation among Adolescents for the Decisional Balance and Situational Temptations Prevention Inventories

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Abstract

Alcohol use by middle school-aged students is a public health concern because of the numerous adverse social, health and psychological outcomes. Prevention programs attempt to intervene before alcohol use begins. A tailored, computer-delivered program for the prevention of alcohol use and a series of new transtheoretical model measures were developed, including decisional balance (Pros and Cons) of alcohol use and Situational Temptations to Try Alcohol. This study investigated if there were any demographic differences on these measures in a sample of 6th grade middle school students from 20 schools (N=4151) at baseline. Three factorial analysis of variance tests were conducted to explore the impact of race (whites vs. non-whites), ethnicity (Hispanics vs. Non-Hispanics) and gender (males vs. females). A significant two-way interaction effect was found between gender and ethnicity for Pros of Alcohol Use. A significant three-way interaction effect was found between gender, race and ethnicity for Cons of Alcohol Use. Main effects were found for the three demographic factors for Situational Temptations to Try Alcohol. However, the effect sizes for the interaction effects and main effects were very small (all below $\eta^2 = .01$), suggesting that race/ethnicity and gender alone may not be highly influential factors in the Decisional Balance for the Prevention of Alcohol and Situational Temptations to Try Alcohol in adolescence. The implications for these results and alcohol use prevention among this group are discussed.

Keywords

alcohol use; demographic factors; adolescents; Transtheoretical Model; effect size estimation

Alcohol use among adolescents is a major public health concern (Center for Disease Control [CDC], 2012; Eaton et al., 2010; Jackson, 2010; Nygaard, Waiters, Grube & Keefe, 2003).

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According to the CDC (2012), approximately 70.8% of adolescents reported having an alcoholic drink in their lifetime. Among those adolescents, 20.5% reported drinking before the age of 13 (CDC, 2012). Additionally, these same studies show that approximately 38% of adolescents reported having at least one alcoholic drink during the past 30 days (CDC, 2012).

Early onset of alcohol use is associated with excessive alcohol consumption or binge drinking (Alvanzo et al., 2011, CDC, 2012). Early alcohol use and binge drinking during adolescence are associated with alcohol dependence in adulthood (Alvanzo et al., 2011; Calvert, Bucholz, & Steger-May, 2010). Long-term alcohol misuse has numerous adverse effects, including liver disease, cancer, cardiovascular disease, and neurological damage (CDC, 2010) as well as psychiatric problems such as depression and anxiety (Kelly et al., 2011; McBride, Bell, Rodd, Strother, & Murphy, 2005).

In 2010, CDC data linked underage drinking to three primary causes of adolescent mortality: motor vehicular-related deaths, homicide and suicides. Moreover, a longitudinal study conducted by Buchmann et al. (2009) found that early alcohol use and later difficulties, including alcohol dependence in adulthood, is significant even when other risk factors (e.g., parental alcohol use and peer/ sibling alcohol use) are controlled. Another longitudinal study conducted by Malone, Northup, Masyn, Lamis and Lamont (2012) showed similarly negative outcome between early onset of alcohol use and trajectory of alcohol use. Given these findings, alcohol use prevention programs are needed to intervene before alcohol use begins. However, to reduce these risks, we need to understand the risk factors involved in the initiation of adolescent alcohol use.

Demographic variables and alcohol use

Demographic factors such as race, gender and age have been identified as risk factors for alcohol use in the initiation of alcohol use among adolescents (CDC, 2012; Malone et al., 2012; Williams et al., 2007). According to Williams et al. (2007), higher percentage of white American youths engage in alcohol use in comparison to black youths and Hispanic youths. Chen and Jacobson (2011) reported higher initiation rate of substance use, including alcohol use, among Hispanic youths as compared to black and white youths. Moreover, a national survey shows that prevalence of alcohol use was higher among whites (44.7%) and Hispanics (42.9%) as compared to blacks (33.4%) (Eaton et al., 2010).

Higher rates were noted for women regarding progressing from first initiate use to frequent use to alcohol dependence as compared to men (Gruca, Norberg, Bucholz, & Bierut, 2008; Zhong & Schwartz, 2010). Other studies have shown contrasting results, showing women as having higher expectancy of progression than men (Godley, Hedges, & Hunter, 2011; Jackson, 2010). On the other hand, several studies have noted no gender difference for both initiation and alcohol progression (Alvanzo et al., 2011; Malone et al., 2012).

Donovan (2004), in his review on determinants for alcohol use initiation among adolescents, attributes the discrepancies in these findings as due to a lack of explanatory knowledge of alcohol use initiation among adolescents in the literature. Similarly to Donovan (2004), Schutle, Ramo and Brown (2009) argue that this paucity reflects the limited methodologies

of previous studies that have failed to distinguish between factors for initiating alcohol use, other alcohol use involvement (e.g., progression to daily use or binge drinking) as well as illicit drug use in adolescence. They added that most studies assume that a risk factor, for example, for adolescent initiation in marijuana use is likely a risk factor for alcohol use initiation as well. Clearly, this deficiency in the literature needs to be addressed to inform prevention programs. Achieving this goal requires that researchers address a key issues likely fostering these inconsistencies: The use of statistical significance as the sole evidence for determining risk factors.

Statistical significance

Statistical significance testing as an analytic method has been criticized due its dependence on sample size and the unknown of the size of the effect for the target variable(s) (Cohen, 1988, 1994; Kline, 2013). The reliance on sample size benefits studies with large number of participants and consequently will almost always yield significant differences because even very small differences will be detected as significant. In fact, most comparison studies on the prevalence of substance abuse initiation across adolescent subgroups consist of very large samples (e.g., Alvanzo et al., 2011; CDC, 2012; Kelly et al., 2011). Therefore, the use of effect sizes is more appropriate to determine and establish important factors for this behavior (Cohen, 1988). Effect sizes describe the magnitude of the relationship, which is a way of assessing the practical significance of an effect between two variables (Cohen, 1988, 1992; Velicer, et al., 2008). The taxonomy of effects size consists of established criteria, which researchers use to assess and interpret the relationship between the two variables. For example, Cohen (1988) recommended the following criteria for interpreting eta-squared values: small effect size = .01, medium effect size = .06, and large effect size = .14.

Defining a risk factor

A risk factor is described as a variable that significantly predicts whether an individual or a group will engage in a particular behavior or develop a certain illness or disorder (Donovan, 2004; Kraemer, Stice, Kazdin, Offord, & Kupfer, 2001). Kraemer et al. (2001) mentioned that a risk factor must demonstrate a *strong* association with the target behavior. Based on these definitions, a variable is considered a risk factor for the initiation of alcohol use through consistent evidence that it increases the probability of adolescents' engagement in alcohol use.

Measuring alcohol acquisition

Understanding the mechanisms for increased risk for alcohol initiation in adolescence is crucial for developing effective prevention strategies. Perceived risks and perceived benefits are established as two of the most proximal predictors of behavior acquisition and behavior change (Prochaska & Velicer, 1997; Velicer, DiClemente, Prochaska, & Brandenburg, 1985). There is evidence to suggest that these variables might be correlates for early onset of alcohol use in adolescence (Goldberg, Halpern-Felsher, & Millstein, 2002; Sartor, Lynskey, Heath, Jacob, & True, 2007). Level of temptations has also been cited in favoring onset of substance use, including alcohol use, in adolescence (Eptstein, Griffin, & Botvin, 2008; Zhong, & Schawtz, 2010). Temptation factors associated with alcohol acquisition in this

group include social pressure or peer pressure and peer drinking and access to alcohol (Mundt, 2011; Stephens et al., 2009; Truong & Sturm, 2009; Griffin & Botvin, 2008). These factors are also included in two new TTM-based measures for alcohol initiation for adolescents (Babbin et al., 2011; Harrington et al., 2011)

Transtheoretical model

The TTM is a comprehensive framework comprising of multiple dimensions of behavior and behavior change. This model has been validated across numerous studies and has been applied to many health risk behaviors including early onset of alcohol use (Hall & Rossi, 2008). The current study assessed potential demographic differences on two baseline TTM measures for alcohol use prevention, the Decisional Balance Inventory for Prevention of Alcohol Use (Babbin et al., 2011) and the Situational Temptations to Try Alcohol Scale (Harrington et al., 2011). These measures were adopted from the original TTM-measures for decisional balance and situational temptations for alcohol use prevention with adult populations (Migneault, Planonen, & Velicer, 1997; Migneault, Velicer, Prochaska, & Stevenson, 1999). The decisional balance inventory for alcohol use prevention assesses an individual's weighing of the pros and cons (i.e., perceived benefits and perceived risks) of engaging in this behavior (Ding et al., 1995). It has been replicated across multiple behaviors (Hall & Rossi, 2008). The situational temptations dimension of the TTM (Velicer et al., 1990), adapted from Bandura's self-efficacy model (Bandura, 1982) and models of behavior maintenance (Velicer et al., 1990), measures "the intensity of urges to engage in a specific behavior when in difficult situations" (Pummer et al., 2001, p. 544), and the confidence to avoid engaging in a particular behavior despite being in difficult situations (Velicer et al., 1990). These two constructs have been important mediator variables and widely employed in interventions based on the TTM. Analogous measures are found in most other theories of health behavior change (Abraham & Michie, 2008; Schwarzer, 2008).

Method

Participants

The sample was 6th grade students from 20 middle schools in Rhode Island who were involved in a three-year prevention program for alcohol and smoking based on the TTM (Velicer, Redding, Paiva, Mauriello, Blissmer, Oatley, Meier, Babbin, McGee, Prochaska, Burditt, & Fernandez, 2013). Only complete cases (N=3691) were used in the analyses. The original sample was 4151 participants. The age range of participants was between 10 to 15 years old, with a mean age of 11.40 (SD = .70).

Measures

Demographics—Single items corresponding to the US Census were used to assess participant race, ethnicity, gender and age. Participants were not limited to choose either a race or an ethnic category and small samples of participants identified as a race group as well as an ethnic group (e.g., Hispanic and white as Hispanic and black). Those samples were not adequate for analysis. For race, the sample size was adequate only for white versus

non-white comparisons. For ethnicity, the sample was adequate only for Hispanics and Non-Hispanic comparisons.

Decisional Balance Inventory for Prevention of Alcohol Use—The decisional balance measure (Babbin et al., 2011) consisted of six items, three representing the Pros of Alcohol Use (an example of item is: “I will have more fun if I drink alcohol”) and three representing the Cons of Alcohol Use (an example of an item: “I will make better decisions without drinking”). This inventory was adapted from the original TTM measure for decisional balance inventory for prevention of alcohol use for adults (Babbin et al., 2011; Migneault et al., 1997; Migneault et al., 1999, Velicer, DiClemente, Prochaska, & Brandenburg, 1985). For each item, participants are asked to rate how much they agree or disagree on a 5-point Likert scale. The Cronbach’s Alphas for the cons scale and pros scale, respectively, were .61 and .67.

Situational Temptations to Try Alcohol—The Situational Temptations to Try Alcohol scale (Harrington, et al., 2011) consists of three highly correlated subscales, *Social Pressure* (an example for an item for the positive social subscale: “When I am with others my age that are trying alcohol”), *Opportunity* (an example for an item for the opportunity subscale: “When my parents don’t lock up the liquor cabinet”) and *Social Anxiety* (an example for an item for the social anxiety subscale: “When I am anxious about meeting people”). Each subscale consists of three items. Participants are asked to report how much they are tempted on a five-point Likert scale ranging from 1= “Not all tempted” to 5 “Extremely tempted.” The Alpha coefficients for these subscales, respectively, are .90, .81 and .82 (Harrington et al., 2011). The full, nine-item scale was used in this study because the Situational Temptations scale consists of three highly correlated (.79 to .91) subscales which produce the same pattern of results. (e.g., Velicer et al., 1999; Maddock, Laforge, & Rossi, 2000; Breitling, Twardella, Raum & Brenner, 2009).

Data analysis

Three different three-way factorial analysis of variance tests were conducted to explore the relationships between race, ethnicity, and gender for Pros of Alcohol Use, Cons of Alcohol Use, and Situational Temptations to Try Alcohol. Effect size values, partial eta-square values, were evaluated in addition to statistical significance, using the Cohen taxonomy. Table 1 presents the means and standard deviations for the three variables for each of the subgroups.

Results

Interaction effects were noted for two of the measures; thus, main effects were not interpreted. According to Scheffe (1999), interpreting main effects in the presence of interaction effects will likely lead to erroneous assessment of the relationships between factors and the dependent variable. In this study, effect sizes and statistical significance tests were used to assess the linear combination of factors and each dependent variable. Estimated marginal means were used to evaluate the impact of the independent variable and levels and Pros of Alcohol Use, Cons of Alcohol Use and Situational Temptation to Try Alcohol. The

estimated marginal means included means, standard errors (SE) and confidence intervals (CI). These indices demonstrated the impact of each factor on the dependent variable model by adjusting or accounting for other variables (and levels) in the model, allowing researchers to make importance inferences about data from the sample and the relevant population (Scheffe, 1999).

Pros of alcohol use subscale

A significant two-way interaction effect was noted between the gender and ethnicity variables, $F(1, 3683) = 3.99, p < .05; \eta^2 = .001$. This interaction indicated Pros of Alcohol Use was slightly higher for Hispanic female adolescents ($M = 6.52, SE = .20$) compared to Hispanic males ($M = 6.44, SE = .18$). Non-Hispanic male adolescents ($M = 6.29, SE = .17$) were higher in pros than Non-Hispanic female adolescents ($M = 5.67, SE = .16$).

Cons of alcohol use subscale

A significant three-way interaction effect was noted between the gender, race and ethnicity, $F(1, 3683) = 4.104, p < .05; \eta^2 = .001$. Higher Cons of Alcohol Use were noted for Hispanic, white and female adolescents ($M = 17.56, SE = .39$) compared to Hispanic, white and male adolescents ($M = 16.92, SE = .38$). Non-Hispanic, white and female adolescents reported higher cons ($M = 17.94, SE = .10$) in comparison to Non-Hispanic, White and male adolescents ($M = 17.14, SE = .10$). The main effect for race was not statistically significant.

Situational temptations to try alcohol

Statistically significant main effects were found between males and females, $F(1, 3683) = 10.57, p < .001; \eta^2 = .001$, and between whites and non-whites $F(1, 3683) = 15.29, p < .001; \eta^2 = .001$. For gender, male adolescents had higher means ($M = 11.95, SE = .21$) of Situational Temptations in comparison to female adolescents ($M = 10.99, SE = .21$). For race, white adolescents ($M = 10.89, SE = .15$) had lower Situational Temptations to Try Alcohol than non-white adolescents ($M = 12.05, SE = .25$). Lastly, Non-Hispanic adolescents had a lower mean score ($M = 11.19, SE = .20$) for Situational Temptations to Try Alcohol than Hispanic adolescents ($M = 11.77, SE = .22$).

Discussion

The purpose of this study was to extend the literature with respect to the risk factors influencing the initiation of adolescent drinking by evaluating the relation between three demographic variables (race, ethnicity, and gender) and two TTM-based measures, Decisional Balance (Pros and Cons) and Situational Temptations within a large adolescent sample. Effect size estimation was used (in addition to statistical significance testing) to determine the strength of the relationship between the three demographic factors and the two measures. Data analyses show overall significant differences for the Decisional Balance and Situational Temptations for race, ethnicity and gender. Specifically, a three-way interaction effect was observed between gender, race and ethnicity for Cons of alcohol use, a two-way interaction effect was noted for Pros of alcohol. Significant main effects were noted for the three demographic factors and Situational Temptations to try alcohol. However, the effect

sizes for these interaction effects and main effects were below the small category in the Cohen taxonomy.

The use of effect size is central in the assessment of factors underlying a problem behavior and thus the development of effective prevention strategies (Velicer et al., 2008). The knowledge of established risk factors influencing initiation of alcohol use among adolescents will help guide the development effective prevention methods, including tailoring, to prevent the behavior before it begins. Conversely, the discrepancy in the knowledge of specific risk factors underling this behavior will hinder prevention outcomes. The reliance on statistical significance or null hypothesis testing is prolific in this area of research and likely supports the inconsistencies that exist currently in the literature. The flaw of this method is that it is highly influenced by sample size and thus even very small differences can reach statistical significance. Numerous studies on alcohol use initiation and or alcohol use patterns to date continue to use statistical significance testing to determine risk factors in this behavior in adolescence. The effect sizes for the three demographic variables in the current study reached statistical significance, however, they did not demonstrate a strong relationship in the two psychological constructs underlying initiation of alcohol use in adolescence. These results suggest that prevention strategies targeting adolescent initiation of alcohol use that are based solely on race, ethnicity, and gender may not effectively dissuade this behavior among this group. These finding are consistent with the results of a similar analysis for psychosocial constructs relating to smoking acquisition (Sillice et al., 2012). They are also consistent with other studies that have focused on effect size estimation in this area (Doucet, Velicer, & Laforge, 2007; Velicer, Redding, Sun, & Prochaska, 2007).

Several limitations should be noted in the present study. First, the limited number of items resulted in moderate reliability coefficients for the Pros subscale (.61) and the Cons subscale (.67). The low reliability could have influenced the assessment of the relationship between the three demographic factors and the subscales. Second, we did not consider whether Decisional Balance for Alcohol Prevention and Situational Temptation to Try Alcohol might be related differently to a third variable, such as peer pressure or negative affective. Third, tailoring on these demographic variables could increase engagement, which could result in increased intervention effectiveness. This could be the focus of a future study. Fourth, our analysis did not investigate the relation of the demographic variables directly to alcohol initiation. Fifth, the study only consisted of only adolescent subgroups that were of adequate sample size for analysis. Thus, it is unclear whether similar findings would be noted with other ethnic and racial subgroups. Lastly, our analyses did not evaluate the impact of school cluster and demographic differences for the two TTM constructs. Future research with this population should explore the aforementioned factors as well as the school environment and further assess risk factors underlying alcohol use initiation in adolescence.

Despite these limitations, the current study extends the literature by contributing to the explanatory knowledge of race, ethnicity and gender on critical psychosocial constructs for alcohol use initiation among adolescents. Our findings underline the need for a complete understanding of influential factors underlining the initiation of alcohol use among adolescents in turn to develop effective prevention strategies among this group.

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Highlights

- The study investigated if demographic differences existed for three important alcohol prevention measures
- The focus was on three recently developed measures: Pros of Alcohol Use, Cons of Alcohol Use, and Situational Temptations to Try Alcohol
- There were significance differences for gender, race and ethnicity
- However, effect sizes for the interaction effects and main effects were very small (all below $\eta^2 = .01$)

Table 1

Means and Standard Deviations for Decisional Balance and Situational Temptations

Variable		
RACE	Mean (<i>sd</i>)	Mean (<i>sd</i>)
	Whites	Non-Whites
	Pros	6.39(3.25)
	Cons	17.08 (4.21)
S. Temptations	10.51(4.28)	12.05 (7.11)
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ETHNICITY		
	Hispanics	Non-Hispanics
Pros	6.43 (3.11)	5.76 (2.71)
Cons	16.60 (4.56)	17.43 (3.77)
S. Temptations	11.77 (6.46)	10.57 (4.47)
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GENDER		
	Male	Female
Pros	5.99 (2.87)	5.69 (2.67)
Cons	16.95 (4.15)	17.76 (3.54)
S. Temptations	10.96 (5.21)	10.49 (4.40)