

Comparing alexithymia scales in relation to emotion regulation, distress and positive and negative affect.

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Abstract

Alexithymia is conceptualised as the inability to experience, identify and express emotions, in which it is conceptualised in terms of deficits in cognitive processing and regulation of emotional states. Alexithymia is a trait in the general population that is associated with mental health disorders but can also impair any psychological treatment effectiveness. The Toronto Alexithymia Scale (TAS-20) is a widely known and commonly used scale to measure alexithymia based on psychoanalytic theory. However, a recent model of alexithymia, attention-appraisal model, explained symptoms of alexithymia in stages of emotion regulation and emphasised emotional valence. Based on this model, Preece et al. (2018) developed the Perth Alexithymia Questionnaire (PAQ) to incorporate positive and negative valence. There is limited research in comparing the predictability of TAS-20 and PAQ in relation to emotional regulation psychological distress and positive and negative affect. Therefore, this study utilised bivariate correlation and multiple regression to compare the PAQ and TAS-20 in their relation to the variables. Results have shown that compared to TAS-20, PAQ is similar in the prediction of emotional regulation, and psychological distress. However, the PAQ EOT subscale has a better prediction compared to TAS-20 EOT subscale. The positive and negative subscales did not show a difference in correlation with positive and negative affect. Although PAQ is recommended over TAS-20 due to slightly better prediction, however, it did not distinguish between positive and negative valence. Therefore, future research should focus on whether high in alexithymia discriminates positive and negative affect and the conceptual and practice issues. This study further demonstrated the usefulness of identifying alexithymia in individuals in order to suggest the most appropriate therapy.

Key words: Alexithymia, Perth Alexithymia Questionnaire, Toronto Alexithymia Scale.

Declaration

This thesis contains no material which has been accepted for the award of any other degree or diploma in any University, and, to the best of my knowledge, this thesis contains no material previously published except where due reference is made. I give permission for the digital version of this thesis to be made available on the web, via the University of Adelaide's digital thesis repository, the Library Search and through web search engines, unless permission has been granted by the School to restrict access for a period of time.

Table 1

My relative contributions to each aspect of the current project. This table is based on the Credit Contributor Roles Taxonomy (For details see: <https://credit.niso.org/>).

ROLE	ROLE DESCRIPTION	Student	Supervisor
CONCEPTUALIZATION	Ideas; formulation or evolution of overarching research goals and aims.	40%	60%
METHODOLOGY	Development or design of methodology; creation of models.	60%	40%
PROJECT ADMINISTRATION	Management and coordination responsibility for the research activity planning and execution.	100%	
SUPERVISION	Oversight and leadership responsibility for the research activity planning and execution, including mentorship external to the core team.		100%
RESOURCES	Provision of study materials, laboratory samples, instrumentation, computing resources, or other analysis tools.	100%	
SOFTWARE	Programming, software development; designing computer programs; implementation of the computer code and supporting algorithms; testing of existing code.	100%	
INVESTIGATION	Conducting research - specifically performing experiments, or data/evidence collection.	100%	
VALIDATION	Verification of the overall replication/reproducibility of results/experiments.	100%	
DATA CURATION	Management activities to annotate (produce metadata), scrub data and maintain research data (including software code, where it is necessary for interpreting the data itself) for initial use and later re-use.	100%	
FORMAL ANALYSIS	Application of statistical, mathematical, computational, or other formal techniques to analyse or synthesize study data.	100%	
VISUALIZATION	Visualization/data presentation of the results.	100%	
WRITING – ORIGINAL DRAFT	Specifically writing the initial draft.	100%	
WRITING – REVIEW & EDITING	Critical review, commentary or revision of original draft	100%	

Alexithymia is an important underlying construct that influences one's ability on emotion regulation, associated with a range of mental disorders and can impair any psychological treatment effectiveness. Alexithymia is a multidimensional construct, that is characterised by difficulties in experiencing, regulating and communicating emotions (Suslow & Donges, 2017; Preece et al., 2022). Alexithymia is a trait that endures in the general population that appears to be continuum and normally distributed (Trimble, Robinson, & Preece, 2022). The prevalence of alexithymia is around 10% of the general population (Wang, Goerlich, Luo, Xu & Aleman, 2022, pp. 387), and 7.3-29.9% in adolescents (Wang et al., 2021, pp.2; Joukamaa et al., 2007, pp. 373). Adolescence has a higher prevalence of alexithymia and more vulnerable to other forms of psychological distress, thus, greatly affects their emotional regulation and expression (Hamaideh, 2017; Lyvers et al., 2020). This is further supported by studies which have shown that university students with alexithymia tend to experience more negative affect and less positive affect compared to non-alexithymic students (Suslow & Donges, 2017). As university students have a higher prevalence of experiencing alexithymia symptoms, this sample population would be ideal in assessing and exploring alexithymia. It is also important to note that as emotion processing skills undergo significant development throughout individual's upbringing. Psychopathological symptoms that are developed and not addressed properly during adolescence are likely to increase and continue during adulthood (Trimble, Robinson, & Preece, 2022). In addition, alexithymia is found to be associated with a range of psychopathology such as psychological distress, substance use, eating disorders and personality disorders (Preece et al., 2023, pp.232). Moreover, alexithymia also affects social functioning, such as less altruistic behaviour, reduced ability in physiological activations for moral decisions, unusual expectation on social rewards and poor interpersonal relationships (Wang, Goerlich, Luo, Xu & Aleman, 2022). This is further supported by the commonality (26% to 55%) of those patients with depressive disorders experiencing a high level of alexithymia (Honkalampi et al., 2018, pp.143; Leweke et al., 2010, pp.26), and 21.5% to 58% of patients experiencing anxiety disorders also score highly of alexithymia (Leweke et al., 2010, pp.23). As mentioned previously, alexithymia can affect psychological interventions, therefore it is crucial in understanding the underlying difficulties in order to effectively assist different mental disorders.

Emotions are coping responses to experiences of events and situations, in terms of experiential, behavioural and physiological channels (Preece et al. 2018, pp.2018). This modifies the relationship between the individuals and the environment in terms of their

motives and representation of progress toward implicit goals (Rodebaugh & Heimberg, 2008, pp.142). Emotion regulation allows individuals to manage and alter emotional episodes via reappraisal and suppression (Ghorbani et al., 2007; Holodynski & Friedlmeier, 2005; Brans et al, 2013). The process model of emotion regulation portrays when the five points of regulating emotions occurs: situation selection, situation modification, attentional deployment, cognitive change and response modulation (Gross, 2014). This demonstrated how a situation is selected, modified, attended, appraised and lastly generated an emotional response (Preece et al., 2017). Most importantly, demonstrated that emotion regulation allows individuals to manage and alter emotional episodes (Ghorbani et al., 2007; Holodynski & Friedlmeier, 2005; Brans et al, 2013). Emotions can be classified as positive and negative. Negative affect refers to negative emotional states such as fear, anger, and disgust, conversely. Positive affect refers to the positive emotions, such as joy, enthusiasm, and excitement, an individual experiences (Singh & Jha, 2008). Recent research has shown that positive or negative valence stimuli will affect the experience of emotions significantly (Becerra, Preece, Campitelli & Scott-Pillow, 2019). Various research has associated alexithymia with high levels of negative reactivity and explained emotion regulation aims to up-regulate positive feelings and down-regulate negative feelings (Preece et al., 2017; Preece et al., 2021). Consequently, individuals with poorer emotion regulation skills tend to experience negative feelings more intensely and less intensely for positive feelings comparing to individuals with better emotion regulation skills. Therefore, this emphasized the importance of both positive and negative reactivity in relation to a range of mental disorders.

Emotion regulation is a mediating variable between alexithymia and psychological distress (Luminet & Zamariola, 2018). Research has shown that poor emotion regulation is significantly associated with higher levels of depression, anxiety, and higher usage of suppression (Mazidi et al., 2023). Negative affect is strongly associated with psychological distress, for which depression and anxiety have been found to positively correlate with alexithymia (Taylor, 2004). Sagar et al. (2021) explained that in relation to experiencing depression and anxiety, secondary alexithymia acts as a defence mechanism. As a result, individuals with psychological distress tend to experience difficulties in socialising and maintaining internal emotions. Therefore, secondary alexithymia illustrates that it aims to protect the self and decreases vulnerability against emotional distress (Patrikelis, 2019). Correspondingly, positive affect is strongly and negatively correlated with depression and anxiety (Xu et al., 2015; Headey, Kelley & Wearing, 1991), and positively associated with

well-being and happiness. Consequently, positive affect is negatively correlated with alexithymia. Life satisfaction indicates the physical factor of wellbeing, which represents the cognitive component, and happiness is the psychological factor, indicating the affective component of subjective wellbeing (Timoney & Holder, 2013). Therefore, both traits can be tested to evaluate the cognitive affect deficits that can be linked to alexithymia. In relation to testing negative and positive affect in the following study, negative affect is examined through DASS-21 which assesses depression and anxiety; and Life Satisfaction scale plus General Happiness scale will be used to examine positive affect.

Early theoretical models conceptualised alexithymia as difficulties in identifying feelings (DIF), difficulties in describing feelings (DDF), externally oriented thinking style (EOT) and difficulty fantasising (DFAN) (Zimmermann et al., 2005; Schroeders, Kubera & Gnambs, 2022). A systematic investigation on patients with classic psychosomatic diseases demonstrates symptoms of difficulty in describing subjective feelings, the lack of fantasy life and an externally oriented cognitive style, which devised the term alexithymia (Taylor & Bagby, 2013). This is further explained by Taylor, Bagby & Parker (1999) in relation to psychoanalytic theory. Individuals with alexithymia experienced psychosomatic symptoms due to unable to use fantasy activity to regulate the psychoanalytic drives, resulting in poor emotion regulation. However, later research demonstrates that there are different aspects of fantasy which leads to difficulty in precisely identify which aspects would be impaired in psychoanalytic formulations of alexithymia (Preece & Gross, 2023). Moreover, daydreaming and fantasy does not dependent on the development of emotion schemas (Preece et al., 2017). Therefore, a modification of alexithymia has removed DFAN to align with the understanding of emotion regulation, and thus, consistent with the new construct of alexithymia.

The Toronto Alexithymia Scale (TAS-20) is based on the psychoanalytic theory and is the most commonly used scale to measure alexithymia that has been tested in a range of population. TAS-20 measures alexithymia with three subscales: DIF, DDF, and EOT. Preece et al (2020) established that TAS-20 DIF and DDF subscales were statistically assessing negative emotions. Despite being proven valid and reliable (Lashkari, 2021; Hamaideh, 2017), it has also received several criticisms, such as the high correlation with psychopathology variables that indicates potentially not measuring a distinct construct (Leising, Grande & Faber, 2009). In contrast to the psychoanalytic theory, Preece et al (2018) proposed the attention-appraisal model of alexithymia. The model explains emotion

regulation in stages: firstly, the situation stage where a stimulus is presented which provokes emotions; secondly, the attention stage, where the individuals focus on emotional responses to the stimulus; thirdly, the appraisal stage, where the individuals address the emotional responses and articulate what the response means; lastly, the response stage, which is emotional regulation, where the person will modify their emotions based on their goals set from the appraisal stage. The severity of alexithymia can be understood through the difficulties of the attention and appraisal stage. High alexithymia indicates a low developmental level. This proposed that the individual can experience basic pleasant or unpleasant emotions. In contrast, low alexithymia indicates a high developmental level. Indicating that the individual can differentiate emotions, such as angry but not sad; or excited but not amused (Preece et al, 2018, pp.33). This model conceptualised EOT as the difficulty in the attention stage; and DIF plus DDF are difficulties during the appraisal stage. As mentioned previously, DFAN does not conceptualise in the model as it lacks attention on emotions, therefore is not included in the conceptualisation of alexithymia under the attention-appraisal model. In relation, emotion valence is shown during the appraisal stage; as the ability to differentiate negative and positive emotions is not equivalent, it is crucial to evaluate how one perceives, expresses and regulates positive and negative emotions separately. Consequently, Preece et al (2018) developed the Perth Alexithymia Questionnaire (PAQ) to alter the changes of the conceptualisation of alexithymia based on the attention-appraisal model. This is through removing DFAN and incorporate positive and negative affect. Thus, provides a more detailed facet-level and valence-specific understanding of alexithymia (Preece et al., 2020; Taylor & Bagby, 2021).

As the PAQ is newly developed, there is limited research in the comparison of PAQ and TAS-20 in relation to the evaluation of which scale has a better prediction for alexithymia traits. Therefore, the aim of this study is to evaluate whether the recently developed PAQ is better at predicting emotional regulation, psychological distress and positive and negative affect compared to established TAS-20. It is hypothesised that there will be no difference in predicting emotional regulation, and psychological distress. However, it is hypothesised that PAQ will be better at predicting positive affect compared to TAS-20 due to the changes based on the new model.

Methods

Participants and procedure

A total of 93 participants were recruited. 54 psychology students were recruited from the University of Adelaide, through the university's Research Participation System (RPS) in exchange for course credits, and 39 participants through Facebook recruitment. Twelve participants' data were excluded due to missing data, or dropped out, therefore there are 81 total participants. Participants will then complete the survey via an online platform, Qualtrics, to complete a self-report online questionnaire. There are 29.6% of participants who identified as male, and 70.4% who identified as female. Participants age ranged between 18 to 45, with mean = 21.25. There are 37% completed postgraduate degree; 14.8% completed a bachelor's degree; 76.5% completed high school; 1.2% completed diploma; and 3.7% completed TAFE certificate.

Measures

Toronto Alexithymia Scale (TAS-20, Bagby, Parker & Taylor, 1994) is a 20-item self-report measure of alexithymia. It is divided into three subscales: Difficulty Identifying Feelings (DIF); Difficulty Describing Feelings (DDF); and Externally Oriented Thinking (EOT). Participants indicate their level of agreement with each statement on a 5-point Likert scale. The total score signifies the severity of alexithymia, score 0 - 51 indicates no alexithymia; 52-60 indicates possible alexithymia; and 61-100 indicates alexithymia present. Cronbach's alpha was used to test for internal reliability, which shows that, in this study, the TAS-20 total score $\alpha = .84$; for subscales DIF $\alpha = .85$; DDF $\alpha = .83$; and EOT $\alpha = .32$. TAS-20 total score, DIF, DDF and EOT subscales were used in analysis.

Perth Alexithymia Questionnaire (PAQ; Preece et al., 2018) is a 24-item self-report measure of alexithymia based on the attention-appraisal model, accounting for positive and negative emotions. It is divided into five subscales: general-difficulty identifying feelings (G-DIF) (with positive and negative difficulty identifying feelings N-DIF and P-DIF); general-difficulty describing feelings (G-DDF) (with positive and negative-general difficulty describing feelings N-DDF and P-DDF); negative-difficulty appraising feelings (N-DAF); positive difficulty appraising feelings (P-DAF); and general-difficulty appraising feelings (G-DAF). A 7-point Likert scale is utilised. Cronbach's alpha for PAQ total score is .97; DIF $\alpha = .94$; DDF $\alpha = .94$; EOT $\alpha = .95$; P-DIF $\alpha = .91$; N-DIF $\alpha = .90$; P-DDF $\alpha = .92$; N-DDF α

=.91. PAQ total score, DIF, DDF and EOT, plus DIF and DDF positive and negative subscales will be used for evaluation in order to reflect the changes corporate in the design of PAQ.

Perth Emotion Competency Inventory (PERCI, Preece et al., 2018) is a 32-item self-report measure for emotion regulation ability. It consists of five subscales: negative-emotion regulation; positive-emotion regulation; general-facilitating hedonic goals; positive-containing emotions; and general-emotion regulation. Participants answer each item on a 7-point Likert scale. Cronbach's alpha for all subscales ranged between .90 to .93, indicating an excellent internal validity. PERCI positive and negative subscales will be used separately for evaluation.

Depression Anxiety Stress Scale (DASS-21, Lovibond & Lovibond, 1995) is a 21-item self-report measure for depression, anxiety and stress. Participants will indicate how much the statement applies to them over the past week via a 4-point Likert scale. DASS-21 displayed a high internal consistency with $\alpha = .93$ for total scores; $\alpha = .88$ for depression; $\alpha = .80$ for anxiety stress and $\alpha = .84$ for anxiety, indicating good to excellent internal reliability (Thiyagarajan et al., 2022, pp.138). DASS-21 Depression and Anxiety subscales will be used for data analysis.

Positive and Negative Affect Schedule (PANAS, Watson, Clark & Tellegen, 1988) is a 20-item measure of positive and negative emotion, using the 5-point Likert scale. Cronbach's alpha was .76 for the total score; .87 for positive affect and .87 for negative affect indicating a good to excellent internal reliability. PANAS Positive and Negative subscales will be used separately for analysis.

Satisfaction with Life Scale (Diener et al., 1985) is a 5-item self-report measure regarding life satisfaction. It utilises a 7-point Likert scale. As Cronbach alpha is .90, this indicates a good internal reliability (Palmer, Donaldson & Stough, 2002). The total score will be utilised in data analysis to assess positive affect.

General Happiness Scale (Lyubomirsky & Lepper, 1999) is a 4-item self-report measure of subjective happiness. Items are rated on a 7-point Likert scale. Cronbach's alpha ranged

between .78 to .90 indicating a good to excellent internal validity. The total score will be used in analysis.

Procedures

A brief description of the study was posted on the university SONA Research Participation System for first year psychology students enrolled in the University of Adelaide, with 67.74% participants recruited from SONA. The study was also advertised on social media, Facebook, which recruited 32.26% participants. Participants were informed regarding what is alexithymia, the purpose of the study, associated risks, and the rights to withdraw anytime. Informed consent and demographic information such as age, gender and education level were also obtained from the participants. Individuals who participate in exchange of course credits were required to provide their student ID number Research Participation System ID code. Participants then anonymously complete the questionnaire created through Qualtrics. Participants took approximately 20 minutes to complete the study. The study has been approved by the HREC sub-committee for the School of Psychology (approval number 23/65).

Data analysis

SPSS Statistic 27 was used to analyse the data. Pearson's and Spearman's correlations were used to examine the strengths of the relationship between the variables. Multiple regressions were used to assess the strength of PAQ DIF and DDF Positive and Negative subscales in predicting PANAS Positive and Negative subscales. Required sample size were estimated using G Power. To evaluate how many participants are required for significant results, effect size of 0.12, power of .80 and alpha level of .05 were input to G Power, and it estimated approximately 52 participants would be required to complete the study.

Results

There were missing data for all scale items in some measures (PAQ 2; PERCI 6; Satisfaction with Life 4; PANAS 4; DASS-21 3). Therefore, pairwise deletion was used in statistical analyses.

Table 2 shows descriptive data for all the variables. The mean score of TAS-20 total score is below the clinical cut-off for alexithymia (Bagby, Parker & Taylor, 1994). Similarly, with PAQ total score, the means score indicated average level of alexithymia (Preece et al., 2018). The results also show that the sample obtained average level of difficulty in overall regulating positive and negative emotions based on the PERCI positive and negative subscales (Preece et al., 2018). Moreover, higher levels of positive and negative affect from PANAS positive and negative subscales (Watson, Clark & Tellegen, 1988). The participants on average also felt slightly satisfied with their life (Diener et al., 1985), and considered an average happy person (Lyubomirsky & Lepper, 1999). Lastly, on average, the participants also experience mild depression and moderate level of anxiety (Lovibond & Lovibond, 1995).

Two outliers were identified, that are slightly outside the 1.5 interquartile range, one of each on the TAS-20 EOT subscale and General Happiness Scale. Therefore, these data were retained for statistical analysis. The TAS-20 total score and subscales, PAQ total scores, Satisfaction with Life scale, PERCI, PANAS Positive and General Happiness scales were normally distributed. However, age, some PAQ subscales, PANAS negative and DASS-21 Depression and Anxiety subscales were positively skewed.

Table 2*Descriptive statistics for measures used in the study.*

Measures	M	SD
Age	21.21	5.80
Satisfaction With Life scale	22.38	7.54
General Happiness scale	4.42	1.13
DASS-21 Depression subscale	6.32	4.40
DASS-21 Anxiety subscale	6.08	4.14
PERCI positive subscale	42.34	15.45
PERCI negative subscale	63.36	19.51
PANAS positive subscale	30.34	7.37
PANAS negative subscale	25.29	8.17
TAS-20 total score	51.32	11.61
TAS-20 DIF subscale	17.57	5.97
TAS-20 DDF subscale	13.86	4.78
TAS-20 EOT subscale	19.895	3.65
PAQ total score	76.97	31.62
PAQ DIF subscale	26.61	11.55
PAQ DDF subscale	26.43	11.46
PAQ EOT subscale	25.92	12.42
PAQ positive subscale	27.16	12.71
PAQ negative subscale	26.58	11.23

Note. DASS-21 = Depression Anxiety Stress Scale-21, PERCI= Perth Emotion Competency Inventory, PANAS = Positive and Negative Affect Schedule, TAS-20 = Toronto Alexithymia Scale-20, PAQ = Perth Alexithymia Questionnaire, DIF= Difficulty identifying feelings, DDF = difficulty describing feelings, EOT= externally oriented thinking.

Pearson's and Spearman's correlation were used to examine the bivariate correlation between variables. Person's correlation was used when there were normal distributions for both variables, whereas Spearman's correlation was used when there were deviations from normality. Table 3 shows correlations between the variables used in the study. The results indicate that there are no significant correlations between age and study measures.

As shown in Table 3, both alexithymia scales are highly correlated. TAS-20 total score and PAQ total score are significant, positive, and strongly correlated ($r = .90$). Similarly, TAS-20 subscales are significant, positive, and largely correlated respectively with PAQ subscales (r ranges between .53 to .89).

Table 3

Correlation of TAS-20 subscales with PAQ subscales (N=79).

PAQ \ TAS-20	TAS-20 total score	TAS-20 DIF subscale	TAS-20 DDF subscale	TAS-20 EOT subscale
PAQ total score	.90**	.85**	.74**	.52**
PAQ DIF subscale	.830+ **	.89+ **	.56+ **	.44+**
PAQ DDF subscale	.90+**	.84+**	.78+**	.49+**
PAQ EOT subscale	.74+**	.63+**	.62+**	.53+**

Note. Pearson's correlation, unless indicated otherwise. TAS-20 = Toronto Alexithymia Scale-20, PAQ = Perth Alexithymia Questionnaire, DIF= Difficulty identifying feelings, DDF = difficulty describing feelings, EOT= externally oriented thinking.

+ Spearman's correlation, ** $p < .001$

In reference to Table 4, the DASS-21 Depression subscale showed similar significant, positive, and moderate correlation with TAS-20 and PAQ, $r = .502$; and $r = .490$ respectively. Similarly, DASS-21 Anxiety showed significant, positive and moderate correlations with TAS-20 and PAQ, $r = .44$; and $r = .46$ respectively. PANAS negative subscale with TAS-20 and PAQ correlation are $r = .33$; and $r = .37$, indicating significant, positive, and moderate correlation. Similarly, PERCI negative subscale is also significant, positive, and moderately to strongly correlated with TAS-20 and PAQ, $r = .44$; and $r = .52$.

With regard to measures of positive affect, also shown in Table 4, the correlation with TAS-20 and PAQ are somewhat different. The correlation of Satisfaction with Life scale with TAS-20 and PAQ, $r = -.15$; and $r = -.03$ respectively. This indicates non-significant, negative and weak correlation. General Happiness scale with TAS-20 and PAQ are significant, negative, and moderately correlated, $r = -.45$; and $r = -.38$ respectively. PANAS positive subscale showed in-significant, negative, and weak correlation with TAS-20, $r = -.02$; but

positive correlation with PAQ, $r = .20$. PERCI positive subscale is significant, positive, and moderately to largely correlated with TAS-20 and PAQ, $r = .46$; and $r = .54$. In summary, correlations between PAQ and measures of affect were similar to or exceeded correlations between TAS-20 in most cases.

Table 4

Correlation between TAS-20 and PAQ with other variables.

Outcome Variables	TAS-20 total score	PAQ total score
Age	-.01 ⁺	-.07 ⁺
Satisfaction with Life total score	-.15	-.03
General Happiness Scale	-.45**	-.38**
DASS 21- Depression subscale	.50 ⁺ **	.49 ⁺ **
DASS 21- Anxiety subscale	.45 ⁺ **	.46 ⁺ **
PERCI positive subscale	.46**	.54**
PERCI negative subscale	.44**	.52**
PANAS positive subscale	-.02	.20
PANAS negative subscale	.33 ⁺ *	.37 ⁺ **

Note. Pearson's correlation, unless indicated otherwise. DASS-21 = Depression Anxiety Stress Scale-21, PERCI= Perth Emotion Competency Inventory, PANAS = Positive and Negative Affect Schedule, TAS-20 = Toronto Alexithymia Scale-20, PAQ = Perth Alexithymia Questionnaire.

⁺ Spearman's correlation, ** $p < .001$, * $p < .05$

The comparison between the correlation of TAS-20 EOT subscale and PAQ EOT subscale with other variables are shown in Table 5. Apart from age and education, PAQ EOT subscale has a higher correlation with other variables comparing to TAS-20 EOT subscale.

Table 5:

The correlations between TAS-20 subscale and PAQ EOT subscale with other variables.

Outcome Variables	TAS-20 EOT	PAQ EOT
Age	.17	.05
Satisfaction with Life total score	.21	-.22
General Happiness Scale	-.30*	-.31*
DASS 21- Depression subscale	.28*	.35*
DASS 21- Anxiety subscale	.14	.27*
PERCI positive subscale	.32*	.36**
PERCI negative subscale	.32*	.39**
PANAS positive subscale	.07	.08
PANAS negative subscale	.18	.17

Note. Spearman's correlation. DASS-21 = Depression Anxiety Stress Scale-21, PERCI= Perth Emotion Competency Inventory, PANAS = Positive and Negative Affect Schedule, TAS-20 = Toronto Alexithymia Scale-20, PAQ = Perth Alexithymia Questionnaire, EOT= externally oriented thinking.

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

Lastly, as PAQ is designed to separately measure alexithymia for positive and negative affects. Table 6 shows the correlations between PAQ positive and negative DIF and DDF subscales with other variables. The results show that the correlations between positive and negative DIF and DDF subscales with most variables were similar, with the exception of PANAS positive and negative subscales. The Life Satisfaction Scale and General Happiness scale are significant, negative and moderately correlated with PAQ positive and negative DIF and DDF subscales. DASS-21 Depression and Anxiety subscales and PERCI positive and negative subscales are significant, positive and moderately to strongly correlated with PAQ positive and negative DIF and DDF subscales.

However, PAQ negative DIF obtained a larger correlation with PANAS positive subscale ($r = -.22$) compared to PAQ positive DIF ($r = -.04$). Similarly, negative DDF obtained a larger correlation ($r = -.18$) with PANAS positive subscale than positive DDF ($r = -.01$). PAQ

positive DIF obtained a larger correlation with PANAS negative subscale ($r = .50$) comparatively to negative DIF ($r = .48$). Lastly, positive DDF obtained a higher correlation ($r = .44$) than negative DDF ($r = .31$) with PANAS negative subscale.

Table 6:

The correlation of PAQ positive and negative DIF and DDF subscales with other variables.

Outcome variables	PAQ positive DIF	PAQ negative DIF	PAQ positive DDF	PAQ negative DDF
Life Satisfaction total score	-.37**	-.30*	-.27*	-.27*
General Happiness Scale	-.46**	-.44**	-.41**	-.39**
DASS 21- Depression subscale	.56**	.54**	.48**	.41**
DASS 21- Anxiety subscale	.53**	.52**	.50**	.40**
PERCI positive subscale	.56**	.53**	.56**	.48**
PERCI negative subscale	.55**	.55**	.52**	.49**
PANAS positive subscale	-.04	-.22	-.01	-.18
PANAS negative subscale	.50**	.48**	.44**	.31*

Note. Spearman's correlation. DASS-21 = Depression Anxiety Stress Scale-21, PERCI= Perth Emotion Competency Inventory, PANAS = Positive and Negative Affect Schedule, PAQ = Perth Alexithymia Questionnaire, DIF= Difficulty identifying feelings, DDF = difficulty describing feelings, EOT= externally oriented thinking.

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

PANAS positive and negative subscales obtained dissimilar correlations between PAQ positive and negative DIF and DDF. Therefore, multiple regression was utilised to examine the best predictors of PANAS positive and negative subscales, using predictors PAQ positive DIF, negative DIF, positive DDF, and negative DDF subscales. For PANAS positive subscale, $F(4, 71) = 2.89$, $p > .005$, $R^2 = .140$, which shows a small statistically significant effect. Furthermore, PAQ positive DDF obtaining the largest effect ($\beta = .70$, $p = .08$) but not statistically significant, and negative DIF shows a medium effect but is not statistically significant ($\beta = -.44$, $p = .08$). There was significant regression of PANAS negative on $F(4,$

71) = 6.63, $p < .005$, $R^2 = .27$. Positive DIF shows a large effect but not significant ($\beta = .64$, $p = .07$). Although the predictors show medium to large effects, VIF values showed indications of multicollinearity between the PAQ positive and negative subscales. Therefore, regression results are not considered further.

Discussion

Due to the lack of research in comparing the predictability of TAS-20 and PAQ in regards to emotion regulation, psychological distress and positive and negative affect, this study aimed to evaluate which scale has a better prediction on the mentioned variables. TAS-20 is based on the psychoanalytic theory and the PAQ is based on the attention-appraisal model, which expands on the understanding of alexithymia. Consequently, it was hypothesised that both scales will have no differences in predicting emotion regulation and psychological distress, as the construct of alexithymia remains the same. However, the attention-appraisal model explains that positive and negative emotions are expressed and regulated differently (Preece et al, 2018). Research indicates that TAS-20 assesses negative emotions, whereas the PAQ considers both positive and negative affect based on the attention-appraisal model. Therefore, it is also hypothesised that PAQ will be better at predicting positive affect compared to TAS-20.

The results indicated the sample in this study on average has no alexithymia based on the TAS-20 results (mean = 51.31) (Bagby, Parker & Taylor, 1994) but indicated an average level of alexithymia for PAQ (mean = 76.97) (Preece et al., 2018). The slight discrepancy in the analysis of one's level of alexithymia could be due to PAQ providing a more detailed facet-level understanding of alexithymia and, therefore better at assessing alexithymia in general. Another explanation could be due to the participant's attentiveness to the questions. The attention check question in the survey shows that 53.1% of participants read the questions correctly, however, 42% of participants did not read the questions carefully, and the remaining 4.9% did not answer the attention check question. This shows that more than half of the participants did not read the questions properly, consequently, this could decrease the accuracy of the results. The results from other variables also indicated average levels of difficulty in regulating emotion (Preece et al., 2018), and psychological distress (Lovibond & Lovibond, 1995) but higher levels of positive and negative affect (Watson, Clark & Tellegen, 1988). Moreover, Cronbach's alpha higher than .80 indicating a good internal consistency, therefore Cronbach's alphas from TAS-20 total and subscales indicate a good internal consistency apart from EOT (Leising, Grande & Faber, 2009, pp.708). As all PAQ Cronbach's alphas are larger than .90, therefore it suggests an excellent internal validity. As PAQ subscales have a better internal validity, especially EOT subscale, therefore, PAQ has a higher trustworthiness of causal relationship, and a better scale than TAS-20.

With reference to the first hypothesis, as expected, there are significant, positive and strong correlations between the TAS-20 and PAQ total scores and corresponding subscales. This shows that the construct of alexithymia is the same on both scales. The correlation between the TAS-20 EOT subscale and the PAQ EOT subscale has the lowest correlation but is still considered a large effect size ($r = .53$). Further investigation on the correlation of the TAS-20 EOT subscale and PAQ EOT subscale with other variables demonstrated that the PAQ EOT subscale has a higher correlation with other variables. This proposes that the EOT subscale from the PAQ scale has a stronger relationship with the variables, hence a more accurate prediction.

In relation to the correlation between TAS-20 total score and PAQ total score with other variables, the correlations are very similar. Firstly, there is no correlation between age with TAS-20 or PAQ. This is inconsistent with previous literature, as Hamaideh (2017) argued that adolescence has a higher prevalence of alexithymia due to being more vulnerable to psychological distress. However, as there are insufficient samples for each age groups, the results from this study might not be accurate to disprove the above argument. Moreover, this study has also not investigated the correlation between different age groups with TAS-20 or PAQ total scores. Therefore, it is difficult to conclude whether adolescence has a higher prevalence, but only showed no correlation between age and the total scores from TAS-20 and PAQ. With regards to the correlation between TAS-20 total score and PAQ total score with other variables, there are insignificant differences between the correlations. This further suggests that the construct of the subscales and the conceptualisation of alexithymia are the same in both TAS-20 and PAQ. To evaluate the prediction of emotion regulation, PERCI has been utilised. TAS-20 and PAQ are significantly, positively, and strongly correlated with PERCI positive ($r = .52$; $r = .52$ respectively) and negative subscales ($r = .55$; $r = .52$). This shows there are no differences in predicting emotion regulation from TAS-20 or PAQ. To evaluate psychological distress, DASS-21 Depression and Anxiety subscales were utilised to examine the negative psychological distress. The Life Satisfaction scale and General Happiness scale were used to examine positive psychological contentment. TAS-20 has a slightly higher correlation with the DASS-21 Depression subscale compared to PAQ. Whereas PAQ is slightly higher in correlation with DASS-21 Anxiety subscale compared to TAS-20. However, due to the insignificant difference in correlations, it can be concluded that there is no difference in predicting negative psychological distress. All correlations with DASS-21 Depression and Anxiety subscales are also positive and moderate. This implies the

relationship between psychological distress and alexithymia moves in the same direction. Therefore, individuals with higher alexithymia tends to experience higher psychological distress as well. These results are similar to those reported by Preece et al. (2023) stating the association of alexithymia with a range of psychological disorders, including depression and anxiety. TAS-20 and PAQ with Life Satisfaction scale are significant, negative, and weakly correlated ($r = -.24$; $r = -.30$). The low correlation indicates that the Life Satisfaction scale might not be the best scale to evaluate positive psychological contentment. However, the direction of the correlation further supported the understanding that lower alexithymia has a stronger association with higher satisfaction. This also reinforced the above findings that higher alexithymia will have a higher association with psychological distress. Furthermore, the results of the correlation with General Happiness scale also supported the association. Both correlations of TAS-20 and PAQ with General Happiness scale are significant, negative and moderate, therefore showing higher alexithymia tends to decrease the happiness of the individuals. As the correlations between TAS-20 and PAQ have no significant difference with psychological distress, therefore the results supported the first hypothesis.

Furthermore, to evaluate positive and negative affect, PANAS positive and negative subscales were used. PAQ total score has a larger correlation with PANAS Positive ($r = .20$) and Negative ($r = .37$) subscales compared to TAS-20 ($r = -.02$ and $r = .33$ respectively). Firstly, the results show no significant difference in the correlation for PANAS negative subscale. Therefore, both scales are equal in the prediction of negative affect. Secondly, as there is no correlation between TAS-20 and PANAS positive subscale, therefore it further supported Preece et al. (2020) confirmation that TAS-20 only assesses negative emotions. Finally, PAQ has a positive and weak correlation with PANAS positive subscale. This aligns with the attention-appraisal model that there is the ability to differentiate positive and negative emotion valence (Preece et al., 2018). The results also show that PAQ is slightly better at predicting positive affect compared to TAS-20. Subsequently, to further evaluate whether PAQ positive and negative subscales provided a valence-specific understanding of alexithymia, correlations between PAQ DIF and DDF positive and negative subscales with variables are evaluated.

PAQ positive and negative DIF and DDF subscales show insignificant differences in correlations with other variables, and the direction of the correlations are not as predicted. For example, General Happiness scale is predicted to be positively correlated with PAQ positive

DIF and DDF, but negatively correlated with PAQ negative DIF and DDF. As expected, the results show significant, negative and moderately correlated with negative DIF ($r = -.44$) and DDF ($r = -.39$), however, the correlation is the same with positive DIF ($r = -.46$) and DDF ($r = -.41$). In contrast, DASS-21 Depression subscale should be negatively correlated with PAQ positive DIF and DDF; and positively correlated with PAQ negative DIF and DDF. The results show significant, positive and moderate to strong correlations with positive and negative DIF and DDF subscales. On average, participants from this study have no to low level of alexithymia, therefore the symptoms of alexithymia should not interfere with the processing of positive and negative emotions. Therefore, a possible explanation for the incorrect direction in correlations could be the design of PAQ. The wording for questions regarding positive and negative valence emotions are similar, therefore if the participants did not read the questions correctly, the results might not be accurate. Although previous analysis show PAQ slightly better at predicting positive affect, however, through comparing and evaluating PAQ positive and negative subscales with PANAS, the results could not support the second hypothesis.

Multiple regression was performed to evaluate the best predictor for PANAS positive and negative subscales. Positive DDF shows a large effect but is not statistically significant, and negative DIF shows a medium effect but is not statistically significant with PANAS positive. Comparatively, positive DIF also shows a large effect but not significant. As the results show a large effect but not statistically significant, this suggests the study is underpowered. Moreover, the correlations range between $r = .67$ to $.94$, which is considered highly correlated, therefore this demonstrated high multicollinearity. This is supported by previous literature (Preece & Gross, 2023), which also shows that the correlation between PAQ positive and negative DIF and DDF are indeed highly correlated. To conclude, the results show multicollinearity, as the correlation between each subscale is highly correlated. Consequently, influenced the inability to determine the individual effects on the PANAS positive and negative subscales. Along with the low sample size, in which reduces the probability of detecting the true effect. Subsequently, the results obtained from multiple regression are not considered further.

This study provided insights on the comparison of TAS-20 and PAQ in relation to the predictability of emotion regulation, psychological distress and positive and negative affect, plus evaluated the positive and negative valence in relation to the attention-appraisal model.

This study has shown that TAS-20 and PAQ subscales have a similar correlation with other variables, however, PAQ EOT subscale has a higher correlation with other variables. Consequently, PAQ could be a better measure of alexithymia and would recommend it over TAS-20. Another significant aspect in this study is as PAQ is recommended, clinicians are able to utilise the understanding of the attention-appraisal model in relation to the subscales to identify which aspects are in deficits. For example, if the individual scores high in EOT subscale, this indicates difficulty in the attention stage. Consequently, during the consultation, the therapist could suggest the most appropriate treatment for the individual based on the results of the PAQ scale. Such as, mindfulness, which improves interoceptive awareness, which decreases affective deficits common in alexithymia individuals (Aaron, Blain, Snodgrass & Park, 2020). Moreover, with the understanding of alexithymia being an underlying condition for the individual, the clinician will be able to identify certain treatments that will not be suitable for them. For example, cognitive behavioural therapy, this is due to individuals having to identify and change emotions and behaviour (Morie, Nich, Hunkele, Potenza & Carroll, 2015), however the symptoms of alexithymia interfere the process. In summary, this study provided a new insight on the comparison between TAS-20 and PAQ and highlighted the usefulness of identifying level of alexithymia in an individual.

There are several strengths and limitations in this study. Firstly, the mean score for the study samples was not in the clinical range for alexithymia. However, on average participants scored mild in DASS-21 Depression subscale, moderate for DASS-21 Anxiety subscale, average level of emotion regulation, and had higher levels of positive and negative affect. This indicates that the sample is suitable to test the relationships between alexithymia with emotion regulation, psychological distress and positive and negative affect. Although there are participants from different cultural backgrounds, 70.7% were born in Australia, 20.8% in Asia, 3.7% in America, 2.4% in Africa, 1.2% in Europe, 1.2% in New Zealand. This can be considered as a limitation as the cultural distribution is not sufficient. Therefore, this study is unable to draw cultural assumptions. Moreover, due to the small sample size, the results are skewed, and results in some reasonable sized correlations but non-significant. Another limitation is that 72.8% of participants were university students aged between 18 to 21, therefore the sample of this study cannot represent the population. Lastly, questions on the survey were not randomised, which contributed to missing data.

Future research is crucial in exploring more on alexithymia and the attention-appraisal model. In relation to the attention-appraisal model, future research should evaluate the relative value of the model, such as whether the model recommends different interventions and how useful it is to evaluate positive and negative emotions separately. This study shows no difference in the correlation of PAQ positive and negative subscales with other variables. Therefore, future research should investigate whether positive and negative emotions discriminate in high alexithymia individuals, and the conceptual and practical issues of the concept.

In conclusion, as alexithymia is greatly associated with various psychological distress and impairs certain treatments, it is crucial to evaluate whether an individual has an underlying concern of alexithymia. The results supported the first hypothesis that TAS-20 and PAQ have no difference in predicting emotion regulation and psychological distress. This study also shows that PAQ positive and negative subscales are not significantly different in predicting other variables. Consequently, the results do not support the second hypothesis that PAQ is better at predicting positive affect compared to TAS-20. However, this study recommended PAQ over TAS-20 due to higher internal validity and PAQ EOT subscale has a higher correlation with emotion regulation, psychological distress, and positive and negative affects compared to TAS-20 EOT subscale. Through this, it is essential for future research to focus on the attention-appraisal model, especially more research on positive and negative emotion valence in relation to high alexithymia individuals is needed. It is also crucial to highlight the importance of the model and advise clinicians to utilise the results, in regards to the model, to recommend the appropriate treatment for the individual.

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