# Validation of the Adolescent Drinking Expectancy Questionnaire and development of a short form


## Author

Patton, Kiri A, Connor, Jason P, Rundle-Thiele, Sharyn, Dietrich, Timo, Young, Ross McD, Gullo, Matthew J



## Published

2018

## Journal Title

Drug and Alcohol Review

## Version

Accepted Manuscript (AM)

## DOI

10.1111/dar.12567

# Validation of the Adolescent Drinking Expectancy Questionnaire (DEQ-A) and development of a short form (DEQ-SA).

Kiri Patton, BPsySc[1,2,*], Jason P. Connor, PhD[1,3], Sharyn Rundle-Thiele, PhD[4], Timo Dietrich, PhD[4], Ross McD. Young, PhD[5,6], Matthew J. Gullo, PhD[1]

[1] Centre for Youth Substance Abuse Research, Faculty of Health and Behavioural Sciences, The University of Queensland, Brisbane, QLD, Australia
[2] School of Psychology, Faculty of Health and Behavioural Sciences, The University of Queensland, Brisbane, QLD, Australia
[3] Discipline of Psychiatry, School of Medicine, Faculty of Health Sciences, The University of Queensland, Brisbane, QLD, Australia
[4] Social Marketing @ Griffith, Menzies Health Institute Queensland, Griffith University, Nathan, QLD, Australia
[5] Institute of Health and Biomedical Innovation, Queensland University of Technology, Kelvin Grove, QLD, Australia
[6] Faculty of Health, Queensland University of Technology, Kelvin Grove, QLD, Australia
* Corresponding author: kiri.patton@uqconnect.edu.au

Running head: Validation of DEQ-A and DEQ-SA

This is the preprint version of a published journal article. The published version can be found at http://dx.doi.org/10.1111/dar.12567. Please cite as:

Patton, K. A., Connor, J. P., Rundle-Thiele, S., Dietrich, T., Young, R. MD., and Gullo, M. J. (2017) Validation of the Adolescent Drinking Expectancy Questionnaire and development of a short form. Drug and Alcohol Review, doi: 10.1111/dar.12567.

Abstract

**Aims** This study aimed to validate the Drinking Expectancy Questionnaire – Adolescent version (DEQ-A) in a large adolescent sample and to develop and validate a brief measure, the Drinking Expectancy Questionnaire – Shortened Adolescent version (DEQ-SA). **Design and Methods** Cross-sectional survey of secondary school students ($N$ = 2,357, aged 13-16, $M$ = 14.66 years, $SD$ = 0.60). Students completed the DEQ-A in school time, and measures of alcohol consumption including the Alcohol Use Disorders Identification Test – Consumption (AUDIT-C). **Results** The 24-item DEQ-A was successfully reduced to 12 items (DEQ-SA) without compromising psychometric properties. The DEQ-A and the DEQ-SA both demonstrated adequate-to-good fit to the data and very good internal reliability, $\alpha$ = .96 and $\alpha$ = .95 respectively. The DEQ-A and DEQ-SA explained 20% and 18% of the variance in alcohol consumption respectively, *Adj.* $R^2$ = 0.20 and 0.18, *p*s < .001. Adolescents who drank endorsed more positive alcohol expectancies on the DEQ-A, whereas alcohol-naïve adolescents scored higher on negative alcohol expectancies, $F(4, 1174) = 82.24$, $p < .001$, Pillai's Trace = .22, partial $\eta^2$ = .22. **Discussion and Conclusions** The DEQ-A and the short form of this scale developed in the present study (DEQ-SA) show good reliability, internal structure, and account for a large proportion of variance in alcohol consumption. Both scales can assist in targeting cognitive change processes within tailored alcohol prevention and treatment approaches, and in investigating hypothesised mechanisms of change. The DEQ-SA is recommended for more time limited research and clinical environments.

**Key words:** Adolescent, alcohol, measurement, expectancies, validation

## Introduction

Hazardous alcohol use in adolescence is one of the leading causes of adolescent morbidity and mortality [1,2] and is predictive of future alcohol-related problems and dependence [3–7]. A comprehensive understanding of the mechanisms contributing to hazardous alcohol use in adolescents could enhance the effectiveness of early interventions and Alcohol Use Disorder [AUD] treatments. A recent *Lancet* review on AUDs highlighted outcome expectancies as a central psychological mechanism supporting initiation and maintenance of alcohol problems [4]. Drawn from Social Cognitive Theory [8], alcohol expectancies are the perceived outcomes of drinking [9,10]. They are developed from both vicarious and experiential learning [8,9]. Alcohol expectancies are robust predictors of consumption and problem use in adult and adolescent populations [11–15] and are consequently a common target for prevention and treatment [16,17].

Alcohol expectancies have been broadly classified into positive and negative expectancies. Positive expectancies reflect beliefs that alcohol consumption will result in rewarding outcomes; negative expectancies in undesirable outcomes [18,19]. Socially-related positive alcohol expectancies [e.g., "Drinking makes me feel more outgoing"] are strongly associated with the onset and maintenance of alcohol use in an adolescent population [20–23]. By comparison, adults show elevated positive expectancies across several domains [24]. These findings suggest that specific alcohol expectancies may evolve over time and with exposure to alcohol [25,26], and that the influence of alcohol expectancies may differ between prevention and treatment contexts.

Due to the strong association between early drinking onset and future alcohol problems, alcohol prevention programs are usually targeted at adolescents [6]. A robust measure of adolescent alcohol expectancies is critical to assess and target this hypothesized mechanism of change within interventions. Scale length requires consideration to avoid

respondent fatigue. Importantly, succinct scales have demonstrated comparable psychometric properties and predictive power [27]. Several adolescent alcohol expectancy instruments have been developed, including the 90-item Alcohol Expectancy Questionnaire-Adolescent version (AEQ-A; [10,28]) and the 24-item Drinking Expectancy Questionnaire–Adolescent version (DEQ-A; [13,29,30]).

The DEQ-A is one of the shortest measures of alcohol expectancies. While a brief version of the AEQ-A exists (the AEQ-AB; 7-items; [31]), it was developed using 124 [predominately male] detainees at a juvenile correctional facility. The sample had a history of regular alcohol and polysubstance use and may not be representative of the general adolescent population. The 'changes in social behaviour' subscale of the AEQ-A has been used as a stand-alone measure [23], but it has not been independently validated. Further, there is evidence that negative alcohol expectancies also predict adolescent alcohol consumption [32].

A brief measure that included positive and negative expectancies would provide a more comprehensive approach. A 60-item Negative Alcohol Expectancy Questionnaire (NAEQ; [33]) has been published, but it was developed for adult populations. While a negative expectancy scale was added to the AEQ-A, the adult AEQ assesses only positive expectancies. This does not allow for a single measure comparison of both positive and negative expectancies over time and at different ages. By contrast, the DEQ and DEQ-A have the same factor structure and include two negative expectancy subscales [*cognitive and motor impairment* and *negative mood/affective change*]. Therefore, the DEQ and DEQ-A offer a more comprehensive assessment of negative expectancies and can be used to assess changes in both positive and negative alcohol expectancies over the life-span.

Connor et al [13] employed confirmatory factor analysis to conduct preliminary psychometric validation on the DEQ-A in a sample of 192 adolescents [$M$ = 13.8 years, SD =

0.5]. They reported support for the hypothesised four-factor structure [*increased confidence, tension reduction, cognitive and motor impairment,* and *negative mood*] as well as high internal consistency for each subscale. The DEQ-A prospectively predicted alcohol use at 12-month follow-up [13], however requires validation in a larger, independent sample with exploratory as well as confirmatory factor analytic techniques [34]. Additionally, a short form of the DEQ-A would be desirable for prevention applications where brevity of measurement is a central concern.

The present study utilises a large sample of adolescents to evaluate the psychometric properties and factor structure of the DEQ-A. Further, a brief version of the DEQ-A was developed and evaluated.

## Materials and methods

### *Participants*

Participants were Grade 10 students from 24 schools across Queensland, Australia (*N* = 2,609), recruited for the *Game On: Know Alcohol* [GOKA] project (see [35,36]). Pre-intervention baseline data were analysed, which were restricted to a sample aged 13-16, Mean = 14.66 years, *SD* = 0.60, *N* = 2,357, males = 1,195 (50.7%), females =1,161 (49.3%), gender not reported = 1. Parental ethnic background of the sample was primarily "White" Australian (59.3% fathers; 59.2% mothers) or European (19.6% fathers; 19.9% mothers) and 89.1% of students were born in Australia.

### *Measures*

*Drinking Expectancy Questionnaire-Adolescent Version (DEQ-A).* The DEQ-A is a 24-item scale assessing positive and negative alcohol-related expectancies. It is a modification of the Drinking Expectancy Questionnaire (DEQ), which was developed based on interviews with a diverse sample of alcohol drinkers [30]. The items are formatted as 5-point Likert-style questions (1 = Strongly Disagree; 5 = Strongly Agree). A four-factor structure was

expected; two relating to positive alcohol expectancies (*Increased confidence* and *Tension Reduction*) and two relating to negative alcohol expectancies (*Cognitive and motor impairment* and *Negative Mood*; [13]).

*Drinking status and consumption.* Participants were asked if they had ever consumed a full alcoholic drink and were categorised into drinking adolescents [those who said "yes"] and non-drinking adolescents [those who said "no"]. The AUDIT was developed for the World Health Organisation and comprises 10-items. The first 3 items pertaining to frequency and typical quantity of use as well as binge frequency can be combined for use as a measure of alcohol consumption, the AUDIT-C, and uses a 5-point Likert type response style (e.g., 0 = *Never*; 4 = *Daily or almost daily*; [37,38]). Cronbach's α was 0.86 for the AUDIT-C in the present study.

*Procedure*

This study uses baseline data prior to delivery of a school-based social marketing intervention (see [35,36]). Institutional human ethics committee's approval was obtained.

*Data Analysis.* To provide rigorous evaluation of the DEQ-A, exploratory and confirmatory factor analysis was conducted (EFA/CFA; [34]). Use of both EFA and CFA helps to protect against the adoption of a factor structure that may be influenced by statistical artefacts arising from a particular analytic approach. Data were randomly split into two groups for these two studies using the 'random select' data function in SPSS. Study 1 included EFA and examination of the subscales. Based on the results of Study 1, several plausible models, including a shortened version of the DEQ-A, were estimated and compared using CFA in Study 2. Finally, the psychometric properties of the DEQ-A and the shortened scale created in Study 2 were investigated. Study 2 analyses utilised the second randomly split dataset. The randomly split groups (Study 1 $N$ = 1,179; Study 2 $N$ = 1,178) did not differ

significantly in age, gender, drinking status, AUDIT risk level, or endorsement of expectancies (*p*s ranged from .310 to .770).

*Model estimation and evaluation.* In Study 1, an EFA was conducted in SPSS (version 22) using Principal Axis Factoring (PAF) extraction due to the non-normal data distribution [39], with a direct oblimin (oblique) rotation given the documented moderate correlations among DEQ factors. In Study 2, the $\chi^2$ test statistic was used to examine CFA model fit. However, as the test statistic is sensitive to large sample sizes [40], comparative fit index (CFI), root mean-square error of approximation (RMSEA), and the standardized root mean-square residual (SRMR) were also examined. The cut-off criteria for good fit were CFI $\geq$ .95, RMSEA $\leq$ .06, and SRMR $\leq$ .08 [41]. It should be noted that these "cut-offs" are generally regarded only as guidelines, and models approaching these values were interpreted as having acceptable fit [40]. Additionally, the Akaike Information Criterion (AIC; [42]) was also used to compare non-nested models and assess model parsimony, with smaller values being associated with better-fitting models.

## Results

*Alcohol use (N = 2,357)*

Approximately 40% (*N* = 930) of participants indicated that they had consumed an alcoholic drink previously. For these adolescents, AUDIT-C scores ranged from 1 – 12 (Mean(*SD*) = 2.47(2.42)) and 23.4% were drinking at "risky" levels according to the AUDIT.

*Study 1: Exploratory factor analysis (N = 1,179)*

The EFA extracted four factors accounting for 67.55% variance, but examination of the scree plot and the eigenvalues (> 1.0) suggested a 2-factor solution was more appropriate. Further, while the item loadings approximated the 4 subscales of the DEQ-A, there were high (e.g., -.539) and frequent item cross-loadings (all items of the 3$^{rd}$ and 4$^{th}$ factor also loaded onto either factor 1 or 2; see Table S01).

A second EFA was conducted restricting extraction to two factors, as suggested by the scree plot. The 2-factor model explained 60.16% of the variance and produced strong factor loadings (.55 - .95), fewer cross-loadings and more theoretically-consistent item groupings. The two factors were labelled *positive expectancies* and *negative expectancies* (see Table 1).

>>insert Table 1 here<<

While there have been no previous EFAs reported on the DEQ-A, confirmatory factor analyses supported a 4-factor structure (2 positive, 2 negative expectancy factors) in a similarly aged sample [13].

The low endorsement (where high endorsement is defined as average scores > 3 on the 5-point scale) and restriction of range in *negative mood* and *tension reduction* subscales (10.6% and 6.4% high endorsement, respectively) compared with the endorsement of the *increased confidence* and *cognitive and motor impairment* subscales (23.5% and 17.4%, respectively) may have impacted the factor reduction. A third EFA was conducted using the positive and negative subscales with the highest endorsement rates (*increased confidence* and *cognitive and motor impairment*). Examination of the eigenvalues and the scree plot both indicated extraction of two factors. The two factors explained 67.12% of the variance in the model and were highly correlated, $r = .65$ ($p < .001$). The item loadings were consistent with the pre-determined subscales, i.e., *increased confidence* items all loaded onto factor one and *cognitive and motor impairment* items all loaded onto factor two (see Table 2).

>>insert Table 2 here<<

*Study 2: Confirmatory factor analysis (N = 1,178)*

CFAs were conducted on the 4-factor model specified by the 24-item DEQ-A, with each latent factor allowed to covary (Model 1 in Table 3). The revised 21-item 4-factor model reported by Connor et al [13], in which items 18, 19, and 23 were removed in post hoc model modifications to improve fit and a higher-order Drinking Expectancy factor was added, was also examined (Model 2). An alternative, higher-order 2-factor model separating the four DEQ-A subscales into covarying positive and negative expectancy factors (Model 3) was also tested to further examine results obtained in EFA. These models were compared to a shortened 2-factor model (*increased confidence* and *cognitive and motor impairment* subscales with items 18 and 23 removed as per Connor et al., 2011; Model 4). Assumption testing for CFA was conducted and data were found to deviate significantly from multivariate normality. This precluded the use of standard Maximum Likelihood (ML) estimation. To reduce the effect of multivariate non-normality, the Satorra-Bentler scaled $\chi^2$ test and robust standard errors were interpreted [47,48]. The CFAs were run in *R* (version 3.2.1) using the *lavaan* package (version 18; [43,44]).

*Confirmatory factor analysis*. The CFAs showed that the DEQ-A (Model 1; see Table 3) and the Connor et al. [13] revised DEQ-A model (Model 2) had adequate-to-good fit on all indices, as did the shortened 2-factor model (highest endorsed positive and negative subscales; Model 4). As the EFA suggested a two-factor solution (positive and negative expectancies), a CFA was run testing this structure. The two factor solution (Model 3) showed significantly reduced fit compared with the four factor structure. The shortened 2-factor model showed high loadings of the measured variables onto the latent factors (Figure 1). However, *cognitive and motor impairment* and *increased confidence* were highly correlated with one other, leading to questions about the appropriateness of separating the factors. A subsequent CFA was run where *cognitive and motor impairment* and *increased confidence* items were combined to load onto a single latent factor (Model 5 in Table 3).

This model showed significantly poorer fit to the data indicating that *cognitive and motor impairment* and *increased confidence* are separate factors, despite their correlation. Therefore, Model 4 was retained and labelled the short-form DEQ-A (DEQ-SA).

>>insert Table 3 here<<

>>insert Figure 1 here<<

*Investigation of psychometric properties of scales*

*Reliability.* The internal reliability of the DEQ-A (Model 1, Table 3 above) and the revised DEQ-A ([13]; Model 2, Table 3 above) and subscales was good to excellent; (*increased confidence* α = .94 and .94; *tension reduction* α = .91 and .90; *cognitive and motor impairment* α = .92 and .92; *negative mood* α = .86 and .86.) For the total DEQ-A and revised DEQ-A scale α = .96 and .96. For the DEQ-SA scale (Model 4, Table 3 above; *increased confidence* and *cognitive and motor impairment*) α = .95.

*Association between drinking status and expectancy endorsement.* To assess concurrent validity a one-way MANOVA was conducted with adolescents who drank vs. those who did not drink as the categorical independent variable and the DEQ-A subscales as the dependent variables. Due to violated assumptions of homogeneity of variances and covariances, Pillai's Trace was used for interpretation and a lower alpha cut-off for significance was used ($p < .001$). Drinkers had higher scores on positive expectancy scales and they also scored lower than the non-drinking adolescents on negative expectancies (see Table 4). The difference between drinking and non-drinking adolescents on the combined expectancies total was significant, $F(4, 1174) = 82.24$, $p < .001$, Pillai's Trace = .22, partial $\eta^2 = .22$. A series of follow-up one-way ANOVAs revealed that each contrast between expectancies of drinking and non-drinking adolescents was significant, even after Bonferroni adjustments (see Table 4).

>>insert Table 4 here<<

*Association with alcohol consumption.* Regressions between the DEQ-A, the revised DEQ-A [13], and the DEQ-SA and alcohol consumption were run using the Study 2 dataset (see Table 5). No covariates were included. The DEQ-A, the revised DEQ-A, and the DEQ-SA each explained significant variance in concurrent alcohol consumption, accounting for 20% [DEQ-A and revised DEQ-A] and 18% of the variance in consumption, respectively. To explore prospective prediction data from Connor et al.'s [13] study of 192 adolescents was reanalysed using only DEQ-SA items. Controlling for Time 1 AUDIT-C scores, Increased Confidence ($B$ = .10, $SE$ = .04, $p$ = .033, $sr^2$ = .02) predicted unique variance in Time 2 AUDIT-C scores at 12 months, but Cognitive and Motor Impairment ($B$ = .02, $SE$ = .04, $p$ = .599, $sr^2$ = .001) did not, $\Delta F$ (3, 186) = 39.52, $p$ < .001.

>>insert Table 5 here<<

## Discussion

This study drew on a large sample of adolescents ($N$ = 2,357) to validate the Adolescent version of the Drinking Expectancy Questionnaire (DEQ-A) and develop a brief measure of adolescent alcohol expectancies (DEQ-SA). The 24-item four-factor DEQ-A was found to have strong psychometric properties and is considered suitable for use in both adolescent alcohol prevention and treatment settings. Similarly, the 12-item DEQ-SA had good reliability and validity and is proposed for screening or research purposes in an adolescent alcohol prevention setting when a shorter assessment timeframe is required.

The purpose of developing the DEQ-SA was twofold: 1) to provide a brief version of the DEQ-A that would retain the psychometric properties and predictive power of the original measure, 2) to be a measure for use in a prevention context which would necessarily involve

inclusion of adolescents yet to experience alcohol consumption [non-drinkers] but who have developed expectancies vicariously. We also see particular value in the application of this shortened measure in longitudinal research projects with youth, which will allow researchers to understand changes in expectancies over time while helping to minimise participant burden. The DEQ-SA comprises the most endorsed subscales of the DEQ-A, which were the positive expectancy subscale of *increased confidence* and the negative expectancy subscale of *cognitive and motor impairment*. These two subscales accounted for almost identical amounts of variance in alcohol consumption as all four subscales combined, indicating that the DEQ-SA has comparable predictive power to the DEQ-A as a stand-alone measure in a young adolescent sample. The factor structure of the DEQ-SA was supported by both exploratory factor analysis and, confirmatory factor analysis and model comparisons.

The preliminary DEQ-A scale validation [13] resulted in four subscales [*increased confidence, tension reduction, negative mood, and cognitive and motor impairment*] with a higher-order factor. While a two-factor model was found using an exploratory approach in the current study, confirmatory analyses revealed that the more theoretically consistent four-factor models were found to better fit the data compared to a two-factor model. Differing results from EFA and CFA are not uncommon in psychological measurement due to inherent differences in underlying assumptions and specified parameters of each analysis [34].

The current findings suggest that drinking and non-drinking adolescents have differing expectancy profiles, with drinkers reporting high positive alcohol expectancies and low negative alcohol expectancies than their non-drinking counterparts. Overall, this pattern of results is consistent with theoretical models emphasising the greater role of positive expectancies in drinking initiation and early consumption [14,45]. This study found that adolescent drinking was particularly driven by the socially-rewarding aspects of alcohol consumption.

The finding that non-drinking adolescents had higher negative alcohol expectancies than drinking adolescents [rather than just lower positive expectancies] has received little emphasis in previous research. This is potentially due to poor measurement of negative alcohol expectancies e.g., [12], decisions not to include negative expectancies in analyses (e.g., [14–16]) or report negative expectancy findings when included (e.g., [17,28]). Additionally, studies including negative expectancies have typically investigated predictive power rather than investigating differing endorsement rates between drinking and non-drinking participants. The small effect size for negative expectancies observed in the present study indicate that a large sample may be required to find significant results in an adolescent population. This may partially explain the inconsistent reporting on negative expectancies in the literature.

The study has some limitations. While the effect of the *negative expectancy* subscale on alcohol consumption was small, the squared semi-partial correlations showed that the *negative expectancy* subscale did have an additive effect to the model. The decision was made to retain the subscale in the DEQ-SA due to the potential clinical utility of the negative expectancy subscale and the possibility that its role in drinking increases over the adolescent period. Further research into subscale endorsement and measure applicability and appropriateness should be also pursued in populations with AUDs and older adolescents with higher rates of alcohol experience, where negative expectancies may be more prevalent. Additionally, the sample was from a predominantly "Caucasian" Australian or European background. Further investigation should be conducted into the appropriateness of the DEQ-SA for adolescents from different cultural or ethnic backgrounds.

In summary, this study validated an existing adolescent alcohol expectancy measure (the DEQ-A) and developed a brief version (the DEQ-SA) in a large sample of young adolescents. Both the DEQ-A and the DEQ-SA show strong psychometric properties. The

scales were associated with alcohol consumption and drinking and non-drinking adolescents had significantly different alcohol expectancy profiles. It is expected that both scales will be useful in clinical contexts. The DEQ-A can be used in contexts where the influence of various expectancies would be valuable, such as treatment programs, whereas the DEQ-SA could be used for screening, with adolescents who report non-drinking, or where a brief measure is preferable.

**Acknowledgements**

MJG is supported by a National Health and Medical Research Council (NHMRC) of Australia Early Career Fellowship (1036365). JPC is supported by a NHMRC of Australia Career Development Fellowship (1031909). Data collection was funded by an Australian Research Council grant (LP130100345) to SR-T and JPC. The funders played no role in study design, collection, analysis, or interpretation of data.

**Conflict of interest**

None to declare.

References


[1] World Health Organization. Global status report on alcohol and health. Geneva, Switzerland; 2014.

[2] AIHW. Young Australians: Their health and wellbeing 2011. Canberra: AIHW.; 2011.

[3] AIHW. National Drug Strategy Household Survey detailed report: 2013. Canberra: AIHW; 2014.

[4] Connor JP, Haber PS, Hall WD. Alcohol use disorders. Lancet 2016;387(10022):988–98.

[5] Gao C, Ogeil R, Lloyd B. Alcohol's burden of disease in Australia. Canberra; 2014.

[6] Grant BF, Dawson DA. Age at onset of alcohol use and its association with DSM-IV alcohol abuse and dependence: Results from the National Longitudinal Alcohol Epidemiologic Survey. J Subst Abuse 1997;9:103–9.

[7] Grant BF, Stinson FS, Harford TC. Age at onset of alcohol use and DSM-IV alcohol abuse and dependence: A 12-year follow-up. J Subst Abuse 2001;13(4):493–504.

[8] Bandura A. Social foundations of thought and action. Englewood Cliffs NJ: Prentice-Hall; 1986.

[9] Bandura A. Social Learning Theory. Oxford, England: Prentice-Hall; 1971.

[10] Brown SA, Christiansen BA, Goldman MS. The alcohol expectancy questionnaire: An instrument for the assessment of adolescent and adult alcohol expectancies. J Stud Alcohol 1987;48(5):483–91.

[11] Brown SA, Goldman MS, Christiansen BA. Do alcohol expectancies mediate drinking patterns of adults? J Consult Clin Psychol 1985;53(4):512–9.

[12] Christiansen BA, Goldman MS. Alcohol-related expectancies versus demographic/background variables in the prediction of adolescent drinking. J Consult Clin Psychol 1983;51(2):249–57.

[13] Connor JP, George SM, Gullo MJ, Kelly AB, Young RM. A prospective study of alcohol expectancies and self-efficacy as predictors of young adolescent alcohol misuse. Alcohol Alcohol 2011;46(2):161–9.

[14] Jones BT, Will C, Fromme K. A review of expectancy theory and alcohol consumption. Addiction 2001;96(1):57–72.

[15] Young RM, Oei TPS. Grape expectations: The role of alcohol expectancies in the understanding and treatment of problem drinking. Int J Psychol 1993;28(3):337–64.

[16] Scott-Sheldon LAJ, Terry DL, Carey KB, Garey L, Carey MP. Efficacy of expectancy challenge interventions to reduce college student drinking: A meta-analytic review. Psychol Addict Behav 2012;26(3):393–405.

[17] Young RM, Connor JP, Feeney GFX. Alcohol expectancy changes over a 12-week cognitive-behavioral therapy program are predictive of treatment success. J Subst Abuse Treat 2011;40(1):18–25.

[18] Leigh BC. In search of the Seven Dwarves: issues of measurement and meaning in alcohol expectancy research. Psychol Bull 1989;105(3):361–73.

[19] Jones BT, McMahon J. The reliability of the Negative Alcohol Expectancy Questionnaire and its use. J Assoc Nurses Subst Abus 1993;12:15–6.

[20] Jester JM, Steinberg DB, Heitzeg MM, Zucker RA. Coping expectancies, not enhancement expectancies, mediate trauma experience effects on problem alcohol use: A prospective study from early childhood to adolescence. J Stud Alcohol Drugs 2015;76(1988):781–9.

[21] Smith GT, Goldman MS, Greenbaum PE, Christiansen BA. Expectancy for social facilitation from drinking: the divergent paths of high-expectancy and low-expectancy adolescents. J Abnorm Psychol 1995;104(1):32–40.

[22] Tomlinson KL, Brown SA. Self-medication or social learning? A comparison of models to predict early adolescent drinking. Addict Behav 2012;37(2):179–86.

[23] Young-Wolff KC, Wang P, Tuvblad C, Baker LA, Raine A, Prescott CA. Drinking experience uncovers genetic influences on alcohol expectancies across adolescence. Addiction 2015;110:610–8.

[24] Gullo MJ, Dawe S, Kambouropoulos N, Staiger PK, Jackson CJ. Alcohol expectancies and drinking refusal self-efficacy mediate the association of impulsivity with alcohol misuse. Alcohol Clin Exp Res 2010;34(8):1386–99.

[25] Aas HN, Leigh BC, Anderssen N, Jakobsen R. Two-year longitudinal study of alcohol expectancies and drinking among Norwegian adolescents. Addiction 1998;93:373–84.

[26] Bekman NM, Goldman MS, Worley MJ, Anderson KG. Pre-adolescent alcohol expectancies: Critical shifts and associated maturational processes. Exp Clin Psychopharmacol 2011;19(6):420–32.

[27] Fromme K, D'Amico EJ. Measuring adolescent alcohol outcome expectancies. Psychol Addict Behav 2000;14(2):206–12.

[28] Christiansen BA, Goldman MS, Inn A. Development of alcohol-related expectancies in adolescents: Separating pharmacological from social-learning influences. J Consult Clin Psychol 1982;50(3):336–44.

[29] Young RM, Oei TPS. Drinking expectancy profile (DEP) test manual. Brisbane, Australia: Behaviour Research and Therapy Centre, University of Queensland; 1996.

[30] Young RM, Knight RG. The Drinking Expectancy Questionnaire: A revised measure of alcohol-related beliefs. J Psychopathol Behav Assess 1989;11(1):99–112.

[31] Stein LAR, Katz B, Colby SM, Barnett NP, Golembeske C, Lebeau-Craven R, et al. Validity and reliability of the Alcohol Expectancy Questionnaire-Adolescent, brief. J Child Adolesc Subst Abuse 2007;16(2):115–27.

[32] Leigh BC, Stacy AW. Alcohol expectancies and drinking in different age groups. Addiction 2004;99(2):215–27.

[33] McMahon J, Jones BT. The negative alcohol expectancy questionnaire. J Assoc Nurses Subst Abus 1993;12:17.

[34] Hopwood CJ, Donnellan MB. How should the internal structure of personality inventories be evaluated? Personal Soc Psychol Rev 2010;14(3):332–46.

[35] Rundle-Thiele S, Russell-Bennett R, Leo C, Dietrich T. Moderating teen drinking: Combining social marketing and education. Health Educ 2013;113(5):392–406.

[36] Dietrich T, Rundle-Thiele S, Schuster L, Drennan J, Russell-Bennett R, Leo C, et al. Differential segmentation responses to an alcohol social marketing program. Addict Behav 2015;49:68–77.

[37] Bush K, Kivlahan DR, McDonell MB, Fihn SD, Bradley KA. The AUDIT Alcohol

Consumption Questions (AUDIT-C). Arch Intern Med 1998;158:1789–95.

[38] Saunders JB, Aasland OG, Babor TF, de la Fuente JR, Grant M. Development of the alcohol use disorders identification test (AUDIT): WHO collaborative project on early detection of persons with harmful alcohol consumption-II. Addiction 1993;88(6):791–804.

[39] Fabrigar LR, Wegener DT, MacCallum RC, Strahan EJ. Evaluating the use of exploratory factor analysis in psychological research. Psychol Methods 1999;4(3):272–99.

[40] Marsh HW, Hau K-T, Wen Z. In search of golden rules: Comment on hypothesis-testing approaches to setting cutoff values for fit indexes and dangers in overgeneralizing Hu and Bentler's (1999) findings. Struct Equ Model 2004;11(3):320–41.

[41] Tabachnick BG, Fidell LS. Using Multivariate Statistics. 5th ed. New York: Allyn and Bacon.; 2007.

[42] Akaike H. Factor analysis and AIC. Psychometrika 1987;52(3):317–32.

[43] Rosseel Y. lavaan: An R Package for Structural Equation Modeling. J Stat Softw 2012;48(2):1–36.

[44] R: A language and environment for statistical computing [software]. Vienna, Austria; 2014. Available from: http://www.r-project.org/.

[45] Oei TPS, Baldwin AR. Expectancy theory: A two-process model of alcohol use and abuse. J Stud Alcohol Drugs 1993;55(5):525–34.

[46] Little R. A test of missing completely at random for multivariate data with missing values. J Am Stat Assoc 1988;83(404):1198–202.

[47] Satorra A, Bentler PM. Corrections to test statistics and standard errors in covariance structure analysis. In: von Eye A, Clogg CC, editors. Latent variables analysis: Applications for developmental research. Thousand Oaks, CA: SAGE Publications Ltd; 1994. p. 399–419.

[48] Satorra A, Bentler PM. A scaled difference chi-square test statistic for moment structure analysis. Psychometrika 2001;66(4):507–14.

## Tables

Table 1.
*Factor loadings for the exploratory factor analysis with extraction restricted to two factors.*

| Items | Positive Expectancies | Negative Expectancies |
|---|---|---|
| 20. Drinking makes me get along with people better | 0.95 | |
| 9. Drinking makes me feel more outgoing and friendly | 0.90 | |
| 23. If I'm drinking it's easier to express my feelings | 0.90 | |
| 17. Drinking makes it easier to talk to strangers | 0.83 | |
| 5. Drinking makes it easier to openly express love and affection | 0.82 | |
| 1. I feel less shy when I am drinking | 0.78 | |
| 13. Drinking alcohol makes me more responsive to the opposite sex | 0.76 | |
| 19. Drinking makes me feel hopeful about the future | 0.75 | |
| 7. Drinking alcohol helps when I'm anxious | 0.70 | |
| 15. Drinking makes the future brighter | 0.69 | |
| 22. I drink alcohol to relieve tension | 0.63 | |
| 11. Drinking alcohol helps calm me down when I'm upset | 0.63 | |
| 3. I drink alcohol to unwind | 0.61 | |
| 4. I am more sullen and depressed when I'm drinking alcohol | | 0.83 |
| 8. Drinking alcohol makes me feel negative about the future | | 0.80 |
| 16. Drinking alcohol makes me feel sad | | 0.78 |
| 24. I become confused when drinking alcohol | | 0.73 |
| 12. I feel gloomy when drinking alcohol | | 0.73 |
| 10. When I am drinking it is harder to make mental connections | | 0.70 |
| 2. I am more forgetful when I am drinking | | 0.60 |
| 14. When I drink alcohol I accidentally break and destroy things | | 0.60 |
| 18. I think less clearly when drinking alcohol | | 0.60 |
| 6. I am likely to fall down when drinking | | 0.59 |
| 21. I am clumsier when drinking alcohol | 0.32 | 0.55 |

*Note.* Item loadings below .30 were omitted for clarity of exposition.

Table 2.
*Item loadings from exploratory factor analysis of the Drinking Expectancy Questionnaire – Shortened Adolescent version (N=1,179).*

| Subscale of origin | Item | Positive expectancy | Negative expectancy |
|---|---|---|---|
| Increased confidence | 20. Drinking makes me get along with people better | .93 | |
| | 9. Drinking makes me feel more outgoing and friendly | .91 | |
| | 23. If I'm drinking it's easier to express my feelings | .83 | |
| | 1. I feel less shy when I am drinking | .81 | |
| | 5. Drinking makes it easier to openly express love and affection | .81 | |
| | 17. Drinking makes it easier to talk to strangers | .74 | |
| | 13. Drinking alcohol makes me more responsive to the opposite sex | .67 | |
| Cognitive and Motor Impairment | 24. I become confused when drinking alcohol | | .91 |
| | 18. I think less clearly when drinking alcohol | | .82 |
| | 21. I am clumsier when drinking alcohol | | .81 |
| | 10. When I am drinking it is harder to make mental connections | | .78 |
| | 14. When I drink alcohol I accidentally break and destroy things | | .73 |
| | 6. I am likely to fall down when drinking | | .71 |
| | 2. I am more forgetful when I am drinking | | .70 |

*Note.* Item loadings lower than .30 suppressed.

Table 3.

*Model fit indices for the DEQ-A and DEQ-SA confirmatory factor analyses (N = 1,178).*

| Model | $\chi^2$ (df) | CFI | RMSEA | SRMR | AIC |
|---|---|---|---|---|---|
| 1. 24-item 4-factor model | 1375.77* (246) | .95 | .06 | .05 | 75949.83 |
| 2. Connor et al. (2011) revised 19-item 4-factor model | 1069.18* (184) | .95 | .06 | .05 | 67800.38 |
| 3. 24-item 2-factor model (positive and negative expectancies) | 2191.13* (251) | .91 | .08 | .06 | 77342.23 |
| 4. 12-item DEQ-SA: Shortened 2-factor model (Inc. confidence + Cog/Motor Impairment) | 379.18* (53) | .97 | .07 | .04 | 40243.71 |
| 5. Alternative 12-item 1-factor model (Inc. confidence + Cog/Motor Impairment combined) | 1493.26* (77) | .89 | .13 | .09 | 47750.75 |
| 1. vs. 3. $\chi^2_{diff}(df_{diff})$ | 815.36(5)* | | | | |
| 4. vs. 5. $\chi^2_{diff}(df_{diff})$ | 1114.08(24)* | | | | |

*Note.* CFI, comparative fit index; RMSEA, root-mean-square error of approximation; SRMR, standardised root mean-square residual; AIC, Akaike Information Criterion.

* $p < .001$

Table 4.
*Comparison of expectancies between drinking and non-drinking adolescents (Study 2).*

| | Mean(SD) | | | Comparison | |
|---|---|---|---|---|---|
| | Drinking students (N = 448) | Non-drinking students (N = 730) | Total (N = 1,178) | *F*(df) | Partial $\eta^2$ |
| Increased confidence, Mean(SD) | 18.11(7.30) | 14.26(6.92) | 15.72(7.31) | 82.65(1, 1176)** | .07 |
| Tension Reduction, Mean(SD) | 11.37(5.26) | 10.14(5.02) | 10.60(5.14) | 16.06(1, 1176)** | .01 |
| Cognitive and Motor Impairment, Mean(SD) | 14.00(6.28) | 15.08(7.32) | 14.67(6.96) | 6.80(1, 1176)* | .01 |
| Negative Mood, Mean(SD) | 7.08(3.47) | 8.61(4.26) | 8.03(4.05) | 40.81(1, 1176)** | .03 |

**$p < .001$, *$p < .05$

Table 5.
*Associations between DEQ-A and DEQ-SA subscales and AUDIT-C scores (Study 2; N = 1,178).*

| **Regression model** | **Predictors** | **B** | **β** | ***sr²*** | ***t*** | **R** | **$_{adj}R^2$** | ***F*-test (df)** |
|---|---|---|---|---|---|---|---|---|
| 1. DEQ-A | Increased confidence | .12 | .43 | .06 | 9.43** | .45 | .20 | 74.74 (4, 1173)** |
| | Tension Reduction | .07 | .17 | .01 | 3.84** | | | |
| | Cognitive and Motor Impairment | -.04 | -.13 | .01 | -2.96* | | | |
| | Negative Mood | -.10 | -.20 | .02 | -5.07** | | | |
| 2. DEQ-SA | Increased confidence | .15 | .55 | .17 | 15.64** | .43 | .18 | 130.44 (2, 1175)** |
| | Cognitive and Motor Impairment | -.07 | -.25 | .04 | -7.25** | | | |

**$p < .001$, *$p < .05$,

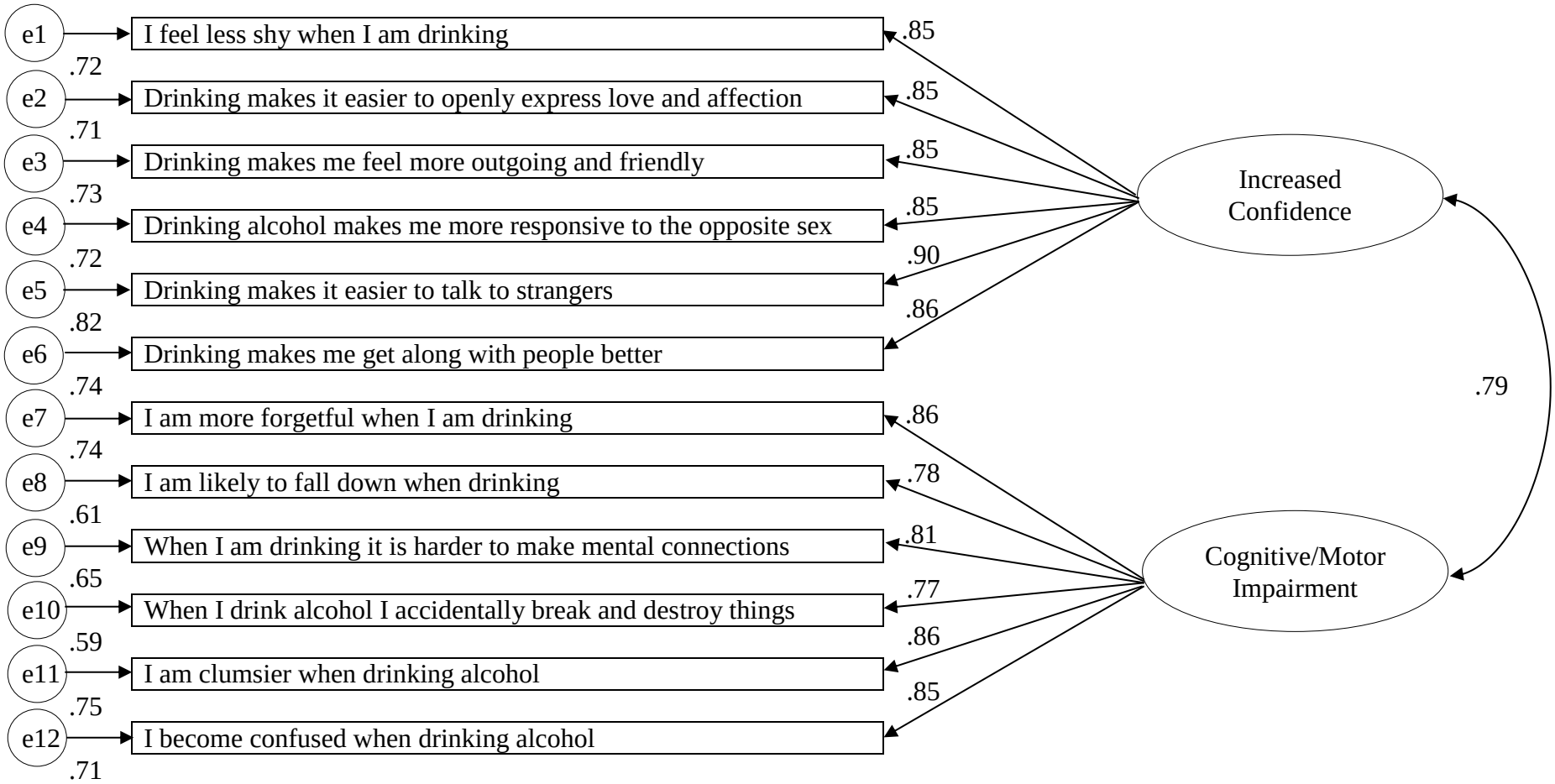


*Figure 1.* Two-factor shortened drinking expectancy measurement model.
*Note*. Ellipses represent latent constructs, rectangles indicate measured variables, and circles reflect residuals. All parameters are significant at $p < .05$

The Drinking Expectancy Questionnaire – Revised Adolescent version (DEQ-RA)

The purpose of these questions is to find out about YOUR thoughts, feelings and beliefs about drinking alcohol. If you have never drunk alcohol, respond with what you think would happen IF you drank alcohol. Please circle the most appropriate response using the following scale:

| | | | | | | |
|---|---|---|---|---|---|---|
| | **1** Strongly Disagree | **2** Disagree | **3** Neither agree nor Disagree | **4** Agree | **5** Strongly Agree | |
| **1.** | I feel less shy when drinking | | | **1** | **2** | **3** **4** **5** |
| **2.** | I am more forgetful when I am drinking | | | **1** | **2** | **3** **4** **5** |
| **3.** | I drink alcohol to help me unwind | | | **1** | **2** | **3** **4** **5** |
| **4.** | I am more sullen and depressed when I'm drinking alcohol | | | **1** | **2** | **3** **4** **5** |
| **5.** | Drinking makes it easier to openly express love and affection | | | **1** | **2** | **3** **4** **5** |
| **6.** | I am likely to fall down when drinking | | | **1** | **2** | **3** **4** **5** |
| **7.** | Drinking alcohol helps when I am anxious | | | **1** | **2** | **3** **4** **5** |
| **8.** | Drinking alcohol makes me feel negative about the future | | | **1** | **2** | **3** **4** **5** |
| **9.** | Drinking makes me feel more outgoing and friendly | | | **1** | **2** | **3** **4** **5** |
| **10.** | When I am drinking it is harder to make mental connections | | | **1** | **2** | **3** **4** **5** |
| **11.** | Drinking alcohol helps calm me down when I'm upset | | | **1** | **2** | **3** **4** **5** |
| **12.** | I feel gloomy when drinking alcohol | | | **1** | **2** | **3** **4** **5** |
| **13.** | Drinking alcohol makes me more responsive to the opposite sex | | | **1** | **2** | **3** **4** **5** |
| **14.** | When I drink alcohol I accidentally break and destroy things | | | **1** | **2** | **3** **4** **5** |
| **15.** | Drinking makes the future brighter | | | **1** | **2** | **3** **4** **5** |
| **16.** | Drinking alcohol makes me feel sad | | | **1** | **2** | **3** **4** **5** |
| **17.** | Drinking makes it easier to talk to strangers | | | **1** | **2** | **3** **4** **5** |
| **18.** | Drinking makes me get along with people better | | | **1** | **2** | **3** **4** **5** |
| **19.** | I am clumsier when drinking alcohol | | | **1** | **2** | **3** **4** **5** |
| **20.** | I drink alcohol to relieve tension | | | **1** | **2** | **3** **4** **5** |
| **21.** | I become confused when drinking alcohol | | | **1** | **2** | **3** **4** **5** |

# DEQ-RA scoring

To calculate total scores for the DEQ-RA subscales add relevant items. Higher scores represent increased agreement with alcohol expectancies.

*Increased Confidence* = 1 + 5 + 9 + 13 + 17 + 18

*Tension Reduction* = 3 + 7 + 11 + 15 + 20

*Cognitive and Motor Impairment* = 2 + 6 + 10 + 14 + 19 + 21

*Negative Mood* = 4 + 8 + 12 + 16

For an indication of endorsement take the average of each subscale. Scores > 3 indicate endorsement of the subscale.

To calculate the total expectancy score, reverse score negative expectancies subscale items (*Cognitive and Motor Impairment* and *Negative Mood*) and add positive expectancies subscale items (*Increased Confidence* and *Tension Reduction*) and reverse-scored negative expectancies subscale items together. Total scores indicate higher positive expectancies and lower negative expectancies.

The Drinking Expectancy Questionnaire – Shortened Adolescent version (DEQ-SA)

The purpose of these questions is to find out about YOUR thoughts, feelings and beliefs about drinking alcohol. If you have never drunk alcohol, respond with what you think would happen IF you drank alcohol. Please circle the most appropriate response using the following scale:

| **1** Strongly Disagree | **2** Disagree | **3** Neither agree nor Disagree | **4** Agree | **5** Strongly Agree |
|---|---|---|---|---|

| | | | | | | |
|---|---|---|---|---|---|---|
| **1.** | I feel less shy when drinking | **1** | **2** | **3** | **4** | **5** |
| **2.** | I am more forgetful when I am drinking | **1** | **2** | **3** | **4** | **5** |
| **3.** | Drinking makes it easier to openly express love and affection | **1** | **2** | **3** | **4** | **5** |
| **4.** | I am likely to fall down when drinking | **1** | **2** | **3** | **4** | **5** |
| **5.** | Drinking makes me feel more outgoing and friendly | **1** | **2** | **3** | **4** | **5** |
| **6.** | When I am drinking it is harder to make mental connections | **1** | **2** | **3** | **4** | **5** |
| **7.** | Drinking alcohol makes me more responsive to the opposite sex | **1** | **2** | **3** | **4** | **5** |
| **8.** | When I drink alcohol I accidentally break and destroy things | **1** | **2** | **3** | **4** | **5** |
| **9.** | Drinking makes it easier to talk to strangers | **1** | **2** | **3** | **4** | **5** |
| **10.** | Drinking makes me get along with people better | **1** | **2** | **3** | **4** | **5** |
| **11.** | I am clumsier when drinking alcohol | **1** | **2** | **3** | **4** | **5** |
| **12.** | I become confused when drinking alcohol | **1** | **2** | **3** | **4** | **5** |

# DEQ-SA scoring

To calculate total scores for the DEQ-SA subscales add relevant items. Higher scores represent increased agreement with alcohol expectancies.

*Increased Confidence* = 1 + 5 + 9 + 13 + 17 + 18

*Cognitive and Motor Impairment* = 2 + 6 + 10 + 14 + 19 + 21

For an indication of endorsement take the average of each subscale. Scores > 3 indicate endorsement of the subscale.

To calculate the total expectancy score, reverse score negative expectancies subscale items (*Cognitive and Motor Impairment*) and add positive expectancies subscale items (*Increased Confidence*) and reverse-scored negative expectancies subscale items together. Total scores indicate higher positive expectancies and lower negative expectancies.