Published in final edited form as:

Psychol Addict Behav. 2014 March ; 28(1): 276–281. doi:10.1037/a0033605.

Identifying the Factor Structure of the SOCRATES in a Sample of Latino Adolescents

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Abstract

The SOCRATES is a frequently used measure to assess client motivation to change an alcohol use problem. The factor structure of this measure has most extensively been studied in samples of adult clients with alcohol use disorders with very little research conducted with adolescents or ethnic minority participants. The purpose of the current study is to determine if the factor structure of the SOCRATES (Version 8A – Alcohol) found in prior research can be generalized to a sample of Latino adolescents with substance use disorders. Latino adolescents (N = 106) were administered the SOCRATES and assessed for alcohol use at a pretreatment baseline assessment as part of a larger study. Competing factor models were tested and results via confirmatory factor analysis indicated that a 14-item two factor model best fit the data for the Latino adolescents in this sample. In addition, scores on the Taking Steps factor predicted alcohol use variables. Implications for these results and suggestions for further research are discussed.

Keywords

Latino; adolescents; SOCRATES; alcohol; factor structure

The motivation people have for changing drug related behavior and its relation to pretreatment readiness is an issue that continues to be discussed in the literature. One of the areas that receives a lot of attention concerns how to measure motivation to change in different samples of substance users. By far, the most widely cited instrument for measuring motivation to change substance use behavior is the Stages of Change Readiness and Treatment Eagerness Scale (SOCRATES; Miller & Tonigan, 1996). The SOCRATES was initially validated in a large sample of adult alcoholics receiving outpatient treatment in PROJECT Match in the early 1990's and the developers indicate that it measures three areas related to motivation to change alcohol use behavior; that is, recognition, ambivalence and taking steps. Recognition represents the level of awareness a person has about an alcohol problem, ambivalence is the internal conflict associated with doing something about it and taking steps are the activities the person engages in to change the problem behavior.

Since the time Miller and Tonigan (1996) first identified a three-factor structure for the SOCRATES there have been many investigative efforts to confirm the factor structure in other samples, of mostly adult, substance users. Interestingly, there has been about as many studies in which a three-factor structure has been identified (Chun, 2005; Chun, Cho, &

Shin, 2010; Demmel, Beck, Richter, & Reker, 2004; Vik, Culbertson, & Sellers, 2005; Zullino et al., 2007) as there have been for a two-factor structure (Bertholet et al., 2009; Burrow-Sanchez & Lundberg, 2007; Figlie, Dunn, & Laranjeira, 2005; Maisto, Chung, Cornelius, & Martin, 2003; Maisto et al., 1999). When three-factors have been found they are largely congruent with the developers original domains of recognition, ambivalence and taking steps. In studies where a two-factor model has been a better fit to the data the recognition and ambivalence domains are typically combined to form a single factor.

To date, there has been one study that has examined the factor structure of the SOCRATES in a sample of adolescents with alcohol problems (Maisto, et al., 2003) and none that have been conducted with ethnic minority adolescents. Maisto and colleagues (2003) found that a three-factor structure had a better overall fit for a sample of adolescents (95% Caucasian) with alcohol use disorders but suggested that an alternative two-factor structure was preferred due to model parsimony. The vast majority of factor structure studies on the SOCRATES have been conducted with Caucasian adult samples with the exception of international studies (Chun, et al., 2010; Demmel, et al., 2004; Figlie, et al., 2005; Zullino, et al., 2007). Thus, the factor structure of the SOCRATES with samples of ethnic minority adolescents remains unclear. One group for which more research is needed are Latinos as they are currently the largest ethnic minority group in the U.S. with expectations to reach 29% of the population by 2050 (Passel & D'Vera, 2008).

The purpose of the current study is to determine how the factor structure of the SOCRATES identified in prior research generalizes to a pretreatment sample of Latino adolescents with substance use disorders. This study is exploratory in nature due to the lack of prior research on the factor structure of the SOCRATES with adolescents in general and Latinos, in particular. The primary objective is to determine via confirmatory factor analysis (CFA) if a two or three-factor model is a better fit to the data for a Latino adolescent sample. The secondary objective is to investigate if the SOCRATES latent factors identified through the CFA predict baseline alcohol use levels.

Method

Sample Demographics and Recruitment

The sample was comprised of 106 adolescents who ranged in age from 13–18 ($M = 15.30$, $SD = 1.27$) and were recruited as part of a larger set of studies examining the cultural accommodation of substance abuse treatment for Latino adolescents (see Burrow-Sanchez, Martinez, Hops, & Wrona, 2011; Burrow-Sanchez & Wrona, 2012). All adolescents in this study identified as Latino and most were male (91.5%) and born in the U.S. (63.2%). The majority of adolescents were referred from probation officers or case managers working in the juvenile justice system within a medium-sized city in a Mountain West state of the U.S. and mandated to treatment at the time of referral. An adolescent was eligible for participation if he or she: a) was between 13 and 18, b) had parental consent, c) provided assent, d) was bilingual (English/Spanish), e) met DSM-IV-TR (American Psychiatric Association, 2000) diagnostic criteria for drug abuse or dependence and f) identified as Latino/Hispanic. Adolescents were excluded if he or she: a) was under the age of 13 or over 18, b) spoke only Spanish, c) did not have parental consent, d) was not willing to provide

assent, e) required a higher level of care than provided by the study treatment, f) had completed substance abuse treatment within the 90 days prior to referral, or g) did not identify as Latino/Hispanic. It is important to note that 98% of the adolescents in the larger set of studies preferred verbal communication and written materials in English and subsequently the intervention was delivered primarily in English to adolescents; thus, the rationale for excluding adolescents who were monolingual Spanish speaking. All of the participant procedures for this study were approved by the Institutional Review Board at the institution of the author. Baseline acculturation scores indicated that most adolescents in the sample identified as either bicultural with a slight Anglo orientation (44.3%) or balanced bicultural to Mexican oriented (42.9%) as measured by the Acculturation Rating Scale for Mexican-Americans (ARSMA; Cuellar, Arnold, & Maldonado, 1995). The majority of adolescents in the sample had parents who were born in Mexico (73.6% of mothers; 81.1% of fathers) and reported annual household incomes of \$25,000 or less (72.6%). At the baseline assessment, 72.6% of the adolescents in the sample reported having alcohol 1 to 47 days in the past 90 with a mean of 6.73 (SD = 4.54) drinks per drinking episode.

Measures

All measures were available in English or Spanish and administered at pre-determined time points as part of the larger study. Trained bilingual research assistants administered all measures to participants in their preferred language; the majority of the adolescents preferred verbal interactions and completion of the measures in English. The focus of the current study is on the baseline assessment measures that were administered prior to adolescents being randomized to a treatment condition.

Timeline Follow Back (TLFB)—Substance use for all participants was measured using the TLFB (Sobell & Sobell, 1992) which is a semi-structured interview that records substance use over a specified period of time. The TLFB utilizes a calendar format and establishes relevant life markers to help individuals remember their history and patterns of substance use. It has been used extensively in the substance abuse literature with adolescents and appropriate psychometric properties have been established (Dennis, Funk, Godley, Godley, & Waldron, 2004; Sobell & Sobell, 2003). For the present study, alcohol use data from the TLFB (past 90 days) obtained at baseline assessment were used.

Structured Clinical Interview for DSM-IV (SCID)—The SCID is a structured clinical interview used for assessing mental disorders in clients and research participants based on criteria of the Diagnostic and Statistical Manual-IV-TR (First, Gibbon, Spitzer, & Williams, 2002). The research version of the *Substance Use Disorders Module* was used to determine the presence or absence of a substance abuse or dependence disorder during the clinical intake. It was administered in the preferred language of the adolescent by a bilingual study therapist and all adolescents had either a diagnosis of substance abuse or dependence.

SOCRATES—The Stages of Change Readiness and Treatment Eagerness Scale (SOCRATES; Miller & Tonigan, 1996) is a 19-item self-report instrument used to measure client motivation to change drug related behavior. Two versions of this measure were developed for adults, one for alcohol (8A) and another for drugs (8D); the focus of the

current study is on version 8A. Clients indicate their agreement to each item on the measure through use of a Likert-type scale ranging from 1 “NO! Strongly Disagree” to 5 “YES! Strongly Agree.”

Analytical Plan

The analytical plan for the primary analysis consisted of testing two competing factor models of the SOCRATES via a confirmatory factor analysis (CFA) for the sample of Latino adolescents in the present study. Prior research has found equivocal support for the existence of two and three factor models for the SOCRATES. Secondary analysis included the use of multiple regression to determine if the latent factor scores predicted alcohol use variables for adolescents.

Results

Data Preparation

The data were screened for outliers and missing values using IBM SPSS ver. 20 (IBM, 2011b). Screening indicated that 0.3% of the participant SOCRATES data were missing (i.e., 6 values from a possible 2,014). In order to utilize SOCRATES data from the entire sample and because the total amount of missing data was minimal it was replaced using the series mean procedure available in SPSS.

Confirmatory Factor Analysis

The two competing factor models tested via confirmatory factor analysis (CFA) were replicated from the original three factor 19-item and two factor 14-item models identified by Miller and Tonigan (1996) and Maisto et al., (2003), respectively. In particular, the Miller and Tonigan model consisted of the three factors Recognition, Ambivalence and Taking Steps. In contrast, the Maisto et al., model consisted of the two factors AMREC and Taking Steps; the AMREC factor is a combination of the original Ambivalence and Recognition factors. The confirmatory factor analyses for both models were carried out using IBM SPSS AMOS ver. 20 (IBM, 2011a) and were compared based on the following fit criteria: (1) Chi-square over *df* ratio of less than 2, (2) Comparative fit index (CFI) closer to 0.95, (3) Normed fit index (NFI) closer to 0.95 and (4) Root mean square error of approximation (RMSEA) closer to 0.08 (Byrne, 2010). The models in the present study were analyzed using maximum likelihood (ML) estimation. This method of estimation assumes that the indicators of a measure are continuous variables; however, the indicators for the SOCRATES are categorical variables measured on a 5-point Likert-type scale. There is some controversy regarding the use of ML estimation for categorical variables even though it is a common approach in the literature (Breckler, 1990; Byrne, 2010). An alternative approach for estimating categorical variables in the AMOS software program is the asymptotic distribution-free (ADF) method which is analogous to the weighted least squares method (WLS; Byrne, 2010; Flora & Curran, 2004). Unfortunately, the ADF method was not practical for the present study due to the large samples size needed based on the number of estimated parameters in the model (Curran, West, & Finch, 1996); specifically, some researchers indicate that a minimum sample size of 10 times the number of estimated parameters is needed to properly conduct ADF estimation (Raykov & Marcoulides, 2000).

However, there is ample evidence to suggest that when the number of categories is four or more and the distribution does not markedly differ from normal the use of ML estimation for categorical variables is not problematic (Bentler & Chou, 1987; Green, Akey, Fleming, Hershberger, & Marquis, 1997). In the present study, this estimation issue was addressed through comparing the parameter estimates for the final model generated from both ML and Bayesian methods as suggested by Byrne (2010); the comparison of both sets of parameters indicated they were similar and did not change the substantive conclusions for the final model described below.

Analysis of the first two models indicated poor fits to the data for the sample of Latino adolescents (see Table 2: Models 1 and 2). The second model (i.e., Maisto, et al., 2003) was further analyzed for misspecification due to model parsimony (compared to Model 1) and because it had received prior testing with an adolescent sample. Review of the estimated parameters for Model 2 indicated that the largest standard errors of the unstandardized regression weights and standardized residual covariances were found for items 6 and 11; similarly, these same items exhibited low standardized regression weights compared to the other items on the measure. Examination of the modification indices (i.e., covariances and regression weights) revealed that items 6 and 11 cross-loaded more strongly on the Taking Steps factor compared to the originally specified AMREC factor. Based on review of the estimated parameters and modification indices Model 2 was revised by loading items 6 and 11 on the Taking Steps rather than the AMREC factor.

An examination of the revised model (Model 3a) indicted an improved fit compared to Model 2 (see Table 2) due to respecification of items 6 and 11 on the TS factor; however, the modification indices (covariances) for Model 3a revealed that error terms covaried for three items on the measure (i.e., item 4 – item 8, item 4 – item 9). Therefore, a final model (Model 3b) was tested that allowed the error terms to covary for the three items. Model 3b had an improved fit to the data compared to the other models tested (see Table 2). Because Model 3b was nested in Model 2 the difference between their chi-square statistics provided a comparison of model fit to the data (Kline, 2005); that is, Model 2 – Model 3b = $232.602 - 124.631 = 107.971$ for 2 *df*, $p < .001$. These analyses indicate that Model 3b produced a statistically better fit to the data compared to Model 2 and the chi-square difference between the models was significant. It is important to note that the NFI index for Model 3b is less than the suggested level of 0.95; however, the NFI will tend to underestimate model fit with small sample sizes and therefore the CFI (that corrects for sample size) is a better estimate of fit (Bentler, 1990; Byrne, 2010). The correlation between the AMREC and TS factors for Model 3b was .530, $p < .001$; the average variances extracted and construct reliabilities for the AMREC and TS factors were 64% (0.90) and 58% (0.93), respectively. Item content, latent factors and factor loadings for the three major SOCRATES models tested in the analysis described above can be found in Table 1. Finally, the factor loadings for the 14-items in the final model (see Table 1) are as strong or stronger than loadings from the Maisto et al., (2003; range = 0.58 – 0.87) or Miller and Tonigan (1996; range = 0.26 – 0.87) models.

Regression Analysis

A multiple regression analysis was conducted to investigate if the SOCRATES latent factors for Model 3b predicted baseline alcohol use variables for adolescents in the sample. In particular, the baseline number of drinking days and consumed number of drinks reported by adolescents in the past 90 days were regressed on demographic variables and the latent factors AMREC and TS. The dependent alcohol use variables were positively skewed because the range included zeros but this is fairly typical for adolescent substance use data measured by the TLFB. In order to correct for the non-normality of these variables they were log transformed and significant outliers were removed prior to analysis. As can be seen from Table 3, the TS factor significantly predicted ($p < .05$) the number of baseline drinking days in the past 90 for adolescents. Specifically, adolescents with higher mean TS scores at baseline were more likely to report a higher number of drinking days in the past 90. The second regression indicated a marginal prediction ($p = .057$) between the TS factor and the number of drinks consumed in the past 90 days (see Table 4). Similar to the first regression, results from the second indicated that adolescents with higher mean TS scores at baseline were more likely to report a higher number of drinks consumed over the past 90 days.

Discussion

Findings from the current study indicate that a 14-item two factor model of the SOCRATES is the best fit for a sample of Latino adolescents with substance use disorders. The average variance extracted for the 5-item AMREC factor was 64% and 58% for the 9-item Taking Steps factor; both latent factors also had good construct reliabilities. In addition, the regression analyses revealed predictive relationships for adolescents between mean TS factor scores and alcohol use variables.

The factor structure for Latino adolescents identified in the present study was largely consistent with prior research on the SOCRATES (Burrow-Sanchez & Lundberg, 2007; Maisto, et al., 2003; Maisto, et al., 1999) with a few notable exceptions. Five of the items that loaded on the AMREC factor were consistent with the prior findings by Maisto et al., (2003); however, two items (6 and 11) from the AMREC factor loaded on the Taking Steps factor. Both of these items contain content regarding the *control* and *influence* that one's drinking has on self and others ("*Sometimes I wonder if I am in control of my drinking*" "*Sometimes I wonder if my drinking is hurting other people*"). It was most likely the case that adolescent's in the current study interpreted the *control* and *influence* components of these items as being more similar to the Taking Steps construct rather than the construct of ambivalence. It may also be the case that adolescents who are mandated to treatment are more likely to interpret items regarding the *control* and *influence* of one's drinking behavior on self and others in a similar manner to other TS items due to the external pressures on them to change such behavior (Battjes, Gordon, O'Grady, Kinlock, & Carswell, 2003). Another notable deviation from the Maisto et al., model was that the error term for item 4 covaried with items 8 and 9. Review of these items ("*I have already started making some changes in my drinking*" "*I'm not just thinking about changing my drinking, I'm already doing something about it*" "*I have already changed my drinking, and I am looking for ways to keep from slipping back to my old pattern*") indicate high levels of item content overlap.

More specifically, all three items have communality in wording indicating that the person has *already started to make some changes* in his/her drinking. It is likely this overlap in item structure contributed to the residual correlation and suggests that these items could be condensed into one or two items on future revisions of this measure with adolescents.

Similar predictive relationships were found between the TS factor and alcohol use variables for adolescents in this sample. First, adolescents who had higher baseline TS scores were more likely to report a higher number of drinking days in the past 90. This finding can be understood within the context of adolescents who are court mandated to treatment. For example, court mandated adolescents have many times been caught using substances by an authority (e.g., police, parents) and experience a lot of external pressure (e.g., courts, parents, school administrators) to change their drug use behavior (Battjes, et al., 2003). Further, the probability of an adolescent being caught using substances generally increases with the number of days that he or she uses. Therefore, it is not unreasonable to conclude that adolescents who are working to change their drinking behavior (i.e., Taking Steps) at pretreatment are also likely to report more drinking days in the prior three months (i.e., more opportunities to be caught drinking). Second, adolescents who had higher baseline TS scores were also more likely to report a higher number of drinks consumed in the prior three months. The number of drinks consumed is conceptualized as an indicator of the severity of an alcohol problem. Thus, this second finding suggests that adolescents with higher baseline TS scores are more likely to report severe drinking problems. Taken together these findings suggest that adolescents with higher TS scores at baseline are more likely to report a higher number of drinking days and more severe drinking problems compared to adolescents with lower TS scores. The practical implications of these findings suggest that scores on the TS factor may help practitioners identify adolescents with more severe drug use problems at pretreatment.

In light of the findings in the current study some limitations exist. First, version 8A of the SOCRATES used in the present study focuses only on alcohol. It is well known that adolescents in substance abuse treatment are more likely to report the use of more than one substance and therefore, future research should be conducted that examines the factor structure of the drug version of the SOCRATES (8D) with adolescent samples. Second, this study was cross-sectional as it only examined pretreatment baseline scores for adolescents. Longitudinal research should be conducted on the SOCRATES with the goal of examining how latent factor scores predict treatment outcome for adolescents. Finally, this study should be replicated with a larger sample of Latino adolescents to further investigate the factor structure of the SOCRATES in this population.

The current study was the second to test the factor structure of the SOCRATES with a sample of adolescents with substance use disorders and the first to examine use of this measure with Latino adolescents. Overall, findings support a 14-item two factor structure of the SOCRATES and suggest that scores on the Taking Steps factor may help predict amenability to changing alcohol use behavior at pretreatment. Future research should also be conducted to examine the factor structure of the companion drug version of this measure in adolescent samples with substance use disorders.

Acknowledgments

This research was supported by Award Number K23DA019914 from the National Institute on Drug Abuse awarded to the author. The content is solely the responsibility of the author and does not necessarily represent the official views of the National Institute on Drug Abuse or the National Institutes of Health.

The author wishes to thank the following people for their assistance with this research: Drs. James Alexander (University of Utah), Glen Hanson (University of Utah), Hyman Hops (Oregon Research Institute), Charles Martinez (Oregon Social Learning Center) and Stephen Tiffany (SUNY-Buffalo) and all members of the VIDA Research Team at the University of Utah.

References

- American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders - Text Revision. 4th ed.. Washington, D.C.: Author; 2000.
- Battjes RJ, Gordon MS, O'Grady KE, Kinlock TW, Carswell MA. Factors that predict adolescent motivation for substance abuse treatment. *Journal of Substance Abuse Treatment*. 2003; 24:221–232. [PubMed: 12810143]
- Bentler PM. Comparative fit indexes in structural models. *Psychological Bulletin*. 1990; 107:238–246. [PubMed: 2320703]
- Bentler PM, Chou CP. Practical issues in structural equation modeling. *Sociological Methods & Research*. 1987; 16:78–117.
- Bertholet N, Dukes K, Horton NJ, Palfai TP, Pedley A, Saitz R. Factor structure of the SOCRATES questionnaire in hospitalized medical patients. *Addictive Behaviors*. 2009; 34(6–7):568–572. [PubMed: 19395177]
- Breckler SJ. Applications of covariance structure modeling in psychology: Cause for concern? *Psychological Bulletin*. 1990; 107:260–271. [PubMed: 2320704]
- Burrow-Sanchez JJ, Lundberg KJ. Readiness to change in adults waiting for publicly funded substance abuse treatment. *Addictive Behaviors*. 2007; 32(1):199–204. [PubMed: 16678975]
- Burrow-Sanchez JJ, Martinez CR, Hops H, Wrona M. Cultural accommodation of substance abuse treatment for Latino adolescents. *Journal of Ethnicity and Substance Abuse*. 2011; 10(3):202–225.
- Burrow-Sanchez JJ, Wrona M. Comparing culturally accommodated versus standard group CBT for Latino adolescents with substance use disorders: A pilot study. *Cultural Diversity and Ethnic Minority Psychology*. 2012; 18(4):373–383. [PubMed: 22866693]
- Byrne, BM. *Structural Equation Modeling with AMOS: Basic Concepts, Applications and Programming*. 2nd ed.. New York, NY: Routledge; 2010.
- Chun YM. Assessing alcohol dependents' motivation for change: The development study on the Korean version of the Stages of Change Readiness and Treatment Eagerness Scale. *The Korean Journal of Clinical Psychology*. 2005; 24:207–223.
- Chun YM, Cho SM, Shin SM. Factor structure of a Korean-language version of the Stages of Change Readiness and Treatment Eagerness Scale (SOCRATES) in a clinical sample of clients with alcohol dependence. *Psychology of Addictive Behaviors*. 2010; 24(4):555–562. [PubMed: 21198218]
- Cuellar I, Arnold B, Maldonado R. Acculturation Rating Scale for Mexican Americans II: A revision to the original ARSMA scale. *Hispanic Journal of Behavioral Sciences*. 1995; 17(3):275–304.
- Curran PJ, West SG, Finch JF. The robustness of test statistics to nonnormality and specification error in confirmatory factor analysis. *Psychological Methods*. 1996; 1:16–29.
- Demmel R, Beck B, Richter D, Reker T. Readiness to change in a clinical sample of problem drinkers: relation to alcohol use, self-efficacy, and treatment outcome. *European Addiction Research*. 2004; 10(3):133–138. [PubMed: 15258444]
- Dennis ML, Funk R, Godley SH, Godley MD, Waldron HB. Cross-validation of the alcohol and cannabis use measures in the Global Appraisal of Individual Needs (GAIN) and Timeline Followback (TLFB; Form 90) among adolescents in substance abuse treatment. *Addiction*. 2004; 99(2):120–128. [PubMed: 15488110]

- Figlie NB, Dunn J, Laranjeira R. Motivation for change in alcohol dependent outpatients from Brazil. *Addictive Behaviors*. 2005; 30(1):159–165. [PubMed: 15561456]
- First, MB.; Gibbon, M.; Spitzer, RL.; Williams, JBW. User's guide for the Structured Clinical Interview for DSM-IV-TR Axis I Disorders - Research Version. New York, NY: Biometrics Research Department. New York State Psychiatric Institute; 2002.
- Flora DB, Curran PJ. An empirical evaluation of alternative methods for estimation for confirmatory factor analysis with ordinal data. *Psychological Methods*. 2004; 9(4):466–491. [PubMed: 15598100]
- Green SB, Akey TM, Fleming KK, Hershberger SL, Marquis JG. Effect of the number of scale points on chi-square fit indices in confirmatory factor analysis. *Structural Equation Modeling*. 1997; 4:108–120.
- IBM. IBM SPSS Amos (Version 20.0). Meadville, PA: Amos Development Corporation; 2011a.
- IBM. IBM SPSS Statistics for Windows (Version 20.0). Armonk, NY: IBM Corp; 2011b.
- Kline, RB. Principles and Practice of Structural Equation Modeling. 2nd ed.. New York City: New York: Guilford Press; 2005.
- Maisto SA, Chung TA, Cornelius JR, Martin CS. Factor structure of the SOCRATES in a clinical sample of adolescents. *Psychology of Addictive Behaviors*. 2003; 17(2):98–107. [PubMed: 12814273]
- Maisto SA, Conigliaro J, McNeil M, Kraemer K, O'Connor M, Kelley ME. Factor structure of the SOCRATES in a sample of primary care patients. *Addictive Behaviors*. 1999; 24(6):879–892. [PubMed: 10628520]
- Miller WR, Tonigan JS. Assessing drinkers' motivations for change: The Stages of Change Readiness and Treatment Eagerness scale (SOCRATES). *Psychology of Addictive Behavior*. 1996; 10(2): 81–89.
- Passel JS, D'Vera C. U.S. Population Projections: 2005–2050. 2008 Retrieved from www.pewhispanic.org.
- Raykov, T.; Marcoulides, GA. A first course in structural equation modeling. Mahwah, NJ: Erlbaum; 2000.
- Sobell, LC.; Sobell, MB. Timeline follow-back. In: Litten, R.; Allen, J., editors. Measuring alcohol consumption. Totowa, NJ: Humana Press; 1992. p. 41-72.
- Sobell, LC.; Sobell, MB., editors. Alcohol consumption measures. 2nd ed.. Bethesda, MD: National Institute on Alcohol Abuse and Alcoholism; 2003.
- Vik PW, Culbertson KA, Sellers K. Readiness to change drinking among heavy drinking college students. *Journal of Studies on Alcohol*. 2005; 61:674–680. [PubMed: 11022806]
- Zullino DF, Krenz S, Fresard E, Montagnin Y, Kolly S, Chatton A, Broers B. Psychometric properties of a French-language version of the stages of change readiness and treatment eagerness scale (SOCRATES). *Addiction Research & Theory*. 2007; 15:153–160.

Table 1
Item Content, Associated Latent Factors and Factor Loadings for Three SOCRATES Models

Item	Item Content	Miller & Tonigan '96	Maisto et al., '03	Present Study	Factor Loadings ^a
1	I really want to make some changes in my drinking	RC	--	--	--
2	Sometimes I wonder if I am an alcoholic	AM	AMR	AMR	0.639
3	If I don't change my drinking soon, my problems are going to get worse	RC	--	--	--
4	I have already started making some changes in my drinking	TS	TS	TS	0.624
5	I was drinking too much at one time, but I've managed to change my drinking	TS	TS	TS	0.608
6	Sometimes I wonder if my drinking is hurting other people	AM	AMR	TS	0.803
7	I am a problem drinker	RC	AMR	AMR	0.852
8	I am not just thinking about changing my drinking, I'm already doing something about it	TS	TS	TS	0.817
9	I have already changed my drinking, and I am looking for ways to keep from slipping back to my old patterns	TS	TS	TS	0.793
10	I have serious problems with drinking	RC	AMR	AMR	0.769
11	Sometimes I wonder if I am in control of my drinking	AM	AMR	TS	0.636
12	My drinking is causing a lot of harm	RC	--	--	--
13	I am actively doing things now to cut down or stop drinking	TS	TS	TS	0.899
14	I want to help to keep from going back to the drinking problems that I had before	TS	--	--	--
15	I know that I have a drinking problem	RC	AMR	AMR	0.874
16	There are times when I wonder if I drink too much	AM	--	--	--
17	I am an alcoholic	RC	AMR	AMR	0.837
18	I am working hard to change my drinking	TS	TS	TS	0.899
19	I have made some changes in my drinking, and I want some help to keep from going back to the way I used to drink	TS	TS	TS	0.731

Note. RC = Recognition, AM = Ambivalence, TS = Taking Steps and AMR = Ambivalence/Recognition.

^aFactor loadings are reported as standardized regression weights.

Table 2

Fit Indices for Models Tested

Model ^a	Factors (Items)	χ^2	Df	χ^2/df	CFI	NFI	RMSEA	CI for RMSEA ^b
1	3 (19)	442.655	149	2.971	.807	.739	.137	.122 – .152
2	2 (16)	232.602	76	3.061	.851	.796	.140	.120 – .161
3a	2 (16)	165.026	76	2.171	.915	.855	.106	.084 – .128
3b	2(16)	124.631	74	1.684	.952	.891	.081	.055 – .105

Note.

^aModel 1 = Miller & Tonigan '96, Model 2 = Maisto et al., '03, Models 3a/b = Present Study; CFI = Comparative fit index; NFI = Normed fit index; RMSEA = Root mean square error of approximation.

^bCI for RMSEA = 90% Confidence Interval for Root mean square error of approximation.

Table 3Multiple Regression for SOCRATES Factors Predicting Drinking Days ($N=100$)

Variable	<i>B</i>	SE	β
Constant	.322	.468	
Age	-.050	.059	-.181
Grade	.063	.057	.229
AMREC	.047	.058	.093
TS	.076	.036	.242*

Note. $R^2 = .104$; $F(4,95) = 2.753$, $p < .05$;

* $p < .05$; Dependent variable (log transformed) is the total number of drinking days in the past 90; AMREC = Ambivalence/Recognition Factor, TS = Taking Steps Factor.

Table 4Multiple Regression for SOCRATES Factors Predicting Total Drinks ($N=103$)

Variable	<i>B</i>	SE	β
Constant	-.276	.953	
Age	.019	.120	.033
Grade	.028	.117	.049
AMREC	.173	.119	.162
TS	.142	.074	.213*

Note. $R^2 = .125$; $F(4,98) = 3.509$, $p = .01$;

* $p = .057$; Dependent variable (log transformed) is the total number of drinks consumed in the past 90 days; AMREC = Ambivalence/Recognition Factor, TS = Taking Steps Factor.