

**A confirmatory factor analysis of the Toronto Alexithymia Scale (TAS-20) in an alcohol-dependent sample**

Thorberg, Fred Arne; Young, Ross McD; Sullivan, Karen A.; Lyvers, Michael; Hurst, Cameron P.; Connor, Jason P.; Feeney, Gerald F X

*Published in:*  
Psychiatry Research

*DOI:*  
[10.1016/j.psychres.2009.09.015](https://doi.org/10.1016/j.psychres.2009.09.015)

Published: 01/08/2010

*Document Version:*  
Peer reviewed version

*Licence:*  
CC BY-NC-ND

[Link to publication in Bond University research repository.](#)

*Recommended citation(APA):*

Thorberg, F. A., Young, R. M., Sullivan, K. A., Lyvers, M., Hurst, C. P., Connor, J. P., & Feeney, G. F. X. (2010). A confirmatory factor analysis of the Toronto Alexithymia Scale (TAS-20) in an alcohol-dependent sample. *Psychiatry Research, 178*(3), 565-567. <https://doi.org/10.1016/j.psychres.2009.09.015>

**General rights**

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

For more information, or if you believe that this document breaches copyright, please contact the Bond University research repository coordinator.

A confirmatory factor analysis of the Toronto alexithymia scale (TAS-20) in  
an alcohol dependent sample

Fred Arne Thorberg.<sup>ab</sup>

Ross McD. Young.<sup>ae</sup>

Karen A. Sullivan.<sup>ab</sup>

Michael Lyvers.<sup>c</sup>

Cameron Hurst.<sup>d</sup>

Jason P. Connor.<sup>ef</sup>

Gerald F. X. Feeney.<sup>ef</sup>

Address correspondence to:

Fred Arne Thorberg

<sup>a</sup> Institute of Health and Biomedical Innovation, Queensland University of Technology

60 Musk Avenue, Kelvin Grove, Queensland 4059 Australia

telephone: (61) 7 3138 6131

facsimile: (61) 7 3138 6039

e-mail: [f.thorberg@qut.edu.au](mailto:f.thorberg@qut.edu.au)

<sup>b</sup> School of Psychology and Counselling, Queensland University of Technology,  
Queensland, Australia

<sup>c</sup> Department of Psychology, Bond University, Gold Coast, Queensland, Australia

<sup>d</sup> School of Public Health, Queensland University of Technology, Queensland,  
Australia

<sup>e</sup> Princess Alexandra Hospital, Alcohol & Drug Assessment Unit, Brisbane,  
Queensland, Australia

<sup>f</sup> Faculty of Health, University of Queensland, Brisbane, Queensland, Australia

**Abstract**

Confirmatory factor analyses were conducted to evaluate the factorial validity of the Toronto Alexithymia Scale in an alcohol-dependent sample. Several factor models were examined, but all models were rejected given their poor fit. A revision of the TAS-20 in alcohol-dependent populations may be needed.

*Keywords:* Toronto alexithymia scale; Alcohol dependence; Confirmatory factor analysis

## 1. Introduction

Alexithymia refers to difficulty identifying, differentiating and communicating feelings, a lack of imagination and an externally oriented thinking style (Nemiah et al., 1976). The Toronto Alexithymia Scale (TAS-20) (Bagby et al., 1994) is a reliable self-report measure of alexithymia. It consists of three factors: difficulties identifying feelings (DIF), difficulties describing feelings (DDF) and externally oriented thinking (EOT). Given the link between addiction and alexithymia it is important to validate the TAS-20 in substance misuse samples (Thorberg et al., 2009). There have only been a few such studies. The TAS-20 confirmatory factor analyses (CFA) undertaken by Cleland et al. (2005) in a substance disorder sample indicated a marginal fit for the 2-factor model (Loas et al., 1996; Kooiman et al., 2002) and the original 3-factor model (Bagby et al., 1994). In a combined drug and alcohol-dependent group, Besharat (2008) confirmed the 3-factor model, but the psychometric properties of the TAS-20 were described as suboptimal. In a sample composed of a group with substance dependence and a group with eating-disorders (Loas et al., 2001) the original 3-factor structure was confirmed and was a superior fit than the 2-factor model. In a psychiatric sample including alcohol abusers, a 4-factor model consisting of DIF, DDF, pragmatic thinking, and lack of importance of emotions provided the best fit compared to the other models (Mueller et al., 2003). Given the lack of consistency in previous attempts to identify the TAS-20 factor structure in substance-dependent samples, and the lack of such research in groups with primary alcohol-dependence, further studies of this type are warranted. This study aimed to establish the underlying factor structure of the TAS-20 in an alcohol-dependent sample.

## 2. Method

### 2.1. Participants

Participants were undertaking outpatient Cognitive-Behavioural Therapy for alcohol dependence at a Brisbane hospital. 210 participants (144 males) with a mean age of 38.17 years ( $SD=10.82$ ) diagnosed with alcohol dependence as assessed by DSM-IV-TR criteria (APA, 2000), Brief Michigan Alcoholism Screening Test (bMAST Pokorny et al., 1972) and the Alcohol Use Disorder Identification Test (AUDIT Saunders et al., 1993) were recruited. Exclusion criteria were a diagnosis of a major co-morbid psychiatric disorder, organic brain syndrome, alcohol-related medical complications or heavy sedation. The time between the last drink and the assessment ranged between 4-14 days. 67.6 % drank daily, 17.1% were binge drinkers and 15.3% drank  $\geq$  twice a week. Usual mean amount of alcohol consumed (in grams) per drinking session was 153.26 ( $SD=102.34$ ) and maximum amount was 240.73 ( $SD=121.00$ ). These variables had approximately 20% missing data. Almost three quarters of the sample (71.1%) used alcohol only. Other life time drug use included cannabis for 22.4% of the sample, amphetamine use for 15.3% and ecstasy use by 8.7%. A minority of the sample had used heroin (5.6%) and 4.1% misused benzodiazepines. Poly-substance dependence was not formally assessed. The Depression subscale from the Depression Anxiety and Stress Scales (DASS-21) screening tool yielded an overall mean score of 31.44 ( $SD=25.00$ ) indicating severe depressive symptoms (see Lovibond and Lovibond, 2002).

### 2.2. Measures

#### 2.2.1. Toronto Alexithymia Scale (TAS-20)

The TAS-20 is a 20 item self-report measure of alexithymia with acceptable validity and reliability (Bagby et al., 1994; Besharat, 2008; Meganck et al., 2008). A higher score on the TAS-20 indicates a greater level of alexithymia.

### 2.2.2. *Alcohol Use Disorders Identification Test (AUDIT)*

The AUDIT is a 10 item instrument measuring three different domains of alcohol misuse: hazardous drinking, harmful drinking and alcohol dependence (Saunders et al., 1993).

A total score of  $\geq 20$  indicates alcohol dependence.

### 2.2.3. *Brief Michigan Alcohol Screening Test (bMAST)*

The bMAST is a 10 item self-report scale that assesses life time alcohol-related problems and alcohol dependence (Selzer, 1971; Pokorny et al., 1972). A score of  $\geq 6$  suggests alcohol dependence (Kagan-Krieger et al., 2002).

### 2.3. *Procedure*

Ethics approval was granted by institutional ethics committees. Less than 10% of those people offered a program declined participation. All measures were completed before the first treatment session.

### 2.4. *Data Analysis Methods*

Descriptive statistics and intercorrelations were calculated. CFA evaluated the factor structure of the TAS-20. The following CFA fit indices were used: the  $\chi^2$  statistic; the Akaike's Information Criterion (AIC) where a lower score for both criteria indicates a better model fit (Tanaka, 1993); the normed  $\chi^2$  where values  $< 3$  represent a good fit; the Comparative Fit Index (CFI; Bentler, 1990) where values of  $> 0.90$  indicate a good fit (Ullman, 2001), and; the root mean square error of approximation (RMSEA) with 90% confidence intervals (Steiger, 1990) where values ranging from  $< 0.06$  to  $0.08$  suggest an acceptable fit (Hu and Bentler, 1999). A  $\chi^2$  test was conducted to compare the fit of the competing models. Regression imputation was undertaken for 9 participants to replace missing values for 1-2 items (Hawthorne and Elliott, 2005). An alpha level of  $p < 0.05$  was used to determine the significance of correlations.

### 3. Results

#### 3.1. Means, SD and intercorrelations

The mean score for the TAS-20 was 53.82 ( $SD=11.87$ ), DIF 19.38 ( $SD=6.23$ ), DDF 14.11 ( $SD=4.47$ ), EOT 20.33 ( $SD=4.42$ ), bMAST 16.60 ( $SD=8.27$ ) and AUDIT 26.03 ( $SD=9.80$ ). Pearson's correlations between TAS-20 total score, DIF DDF and EOT were significant ( $r=0.83$ ;  $r=0.87$ ;  $r=0.63$  respectively). The DIF scale was significantly correlated with DDF ( $r=0.63$ ) and EOT ( $r=0.19$ ) and DDF was significantly correlated with EOT ( $r=0.43$ ). The AUDIT was significantly correlated with TAS-20 ( $r=0.25$ ), DIF ( $r=0.27$ ), DDF ( $r=0.17$ ), but not EOT ( $r=0.14$ ). Two of the correlations between the bMAST and TAS-20 were significant (total,  $r=0.17$ ; DIF,  $r=0.21$ ) and two were not (DDF,  $r=0.12$ ; EOT,  $r=0.04$ ).

#### 3.2. Confirmatory Factor Analyses

The 2-factor model, which was a combination of the DIF and DDF items (factor 1) plus the EOT items (factor 2), had sufficient fit with the data  $\chi^2(165)=348.73$ ,  $P<0.001$ ;  $\chi^2/df=2.11$ ; AIC; 478.73; CFI=0.85; RMSEA= 0.07 (90% CI=0.062-0.04). The chi-square test and fit indices indicated a better fit for the traditional DIF, DDF and EOT 3-factor model  $\chi^2(164)=312.96$ ,  $P<0.001$ ;  $\chi^2/df=1.91$ ; AIC=444.96; CFI=0.88; RMSEA=0.06 (90% CI=0.055-0.077). However, as the CFI did not reach the  $>.90$  threshold, a chi-square test was performed to determine which among the less-than-perfect competing theoretical models provided the most plausible explanation (see Lance et al. 2006). This comparison indicated a superior fit for the 3-factor model over the 2-factor model ( $\chi^2$  difference=35.77,  $df=1$ ,  $p<0.0001$ ). An atheoretical 1-factor model was also tested demonstrating a poor fit to the data  $\chi^2(171)=547.11$ ,  $P<0.001$ ;  $\chi^2/df=3.20$ ; AIC; 665.11; CFI=0.69; RMSEA=0.10 (90% CI=0.093-0.11). No EOT factor parameter estimates were significant, but all DIF and DDF estimates were significant.

#### 4. Discussion

The original 3-factor model provided the most plausible theoretical explanation of the data compared to the other models. It had a significantly lower  $\chi^2$  scores as well as a significant chi-square difference indicating a superior global fit. This result supports previous findings (Loas et al., 2001; Mueller et al., 2003; Cleland et al., 2005). DIF and DDF factor loadings were significant and higher than the recommended cut-off (Stevens, 1996), with the exception of DDF item 4. These results are consistent with findings from a recent investigation in a combined alcohol and drug sample (Besharat, 2008) and two other clinical samples (Bressi et al., 1996; Meganck et al., 2008). None of the EOT factor parameter estimates were significant, indicating that these items explained little variance. Although previous studies in mixed addiction samples have found significant parameter estimates for this factor, these studies also report problems with EOT items (Loas et al., 2001; Mueller et al., 2003; Besharat, 2008). The reasons for EOT item inconsistencies are unclear at this stage, but could be related to sample characteristics or they may indicate that EOT is not a feature of alexithymia in substance-dependent samples.

In this group of people with relatively severe alcohol problems, significant, but modest relationships between overall alexithymia, DIF and alcohol measures were found. The EOT factor associations that were not significant, which may be because of poor EOT factor validity. However, similar findings have been obtained for the EOT factor in relation to personality dimensions and psychiatric diagnoses (Bach et al., 1995; Grabe et al., 2000). A limitation of the present study was the relatively small sample size. Utilizing a larger sample may have yielded an acceptable model fit. The criteria used to establish the model fit may have also influenced the results.

In conclusion, all of the previously identified TAS-20 factorial models had to be rejected given the poor fit to the data. A revision of EOT items may be warranted in future



alcohol studies. The counterargument is that such changes could result in a modified construct not true to the original definition (Sifneos, 1996; Loas et al., 2001), and that it may be better to use a well researched scale despite its psychometric shortcomings. For now we suggest caution when applying the EOT scale in alcohol populations whether for clinical or research purposes.

## References

- American Psychiatric Association., 2000. Diagnostic and Statistical Manual of Mental Disorders 4th ed. text rev. American Psychiatric Association, Washington, DC.
- Bach, M., de Zwaan, M., Ackard, D., Nutzinger, D. O., 1994. Alexithymia: Relationship to personality disorders. *Comprehensive Psychiatry*, 35, 239-243.
- Bagby, R. M., Parker, J. D. A., Taylor, G. J., 1994. The twenty-item Toronto Alexithymia Scale: I. Item selection and cross-validation of the factor structure. *Journal of Psychosomatic Research* 38, 23-32.
- Bentler, P. M., 1990. Comparative fit indexes in structural models. *Psychological Bulletin* 107, 238-246.
- Besharat, M. A., 2008. Assessing reliability and validity of the Farsi version of the Toronto Alexithymia Scale in a sample of substance-using patients. *Psychological Reports* 102, 259-270.
- Bressi, C., Taylor, G., Parker, J., Bressi, S., 1996. Cross validation of the factor structure of the 20-item Toronto Alexithymia Scale: An Italian multicenter study. *Journal of Psychosomatic Research* 41, 551-559.
- Cleland, C., Magura, S., Foote, J., Rosenblum, A., Kosanke, N., 2005. Psychometric properties of the Toronto Alexithymia Scale (TAS-20) for substance users. *Journal of Psychosomatic Research* 58, 299-306.
- Grabe, H. J., Rainermann, S., Spitzer, C., Gansicke, M., Freyberger, H. J., 2000. The relationship between dimensions of alexithymia and dissociation. *Psychotherapy and Psychosomatics* 69, 128-131.
- Hawthorne, G., Elliott, P., 2005. Imputing cross-sectional missing data: comparison of common techniques. *Australian and New Zealand Journal of Psychiatry* 39, 583-590.

- Hu, L.T., Bentler, P. M., 1999. Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modelling* 6, 1-55.
- Kagan-Krieger, S., Selby, P., Vohra, S., Koren, G., 2002. Paternal alcohol exposure and Turner syndrome. *Alcohol and Alcoholism* 37, 613-617.
- Kooiman, C. G., Spinhoven, P., Trijsburg, R. W., 2002. The assessment of alexithymia: A critical review of the literature and a psychometric study of the Toronto Alexithymia Scale-20. *Journal of Psychosomatic Research* 53, 1083-1090.
- Lance, C. E., Butts, M. M., Michels, L. C., 2006. The sources of four commonly reported cutoff criteria - What did they really say? *Organizational Research Methods* 9, 202-220.
- Loas, G., Otmani, O., Verrier, A., Fremaux, D., Marchand, M. P., 1996. Factor analysis of the French version of the 20-item Toronto alexithymia scale (TAS-20). *Psychopathology* 29, 139-144.
- Loas, G., Corcos, M., Stephan, P., Pellet, J., Bizouard, P., Venisse, J. L., Perez-Diaz, P., Guelfi, J. D., Flament, M., jeammet, P., 2001. Factorial structure of the 20-item Toronto Alexithymia Scale Confirmatory factorial analyses in nonclinical and clinical samples. *Journal of Psychosomatic Research*, 50, 255-261.
- Lovibond, S. H., Lovibond, P. F., 2002. *Manual for the Depression Anxiety Stress Scales* 2nd edition. Sydney: Psychology Foundation.
- Meganck, R., Vanheule, S., Desmet, M., 2008. Factorial validity and measurement invariance of the 20-item Toronto Alexithymia Scale in clinical and nonclinical samples. *Assessment* 15, 36-47.
- Mueller, J., Buehner, M., Ellgring, H., 2003. Is there a reliable factorial structure in the 20-item Toronto Alexithymia Scale? A comparison of factor models in clinical and normal adult samples. *Journal of Psychosomatic Research* 55, 561-568.

- Nemiah, J. C., Freyberger, H., Sifneos, P. E., 1976. Alexithymia: a view of the psychosomatic process. In: Hill, O., (Ed.), *Modern Trends in Psychosomatic Medicine*. Butterworths, London, Vol. 3. pp. 430-439.
- Pokorny, A. D., Miller, B. A., Kaplan, H. B., 1972. The brief MAST: A shortened version of the Michigan Alcoholism Screening Test. *American Journal of Psychiatry* 129, 342-345.
- Saunders, J. B., Aasland, O. G., Babor, T. F., Delafuente, J. R., Grant, M., 1993. Development of the Alcohol Use Disorders Identification Test (Audit): Who Collaborative Project on Early Detection of Persons with Harmful Alcohol-Consumption-II. *Addiction* 88, 791-804.
- Selzer, M. L., 1971. The Michigan Alcoholism Screening Test: The quest for a new diagnostic instrument. *American Journal of Psychiatry* 127, 1653-1658.
- Sifneos, P. E., 1996. Alexithymia: Past and Present. *American Journal of Psychiatry* 153, 137-142.
- Steiger, J. H., 1990. Structural model evaluation and modification: An interval estimation approach. *Multivariate Behavioral Research* 25, 173-180.
- Stevens, J., 1996. Confirmatory and exploratory factor analysis. In: Stevens, J., (Ed.), *Applied Multivariate Statistics for the Social Sciences* 3rd ed. Lawrence Erlbaum, Mahwah, pp. 362-427.
- Tanaka, J. S., 1993. Multifaceted conceptions of fit in structural equations models. In: Bollen, K. A., Long, J. S., (Eds.), *Testing Structural Equation Models*. Sage, London, pp. 10-39.
- Thorberg, F. A., Young, R. M., Sullivan, K. A., Lyvers, M., 2009. Alexithymia and alcohol use disorders: A critical review. *Addictive Behaviors* 34, 237-245.

Ullman, J. B. (2001). Structural equation modelling. In: Tabachnick, B. G., Fidell, L. S., (Eds.), Using multivariate statistics 4th ed. Allyn & Bacon/Pearson Education, Boston, pp. 653-771.

Vorst, H. C. M., Bermond, B., 2001. Validity and reliability of the Bermond-Vorst Alexithymia Questionnaire. *Personality and Individual Differences* 30, 413-434.

Table 1. Factor loadings for the 3-factor model

Item	DIF	DDF	EOT
1	0.68		
3	0.44		
6	0.68		
7	0.57		
9	0.73		
13	0.78		
14	0.70		
2		0.77	
4		0.31	
11		0.76	
12		0.57	
17		0.62	
5			0.13*
8			-0.52*
10			-0.11*
15			-0.63*
16			-0.45*
18			0.11*
19			0.05*
20			-0.59*

\*  $p > 0.05$