2018

Assessing alexithymia: Psychometric properties and factorial invariance of the 20-item Toronto Alexithymia Scale in nonclinical and psychiatric samples

David Preece
Edith Cowan University

Rodrigo Becerra
Edith Cowan University

Ken Robinson
Edith Cowan University

Justine Dandy
Edith Cowan University

Follow this and additional works at: <https://ro.ecu.edu.au/ecuworkspost2013>

Part of the [Personality and Social Contexts Commons](#)

[10.1007/s10862-017-9634-6](https://ro.ecu.edu.au/ecuworkspost2013/3697)

This is a post-peer-review, pre-copyedit version of an article published as: Preece, D., Becerra, R., Robinson, K., & Dandy, J. (2017). Assessing alexithymia: Psychometric properties and factorial invariance of the 20-Item Toronto alexithymia scale in nonclinical and psychiatric samples. *Journal of Psychopathology and Behavioral Assessment*, 40. 276-287. The final authenticated version is Available online [here](#).

This Journal Article is posted at Research Online.

<https://ro.ecu.edu.au/ecuworkspost2013/3697>

Assessing Alexithymia: Psychometric Properties and Factorial Invariance of the 20-item
Toronto Alexithymia Scale in Nonclinical and Psychiatric Samples

David A. Preece¹, Rodrigo Becerra², Ken Robinson¹, Justine Dandy¹

¹Edith Cowan University, Perth, Australia

²The University of Western Australia, Perth, Australia

Abstract

The 20-item Toronto Alexithymia Scale (TAS-20) is a self-report questionnaire designed to measure the three components of alexithymia; difficulty identifying feelings in the self (DIF), difficulty describing feelings (DDF), and externally orientated thinking (EOT). We examined the scale's psychometric properties in Australian nonclinical ($N=428$) and psychiatric ($N=156$) samples. In terms of factorial validity, confirmatory factor analyses found the traditional 3-factor correlated model (DIF, DDF, EOT) to be the best and most parsimonious solution, but it did not reach adequate levels of goodness-of-fit in either sample. Several EOT items loaded poorly on their intended factor, and a reverse-scored item method factor was present; the factor structure of the scale was invariant across both samples. A higher-order factor model (with a single higher-order factor) was slightly inferior to the correlated models, but still tenable. The total scale score and DIF and DDF subscales displayed sound internal consistency, but the EOT subscale did not. We conclude that the TAS-20 has, for the most part, adequate psychometric properties, though interpretation should focus only on the total scale score and DIF and DDF subscales; we recommend the EOT subscale score not be used. Implications for clinical use and future revision of the scale are discussed.

Assessing alexithymia: Psychometric properties and factorial invariance of the 20-item Toronto Alexithymia Scale in nonclinical and psychiatric samples

Alexithymia (coined from the Greek, *a* = lack, *lexis* = words, *thymos* = feeling) is a trait involving difficulties in the cognitive processing of emotions (Nemiah & Sifneos, 1970; Nemiah, 1984; Sifneos, 1973; Sifneos, 1996). Contemporary theorists define it as multidimensional construct, comprised of three interrelated (positively correlated) components: difficulty identifying feelings in the self (DIF); difficulty describing feelings (DDF); and an externally orientated thinking style (EOT) whereby one tends to not focus their attention on their emotions.¹¹ In other words, people with high levels of alexithymia rarely pay *attention* to their emotional states (EOT) and have difficulty accurately *appraising* what those states are (DIF, DDF) (Preece et al., 2017). Such difficulties are understood to result from underdeveloped emotion schemas (Bucci, 1997; Lane & Schwartz, 1987; Preece et al., 2017) and the habitual use of experiential avoidance as an emotion regulation strategy (Bilotta et al., 2015; Coriale et al., 2012; Panayiotou et al., 2015; Preece et al., 2017).

The trait is normally distributed in the general population (Mattila et al., 2010; Parker et al., 2008) and is of substantial interest to psychiatry. High levels of alexithymia are an important transdiagnostic risk factor for a range of psychopathologies (Taylor et al., 1999) and have been found to reduce the efficacy of some psychotherapy approaches (Leweke, Bausch, Leichsenring, Walter, & Stingl, 2009). The assessment of alexithymia is, hence, of import. Several psychometric tools have been developed for this purpose (for a review, see

¹¹ Some authors disagree with respect to how alexithymia should be defined, positing that difficulty fantasising or reduced emotional reactivity might also be components of the construct (e.g., Vorst & Bermond, 2001). Most empirical work has, however, suggested that the latent structure of the construct is comprised of only DIF, DDF and EOT (for a review, see Preece et al., 2017). We, hence, follow this empirically informed three-component definition when defining alexithymia in this paper. These are the three components that the TAS-20 is designed to assess (Bagby et al., 1994), and this is how alexithymia is defined within the *attention-appraisal model of alexithymia* (Preece et al., 2017).

Bermond et al., 2015), with the most widely used being a self-report questionnaire, the 20-item Toronto Alexithymia Scale (TAS-20; Bagby et al., 1994).

The TAS-20 has 20 items designed to measure the three components of alexithymia (DIF, 7 items; DDF, 5 items; EOT, 8 items). Each item is comprised of a statement which respondents rate on a 5-point Likert scale. Standard scoring involves the calculation of a subscale score for DIF, DDF and EOT, and the summation of all items into a total scale score as a marker of overall alexithymia. Higher scores indicate higher levels of alexithymia. Five items (four EOT items and one DDF item) are reverse-scored by the examiner because their content describes a low level of alexithymia.

Although there is a growing body of literature examining the psychometric properties of the TAS-20, we consider that five key issues remain unresolved. (1) It is unclear whether the factor structure of the scale is best represented by three or four first-order factors. (2) TAS-20 total and subscale scores are often compared across nonclinical and psychiatric groups, for such comparisons to be meaningful it must be demonstrated that the factor structure of the TAS-20 is invariant across these populations (Cheung & Rensvold, 1999), but little research has examined the factorial invariance of the scale. (3) The calculation of a total scale score assumes that the first-order factors (subscales) of the TAS-20 load meaningfully together onto a single higher-order factor (Brown, 2014), but few studies have examined whether this is the case. We also have some concerns about (4) the content validity of several EOT items and (5) the often low internal consistency of the EOT subscale. To determine the adequacy of the TAS-20 as a measure of alexithymia these issues require further examination.

The purpose of this study is to provide clarity on these five issues by examining the psychometric properties of the TAS-20 in nonclinical and psychiatric populations. In the remainder of this introduction, we firstly critique the *content validity* of the TAS-20 and then

summarise the existing psychometric literature with respect to the *factor structure, concurrent/criterion validity, and internal consistency reliability* of the scale. **Content validity**

Our view of the content validity of the TAS-20 is that whilst all the DIF and DDF items appear satisfactory, only three of the eight EOT items appear to be satisfactory. We consider all the DIF and DDF items to have satisfactory content validity because they all reference one's ability to recognise, differentiate, or communicate internal feelings. Likewise, we consider three of the eight EOT items to have satisfactory content validity because these three items reference one's tendency to focus attention on their emotions, and this what we (Preece et al., 2017) and others (e.g., Vorst & Bermond, 2001) consider to be the core of EOT. The other five EOT items, however, we consider potentially problematic, because they do not share this same emphasis. Namely, EOT item 16 and item 20 concern one's preference for different entertainment genres or an aversion to analysing entertainment shows too closely, whereas EOT item 5 and item 8 refer to a tendency to analyse everyday events, and item 18 is about one's capacity to form close interpersonal relationships. Thus, although some of these five EOT items mention emotion related phenomena, they seem to move away from the theoretical definition of EOT.

Factor structure

Several items of the EOT subscale have, indeed, been found to load poorly (factor loading < .40) on their intended latent factor in most factor analytic work (e.g., items 8, 10, 15, 16, and 20 in Bagby et al., 1994; items 5, 8, 16 and 20 in Koch et al., 2015; items 8, 18, 19 and 20 in Meganck et al., 2008). Nonetheless, in line with the theoretical structure of the alexithymia construct, most early studies (e.g., Bach, Bach, De Zwaan, Serim, & Böhmer, 1996; Bagby et al., 1994; Bressi et al., 1996; Loas et al., 2001; Pandey, Mandal, Taylor, & Parker, 1996) found that the scale conformed to a correlated 3-factor structure (comprised of

positively correlated DIF, DDF, and EOT factors) when assessed via exploratory or confirmatory factor analyses. The overall goodness-of-fit of this 3-factor correlated model has often been adequate across nonclinical and psychiatric samples, but results have been equivocal, with some later studies finding inadequate levels of fit (Cleland, Magura, Foote, Rosenblum, & Kosanke, 2005; Haviland & Reise, 1996; Koch et al., 2015; Kooiman et al., 2002; Mattila et al., 2010; Thorberg et al., 2010; Watters, Taylor, Ayearst, & Bagby, 2016; Zech et al., 1999) or finding an alternate 2-factor correlated model or 4-factor correlated model to be superior.

The alternate 2-factor correlated model (DIF/DDF, EOT) was endorsed by Kooiman et al. (2002), Erni, Lötscher and Modestin (1997), and Loas, Otmani, Verrier, Fremaux and Marchand (1996) on the basis of their EFA results showing that the DIF and DDF items loaded on the same factor. The use of EFA is, however, considered less appropriate than CFA when a clear hypothesis about factor structure is present (Fabrigar, Wegener, MacCallum, & Strahan, 1999), and when CFA has been used, the 3-factor correlated model (DIF, DDF, EOT) has always been found to be superior to the 2-factor correlated model (see e.g., Meganck et al., 2008; Zhu et al., 2007); hence there is little psychometric support for the 2-factor correlated model. More convincing evidence is emerging, though, for a 4-factor correlated model (DIF, DDF, PR, IM) where the EOT factor is split into separate pragmatic thinking (PR, 3 items) and lack of importance of emotions (IM, 5 items) factors. The distinction between PR and IM roughly corresponds to a separation between those EOT items which directly reference emotions (IM) and those that do not (PR).

Six CFA studies have directly assessed this 4-factor correlated model (Gignac et al., 2007; Meganck et al., 2008; Müller, Bühner, & Ellgring, 2003; Tsaousis et al., 2010; Watters,

Taylor, Ayearst, & Bagby, 2016; Zhu et al., 2007).¹² In nonclinical samples, four out of six studies supported the 4-factor correlated model over the 3-factor correlated model (Gignac et al., 2007; Muller et al., 2003; Watters, Taylor, Ayearst, & Bagby, 2016; Zhu et al., 2007), but in clinical samples the 4-factor correlated model has only been supported in one out of three studies (Muller et al., 2003). Thus the psychiatric status of the sample might influence the factor structure obtained; a distinction between PR and IM may be more common in nonclinical samples. Only one study has, however, formally examined the factorial invariance of the TAS-20 across nonclinical and psychiatric samples (Meganck et al., 2008); in this study, it was found that the 3-factor correlated model was *partially* invariant across Belgian nonclinical and psychiatric samples, with only one item varying.

Of note, in all but two of the abovementioned studies (Gignac et al., 2007; Meganck et al., 2008) the higher-order factor structure of the TAS-20 was not examined. This trend is unfortunate, as researchers using the TAS-20 frequently use only the total scale score (e.g., McGillivray, Becerra, & Harms, 2017) and the summing of the subscales into a total scale score assumes that all subscales (first-order factors) load meaningfully on a single higher-order factor. This assumption must therefore be confirmed statistically before the total scale score can be used confidently (Brown, 2014). Promisingly though, in the two studies to examine a 3-factor higher-order model (where the DIF, DDF and EOT first-order factors were specified to load onto a single higher-order factor) the results offered tentative support for the presence of a higher-order factor (Gignac et al., 2007; Meganck et al., 2008). Further studies are needed, however, to establish the suitability of deriving a total scale score across various populations.

Some authors have also recently begun to examine whether a reverse-scored item

¹² In one of these studies, Gignac et al. (2007), the 4-factor correlated model was assessed as part of a bifactor model, with a general alexithymia factor also included in the model loading on all the items.

method factor might be present in the TAS-20. This has been motivated by findings within the general psychometric literature whereby reverse-scored items in self-report scales are often found to have a problematic influence on factor structure (e.g., van Sonderen, Sanderman, & Coyne, 2013). Such an influence is, typically, tested via CFA whereby an additional factor (a method factor) is specified in the model. To date, four CFA studies have used this approach with the TAS-20 (Meganck et al., 2008; Mattila et al., 2010; Watters, Taylor, Ayearst, & Bagby, 2016; Gignac et al., 2007), with a majority finding a prominent method effect. Because most of the TAS-20's reverse-scored items are concentrated in the EOT subscale (four reverse-scored items), some authors have subsequently speculated that this method effect may be the cause of the EOT subscale's low internal consistency (e.g., Meganck et al., 2008). To date, however, no studies have examined the internal consistency of the EOT subscale when the reverse-scored items are excluded.

Concurrent and criterion validity

Though there are concerns about some aspects of the TAS-20's internal psychometrics, the scale as a whole does still seem to measure a variable relevant to psychopathology (Taylor & Bagby, 2004). The TAS-20 total scale can discriminate between psychiatric and nonclinical populations (e.g., McGillivray et al., 2017), and is strongly associated with self-reported psychological distress (e.g., Leising et al., 2009) and emotion regulation difficulties (e.g., Swart et al., 2009). The TAS-20 also correlates highly with other measures of alexithymia, and displays evidence of convergent and discriminant validity at a subscale level (e.g., Bagby et al., 2006; Preece et al., 2017; Vorst & Bermond, 2001). Preece et al. (2017), for example, found in a nonclinical sample that the TAS-20 EOT subscale score correlated highly with other self-report measures of EOT (namely, subscales of the Bermond-Vorst Alexithymia Questionnaire [BVAQ; Vorst & Bermond, 2001] and the Difficulties in Emotion Regulation Scale [DERS; Gratz & Roemer, 2004]) and, in factor analysis, loaded on

the same underlying factor as these other EOT measures. Some of the variance in the TAS-20 EOT subscale score does therefore appear to capture its intended construct.

Internal consistency reliability

In almost all studies, however, the internal consistency reliability of the EOT subscale has been below .70 and is frequently below .60 (e.g., Cleland et al., 2005; Kooiman et al., 2002; Loas et al., 2001; Taylor et al., 2003; Thorberg et al., 2010; but see Parker, Taylor, & Bagby, 2003), indicating that more than 50% of the variance in this subscale score is usually attributable to error variance. Most psychometricians agree that the reliability coefficient of a scale score must be at least .70 for it to be useful for research purposes, and ideally around .90 if it is to be used in clinical decision making (e.g., Groth-Marnat, 2009). Hence, whilst the TAS-20 total scale score and DIF and DDF subscales have regularly met these standards, the EOT subscale has not (for a review, see Kooiman et al., 2002). We know of one study that has reported on the reliability of the EOT subscale when it is split into PR and IM subscales, and in this instance, the PR and IM subscales also had poor internal consistency ($\alpha \leq .56$; Muller et al., 2003).

Purpose of the present study

To clarify the psychometric strengths and limitations of the TAS-20, the purpose of this study is to comprehensively examine the factor structure, factorial invariance and internal consistency of the TAS-20 across nonclinical and psychiatric samples.

Method

Participants and procedure

All participants were English speaking and current residents of Australia.

Nonclinical sample. The nonclinical sample was comprised of 428 adults (60.5% female) with an average age of 41.62 ($SD = 16.77$, range = 18-83). The distribution of educational attainment within this sample was, roughly, similar to that of the Australian

population as a whole (Australian Bureau of Statistics, 2016). For 30.4% their highest level of completed education was high school, for 36% it was a technical diploma, and for 33.4% it was a university degree. Under one quarter of the participants (21.5%) were currently studying at university. The nonclinical sample completed the TAS-20 as part of a battery of psychological questionnaires administered via an anonymous online survey. Participants were recruited via three avenues: an online survey recruiting company (Qualtrics panels), an advertisement placed on a social media website, or an advertisement placed on the unit website of an undergraduate psychology course.¹³ Some additional participants ($n = 47$, recruited in the same manner) also completed the survey, but their data was excluded during quality screening because they failed at least one of three attention check questions and/or completed the survey impossibly quickly (suggesting inattentive responding). Participants in the nonclinical sample were required to complete all items in order to submit the online survey, hence there were no missing items.

Psychiatric sample. The psychiatric sample was comprised of 156 adults. These patients had been diagnosed (by a psychiatrist) with a psychiatric disorder using the ICD-10 and were attending an outpatient group psychotherapy program at Fremantle hospital in Western Australia. In terms of primary diagnosis, the most common ICD-10 diagnostic category was mood (affective) disorders (F30-F39; 49.4%), then neurotic, stress related and somatoform disorders (F40-F49; 26.9%), disorders of adult personality and behaviour (F60-F69; 14.1%), schizophrenia, schizotypal and delusional disorders (F20-F29; 6.4%), and behavioural syndromes associated with physiological disturbances and physical factors (F50-F59; 0.6%). Diagnostic information was unavailable for 2.6% of the patients. Compared to the nonclinical sample, the proportion of females was slightly higher in the psychiatric

¹³ Some undergraduate students were included in the nonclinical sample in order to (1) increase the size of the sample and (2) make the distribution of age and gender in the nonclinical sample closer to that of the psychiatric sample.

sample (71.2%) and the average age was slightly lower ($M = 41.10$, $SD = 12.17$, range = 18-66). The proportion of university graduates was also lower in this sample (22.4%); for 50% high school was their highest level of completed education, and for 18.6% it was a technical diploma. Prior to the completion of their first group psychotherapy session, patients completed the TAS-20 as part of a battery of psychological questionnaires. Completion of the scale was supervised by a clinical psychologist. Some additional patients ($n = 19$, recruited in the same manner) also completed the TAS-20, but did not complete enough items for their data to be used (data were missing for more than one item in a subscale, or more than two items overall; G. Taylor, personal communication, 28 April, 2016). Of the 156 patients remaining in the sample, 18 had an acceptable level of missing data and missing items were replaced using the expectation maximisation method (Gold & Bentler, 2000).

Materials

20-item Toronto Alexithymia Scale. The TAS-20 (Bagby et al., 1994) is a 20-item measure of alexithymia. Items are intended to correspond to three subscales; DIF (7 items, e.g., “I am often confused about what emotion I am feeling”), DDF (5 items, e.g., “It is difficult for me to find the right words for my feelings”), and EOT (8 items, e.g., “Being in touch with emotions is essential” [reverse-scored]). All items are also summed into a total scale score as a marker of overall alexithymia. Each item is comprised of a statement that respondents score on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Higher scores indicate higher levels of alexithymia. Five items (four of which are in the EOT subscale) are reverse-scored items.

Analysis

CFAs were conducted using AMOS 24, all other analyses used SPSS 24. Item scores for the TAS-20 were reasonably normally distributed in both samples (maximum skewness = 1.05, maximum kurtosis = -1.33).

Factor structure. Using a series of CFAs (maximum likelihood estimation based on a Pearson covariance matrix), we analysed the factor structure of the TAS-20 in the nonclinical and psychiatric samples separately.

In the first phase of our CFA testing, we examined three basic first-order models to determine which first-order structure best represented the TAS-20 (see Figure 6.1). These first-order factor structures were: a 1-factor model (where all items were specified to load onto a single factor), the traditional 3-factor correlated model (where items were specified to load on either a DIF, DDF, or EOT factor), and the 4-factor correlated model (where the EOT factor was split, and items were specified to load on either a DIF, DDF, PR, or IM factor).

The goodness-of-fit of the CFA models was judged based on the pattern of factor loadings and intercorrelations within each model (Marsh et al., 2004), and three fit indices: the comparative fit index (CFI), Tucker-Lewis index (TLI), and root mean square error of approximation (RMSEA). These three fit indices were selected as they are considered to be among the best indicators of model fit (Byrne, 2016). CFI and TLI values $\geq .90$ were judged to indicate acceptable fit, as were RMSEA values $\leq .08$ (Bentler & Bonnet, 1980; Browne & Cudeck, 1992; Marsh et al., 2004). The models were also directly compared using the Akaike information criterion (AIC) and change in CFI. AIC includes a penalty for more complex models, with lower AIC values indicating better levels of fit; a difference between CFI values of $> .01$ also indicates a better fitting model (Byrne, 2016; Cheung & Rensvold, 2002). Factor loadings $\geq .40$ were considered meaningful loadings (Stevens, 1992).

Reverse-scored item method factor. Once the best of these first-order factor models had been determined, we then tested the best model with the addition of a method factor loading on the reverse-scored items. This method factor was specified to be orthogonal to the other first-order factors in the model (see Figure 6.1). Models that include the method factor are denoted with the label ‘+method’.

Higher-order factor. We then examined a higher-order version of the best fitting first-order model. In this higher-order model, the first-order factors were specified to load on a single higher-order factor (see Figure 6.1).

Factorial invariance. The best fitting model for the nonclinical and psychiatric samples was then examined in terms of whether it was invariant across the samples. Following the procedure outlined by Byrne (2016), a baseline *configural model* was firstly tested with no equality constraints imposed; a *measurement model* was then tested with all factor loadings constrained to be equal across the samples; and a *structural model* was tested with all factor loadings and factor covariances constrained to be equal. A difference in CFI of $< .01$ between the configural model and the measurement and structural models was required for the factor structure to be judged as invariant (Cheung & Rensvold, 2002).

Figure 6.1. The assessed confirmatory factor analysis models for the TAS-20. Item error terms are not displayed. Alexi = alexithymia, DIF = difficulty identifying feelings, DDF = difficulty describing feelings, EOT = externally orientated thinking, PR = pragmatic thinking, IM = lack of importance of emotions, method = reverse-scored item method factor.

Internal consistency reliability. Cronbach's alpha reliability coefficients were calculated for both samples. We also calculated Cronbach's alpha for a 15-item version of the scale that had all the reverse-scored items removed. Cronbach's alpha $\geq .70$ was used as the criteria for acceptable levels of reliability (Groth-Marnat, 2009).

Results

Descriptive statistics

Descriptive statistics are displayed in Table 6.1

Table 6.1

Descriptive Statistics and Cronbach's Alpha Reliability Coefficients for the TAS-20 in the Nonclinical and Psychiatric Samples

	Nonclinical sample			Psychiatric sample		
	<i>M</i>	<i>SD</i>	α	<i>M</i>	<i>SD</i>	α
Total scale	47.08	12.36	.87	59.26	12.42	.86
DIF	14.82	6.05	.87	22.93	6.42	.87
DDF	12.75	4.72	.82	15.73	4.39	.74
EOT	19.51	4.73	.64	20.60	4.75	.61

Note. DIF = difficulty identifying feelings, DDF = difficulty describing feelings, EOT = externally orientated thinking.

Factor structure

CFAs of the 1-factor model, 3-factor correlated model, and 4-factor correlated model, indicated that the 3-factor correlated model was the best of the first-order factor solutions in both samples (see Table 6.2).

The 3-factor correlated model was significantly better fitting than the 1-factor model, indicating that the TAS-20 was measuring a multidimensional construct. The 4-factor correlated model offered no advantage over the 3-factor correlated model in either sample, indicating that splitting EOT into IM and PR was unnecessary. The 3-factor correlated model and 4-factor correlated model were roughly equivalent in terms of fit ($\Delta\text{CFI} < .01$), but because the 3-factor correlated model was more parsimonious, it was selected as the best. Factor intercorrelations in the 3-factor correlated model were consistent with the theoretical structure of the alexithymia construct, with the DIF, DDF and EOT factors all being significantly positively correlated (see Table 6.3). However, none of these models reached

acceptable levels of fit. According to RMSEA, the 3-factor correlated model demonstrated marginal levels of fit in the nonclinical sample and acceptable levels of fit in the psychiatric sample, but CFI and TLI indicated very poor levels of fit in both samples. Overall fit was, therefore, deemed to be inadequate. Inspection of factor loadings (see Table 6.4) for the 3-factor correlated model revealed that four items (EOT items 5, 16, 18, 20) had poor loadings in the nonclinical sample, and five items (EOT items 5, 10, 16, 20; DDF item 4) had poor loadings in the psychiatric sample. Most of these items were reverse-scored items.

Reverse-scored item method factor. The addition of the method factor substantially improved the fit of the 3-factor correlated model (see Table 6.2). The 3-factor correlated model+method demonstrated acceptable levels of fit in both samples according to RMSEA, though fit was still unacceptable according to CFI and TLI. Inspection of factor loadings indicated that either four (in the nonclinical sample) or all (in the psychiatric sample) of the reverse-scored items loaded more heavily on the method factor than on their intended alexithymia factor. With the method-factor added, a greater number of items displayed poor loadings on their intended substantive factor (in the nonclinical sample, EOT items 5, 8, 18, 19, and 20; in the psychiatric sample, EOT items 5, 10, 16, 18, 19 and DDF item 4). The size of the positive correlation between the EOT factor and the DIF and DDF factors was also larger in the 3-factor correlated model+method, suggesting that by removing the variance attributable to the method factor, the remaining EOT factor was more closely related to DIF and DDF (see Table 6.3).

As the overall fit of the 3-factor correlated model+method, nonetheless, remained unacceptable we inspected modification indices for further sources of misspecification. In both samples, there was a large covariance between the error terms of two DIF items, items 3 and 7 (both items refer to being confused by physical sensations in the body). Allowing for this error covariance in the model (models including this covariance are denoted by the label

‘+covariance’) substantially improved the fit of the factor solution. The 3-factor correlated model+method+covariance, however, still did not quite reach *globally* acceptable levels of fit. In the nonclinical sample, RMSEA and CFI indicated acceptable fit whilst TLI indicated marginal fit; in the psychiatric sample RMSEA indicated acceptable fit and CFI and TLI indicated marginal fit (see Table 6.2). Ultimately, the poor factor loadings of several EOT items seemed to suppress fit index values.

Higher-order factor. Higher-order versions of the first-order correlated models produced slight decrements in fit in both samples (see Table 6.2). Nonetheless, in the 3-factor higher-order model, the DIF, DDF and EOT factors all loaded highly and significantly on the higher-order factor in both samples (higher-order factor loadings for the nonclinical sample, DIF = .86, DDF = .85, EOT = .61, $ps < .01$; for the psychiatric sample, DIF = .87, DDF = 1.02, EOT = .56, $ps < .01$), and this higher-order model was not substantially worse fitting than the 3-factor correlated model ($\Delta CFI < .01$). Thus, whilst the relationship between DIF, DDF and EOT could not be perfectly accounted for by a single higher-order factor, there did appear to be enough common variance explained by the higher-order factor to support the calculation of a total scale score.

Table 6.2

Goodness-of-Fit Index Values for the Assessed Confirmatory Factor Analysis Models for the Nonclinical and Psychiatric Samples

Model	χ^2 (df)	CFI	TLI	RMSEA (90%CI)	AIC
Nonclinical sample					
First-order models					
1-factor model	1051.313 (170)	.700	.665	.110 (.104-.117)	1131.313
3-factor correlated model	646.768 (167)	.837	.814	.082 (.075-.089)	732.768
4-factor correlated model	641.748 (164)	.837	.812	.083 (.076-.089)	733.748
Models with a method factor					
3-factor correlated model+method	560.157 (162)	.865	.841	.076 (.069-.083)	656.157
3-factor correlated model+method+covariance	456.117 (161)	.900	.881	.066 (.058-.073)	554.117
Higher-order models					
3-factor higher-order model	667.147 (168)	.830	.808	.083 (.077-.090)	751.147
3-factor higher-order model+method	557.780 (163)	.859	.835	.077 (.070-.084)	671.780
3-factor higher-order model+method+covariance	471.329 (162)	.895	.877	.067 (.060-.074)	567.329
Psychiatric sample					
First-order models					
1-factor model	412.591 (170)	.756	.727	.096 (.084-.108)	492.591
3-factor correlated model	337.272 (167)	.829	.805	.081 (.069-.094)	423.272
4-factor correlated model	330.024 (164)	.833	.807	.081 (.068-.093)	422.024
Models with a method factor					
3-factor correlated model+method	286.835 (162)	.874	.853	.071 (.057-.084)	382.835
3-factor correlated model+method+covariance	267.471 (161)	.893	.874	.065 (.051-.079)	365.471
Higher-order models					
3-factor higher-order model	344.529 (168)	.822	.799	.082 (.070-.095)	428.529
3-factor higher-order model+method	290.711 (163)	.872	.850	.071 (.058-.084)	384.711
3-factor higher-order model+method+covariance	271.032 (162)	.890	.871	.066 (.052-.079)	367.032

Note. For all examined models, $\chi^2 p < .001$. CFI = comparative fit index, TLI = Tucker-Lewis index, RMSEA = root mean square error of approximation, AIC = Akaike information criterion, CI = confidence interval.

Table 6.3

For the Nonclinical and Psychiatric Samples, Estimated Factor Intercorrelations for the 3-Factor Correlated Model, the 3-Factor Correlated Model+Method, and the 4-Factor Correlated Model

Model/factor	F1	F2	F3	F4
3-factor correlated model				
F1 DIF	-	.876**	.365**	-
F2 DDF	.727**	-	.605**	-
F3 EOT	.441**	.616**	-	-
3-factor correlated model+method				
F1 DIF	-	.880**	.476**	-
F2 DDF	.760**	-	.660**	-
F3 EOT	.466**	.689**	-	-
4-factor correlated model				
F1 DIF	-	.877**	.542**	.246*
F2 DDF	.727**	-	.612**	.528**
F3 PR	.436**	.496**	-	.815**
F4 IM	.429**	.637**	.878**	-

Note. ** $p < .01$, * $p < .05$. Correlations below the diagonal are for the nonclinical sample, those above the diagonal are for the psychiatric sample. DIF = difficulty identifying feelings, DDF = difficulty describing feelings, EOT = externally orientated thinking, PR = pragmatic thinking, IM = lack of importance of emotions.

Table 6.4

Standardised Factor Loadings for the 3-factor Correlated Model, 4-Factor Correlated Model, and 3-Factor Correlated Model+Method

Factor/ Item	Nonclinical sample			Psychiatric sample		
	3-factor correlated model	4-factor correlated model	3-factor correlated model+method	3-factor correlated model	4-factor correlated model	3-factor correlated model+method
DIF						
1	.766	.766	.741	.770	.770	.769
3	.527	.526	.585	.638	.636	.637
6	.755	.755	.729	.710	.710	.710
7	.647	.647	.714	.606	.608	.605
9	.776	.776	.813	.808	.810	.809
13	.737	.737	.716	.734	.733	.734
14	.673	.672	.654	.639	.636	.640
DDF						
2	.793	.794	.795	.785	.795	.788
4(r)	.687	.690	.638 (.288)	.332	.337	.313 (.340)
11	.738	.736	.751	.719	.712	.722
12	.572	.571	.580	.522	.513	.529
17	.663	.663	.711	.656	.654	.646
EOT or PR						
5(r)	.231	.232	-.006* (.520)	.295	.280	.158* (.356)
8	.490	.565	.374	.493	.551	.492
20	.333	.372	.294	.293	.322	.412
EOT or IM						
10(r)	.637	.631	.400 (.466)	.288	.355	.104* (.423)
15	.439	.451	.429	.580	.528	.677
16	.345	.348	.485	.257	.225	.354
18(r)	.360	.355	.227 (.293)	.559	.618	.373 (.534)
19(r)	.592	.583	.315 (.562)	.476	.518	.259 (.619)

Note. * $p > .05$. Loadings $< .40$ are in boldface. Factor loadings in brackets indicate loadings on the method factor. DIF = difficulty identifying feelings, DDF = difficulty describing feelings, EOT = externally orientated thinking, PR = pragmatic thinking, IM = lack of importance of emotions, r = reverse-scored item.

Factorial invariance. Having established that the 3-factor correlated model+method+covariance was the best fitting model in the nonclinical and psychiatric samples, we then tested the factorial invariance of this model across the two samples.

Compared to the configural model, the measurement model and structural model were not

substantially worse fitting ($\Delta\text{CFI} < .01$); thus, the factor structure of the TAS-20 was invariant across our nonclinical and psychiatric samples (see Table 6.5).

Table 6.5

Factorial Invariance of the 3-Factor Correlated Model+Method+Covariance Across the Nonclinical and Psychiatric Samples

Model	$\chi^2 (df)$	CFI	TLI	RMSEA (90% CI)	AIC
Configural model	723.588 (322)	.898	.879	.046 (.042-.051)	919.588
Measurement model	774.690 (343)	.890	.878	.047 (.042-.051)	928.690
Structural model	775.925 (346)	.891	.880	.046 (.042-.051)	923.925

Note. For all examined models, $\chi^2 p < .001$. In the configural model, no equality constraints were imposed. In the measurement model, all factor loadings were constrained to be equal across the samples. In the structural model, all factor loadings and factor covariances were constrained to be equal across the samples. CFI = comparative fit index, TLI = Tucker-Lewis index, RMSEA = root mean square error of approximation, AIC = Akaike information criterion, CI = confidence interval.

Internal consistency reliability

In both samples, the internal consistency of the TAS-20 total scale score and DIF and DDF subscales was acceptable, however, the EOT subscale had unacceptably low levels of internal consistency (see Table 6.1). Splitting the EOT subscale into PR and IM subscales did not improve its internal consistency (for the nonclinical sample, PR $\alpha = .30$, IM $\alpha = .57$; for the psychiatric sample, PR $\alpha = .33$, IM $\alpha = .54$) nor did the removal of the reverse-scored items (for the nonclinical sample, EOT [four items] $\alpha = .58$; for the psychiatric sample, EOT [four items] $\alpha = .55$).

Discussion

Our purpose in this study was to examine the psychometric properties of the TAS-20 in nonclinical and psychiatric samples. Our findings suggest that the TAS-20 has, for the most part, adequate psychometric properties and operates similarly across these populations, though the EOT subscale and the reverse-scored items appear problematic.

The factor structure of the TAS-20 was broadly consistent with the established theoretical structure of the alexithymia construct (Preece et al., 2017). Out of the examined first-order correlated models, the 3-factor correlated model (DIF, DDF, EOT) was the best and most parsimonious solution in both samples. This finding is consistent with the majority of previous literature (e.g., Bagby et al., 1994; Bressi et al., 1996; Loas et al., 2001; Meganck et al., 2008), though it is inconsistent with some recent studies that endorsed the 4-factor correlated model (DIF, DDF, IM, PR), particularly in nonclinical samples (Gignac et al., 2007; Muller et al., 2003; Watters, Taylor, Ayearst, & Bagby, 2016; Zhu et al., 2007). Earlier we speculated, based on these other recent studies, that the 4-factor correlated model might more commonly emerge in nonclinical (as opposed to psychiatric) samples, but our data suggest that psychiatric status is an inadequate explanation for these differences. Language differences are also an inadequate explanation, as some studies using the same (English) version of the scale have previously supported the 4-factor correlated model (Gignac et al., 2007; Watters, Taylor, Ayearst, & Bagby, 2016). Sample demographics could account for some of these differences, but ultimately we consider our results to highlight that it is, practically speaking, somewhat arbitrary to decide between three and four first-order factors, because the EOT items perform poorly (i.e., exhibit low internal consistency) regardless of whether they are grouped into EOT, PR, or IM subscales (see also, Muller et al., 2003). In turn, whilst the 3-factor correlated model was superior to the one and four factor models in our samples, it failed to reach acceptable levels of goodness-of-fit. These fit issues seemed attributable to two issues; (1) several EOT items had poor factor loadings and (2) a reverse-scored item method factor was present.

Our finding that several EOT items displayed poor factor loadings is not unexpected, as most studies have reported poor factor loadings for multiple EOT items (e.g., Kooiman et al., 2002). Some authors had posited that these issues may be caused by the reverse-scored

nature of half the EOT items (e.g., Meganck et al., 2008), and there was indeed a reverse-scored method factor in our data. The addition of this method factor substantially improved the fit of the 3-factor correlated model in both our samples, and at least four of the reverse-scored items loaded more heavily on the method factor than their intended alexithymia factor. The 3-factor correlated model+method+covariance was invariant across the samples, suggesting that our nonclinical and psychiatric populations were similarly affected by the method factor. The method factor could not, however, fully explain the problems of the EOT subscale, because several non-reverse-scored EOT items also had poor loadings and removing the reverse-scored items did not improve the low internal consistency of this subscale. Of note, when the reverse-scored items were removed, three of the four remaining EOT items were items that we considered to have unsatisfactory content validity. These results are, therefore, in line with our critique of the content validity of the EOT subscale.

That said, consistent with the previous findings of Gignac et al. (2007) and Meganck et al. (2008), the EOT factor, alongside the DIF and DDF factors, did still load meaningfully on a single higher-order factor in our samples. This suggests that some of the variance in the EOT factor score does capture a construct relevant to alexithymia. Ultimately though, similar to previous psychometric investigations (e.g., Kooiman et al., 2002; Meganck et al., 2008; Muller et al., 2003), we found that information garnered about EOT from the TAS-20 is not sufficiently robust. Whilst the TAS-20 total scale score and DIF and DDF subscales had acceptable levels of internal consistency reliability, the internal consistency of the EOT subscale was unacceptably low across both samples. These reliability issues, as aforementioned, were not improved by removing the reverse-scored items, nor were they improved by splitting the EOT subscale into PR and IM.

Implications

It is a concern that across our samples, regardless of the psychiatric status of the

respondent, none of the theoretically informed factor structures for the TAS-20 displayed globally good levels of fit. Even when the method effect is accounted for, the content validity problems of several EOT items appear to suppress fit index values. We, nonetheless, think that the traditional TAS-20 total scale score and DIF and DDF subscales can be used with reasonable confidence; the caveat being that the EOT subscale score is not robust enough to be used in clinical or research settings. Given the poor factor loadings of several EOT items, some scholars might question the wisdom of still including these items within the TAS-20 total scale score. We agree that this is not ideal, however we also think there is enough evidence to support that the TAS-20 total scale score, in its traditional form, still assesses a variable relevant to psychopathology. Namely, as aforementioned, across the literature this total scale score regularly displays good levels of internal consistency (e.g., Taylor et al., 2003), correlates highly with other measures of alexithymia (e.g., Vorst & Bermond, 2001), and discriminates between nonclinical and psychiatric samples (e.g., McGillivray et al., 2017). Additionally, in our samples, whilst the relationship between the DIF, DDF and EOT factors was not perfectly accounted for by the higher-order factor, in our view, the size of the EOT factor's loading on the higher-order factor was still sufficient to support the calculation of a total scale score as a rough estimate of overall alexithymia (Brown, 2014).

The TAS-20, therefore, seems a viable option for examiners wanting to measure *overall* levels of alexithymia via self-report, particularly since alternative measures also have some weaknesses. Whilst the BVAQ (Vorst & Bermond, 2001) and DERS (Gratz & Roemer, 2004), for example, have an advantage over the TAS-20 in that they have EOT subscales with acceptable reliability, the 40-item BVAQ is arguably unnecessarily long and includes 16 items which do not assess DIF, DDF or EOT, and the 36-item DERS is an incomplete measure of alexithymia in that it has no DDF items.

For clinical or research questions requiring the *isolation* of EOT though (e.g., Bankier

et al., 2001; Leweke et al., 2012; Son et al., 2012; Subic-Wrana et al., 2005), the TAS-20 is not appropriate and would need to be administered as part of a larger battery of tests. Our favoured approach for addressing such questions in clinical practice, presently, is to administer the TAS-20 and DERS. The TAS-20 functions as the primary indicator of overall alexithymia and DIF and DDF, whilst the DERS compliments it by providing reliable information about EOT (via the awareness subscale) as well as information about emotion regulation (Gratz & Roemer, 2004; Gross, 2015a). This seems an adequate solution in the short term, but in the long term, such assessments will ideally be streamlined by revising the TAS-20 so as to improve the content validity and reliability of the EOT subscale. These revisions should be done, in our view, by rewriting the EOT items so that they more directly reference one's tendency to focus attention on emotions (Preece et al., 2017). To remove the problematic influence of the method-factor, we further recommend that all TAS-20 items be written so as to not require reverse-scoring (see also, van Sonderen et al., 2013).

Limitations

We think our study makes a strong contribution, but some limitations should be noted. Chiefly, the size of our psychiatric sample was modest, though it was still large enough for the factor analysis to be robust according to widely accepted criteria (Kline, 1979) and was similar to that of other studies (e.g., Meganck et al., 2008). Our results also apply only to adults; further research is needed to examine the psychometrics of the TAS-20 in adolescent populations (e.g., Parker, Eastabrook, Keefer, & Wood, 2010).

Conclusions

Regardless of an adult examinee's psychiatric status, it appears the TAS-20 can be used in its current form as an adequate measure of overall alexithymia and the DIF and DDF components of the construct. The EOT subscale score, however, is not reliable enough to be used in isolation as a marker of EOT. Researchers and clinicians should be aware of this

limitation when interpreting scores from the TAS-20. Future work should focus on revising the EOT items so as to improve the utility of the scale.

References

- Abler, B. & Kessler, H. (2009). Emotion Regulation Questionnaire - Eine deutsche Fassung des ERQ von Gross & John. *Diagnostica*, 55, 144–152.
- Aldao, A., & Christensen, K. (2015). Linking the expanded process model of emotion regulation to psychopathology by focusing on behavioral outcomes of regulation. *Psychological Inquiry*, 26, 27–36.
- Aldao, A., Gee, D. G., De Los Reyes, A., & Seager, I. (2016). Emotion regulation as a transdiagnostic factor in the development of internalizing and externalizing psychopathology: Current and future directions. *Development and Psychopathology*, 28, 927-946.
- Aldao, A., & Nolen-Hoeksema, S. (2010). Specificity of cognitive emotion regulation strategies: A transdiagnostic examination. *Behaviour Research and Therapy*, 48, 974-983.
- Aldao, A., Nolen-Hoeksema, S., & Schweizer, S. (2010). Emotion-regulation strategies across psychopathology: A meta-analytic review. *Clinical Psychology Review*, 30, 217-237.
- Aldao, A., Sheppes, G., & Gross, J. J. (2015). Emotion regulation flexibility. *Cognitive Therapy and Research*, 39, 263–278.
- American Psychiatric Association (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: Author.
- Amodio, D. M., Master, S. L., Yee, C. M., & Taylor, S. E. (2008). Neurocognitive components of the behavioral inhibition and activation systems: Implications for theories of self-regulation. *Psychophysiology*, 45, 11–19.

Australian Bureau of Statistics. (2016). *Education and work, Australia* (no. 6227.0).

Retrieved from <http://www.abs.gov.au/ausstats/abs@.nsf/mf/6227.0>.

Australian Bureau of Statistics. (2017a). *2016 Census Data Summary: Education*

qualifications in Australia. Retrieved from

<http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/2071.02016?OpenDocument>

Australian Bureau of Statistics. (2017b). *2016 Census data summary: Cultural diversity in*

Australia. Retrieved from

<http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/2071.02016?OpenDocument>

Bach, M., Bach, D., De Zwaan, M., Serim, M., & Böhmer, F. (1996). Validation of the German version of the 20-item Toronto alexithymia scale in normal persons and psychiatric patients. *Psychotherapie, Psychosomatik, Medizinische Psychologie*, 46, 23–28.

Bachorowski, J. A., & Braaten, E. B. (1994). Emotional intensity: Measurement and theoretical implications. *Personality and Individual Differences*, 17, 191-199.

Badcock, J. C., Paulik, G., & Maybery, M. T. (2011). The role of emotion regulation in auditory hallucinations. *Psychiatry Research*, 185, 303-308.

Bagby, R. M., Parker, J. D., & 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.

Bagby, R. M., Quilty, L. C., Taylor, G. J., Grabe, H. J., Luminet, O., Verissimo, R., ... Vanheule, S. (2009). Are there subtypes of alexithymia? *Personality and Individual Differences*, 47, 413–418.

- Bagby, R. M., Taylor, G. J., Parker, J. D., & Dickens, S. E. (2006). The development of the Toronto structured interview for alexithymia: Item selection, factor structure, reliability and concurrent validity. *Psychotherapy and Psychosomatics*, 75, 25–39.
- Bagby, R. M., Taylor, G. J., Quilty, L. C., & Parker, J. D. (2007). Reexamining the factor structure of the 20-item Toronto alexithymia scale: Commentary on Gignac, Palmer, and Stough. *Journal of Personality Assessment*, 89, 258–264.
- Bailey, P. E., & Henry, J. D. (2007). Alexithymia, somatization and negative affect in a community sample. *Psychiatry Research*, 150, 13–20.
- Balzarotti, S., Gross, J. J., & John, O. P. (2010). An Italian adaptation of the Emotion Regulation Questionnaire. *European Journal of Psychological Assessment*, 26, 61–67.
- Bankier, B., Aigner, M., & Bach, M. (2001). Alexithymia in DSM-IV disorder: Comparative evaluation of somatoform disorder, panic disorder, obsessive-compulsive disorder, and depression. *Psychosomatics*, 42, 235–240.
- Bardeen, J. R., Fergus, T. A., & Orcutt, H. K. (2012). An examination of the latent structure of the difficulties in emotion regulation scale. *Journal of Psychopathology and Behavioral Assessment*, 34, 382–392.
- Bardeen, J. R., Fergus, T. A., Hannan, S. M., & Orcutt, H. K. (2016). Addressing psychometric limitations of the difficulties in emotion regulation scale through item modification. *Journal of Personality Assessment*, 98, 298–309.
- Barlow, D. H., Farchione, T. J., Bullis, J. R., Gallagher, M. W., Murray-Latin, H., Sauer-Zavala, S., ... & Ametaj, A. (2017). The unified protocol for transdiagnostic treatment of emotional disorders compared with diagnosis-specific protocols for anxiety disorders: A randomized clinical trial. *JAMA Psychiatry*, 74, 875–884.

- Barlow, D. H., Farchione, T. J., Fairholme, C. P., Ellard, K. K., Boisseau, C. L., Allen, L. B., & May, J. T. E. (2010). *Unified protocol for transdiagnostic treatment of emotional disorders: Therapist guide*. New York, NY: Oxford University Press.
- Barrett, L. F. (2009). The future of psychology: Connecting mind to brain. *Perspectives in Psychological Science*, 4, 326–339.
- Barrett, L. F., Gross, J., Christensen, T. C., & Benvenuto, M. (2001). Knowing what you're feeling and knowing what to do about it: Mapping the relation between emotion differentiation and emotion regulation. *Cognition and Emotion*, 15, 713–724.
- Bausch, S., Stingl, M., Hartmann, L. C., Leibing, E., Leichsenring, F., Kruse, J., ... Leweke, F. (2011). Alexithymia and script driven emotional imagery in healthy female subjects: No support for deficiencies in imagination. *Scandinavian Journal of Psychology*, 52, 179–184.
- Becerra, R., & Campitelli, G. (2013). Emotional reactivity: Critical analysis and proposal of a new scale. *International Journal of Applied Psychology*, 3, 161–168.
- Becerra, R., Amos, A., & Jongenelis, S. (2002). Organic alexithymia: A study of acquired emotional blindness. *Brain Injury*, 16, 633–645.
- Becerra, R., Cruise, K., Murray, G., Bassett, D., Harms, C., Allan, A., & Hood, S. (2013). Emotion regulation in bipolar disorder: Are emotion regulation abilities less compromised in euthymic bipolar disorder than unipolar depressive or anxiety disorders? *Open Journal of Psychiatry*, 3, 1–7.
- Becerra, R., Preece, D., Campitelli, G., & Scott-Pillow, G. (2017). The assessment of emotional reactivity across negative and positive emotions: Development and validation of the Perth Emotional Reactivity Scale (PERS). *Assessment*, 1-13. doi: 10.1177/1073191117694455

- Beck, A. T., & Dozois, D. J. (2011). Cognitive therapy: Current status and future directions. *Annual Review of Medicine*, 62, 397-409.
- Bentler, P. M., & Bonett, D. G. (1980). Significance tests and goodness of fit in the analysis of covariance structures. *Psychological Bulletin*, 88, 588–606.
- Berenbaum, H. (1996). Childhood abuse, alexithymia and personality disorder. *Journal of Psychosomatic Research*, 41, 585–595.
- Bermond, B., Clayton, K., Liberova, A., Luminet, O., Maruszewski, T., Ricci Bitti, P. E., & Wicherts, J. (2007). A cognitive and an affective dimension of alexithymia in six languages and seven populations. *Cognition and Emotion*, 21, 1125–1136.
- Bermond, B., Oosterveld, P., & Vorst, H. C. M. (2015). Measures of alexithymia. In G. J. Boyle, D. H. Saklofske, & G. Matthews (Eds.), *Measures of personality and social psychological constructs* (pp. 227–256). San Diego: Academic.
- Bermond, B., Vorst, H. C., Vingerhoets, A. J., & Gerritsen, W. (1999). The Amsterdam alexithymia scale: Its psychometric values and correlations with other personality traits. *Psychotherapy and Psychosomatics*, 68, 241–251.
- Bilotta, E., Giacomantonio, M., Leone, L., Mancini, F., & Coriale, G. (2015). Being alexithymic: Necessity or convenience. Negative emotionality× avoidant coping interactions and alexithymia. *Psychology and Psychotherapy: Theory, Research and Practice*, 89, 261-275.
- Bonanno, G. A., & Burton, C. L. (2013). Regulatory flexibility: An individual differences perspective on coping and emotion regulation. *Perspectives on Psychological Science*, 8, 591–612.
- Boss, A. D., & Sims, H. P. (2008). Everyone fails! Using emotion regulation and self-leadership for recovery. *Journal of Managerial Psychology*, 23, 135-150.

- Boyes, M. E., Carmody, T. M., Clarke, P. J., & Hasking, P. A. (2017). Emotional reactivity and perseverance: Independent dimensions of trait positive and negative affectivity and differential associations with psychological distress. *Personality and Individual Differences, 105*, 70-77.
- Brackett, M. A., Rivers, S. E., & Salovey, P. (2011). Emotional intelligence: Implications for personal, social, academic, and workplace success. *Social and Personality Psychology Compass, 5*, 88-103.
- Bradley, M. M., & Lang, P. J. (2007). The international affective picture system (IAPS) in the study of emotion and attention. In J. A. Coan, & J. J. B. Allen (Eds.). *Handbook of emotion elicitation and assessment* (pp. 29–46). New York, NY: Oxford University Press.
- Bressi, C., Taylor, G., Parker, J., Bressi, S., Brambilla, V., Aguglia, E., et al. (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.
- Brown, T. A. (2007). Temporal course and structural relationships among dimensions of temperament and DSM-IV anxiety and mood disorder constructs. *Journal of Abnormal Psychology, 116*, 313-328.
- Brown, T. A. (2014). *Confirmatory factor analysis for applied research*. New York: Guilford Publications.
- Brown, T. A., Chorpita, B. F., & Barlow, D. H. (1998). Structural relationships among dimensions of the DSM-IV anxiety and mood disorders and dimensions of negative affect, positive affect, and autonomic arousal. *Journal of Abnormal Psychology, 107*, 179-192.
- Browne, M. W., & Cudeck, R. (1992). Alternate ways of assessing model fit. *Sociological Methods & Research, 21*, 230–258.

- Bucci, W. (1997). Symptoms and symbols: A multiple code theory of somatization. *Psychoanalytic Inquiry, 17*, 151–172.
- Bullis, J. R., Sauer-Zavala, S., Bentley, K. H., Thompson-Hollands, J., Carl, J. R., & Barlow, D. H. (2015). The unified protocol for transdiagnostic treatment of emotional disorders: preliminary exploration of effectiveness for group delivery. *Behavior Modification, 39*, 295-321.
- Butler, E. A., Lee, T. L., & Gross, J. J. (2007). Emotion regulation and culture: Are the social consequences of emotion suppression culture-specific? *Emotion, 7*, 30-48.
- Bydlowski, S., Corcos, M., Jeammet, P., Paterniti, S., Berthoz, S., Laurier, C., et al. (2005). Emotional-processing deficits in eating disorders. *International Journal of Eating Disorders, 37*, 321–329.
- Byrne, B. M. (2013). *Structural equation modeling with LISREL, PRELIS, and SIMPLIS: Basic concepts, applications, and programming*. New York, NY: Psychology Press.
- Byrne, B. M. (2016). *Structural equation modeling with AMOS: Basic concepts, applications, and programming*. New York, NY: Routledge.
- Cabello, R., Salguero, J. M., Fernández-Berrocal, P., & Gross, J. J. (2013). A Spanish adaptation of the emotion regulation questionnaire. *European Journal of Psychological Assessment, 29*, 234-240.
- Campbell-Sills, L., & Barlow, D. H. (2007). Incorporating emotion regulation into conceptualizations and treatments of anxiety and mood disorders. In J. J. Gross (Ed.), *Handbook of emotion regulation* (pp. 542–559). New York: Guilford Press.
- Campbell-Sills, L., Ellard, K. K., & Barlow, D. H. (2014). Emotion regulation in anxiety disorders. In J. J. Gross (Ed.), *Handbook of emotion regulation* (pp. 393-412). New York, NY: Guilford Press.

- Campos, A., Chiva, M., & Moreau, M. (2000). Alexithymia and mental imagery. *Personality and Individual Differences*, 29, 787–791.
- Capaldi, D. M., & Rothbart, M. K. (1992). Development and validation of an early adolescent temperament measure. *The Journal of Early Adolescence*, 12, 153-173.
- Caretti, V., Porcelli, P., Solano, L., Schimmenti, A., Bagby, R. M., & Taylor, G. J. (2011). Reliability and validity of the Toronto structured interview for alexithymia in a mixed clinical and nonclinical sample from Italy. *Psychiatry Research*, 187, 432–436.
- Carver, C. S., Scheier, M. F., & Weintraub, J. K. (1989). Assessing coping strategies: A theoretically based approach. *Journal of Personality and Social Psychology*, 56, 267-283.
- Catanzaro, S. J., & Mearns, J. (1990). Measuring generalized expectancies for negative mood regulation: Initial scale development and implications. *Journal of Personality Assessment*, 54, 546–563.
- Cattell, R. B. (1943). The description of personality: Basic traits resolved into clusters. *The Journal of Abnormal and Social Psychology*, 38, 476-506.
- Cattell, R. B. (1963). Theory of fluid and crystallized intelligence: A critical experiment. *Journal of Educational Psychology*, 54, 1-22.
- Chen, F. F., Sousa, K. H., & West, S. G. (2005). Testing measurement invariance of second-order factor models. *Structural Equation Modeling*, 12, 471–492.
doi:10.1207/s15328007sem1203_7
- Cheung, G. W., & Rensvold, R. B. (1999). Testing factorial invariance across groups: A reconceptualization and proposed new method. *Journal of Management*, 25, 1–27.
- Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling*, 9, 233–255.

- Claes, L., Smits, D., & Bijttebier, P. (2014). The Dutch version of the Emotion Reactivity Scale: Validation and relation with various behaviors in a sample of high school students. *European Journal of Psychological Assessment, 30*, 73-79.
- 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.
- Cole, P. M., Michel, M. K., & Teti, L. O. D. (1994). The development of emotion regulation and dysregulation: A clinical perspective. *Monographs of the society for research in child development, 59*, 73-102.
- Comrey, A. L. (1988). Factor-analytic methods of scale development in personality and clinical psychology. *Journal of Consulting and Clinical Psychology, 56*, 754-761.
- Conklin, L. R., Cassiello-Robbins, C., Brake, C. A., Sauer-Zavala, S., Farchione, T. J., Ciraulo, D. A., & Barlow, D. H. (2015). Relationships among adaptive and maladaptive emotion regulation strategies and psychopathology during the treatment of comorbid anxiety and alcohol use disorders. *Behaviour Research and Therapy, 73*, 124-130.
- Connelly, M., & Denney, D. R. (2007). Regulation of emotions during experimental stress in alexithymia. *Journal of Psychosomatic Research, 62*, 649–656.
- Consedine, N. S., & Mauss, I. (2014). Tasks, capacities, and tactics: A skill-based conceptualization of emotion regulation across the lifespan. In P. Verhaeghen & C. Hertzog (Eds.), *The Oxford handbook of emotion, social cognition, and problem solving in adulthood* (pp. 142-154). New York, NY, US: Oxford University Press.
- Cooper, M. L., Frone, M. R., Russell, M., & Mudar, P. (1995). Drinking to regulate positive and negative emotions: A motivational model of alcohol use. *Journal of Personality and Social Psychology, 69*, 990-1005.

- Coriale, G., Bilotta, E., Leone, L., Cosimi, F., Porrari, R., De Rosa, F., & Ceccanti, M. (2012). Avoidance coping strategies, alexithymia and alcohol abuse: A mediation analysis. *Addictive Behaviors, 37*, 1224–1229.
- Costa, P. T., & McCrae, R. R. (1992). Normal personality assessment in clinical practice: The NEO Personality Inventory. *Psychological Assessment, 4*, 5-13.
- Costa, P. T., & McCrae, R. R. (1995). Domains and facets: Hierarchical personality assessment using the Revised NEO Personality Inventory. *Journal of Personality Assessment, 64*, 21-50.
- Costa, P. T., & McCrae, R. R. (2010). *The NEO personality inventory-3*. Odessa, FL: Psychological Assessment Resources.
- Curran, P. J., West, S. G., & Finch, J. F. (1996). The robustness of test statistics to nonnormality and specification error in confirmatory factor analysis. *Psychological Methods, 1*, 16-29.
- Czernecka, K., & Szymura, B. (2008). Alexithymia–imagination–creativity. *Personality and Individual Differences, 45*, 445–450.
- D'Argembeau, A., & Van der Linden, M. (2006). Individual differences in the phenomenology of mental time travel: The effect of vivid visual imagery and emotion regulation strategies. *Consciousness and Cognition, 15*, 342–350.
- D'Avanzato, C., Joormann, J., Siemer, M., & Gotlib, I. H. (2013). Emotion regulation in depression and anxiety: examining diagnostic specificity and stability of strategy use. *Cognitive Therapy and Research, 37*, 968-980.
- Davidson, R. J. (1998). Affective style and affective disorders: Perspectives from affective neuroscience. *Cognition and Emotion, 12*, 307–330.

- Davidson, R. J. (2015). Comment: Affective chronometry has come of age. *Emotion Review*, 7, 368-370.
- Davis, M. H. (1983). Measuring individual differences in empathy: Evidence for a multidimensional approach. *Journal of Personality and Social Psychology*, 44, 113–126.
- De France, K., & Hollenstein, T. (2017). Assessing emotion regulation repertoires: The regulation of emotion systems survey. *Personality and Individual Differences*, 119, 204–215.
- de Timary, P., Luts, A., Hers, D., & Luminet, O. (2008). Absolute and relative stability of alexithymia in alcoholic inpatients undergoing alcohol withdrawal: Relationship to depression and anxiety. *Psychiatry Research*, 157, 105–113.
- Diaz, A., & Eisenberg, N. (2015). The process of emotion regulation is different from individual differences in emotion regulation: Conceptual arguments and a focus on individual differences. *Psychological Inquiry*, 26, 37–47.
- Duddu, V., Isaac, M. K., & Chaturvedi, S. K. (2003). Alexithymia in somatoform and depressive disorders. *Journal of Psychosomatic Research*, 54, 435–438.
- du Pont, A., Welker, K. Gilbert, K. E., & Gruber, J. (2016). The emerging field of positive emotion dysregulation. In K. D. Vohs & R. F. Baumeister (Eds.), *Handbook of self-regulation: Research, theory and applications* (pp. 364-379). New York, NY: Guilford Press.
- Eastabrook, J. M., Lanteigne, D. M., & Hollenstein, T. (2013). Decoupling between physiological, self-reported, and expressed emotional responses in alexithymia. *Personality and Individual Differences*, 55, 978–982.

- Edwards, E. R., & Wupperman, P. (2017). Emotion regulation mediates effects of alexithymia and emotion differentiation on impulsive aggressive behavior. *Deviant Behavior, 38*, 1160–1171.
- Edwards, E., Shivaji, S., & Wupperman, P. (2018). The emotion mapping activity: Preliminary evaluation of a mindfulness-informed exercise to improve emotion labeling in alexithymic persons. *Scandinavian Journal of Psychology, 1*–9. <http://dx.doi.org/10.1111/sjop.12438>.
- Edwards, E. R., & Wupperman, P. (2017). Emotion regulation mediates effects of alexithymia and emotion differentiation on impulsive aggressive behavior. *Deviant Behavior, 38*, 1160–1171.
- Ehring, T., & Quack, D. (2010). Emotion regulation difficulties in trauma survivors: The role of trauma type and PTSD symptom severity. *Behavior Therapy, 41*, 587–598.
- Eisenberg, N., Fabes, R. A., Guthrie, I. K., & Reiser, M. (2000). Dispositional emotionality and regulation: their role in predicting quality of social functioning. *Journal of Personality and Social Psychology, 78*, 136–157.
- Eisenberg, N., Hofer, C., Sulik, M. J., & Spinrad, T. L. (2014). Self-regulation, effortful control, and their socioemotional correlates. In J. J. Gross (Ed.). *Handbook of emotion regulation* (pp. 157–172). New York: Guilford Press.
- Ekman, P., & Friesen, W. V. (1971). Constants across cultures in the face and emotion. *Journal of Personality and Social Psychology, 17*, 124–129.
- Ellard, K. K., Fairholme, C. P., Boisseau, C. L., Farchione, T. J., & Barlow, D. H. (2010). Unified protocol for the transdiagnostic treatment of emotional disorders: Protocol development and initial outcome data. *Cognitive and Behavioral Practice, 17*, 88–101.

- English, T., & John, O. P. (2013). Understanding the social effects of emotion regulation: The mediating role of authenticity for individual differences in suppression. *Emotion, 13*, 314-329.
- Erni, T., Lötscher, K., & Modestin, J. (1997). Two-factor solution of the 20-Item Toronto alexithymia scale confirmed. *Psychopathology, 30*, 335–340.
- Etkin, A., Büchel, C., & Gross, J. J. (2015). The neural bases of emotion regulation. *Nature Reviews Neuroscience, 16*, 693-700.
- Evers, C., Hopp, H., Gross, J. J., Fischer, A. H., Manstead, A. S., & Mauss, I. B. (2014). Emotion response coherence: A dual-process perspective. *Biological Psychology, 98*, 43–49.
- Eysenck, H. J. (1991). Dimensions of personality: 16, 5 or 3?—Criteria for a taxonomic paradigm. *Personality and Individual Differences, 12*, 773-790.
- Fabrigar, L. R., Wegener, D. T., MacCallum, R. C., & Strahan, E. J. (1999). Evaluating the use of exploratory factor analysis in psychological research. *Psychological Methods, 4*, 272–299.
- Fairholme, C. P., Boisseau, C. L., Ellard, K. K., Ehrenreich, J. T., & Barlow, D. H. (2010). Emotions, emotion regulation, and psychological treatment: A unified perspective. In A. M. King, & D. M. Sloan (Eds.). *Emotion regulation and psychopathology: A transdiagnostic approach to etiology and treatment* (pp. 283–309). New York, NY: Guilford.
- Farchione, T. J., Fairholme, C. P., Ellard, K. K., Boisseau, C. L., Thompson-Hollands, J., Carl, J. R., ... & Barlow, D. H. (2012). Unified protocol for transdiagnostic treatment of emotional disorders: A randomized controlled trial. *Behavior Therapy, 43*, 666-678.

- Fernandes, B. S., Williams, L. M., Steiner, J., Leboyer, M., Carvalho, A. F., & Berk, M. (2017). The new field of 'precision psychiatry'. *BMC medicine*, 15, 80.
- Folkman, S., & Lazarus, R. S. (1980). An analysis of coping in a middle-aged community sample. *Journal of Health and Social Behavior*, 219–239.
- Foran, H. M., & O'Leary, K. D. (2013). The role of relationships in understanding the alexithymia–depression link. *European Journal of Personality*, 27, 470–480.
- Fox, H. C., Axelrod, S. R., Paliwal, P., Sleeper, J., & Sinha, R. (2007). Difficulties in emotion regulation and impulse control during cocaine abstinence. *Drug and Alcohol Dependence*, 89, 298–301.
- Fox, H. C., Hong, K. A., & Sinha, R. (2008). Difficulties in emotion regulation and impulse control in recently abstinent alcoholics compared with social drinkers. *Addictive Behaviors*, 33, 388–394.
- Fraley, R. C., Heffernan, M. E., Vicary, A. M., & Brumbaugh, C. C. (2011). The Experiences in Close Relationships—Relationship Structures Questionnaire: A method for assessing attachment orientations across relationships. *Psychological Assessment*, 23, 615–625.
- Friedlander, L., Lumley, M. A., Farchione, T., & Doyal, G. (1997). Testing the alexithymia hypothesis: Physiological and subjective responses during relaxation and stress. *The Journal of Nervous and Mental Disease*, 185, 233–239.
- Fukunishi, I., Yoshida, H., & Wogan, J. (1998). Development of the alexithymia scale for children: A preliminary study. *Psychological Reports*, 82, 43–49.
- Garnefski, N., & Kraaij, V. (2007). The cognitive emotion regulation questionnaire. *European Journal of Psychological Assessment*, 23, 141–149.

- Gerbing, D. W., & Anderson, J. C. (1984). On the meaning of within-factor correlated measurement errors. *Journal of Consumer Research*, 11, 572-580.
- Gerbing, D. W., & Anderson, J. C. (1988). An updated paradigm for scale development incorporating unidimensionality and its assessment. *Journal of Marketing Research*, 25, 186-192.
- Gignac, G. E., Palmer, B. R., & Stough, C. (2007). A confirmatory factor analytic investigation of the TAS-20: Corroboration of a five-factor model and suggestions for improvement. *Journal of Personality Assessment*, 89, 247-257.
- Gilbert, K. E., Nolen-Hoeksema, S., & Gruber, J. (2013). Positive emotion dysregulation across mood disorders: How amplifying versus dampening predicts emotional reactivity and illness course. *Behaviour Research and Therapy*, 51, 736-741.
- Giuliani, N. R., & Berkman, E. T. (2015). Craving is an affective state and its regulation can be understood in terms of the extended process model of emotion regulation. *Psychological Inquiry*, 26, 48-53.
- Glenn, C. R., & Klonsky, E. D. (2009). Emotion dysregulation as a core feature of borderline personality disorder. *Journal of Personality Disorders*, 23, 20-28.
- Gold, M. S., & Bentler, P. M. (2000). Treatments of missing data: A Monte Carlo comparison of RBHDI, iterative stochastic regression imputation, and expectation maximization. *Structural Equation Modeling*, 7, 319-355.
- Goldberg, D. P., Krueger, R. F., Andrews, G., & Hobbs, M. J. (2009). Emotional disorders: Cluster 4 of the proposed meta-structure for DSM-V and ICD-11: Paper 5 of 7 of the thematic section: 'A proposal for a meta-structure for DSM-V and ICD-11'. *Psychological Medicine*, 39, 2043-2059.

- Goldin, P. R., & Gross, J. J. (2010). Effects of mindfulness-based stress reduction (MBSR) on emotion regulation in social anxiety disorder. *Emotion, 10*, 83-91.
- Goleman, D., Boyatzis, R., & McKee, A. (2013). *Primal leadership: Realizing the power of emotional intelligence*. Boston, MA, US: Harvard Business School Press.
- Golena, N. (2014). *The relation between alexithymia and the vividness of memories during the recall of sad memories* (Bachelor's thesis). Enschede, Netherlands: University of Twente.
- Gori, A., Giannini, M., Palmieri, G., Salvini, R., & Schuldberg, D. (2012). Assessment of alexithymia: Psychometric properties of the psychological treatment inventory-alexithymia scale (PTI-AS). *Psychology, 3*, 231-236.
- Gorsuch, R. L. (1983). *Factor analysis*. Hillsdale, NJ: Erlbaum.
- Grabe, H. J., Löbel, S., Dittrich, D., Bagby, R. M., Taylor, G. J., Quilty, L. C., & Freyberger, H. J. (2009). The German version of the Toronto Structured Interview for Alexithymia: Factor structure, reliability, and concurrent validity in a psychiatric patient sample. *Comprehensive Psychiatry, 50*, 424–430.
- Grandey, A. A. (2000). Emotional regulation in the workplace: A new way to conceptualize emotional labor. *Journal of Occupational Health Psychology, 5*, 95-110.
- Gratz, K. L., & Roemer, L. (2004). Multidimensional assessment of emotion regulation and dysregulation: Development, factor structure, and initial validation of the difficulties in emotion regulation scale. *Journal of Psychopathology and Behavioral Assessment, 26*, 41–54.
- Greenberg, L. S., & Paivio, S. C. (2003). *Working with emotions in psychotherapy*. Guilford Press.
- Gross, J. J. (1998). The emerging field of emotion regulation: An integrative review. *Review of General Psychology, 2*, 271–299.

- Gross, J. J. (2014). Emotion regulation: Conceptual and empirical foundations. In J. J. Gross (Ed.), *Handbook of emotion regulation* (pp. 3–20). New York, NY: Guilford Press.
- Gross, J. J. (2015a). Emotion regulation: Current status and future prospects. *Psychological Inquiry*, 26, 1–26.
- Gross, J. J. (2015b). The extended process model of emotion regulation: Elaborations, applications, and future directions. *Psychological Inquiry*, 26, 130–137.
- Gross, J. J., & Barrett, L. F. (2011). Emotion generation and emotion regulation: One or two depends on your point of view. *Emotion Review*, 3, 8–16.
- Gross, J. J., & Jazaieri, H. (2014). Emotion, emotion regulation, and psychopathology: An affective science perspective. *Clinical Psychological Science*, 2, 387–401.
- Gross, J. J., & John, O. P. (2003). Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology*, 85, 348–362.
- Grossmann, I., Karasawa, M., Kan, C., & Kitayama, S. (2014). A cultural perspective on emotional experiences across the life span. *Emotion*, 14, 679–692.
- Groth-Marnat, G. (2009). *Handbook of psychological assessment*. New York, NY: Wiley.
- Gruber, J. (2011). Can feeling too good be bad? Positive emotion persistence (PEP) in bipolar disorder. *Current Directions in Psychological Science*, 20, 217–221.
- Gruber, J., Eidelman, P., Johnson, S. L., Smith, B., & Harvey, A. G. (2011). Hooked on a feeling: Rumination about positive and negative emotion in inter-episode bipolar disorder. *Journal of Abnormal Psychology*, 120, 956–961.
- Gruber, J., Harvey, A. G., & Gross, J. J. (2012). When trying is not enough: Emotion regulation and the effort–success gap in bipolar disorder. *Emotion*, 12, 997–1003.

- Gruber, J., Harvey, A. G., & Purcell, A. (2011). What goes up can come down? A preliminary investigation of emotion reactivity and emotion recovery in bipolar disorder. *Journal of Affective Disorders*, 133, 457–466.
- Gruber, J., Johnson, S. L., Oveis, C., & Keltner, D. (2008). Risk for mania and positive emotional responding: Too much of a good thing? *Emotion*, 8, 23–33.
- Grynberg, D., Luminet, O., Corneille, O., Grèzes, J., & Berthoz, S. (2010). Alexithymia in the interpersonal domain: A general deficit of empathy? *Personality and Individual Differences*, 49, 845–850.
- Gullone, E., & Taffe, J. (2012). The Emotion Regulation Questionnaire for Children and Adolescents (ERQ-CA): A psychometric evaluation. *Psychological Assessment*, 24, 409–417.
- Han, K., Burns, G. N., Weed, N. C., Hatchett, G. T., & Kurokawa, N. K. (2009). Evaluation of an observer form of the Coping Inventory for Stressful Situations. *Educational and Psychological Measurement*, 69, 675–695.
- Harre, R. (1986). The social constructionist viewpoint. In R. Harre (Ed.), *The social construction of emotions* (pp. 2–14). Oxford, UK: Blackwell.
- Harris, R. (2009). *ACT made simple: An easy-to-read primer on acceptance and commitment therapy*. New Harbinger Publications.
- Haviland, M. G., Hendryx, M. S., Cummings, M. A., Shaw, D. G., & MacMurray, J. P. (1991). Multidimensionality and state dependency of alexithymia in recently sober alcoholics. *The Journal of Nervous and Mental Disease*, 179, 284–290.
- Haviland, M. G., & Reise, S. P. (1996). A California Q-set alexithymia prototype and its relationship to ego-control and ego-resiliency. *Journal of Psychosomatic Research*, 41, 597–607.

- Haviland, M. G., & Reise, S. P. (1996). Structure of the twenty-item Toronto alexithymia scale. *Journal of Personality Assessment*, 66, 116–125.
- Haviland, M. G., Shaw, D. G., MacMurray, J. P., & Cummings, M. A. (1988). Validation of the Toronto Alexithymia Scale with substance abusers. *Psychotherapy and Psychosomatics*, 50, 81–87.
- Haviland, M. G., Warren, W. L., & Riggs, M. L. (2000). An observer scale to measure alexithymia. *Psychosomatics*, 41, 385–392.
- Hayes, S. C., Strosahl, K. D., & Wilson, K. G. (1999). *Acceptance and commitment therapy*. New York: Guilford Press.
- Henry, C., Van den Bulke, D., Bellivier, F., Roy, I., Swendsen, J., M'Bailara, K., ... Leboyer, M. (2008). Affective lability and affect intensity as core dimensions of bipolar disorders during euthymic period. *Psychiatry Research*, 159, 1–6.
- Honkalampi, K., Hintikka, J., Laukkanen, E., & Viinamäki, J. L. H. (2001). Alexithymia and depression: A prospective study of patients with major depressive disorder. *Psychosomatics*, 42, 229–234.
- Harrison, A., Sullivan, S., Tchanturia, K., & Treasure, J. (2010). Emotional functioning in eating disorders: attentional bias, emotion recognition and emotion regulation. *Psychological Medicine*, 40, 1887–1897.
- Hogan, R., & Nicholson, R. A. (1988). The meaning of personality test scores. *American Psychologist*, 43, 621–626.
- Hu, L. T., & Bentler, P. M. (1998). Fit indices in covariance structure modeling: Sensitivity to underparameterized model misspecification. *Psychological Methods*, 3, 424–453.
- Inslegers, R., Meganck, R., Ooms, E., Vanheule, S., Taylor, G., Bagby, R. M., ... Desmet, M. (2013). The Dutch language version of the Toronto structured interview for

- alexithymia: Reliability, factor structure and concurrent validity. *Acta Psychiatrica Belgica*, 53, 93–116.
- Izadpanah, S., Barnow, S., Neubauer, A. B., & Holl, J. (2017). Development and validation of the Heidelberg Form for Emotion Regulation Strategies (HFERST): Factor structure, reliability, and validity. *Assessment*, 1-27. doi: 1073191117720283
- John, O. P., & Eng, J. (2014). Three approaches to individual differences in affect regulation: Conceptualizations, measures, and findings. In J. J. Gross (Ed.). *Handbook of emotion regulation* (pp. 321–345). (2nd ed.). New York, NY: Guilford.
- John, O. P., & Gross, J. J. (2004). Healthy and unhealthy emotion regulation: Personality processes, individual differences, and life span development. *Journal of Personality*, 72, 1301-1334.
- Joormann, J., & Gotlib, I. H. (2010). Emotion regulation in depression: Relation to cognitive inhibition. *Cognition and Emotion*, 24, 281-298.
- Jørgensen, M. M., Zachariae, R., Skytthe, A., & Kyvik, K. (2007). Genetic and environmental factors in alexithymia: A population-based study of 8,785 Danish twin pairs. *Psychotherapy and Psychosomatics*, 76, 369-375.
- Kennedy, M., & Franklin, J. (2002). Skills-based treatment for alexithymia: An exploratory case series. *Behaviour Change*, 19, 158–171.
- Kessler, R. C., Chiu, W. T., Demler, O., & Walters, E. E. (2005). Prevalence, severity, and comorbidity of 12-month DSM-IV disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry*, 62, 617-627.
- Khantzian, E. J. (1997). The self-medication hypothesis of substance use disorders: A reconsideration and recent applications. *Harvard Review of Psychiatry*, 4, 231-244.

- Kia-Keating, M., No, U., Moore, S., Furlong, M. J., Liu, S., & You, S. (2017). Structural validity of the Depression, Anxiety, and Stress Scales-21 adapted for US undergraduates. *Emerging Adulthood*, 1–7.
- Kim, S. H., & Hamann, S. (2007). Neural correlates of positive and negative emotion regulation. *Journal of Cognitive Neuroscience*, 19, 776–798.
- Kline, P. (1979). *Psychometrics and psychology*. London: Academic Press.
- Kline, P. (2013). *Handbook of psychological testing*. Routledge.
- Kline, R. B. (2005). *Principles and practice of structural equation modeling*. New York: The Guilford Press.
- Koch, A. S., Kleiman, A., Wegener, I., Zur, B., Imbierowicz, K., Geiser, F., & Conrad, R. (2015). Factorial structure of the 20-item Toronto alexithymia scale in a large sample of somatoform patients. *Psychiatry Research*, 225, 355–363.
- 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.
- Kring, A. M., & Bachorowski, J. A. (1999). Emotions and psychopathology. *Cognition and Emotion*, 13, 575–599.
- Kuppens, P., & Verduyn, P. (2015). Looking at emotion regulation through the window of emotion dynamics. *Psychological Inquiry*, 26, 72–79.
- Lane, R. D., & Schwartz, G. E. (1987). Levels of emotional awareness: A cognitive-developmental theory and its application to psychopathology. *The American Journal of Psychiatry*, 144, 133–143.
- Lane, R. D., Lee, S., Reidel, R., Weldon, V., Kaszniak, A., & Schwartz, G. E. (1996). Impaired verbal and nonverbal emotion recognition in alexithymia. *Psychosomatic Medicine*, 58, 203–210.

- Lane, R. D., Quinlan, D. M., Schwartz, G. E., Walker, P. A., & Zeitlin, S. B. (1990). The levels of emotional awareness scale: A cognitive-developmental measure of emotion. *Journal of Personality Assessment*, 55, 124–134.
- Lane, R. D., Weihs, K. L., Herring, A., Hishaw, A., & Smith, R. (2015). Affective agnosia: Expansion of the alexithymia construct and a new opportunity to integrate and extend Freud's legacy. *Neuroscience & Biobehavioral Reviews*, 55, 594–611.
- Lannoy, S., Heeren, A., Rochat, L., Rossignol, M., Van der Linden, M., & Billieux, J. (2014). Is there an all-embracing construct of emotion reactivity? Adaptation and validation of the emotion reactivity scale among a French-speaking community sample. *Comprehensive Psychiatry*, 55, 1960–1967.
- Larsen, R. J. (2000). Toward a science of mood regulation. *Psychological Inquiry*, 11, 129–141.
- Lazarus, R. S. (1991). *Emotion and adaptation*. New York, NY: Oxford University Press.
- Lee, D. J., Witte, T. K., Bardeen, J. R., Davis, M. T., & Weathers, F. W. (2016). A factor analytic evaluation of the difficulties in emotion regulation scale. *Journal of Clinical Psychology*, 72, 933–946.
- Leising, D., Grande, T., & Faber, R. (2009). The Toronto Alexithymia Scale (TAS-20): A measure of general psychological distress. *Journal of Research in Personality*, 43, 707–710.
- Levy-Gigi, E., Bonanno, G. A., Shapiro, A. R., Richter-Levin, G., Kéri, S., & Sheppes, G. (2016). Emotion regulatory flexibility sheds light on the elusive relationship between repeated traumatic exposure and posttraumatic stress disorder symptoms. *Clinical Psychological Science: A Journal of the Association for Psychological Science*, 4, 28–39.

- Leweke, F., Bausch, S., Leichsenring, F., Walter, B., & Stingl, M. (2009). Alexithymia as a predictor of outcome of psychodynamically oriented inpatient treatment. *Psychotherapy Research, 19*, 323–331.
- Leweke, F., Leichsenring, F., Kruse, J., & Hermes, S. (2012). Is alexithymia associated with specific mental disorders. *Psychopathology, 45*, 22–28.
- Lezak, M. D., Howieson, D. B., & Loring, D. W. (2004). *Neuropsychological assessment*. USA: Oxford University Press.
- Li, S., Zhang, B., Guo, Y., & Zhang, J. (2015). The association between alexithymia as assessed by the 20-item Toronto Alexithymia Scale and depression: A meta-analysis. *Psychiatry Research, 227*, 1–9.
- Linehan, M. (1993). *Cognitive-behavioral treatment of borderline personality disorder*. New York, NY: Guilford Press.
- Little, T. D., Lindenberger, U., & Nesselroade, J. R. (1999). On selecting indicators for multivariate measurement and modeling with latent variables: When “good” indicators are bad and “bad” indicators are good. *Psychological Methods, 4*, 192–211.
- Larsen, R. J., & Diener, E. (1987). Affect intensity as an individual difference characteristic: A review. *Journal of Research in Personality, 21*, 1-39.
- Loas, G., Corcos, M., Stephan, P., Pellet, J., Bizouard, P., Venisse, J. L., et al. (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.
- 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.

- Lovibond, P. F., & Lovibond, S. H. (1995). The structure of negative emotional states: Comparison of the Depression Anxiety Stress Scales (DASS) with the Beck Depression and Anxiety Inventories. *Behaviour Research and Therapy*, 33, 335–343.
- Luminet, O., Bagby, R. M., & Taylor, G. J. (2001). An evaluation of the absolute and relative stability of alexithymia in patients with major depression. *Psychotherapy and Psychosomatics*, 70, 254–260.
- Luminet, O., Rimé, B., Bagby, R. M., & Taylor, G. (2004). A multimodal investigation of emotional responding in alexithymia. *Cognition and Emotion*, 18, 741–766.
- Luminet, O., Rokbani, L., Ogez, D., & Jadoulle, V. (2007). An evaluation of the absolute and relative stability of alexithymia in women with breast cancer. *Journal of Psychosomatic Research*, 62, 641–648.
- Luminet, O., Vermeulen, N., Demaret, C., Taylor, G. J., & Bagby, R. M. (2006). Alexithymia and levels of processing: Evidence for an overall deficit in remembering emotion words. *Journal of Research in Personality*, 40, 713–733.
- Lundh, L. G., & Simonsson-Sarnecki, M. (2001). Alexithymia, emotion, and somatic complaints. *Journal of Personality*, 69, 483–510.
- Lundh, L. G., Johnsson, A., Sundqvist, K., & Olsson, H. (2002). Alexithymia, memory of emotion, emotional awareness, and perfectionism. *Emotion*, 2, 361–379.
- Lyvers, M., McCann, K., Coundouris, S., Edwards, M. S., & Thorberg, F. A. (2018). Alexithymia in relation to alcohol use, emotion recognition, and empathy: The role of externally oriented thinking. *American Journal of Psychology*, 131, 41–51.
- Mantani, T., Okamoto, Y., Shirao, N., Okada, G., & Yamawaki, S. (2005). Reduced activation of posterior cingulate cortex during imagery in subjects with high degrees of alexithymia: A functional magnetic resonance imaging study. *Biological Psychiatry*, 57, 982–990.

- Marchesi, C., Ossola, P., Tonna, M., & De Panfilis, C. (2014). The TAS-20 more likely measures negative affects rather than alexithymia itself in patients with major depression, panic disorder, eating disorders and substance use disorders. *Comprehensive Psychiatry*, 55, 972–978.
- Markus, H. (1977). Self-schemata and processing information about the self. *Journal of Personality and Social Psychology*, 35, 63–78.
- Marsh, H. W., & Hocevar, D. (1985). Application of confirmatory factor analysis to the study of self-concept: First-and higher order factor models and their invariance across groups. *Psychological Bulletin*, 97, 562–582.
- Marsh, H. W., Hau, K. T., & Wen, Z. (2004). 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. *Structural Equation Modeling*, 11, 320-341.
- Marty, P., & de M'Uzan, M. (1963). La "pensee operateire". *Revue Française de Psychanalyse*, 27, 1345–1356.
- Matsumoto, D., Yoo, S. H., & Nakagawa, S. (2008). Culture, emotion regulation, and adjustment. *Journal of Personality and Social Psychology*, 94, 925–937.
- Matsunaga, M. (2010). How to factor-analyze your data right: Do's, don'ts, and how-to's. *International Journal of Psychological Research*, 3, 97–110.
- Mattila, A. K., Keefer, K. V., Taylor, G. J., Joukamaa, M., Jula, A., Parker, J. D., & Bagby, R. M. (2010). Taxometric analysis of alexithymia in a general population sample from Finland. *Personality and Individual Differences*, 49, 216–221.
- Mauss, I. B., Cook, C. L., Cheng, J. Y., & Gross, J. J. (2007). Individual differences in cognitive reappraisal: Experiential and physiological responses to an anger provocation. *International Journal of Psychophysiology*, 66, 116–124.

- Mauss, I. B., Levenson, R. W., McCarter, L., Wilhelm, F. H., & Gross, J. J. (2005). The tie that binds? Coherence among emotion experience, behavior, and physiology. *Emotion, 5*, 175–190.
- Mayer, J. D., Salovey, P., & Caruso, D. (2002). *Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT): User's manual*. Toronto, ON: Multi-Health Systems.
- McDougall, J. (1974). The psychosomata and the psychoanalytic process. *Internal Review of Psychoanalysis, 1*, 437–459.
- McGillivray, L., Becerra, R., & Harms, C. (2017). Prevalence and demographic correlates of alexithymia: A comparison between Australian psychiatric and community samples. *Journal of Clinical Psychology, 73*, 76–87.
- McGrew, K. S. (2009). CHC theory and the human cognitive abilities project: Standing on the shoulders of the giants of psychometric intelligence research. *Intelligence, 37*, 1–10.
- McHugh, R. K., Reynolds, E. K., Leyro, T. M., & Otto, M. W. (2013). An examination of the association of distress intolerance and emotion regulation with avoidance. *Cognitive Therapy and Research, 37*, 363–367.
- 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.
- Melka, S. E., Lancaster, S. L., Bryant, A. R., & Rodriguez, B. F. (2011). Confirmatory factor and measurement invariance analyses of the Emotion Regulation Questionnaire. *Journal of Clinical Psychology, 67*, 1283–1293.
- Mennin, D. S., & Farach, F. J. (2007). Emotion and evolving treatments for adult psychopathology. *Clinical Psychology: Science and Practice, 14*, 329–352.

- Mennin, D. S., & Fresco, D. M. (2014). Emotion regulation therapy. In J. J. Gross (Ed.), *Handbook of emotion regulation* (pp. 469-490). New York, NY, US: Guilford Press.
- Montag, C., & Panksepp, J. (2017). Primary emotional systems and personality: an evolutionary perspective. *Frontiers in Psychology*, 8, 464.
- Moore, S. A., Zoellner, L. A., & Mollenholt, N. (2008). Are expressive suppression and cognitive reappraisal associated with stress-related symptoms?. *Behaviour Research and Therapy*, 46, 993–1000.
- Morera, O. F., Culhane, S. E., Watson, P. J., & Skewes, M. C. (2005). Assessing the reliability and validity of the Bermond-Vorst Alexithymia Questionnaire among US Anglo and US Hispanic samples. *Journal of Psychosomatic Research*, 58, 289–298.
- Müller, J., Bühner, 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.
- Müller, J., Bühner, M., & Ellgring, H. (2004). The assessment of alexithymia: Psychometric properties and validity of the Bermond–Vorst alexithymia questionnaire. *Personality and Individual Differences*, 37, 373–391.
- Nelis, D., Quoidbach, J., Hansenne, M., & Mikolajczak, M. (2011). Measuring individual differences in emotion regulation: The emotion regulation profile-revised (ERP-R). *Psychologica Belgica*, 51, 49-91.
- Nemiah, J. C. (1977). Alexithymia: Theoretical considerations. *Psychotherapy and Psychosomatics*, 28, 199–206.

- Nemiah, J. C. (1984). The psychodynamic view of anxiety. In R. O. Pasnau (Ed.), *Diagnosis and treatment of anxiety disorders* (pp. 117–137). Washington, DC: American Psychiatric Press.
- Nemiah, J. C., & Sifneos, P. E. (1970). Psychosomatic illness: A problem in communication. *Psychotherapy and Psychosomatics*, 18, 154–160.
- Neumann, D., Malec, J. F., & Hammond, F. M. (2017). Reductions in alexithymia and emotion dysregulation after training emotional self-awareness following traumatic brain injury: A phase I trial. *The Journal of Head Trauma Rehabilitation*, 32, 286–295.
- New, A. S., Rot, M. A. H., Ripoll, L. H., Perez-Rodriguez, M. M., Lazarus, S., Zipursky, E., ...Siever, L. J. (2012). Empathy and alexithymia in borderline personality disorder: Clinical and laboratory measures. *Journal of Personality Disorders*, 26, 660–675.
- Newton, T. L., & Contrada, R. J. (1994). Alexithymia and repression: Contrasting emotion focused coping styles. *Psychosomatic Medicine*, 56, 457–462.
- Nock, M. K., Wedig, M. M., Holmberg, E. B., & Hooley, J. M. (2008). The emotion reactivity scale: Development, evaluation, and relation to self injurious thoughts and behaviors. *Behavior Therapy*, 39, 107–116.
- Nolen-Hoeksema, S., & Watkins, E. R. (2011). A heuristic for developing transdiagnostic models of psychopathology: Explaining multifinality and divergent trajectories. *Perspectives on Psychological Science*, 6, 589–609.
- Norcross, J. C., & Karpiak, C. P. (2012). Clinical psychologists in the 2010s: 50 years of the APA division of clinical psychology. *Clinical Psychology: Science and Practice*, 19, 1–12.
- Nunnally, J. C. (1978). *Psychometric Methods*. New York: McGraw Hill.
- Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory*. New York: McGraw-Hill.

- Ochsner, K. N., & Gross, J. J. (2014). The neural bases of emotion and emotion regulation: A valuation perspective. In J. J. Gross (Ed.). *Handbook of emotion regulation* (pp. 23–42). New York, NY: Guilford Press.
- Osborne, T. L., Michonski, J., Sayrs, J., Welch, S. S., & Anderson, L. K. (2017). Factor structure of the Difficulties in Emotion Regulation Scale (DERS) in adult outpatients receiving dialectical behavior therapy (DBT). *Journal of Psychopathology and Behavioral Assessment*, 39, 355–371.
- Panayiotou, G., Leonidou, C., Constantinou, E., Hart, J., Rinehart, K. L., Sy, J. T., & Björgvinsson, T. (2015). Do alexithymic individuals avoid their feelings? Experiential avoidance mediates the association between alexithymia, psychosomatic, and depressive symptoms in a community and a clinical sample. *Comprehensive Psychiatry*, 56, 206–216.
- Pandey, R., Mandal, M. K., Taylor, G. J., & Parker, J. D. (1996). Crosscultural alexithymia: Development and validation of a Hindi translation of the 20-item Toronto alexithymia scale. *Journal of Clinical Psychology*, 52, 173–176.
- Panksepp, J. (1998). *Affective neuroscience: The foundations of human and animal emotions*. New York, NY: Oxford University Press.
- Panksepp, J. (2005). Affective consciousness: Core emotional feelings in animals and humans. *Consciousness and Cognition*, 14, 30-80.
- Parker, J. D., Eastabrook, J. M., Keefer, K. V., & Wood, L. M. (2010). Can alexithymia be assessed in adolescents? Psychometric properties of the 20-item Toronto alexithymia scale in younger, middle, and older adolescents. *Psychological Assessment*, 22, 798–808.

- Parker, J. D., Keefer, K. V., Taylor, G. J., & Bagby, R. M. (2008). Latent structure of the alexithymia construct: A taxometric investigation. *Psychological Assessment, 20*, 385–396.
- Parker, J. D., Taylor, G. J., & Bagby, R. M. (2003). The 20-item Toronto alexithymia scale: III. Reliability and factorial validity in a community population. *Journal of Psychosomatic Research, 55*, 269–275.
- Perez, C. R., & Soto, J. A. (2011). Cognitive reappraisal in the context of oppression: Implications for psychological functioning. *Emotion, 11*, 675–680.
- Piaget, J. (1981). *Intelligence and affectivity: Their relationship during child development*. Palo Alto, CA: Annual Reviews.
- Taylor, G. J., & Bagby, R. M. (2004). New trends in alexithymia research. *Psychotherapy and Psychosomatics, 73*, 68–77.
- Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology, 88*, 879–903.
- Pollatos, O., Werner, N. S., Duschek, S., Schandry, R., Matthias, E., Traut-Mattausch, E., & Herbert, B. M. (2011). Differential effects of alexithymia subscales on autonomic reactivity and anxiety during social stress. *Journal of Psychosomatic Research, 70*, 525–533.
- Porcelli, P., & Mihura, J. L. (2010). Assessment of alexithymia with the Rorschach comprehensive system: The Rorschach alexithymia scale (RAS). *Journal of Personality Assessment, 92*, 128–136.
- Preece, D., Becerra, R., & Campitelli, G. (2018). Assessing emotional reactivity: Psychometric properties of the Perth Emotional Reactivity Scale and the development

- of a short form. *Journal of Personality Assessment*, 1–9.
<https://doi.org/10.1080/00223891.2018.1465430>.
- Preece, D., Becerra, R., Allan, A., Robinson, K., & Dandy, J. (2017). Establishing the theoretical components of alexithymia via factor analysis: Introduction and validation of the attention-appraisal model of alexithymia. *Personality and Individual Differences*, 119, 341–352.
- Preece, D., Becerra, R., Robinson, K., & Dandy, J. (2018). Assessing alexithymia: Psychometric properties and factorial invariance of the 20-item Toronto Alexithymia Scale (TAS-20) in nonclinical and psychiatric samples. *Journal of Psychopathology and Behavioral Assessment*, 40, 276-287.
- Preece, D., Becerra, R., Robinson, K., Dandy, J., & Allan, A. (2018a). The psychometric assessment of alexithymia: Development and validation of the Perth Alexithymia Questionnaire. *Personality and Individual Differences*, 132, 32–44.
- Preece, D.A., Becerra, R., Robinson, K., Dandy, J., & Allan, A. (2018b). Measuring emotion regulation ability across negative and positive emotions: The Perth Emotion Regulation Competency Inventory (PERCI). *Personality and Individual Differences*, 135, 229-241.
- Preece, D. A., Becerra, R., Robinson, K., & Gross, J. J. (2019). The Emotion Regulation Questionnaire: Psychometric properties in general community samples. *Journal of Personality Assessment*, 1-9. <http://doi.org/10.1080/00223891.2018.156319>
- Preston, C. C., & Colman, A. M. (2000). Optimal number of response categories in rating scales: Reliability, validity, discriminating power, and respondent preferences. *Acta Psychologica*, 104, 1–15.
- Qualtrics. (2014). *ESOMAR 28*. Retrieved from
<https://success.qualtrics.com/rs/qualtrics/images/ESOMAR%2028%202014.pdf>

- Quoidbach, J., Berry, E. V., Hansenne, M., & Mikolajczak, M. (2010). Positive emotion regulation and well-being: Comparing the impact of eight savoring and dampening strategies. *Personality and Individual Differences, 49*, 368-373.
- Raubenheimer, J. (2004). An item selection procedure to maximise scale reliability and validity. *SA Journal of Industrial Psychology, 30*, 59–64.
- Reise, S. P. (2012). The rediscovery of bifactor measurement models. *Multivariate Behavioral Research, 47*, 667–696.
- Reise, S. P., Moore, T. M., & Haviland, M. G. (2010). Bifactor models and rotations: Exploring the extent to which multidimensional data yield univocal scale scores. *Journal of Personality Assessment, 92*, 544–559.
- Rieffe, C., Oosterveld, P., Miers, A. C., Terwogt, M. M., & Ly, V. (2008). Emotion awareness and internalising symptoms in children and adolescents: The emotion awareness questionnaire revised. *Personality and Individual Differences, 45*, 756–761.
- Ripper, C. A., Boyes, M. E., Clarke, P. J., & Hasking, P. A. (2018). Emotional reactivity, intensity, and perseveration: Independent dimensions of trait affect and associations with depression, anxiety, and stress symptoms. *Personality and Individual Differences, 121*, 93–99.
- Rodebaugh, T. L., Woods, C. M., & Heimberg, R. G. (2007). The reverse of social anxiety is not always the opposite: The reverse-scored items of the social interaction anxiety scale do not belong. *Behavior Therapy, 38*, 192–206.
- Rosenberg, N., Rufer, M., Lichev, V., Ihme, K., Grabe, H. J., Kugel, H., ... Suslow, T. (2016). Observer-rated alexithymia and its relationship with the five-factor-model of personality. *Acta Psychiatrica Belgica, 56*, 118–134.

- Rosenthal, M. Z., Gratz, K. L., Kosson, D. S., Cheavens, J. S., Lejuez, C. W., & Lynch, T. R. (2008). Borderline personality disorder and emotional responding: A review of the research literature. *Clinical Psychology Review, 28*, 75-91.
- Rottenberg, J. E., & Johnson, S. L. (2007). *Emotion and psychopathology: Bridging affective and clinical science*. New York, NY: Guilford Press.
- Rottenberg, J., Gross, J. J., & Gotlib, I. H. (2005). Emotion context insensitivity in major depressive disorder. *Journal of Abnormal Psychology, 114*, 627–639.
- Sala, M. N., Molina, P., Abler, B., Kessler, H., Vanbrabant, L., & van de Schoot, R. (2012). Measurement invariance of the Emotion Regulation Questionnaire (ERQ). A cross-national validity study. *European Journal of Developmental Psychology, 9*, 751-757.
- Salovey, P., Mayer, J. D., Goldman, S. L., Turvey, C., & Palfai, T. P. (1995). Emotional attention, clarity, and repair: Exploring emotional intelligence using the Trait Meta-Mood Scale. In J. W. Pennebaker (Ed.), *Emotion, disclosure, and health* (pp. 125–154). Washington, DC: American Psychological Association.
- Samur, D., Tops, M., Schlinkert, C., Quirin, M., Cuijpers, P., & Koole, S. L. (2013). Four decades of research on alexithymia: Moving toward clinical applications. *Frontiers in Psychology, 4*, 1–4.
- Satorra, A., & Bentler, P. M. (1994). Corrections to test statistics and standard errors in covariance structure analysis. In A. von Eye & C. C. Clogg (Eds.), *Latent variables analysis: Applications for developmental research* (pp. 399–419). Thousand Oaks, CA: Sage Publications, Inc.
- Satorra, A., & Bentler, P. M. (1994). Corrections to test statistics and standard errors in covariance structure analysis. In A. von Eye & C. C. Clogg (Eds.), *Latent variables*

analysis: Applications for developmental research (pp. 399-419). Thousand Oaks, CA, US: Sage Publications, Inc.

- Sauer, S., & Baer, R. (2009). Relationships between thought suppression and symptoms of borderline personality disorder. *Journal of Personality Disorders*, 23, 48-61.
- Sauer, S. E., & Baer, R. A. (2010). Validation of measures of biosocial precursors to borderline personality disorder: Childhood emotional vulnerability and environmental invalidation. *Assessment*, 17, 454-466.
- Sauer-Zavala, S., & Barlow, D. H. (2014). The case for borderline personality disorder as an emotional disorder: Implications for treatment. *Clinical Psychology: Science and Practice*, 21, 118-138.
- Sauer-Zavala, S., Boswell, J. F., Gallagher, M. W., Bentley, K. H., Ametaj, A., & Barlow, D. H. (2012). The role of negative affectivity and negative reactivity to emotions in predicting outcomes in the unified protocol for the transdiagnostic treatment of emotional disorders. *Behaviour Research and Therapy*, 50, 551-557.
- Sauer-Zavala, S., Cassiello-Robbins, C., Ametaj, A. A., Wilner, J. G., & Pagan, D. (2018). Transdiagnostic treatment personalization: The feasibility of ordering unified protocol modules according to patient strengths and weaknesses. *Behavior Modification*, 1-26. doi: 10.1177/0145445518774914
- Sauer-Zavala, S., Gutner, C. A., Farchione, T. J., Boettcher, H. T., Bullis, J. R., & Barlow, D. H. (2017). Current definitions of “transdiagnostic” in treatment development: A search for consensus. *Behavior Therapy*, 48, 128-138.

- Schmader, T., & Mendes, W. B. (2015). Putting feelings in a social context: Three case studies applying Gross's extended model of emotion regulation. *Psychological Inquiry*, 26, 116–122.
- Schumacker, R. E., & Lomax, R. G. (2004). *A beginner's guide to structural equation modeling*. Mahwah, NJ: Erlbaum and Associates.
- Sekely, A., Taylor, G. J., & Bagby, R. M. (2018). Developing a short version of the Toronto structured interview for alexithymia using item response theory. *Psychiatry Research*, 266, 218-227.
- Shaver, P. R., & Mikulincer, M. (2014). Adult attachment and emotion regulation. In J. Gross (Ed.). *Handbook of emotion regulation*. New York, NY: Guilford Press.
- Sifneos, P. E. (1973). The prevalence of 'alexithymic' characteristics in psychosomatic patients. *Psychotherapy and Psychosomatics*, 22, 255–262.
- Sifneos, P. E. (1996). Alexithymia: Past and present. *The American Journal of Psychiatry*, 153, 137–142.
- Silvers, J. A., McRae, K., Gabrieli, J. D., Gross, J. J., Remy, K. A., & Ochsner, K. N. (2012). Age-related differences in emotional reactivity, regulation, and rejection sensitivity in adolescence. *Emotion*, 12, 1235-1247.
- Smith, R., Killgore, W. D. S., & Lane, R. D. (2017). The structure of emotional experience and its relation to trait emotional awareness: A theoretical review. *Emotion*, 18, 670-692.
- Son, S., Jo, H., Rim, H. D., Kim, J. H., Kim, H.W., Bae, G. Y., & Lee, S. J. (2012). A comparative study on alexithymia in depressive, somatoform, anxiety, and psychotic disorders among Koreans. *Psychiatry Investigation*, 9, 325–331.
- Soto, J. A., Armenta, B. E., Perez, C. R., Zamboanga, B. L., Umaña-Taylor, A. J., Lee, R. M., ... & Le, T. N. (2012). Strength in numbers? Cognitive reappraisal tendencies and

- psychological functioning among Latinos in the context of oppression. *Cultural Diversity and Ethnic Minority Psychology*, 18, 384-394.
- Soto, J. A., Perez, C. R., Kim, Y. H., Lee, E. A., & Minnick, M. R. (2011). Is expressive suppression always associated with poorer psychological functioning? A cross-cultural comparison between European Americans and Hong Kong Chinese. *Emotion*, 11, 1450-1455.
- Spaapen, D. L., Waters, F., Brummer, L., Stopa, L., & Bucks, R. S. (2014). The Emotion Regulation Questionnaire: Validation of the ERQ-9 in two community samples. *Psychological Assessment*, 26, 1-7.
- Spearman, C. (1904). "General Intelligence," objectively determined and measured. *The American Journal of Psychology*, 15, 201-292.
- Spren, O., & Strauss, E. (2006). *A compendium of neuropsychological tests: Administration, norms, and commentary*. New York, NY, US: Oxford University Press.
- Stanford Psychophysiology Laboratory (2018). *Resources: The Emotion Regulation Questionnaire*. Retrieved from <https://spl.stanford.edu/resources>
- Stawarczyk, D., Majerus, S., Van der Linden, M., & D'Argembeau, A. (2012). Using the daydreaming frequency scale to investigate the relationships between mind-wandering, psychological well-being, and present-moment awareness. *Frontiers in Psychology*, 3, 1–15.
- Stevens, J. P. (1992). *Applied multivariate statistics for the social sciences*. Hillsdale, NJ: Erlbaum.

- Strickland, J., Parry, C. L., Allan, M. M., & Allan, A. (2017). Alexithymia among perpetrators of violent offences in Australia: Implications for Rehabilitation. *Australian Psychologist*, 52, 230-237.
- Su, J. C., Lee, R. M., Park, I. J., Soto, J. A., Chang, J., Zamboanga, B. L., ... & Seol, K. O. (2015). Differential links between expressive suppression and well-being among Chinese and Mexican American college students. *Asian American Journal of Psychology*, 6, 15-24.
- Subic-Wrana, C., Bruder, S., Thomas, W., Lane, R. D., & Köhle, K. (2005). Emotional awareness deficits in inpatients of a psychosomatic ward: A comparison of two different measures of alexithymia. *Psychosomatic Medicine*, 67, 483–489.
- Suslow, T., & Junghanns, K. (2002). Impairments of emotion situation priming in alexithymia. *Personality and Individual Differences*, 32, 541–550.
- Svaldi, J., Griepentstroh, J., Tuschen-Caffier, B., & Ehring, T. (2012). Emotion regulation deficits in eating disorders: A marker of eating pathology or general psychopathology? *Psychiatry Research*, 197, 103–111.
- Swart, M., Kortekaas, R., & Aleman, A. (2009). Dealing with feelings: Characterization of trait alexithymia on emotion regulation strategies and cognitive-emotional processing. *PLoS One*, 4, e5751.
- Taylor, G. J., Bagby, R. M., & Parker, J. D. (1992). The Revised Toronto Alexithymia Scale: Some reliability, validity, and normative data. *Psychotherapy and Psychosomatics*, 57, 34–41.
- Taylor, G. J., Bagby, R. M., & Parker, J. D. (1999). *Disorders of affect regulation: Alexithymia in medical and psychiatric illness*. UK: Cambridge University Press.

- Taylor, G. J., Bagby, R. M., & Parker, J. D. (2003). The 20-item Toronto alexithymia scale: IV. Reliability and factorial validity in different languages and cultures. *Journal of Psychosomatic Research*, 55, 277–283.
- Taylor, G. J., Bagby, R.M., & Parker, J. D. (2016). What's in the name 'alexithymia'? A commentary on “Affective agnosia: Expansion of the alexithymia construct and a new opportunity to integrate and extend Freud's legacy”. *Neuroscience and Biobehavioral Reviews*, 68, 1006–1020.
- Taylor, G. J., Parker, J. D., Bagby, R. M., & Bourke, M. P. (1996). Relationships between alexithymia and psychological characteristics associated with eating disorders. *Journal of Psychosomatic Research*, 41, 561–568.
- Taylor, G. J., Ryan, D., & Bagby, R. M. (1985). Toward the development of a new self report alexithymia scale. *Psychotherapy and Psychosomatics*, 44, 191–199.
- Taylor, G. J., & Bagby, R.M. (2004). New trends in alexithymia research. *Psychotherapy and Psychosomatics*, 73, 68–77.
- Telch, C. F., Agras, W. S., & Linehan, M. M. (2001). Dialectical behavior therapy for binge eating disorder. *Journal of Consulting and Clinical Psychology*, 69, 1061-1065.
- Thompson, R. A., & Calkins, S. D. (1996). The double-edged sword: Emotional regulation for children at risk. *Development and Psychopathology*, 8, 163-182.
- 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.
- Thorberg, F. A., Young, R. M., Sullivan, K. A., Lyvers, M., Hurst, C., Connor, J. P., & Feeney, G. F. (2010). A confirmatory factor analysis of the Toronto alexithymia scale (TAS-20) in an alcohol-dependent sample. *Psychiatry Research*, 178, 565–567.
- Thorndike, R. L. (1936). Factor analysis of social and abstract intelligence. *Journal of Educational Psychology*, 27, 231-233.

- Tsaousis, I., Taylor, G., Quilty, L., Georgiades, S., Stavrogiannopoulos, M., & Bagby, R. M. (2010). Validation of a Greek adaptation of the 20-item Toronto alexithymia scale. *Comprehensive Psychiatry*, *51*, 443–448.
- van der Velde, J., Servaas, M. N., Goerlich, K. S., Bruggeman, R., Horton, P., Costafreda, S. G., & Aleman, A. (2013). Neural correlates of alexithymia: A meta-analysis of emotion processing studies. *Neuroscience and Biobehavioral Reviews*, *37*, 1774–1785.
- van Dijke, A., Ford, J. D., van der Hart, O., van Son, M., van der Heijden, P., & Bühring, M. (2010). Affect dysregulation in borderline personality disorder and somatoform disorder: Differentiating under-and over-regulation. *Journal of Personality Disorders*, *24*, 296-311.
- van Kleef, G. A., Homan, A. C., Beersma, B., & van Knippenberg, D. (2010). On angry leaders and agreeable followers: How leaders' emotions and followers' personalities shape motivation and team performance. *Psychological Science*, *21*, 1827-1834.
- van Sonderen, E., Sanderman, R., & Coyne, J. C. (2013). Ineffectiveness of reverse wording of questionnaire items: Let's learn from cows in the rain. *PLoS One*, *8*, e68967.
- Vermeulen, N., Luminet, O., & Corneille, O. (2006). Alexithymia and the automatic processing of affective information: Evidence from the affective priming paradigm. *Cognition and Emotion*, *20*, 64–91.
- Vine, V., & Aldao, A. (2014). Impaired emotional clarity and psychopathology: A transdiagnostic deficit with symptom-specific pathways through emotion regulation. *Journal of Social and Clinical Psychology*, *33*, 319-342.
- Vorst, H. C., & Bermond, B. (2001). Validity and reliability of the Bermond–Vorst alexithymia questionnaire. *Personality and Individual Differences*, *30*, 413–434.

- Waller, E., & Scheidt, C. E. (2006). Somatoform disorders as disorders of affect regulation: a development perspective. *International Review of Psychiatry, 18*, 13-24.
- Watters, C. A., Taylor, G. J., & Bagby, R. M. (2016). Illuminating the theoretical components of alexithymia using bifactor modeling and network analysis. *Psychological Assessment, 28*, 627–638.
- Watters, C. A., Taylor, G. J., Quilty, L. C., & Bagby, R. M. (2016). An examination of the topology and measurement of the alexithymia construct using network analysis. *Journal of Personality Assessment, 98*, 649–659.
- Watters, C., Taylor, G. J., Ayearst, L., & Bagby, R. M. (2016). Measurement invariance of the English and French language versions of the 20-item Toronto alexithymia scale. *European Journal of Psychological Assessment, 1-8*. <https://doi.org/10.1027/1015-5759/a000365>.
- Way, I. F., Applegate, B., Cai, X., Franck, L. K., Black-Pond, C., Yelsma, P., ... Muliatt, M. (2010). Children's alexithymia measure (CAM): A new instrument for screening difficulties with emotional expression. *Journal of Child and Adolescent Trauma, 3*, 303–318.
- Wechsler, D. (2008). *Wechsler Adult Intelligence Scale—Fourth Edition: Technical and interpretive manual*. San Antonio, TX: Pearson Assessment.
- Weinberg, A., & Klonsky, E. D. (2009). Measurement of emotion dysregulation in adolescents. *Psychological Assessment, 21*, 616-621.
- Weiss, N. H., Gratz, K. L., & Lavender, J. M. (2015). Factor structure and initial validation of a multidimensional measure of difficulties in the regulation of positive emotions: The DERS-positive. *Behavior Modification, 39*, 431–453.
- Werner, K., & Gross, J. J. (2010). Emotion regulation and psychopathology: A conceptual framework. In A. M. Kring, & D. M. Sloan (Eds.). *Emotion regulation and*

- psychopathology: A transdiagnostic approach to etiology and treatment* (pp. 13–37). New York, NY: Guilford.
- Williams, C., & Wood, R. L. (2010). Alexithymia and emotional empathy following traumatic brain injury. *Journal of Clinical and Experimental Neuropsychology*, 32, 259–267.
- Wiltink, J., Glaesmer, H., Canterino, M., Wolfling, K., Knebel, A., Kessler, H., . . . Buetel, M. E. (2011). Regulation of emotions in the community: Suppression and reappraisal strategies and its psychometric properties. *Psycho-Social Medicine*, 8, 1–12.
- Zech, E., Luminet, O., Rimé, B., & Wagner, H. (1999). Alexithymia and its measurement: Confirmatory factor analyses of the 20-item Toronto Alexithymia Scale and the Bermond-Vorst Alexithymia Questionnaire. *European Journal of Personality*, 13, 511–532.
- Zeitlin, S. B., & McNally, R. J. (1993). Alexithymia and anxiety sensitivity in panic disorder and obsessive-compulsive disorder. *The American Journal of Psychiatry*, 150, 658–660.
- Zelkowitz, R. L., & Cole, D. A. (2016). Measures of emotion reactivity and emotion regulation: Convergent and discriminant validity. *Personality and Individual Differences*, 102, 123–132.
- Zelkowitz, R. L., Cole, D. A., Han, G. T., & Tomarken, A. J. (2016). The incremental utility of emotion regulation but not emotion reactivity in nonsuicidal self injury. *Suicide and Life-Threatening Behavior*, 46, 545–562.
- Zhu, X., Yi, J., Yao, S., Ryder, A. G., Taylor, G. J., & Bagby, R. M. (2007). Cross-cultural validation of a Chinese translation of the 20-item Toronto alexithymia scale. *Comprehensive Psychiatry*, 48, 489–496.

- Zimmermann, P. (1999). Structure and functions of internal working models of attachment and their role for emotion regulation. *Attachment and Human Development, 1*, 291–306.
- Zinbarg, R. E., & Barlow, D. H. (1996). Structure of anxiety and the anxiety disorders: a hierarchical model. *Journal of Abnormal Psychology, 105*, 181-193.
- Zou, C., Plaks, J. E., & Peterson, J. B. (2017). Don't get too excited: Assessing individual differences in the down-regulation of positive emotions. *Journal of Personality Assessment, 1*–11. <http://dx.doi.org/10.1080/00223891.2017.1339711>.