

The Chinese version of the Perth Alexithymia Questionnaire: psychometric properties and clinical applications

Supplementary materials

1. Supplementary Methods

2. Supplementary Results

3. Supplementary Table S1. Pearson correlations between the Perth Alexithymia Questionnaire scores and the scores of Toronto Alexithymia Scale-20/Depression Anxiety Stress Scales-21/Emotion Regulation Questionnaire/Difficulties in Emotion Regulation Scale (Study 1 general population/Study 2 the clinical depression group /Study 2 the subclinical depression group).

4. Supplementary Table S2. Factor loadings from a second-order exploratory factor analysis of the Perth Alexithymia Questionnaire and Depression Anxiety Stress Scales-21 subscale scores.

5. Supplementary Table S3. Pearson correlations between alexithymia and educational level (the subclinical depression control group/the subclinical depression group/the clinical depression control group/ the clinical depression group).

6. Supplementary Table S4. Pearson correlations between the Perth Alexithymia Questionnaire scores and the scores of Toronto Alexithymia Scale-20/Depression Anxiety Stress Scales-21/Emotion Regulation Questionnaire/Difficulties in Emotion Regulation Scale (the clinical depression control group/the subclinical depression

control group).

7. Supplementary Table S5. Pearson correlations and partial correlations between alexithymia and depressive symptoms in patients with major depressive disorder.

8. Supplementary Figure S1. The confirmatory factor analysis models examined in Study 1.

Supplementary Methods

As patients with major depressive disorder (MDD) had significantly shorter education length than healthy controls, the PAQ total scores were compared between patients with MDD and healthy controls using an analysis of covariance (ANCOVA) with a covariate of education length. The PAQ subscale scores were compared between the two groups using a multivariate analysis of covariance (MANCOVA) with a covariate of education length. When main effects were significant in the MANCOVA, the ANCOVA was conducted for each subscale scores. To explore the relationships between alexithymia and education length, Pearson correlations between alexithymia and educational level were conducted.

Supplementary Results

Patients with MDD had significantly higher PAQ total scores than healthy controls ($F(1, 97)=20.80, p<0.001$). As for the subscale scores, MANCOVA found significant group differences ($V=0.81, F(4, 94)=5.52, p<0.001$). The follow-up ANCOVAs revealed significant group difference between the MDD group and the MDD control group on each subscale (N-DIF: $F(1, 97)=18.37, p<0.001$; P-DIF: $F(1, 97)=17.53, p<0.001$; N-DDF: $F(1, 97)=15.75, p<0.001$; P-DDF: $F(1, 97)=12.75, p<0.001$; G-EOT: $F(1, 97)=20.15, p<0.001$). The results of Pearson correlations were shown in Supplementary Table S5.

Supplementary Table S1. Pearson correlations between the Perth Alexithymia Questionnaire and the Toronto Alexithymia Scale-20/Depression Anxiety Stress Scales-21/Emotion Regulation Questionnaire/Difficulties in Emotion Regulation Scale (Study 1 general population/Study 2 the clinical depression group/Study 2 the subclinical depression group).

Measure	PAQ subscales					PAQ composite scales					ALEXI
	N-DIF	P-DIF	N-DDF	P-DDF	G-EOT	G-DIF	G-DDF	N-DAF	P-DAF	G-DAF	
TAS											
DIF	0.67 [*] /0.74 [*] /0.74 [*]	0.64 [*] /0.57 [*] /0.52 [*]	0.60 [*] /0.71 [*] /0.73 [*]	0.63 [*] /0.67 [*] /0.57 [*]	0.55 [*] /0.53 [*] /0.52 [*]	0.70 [*] /0.70 [*] /0.71 [*]	0.65 [*] /0.70 [*] /0.70 [*]	0.67 [*] /0.74 [*] /0.78 [*]	0.67 [*] /0.63 [*] /0.61 [*]	0.70 [*] /0.71 [*] /0.75 [*]	0.70 [*] /0.67 [*] /0.74 [*]
DDF	0.60 [*] /0.58 [*] /0.58 [*]	0.56 [*] /0.47 [*] /0.42 [*]	0.63 [*] /0.56 [*] /0.72 [*]	0.64 [*] /0.53 [*] /0.49 [*]	0.50 [*] /0.35 [*] /0.57 [*]	0.62 [*] /0.55 [*] /0.56 [*]	0.68 [*] /0.56 [*] /0.66 [*]	0.65 [*] /0.58 [*] /0.70 [*]	0.63 [*] /0.51 [*] /0.51 [*]	0.68 [*] /0.56 [*] /0.66 [*]	0.66 [*] /0.51 [*] /0.69 [*]
EOT	0.31 [*] /-0.06/0.26	0.39 [*] /-0.12/0.39 [*]	0.32 [*] /-0.07/0.24	0.38 [*] /-0.11/0.25	0.46 [*] /-0.04/0.35 [*]	0.37 [*] /-0.10/0.36 [*]	0.37 [*] /-0.09/0.26	0.33 [*] /-0.07/0.26	0.40 [*] /-0.12/0.35 [*]	0.39 [*] /-0.10/0.33 [*]	0.44 [*] /-0.08/0.37 [*]
Total	0.67 [*] /0.60 [*] /0.70 [*]	0.67 [*] /0.44 [*] /0.57 [*]	0.65 [*] /0.57 [*] /0.72 [*]	0.68 [*] /0.53 [*] /0.57 [*]	0.62 [*] /0.41 [*] /0.60 [*]	0.72 [*] /0.55 [*] /0.71 [*]	0.71 [*] /0.56 [*] /0.70 [*]	0.70 [*] /0.60 [*] /0.76 [*]	0.71 [*] /0.49 [*] /0.63 [*]	0.74 [*] /0.56 [*] /0.75 [*]	0.75 [*] /0.53 [*] /0.77 [*]
DASS-21											
Stress	0.47 [*] /0.60 [*] /0.40 [*]	0.45 [*] /0.48 [*] /0.25	0.41 [*] /0.51 [*] /0.25	0.43 [*] /0.56 [*] /0.22	0.41 [*] /0.30 [*] /0.32 [*]	0.50 [*] /0.57 [*] /0.36 [*]	0.45 [*] /0.55 [*] /0.26	0.47 [*] /0.57 [*] /0.34 [*]	0.46 [*] /0.53 [*] /0.26	0.49 [*] /0.56 [*] /0.32 [*]	0.50 [*] /0.50 [*] /0.36 [*]
Anxiety	0.47 [*] /0.66 [*] /0.49 [*]	0.49 [*] /0.66 [*] /0.36 [*]	0.42 [*] /0.65 [*] /0.33 [*]	0.46 [*] /0.72 [*] /0.24	0.45 [*] /0.51 [*] /0.48 [*]	0.52 [*] /0.70 [*] /0.48 [*]	0.46 [*] /0.70 [*] /0.31 [*]	0.47 [*] /0.67 [*] /0.43 [*]	0.50 [*] /0.70 [*] /0.33 [*]	0.51 [*] /0.71 [*] /0.41 [*]	0.52 [*] /0.66 [*] /0.48 [*]
Depression	0.44 [*] /0.42 [*] /0.26	0.50 [*] /0.40 [*] /0.25	0.40 [*] /0.40 [*] /0.24	0.45 [*] /0.41 [*] /0.13	0.49 [*] /0.32 [*] /0.38 [*]	0.51 [*] /0.44 [*] /0.29 [*]	0.45 [*] /0.41 [*] /0.20	0.45 [*] /0.42 [*] /0.27	0.50 [*] /0.41 [*] /0.21	0.50 [*] /0.43 [*] /0.26	0.53 [*] /0.41 [*] /0.33 [*]
Total	0.49 [*] /0.61 [*] /0.43 [*]	0.51 [*] /0.56 [*] /0.33 [*]	0.44 [*] /0.57 [*] /0.31 [*]	0.47 [*] /0.61 [*] /0.22	0.48 [*] /0.42 [*] /0.45 [*]	0.54 [*] /0.62 [*] /0.42 [*]	0.48 [*] /0.60 [*] /0.29 [*]	0.49 [*] /0.60 [*] /0.39 [*]	0.52 [*] /0.59 [*] /0.30 [*]	0.53 [*] /0.62 [*] /0.37 [*]	0.55 [*] /0.57 [*] /0.44 [*]
ERQ											
Reappraisal	-0.06 [*] /-0.47 [*] /-0.29	-0.16 [*] /-0.36 [*] /-0.36 [*]	-0.09 [*] /-0.41 [*] /-0.09	-0.08 [*] /-0.37 [*] /-0.13	-0.16 [*] /-0.16 [*] /-0.16	-0.11 [*] /-0.44 [*] /-0.37 [*]	-0.09 [*] /-0.40 [*] /-0.12	-0.08 [*] /-0.45 [*] /-0.19	-0.12 [*] /-0.37 [*] /-0.27	-0.10 [*] /-0.42 [*] /-0.25	-0.13 [*] /-0.35 [*] /-0.24
Suppression	0.33 [*] /0.21/0.17	0.42 [*] /0.14/0.39 [*]	0.31 [*] /0.16/0.23	0.41 [*] /0.20/0.30 [*]	0.49 [*] /0.28 [*] /0.60 [*]	0.40 [*] /0.19/0.32 [*]	0.38 [*] /0.18/0.28 [*]	0.34 [*] /0.19/0.22	0.44 [*] /0.17/0.38 [*]	0.41 [*] /0.19/0.32 [*]	0.46 [*] /0.22/0.47 [*]
DERS											
Awareness	0.15 [*] /-0.14/0.27	0.21 [*] /0.06/0.40 [*]	0.18 [*] /-0.09/0.43 [*]	0.22 [*] /0.02/0.44 [*]	0.33 [*] /-0.11/0.37 [*]	0.20 [*] /-0.04/0.38 [*]	0.21 [*] /-0.03/0.47 [*]	0.18 [*] /-0.12/0.38 [*]	0.23 [*] /0.04/0.47 [*]	0.22 [*] /-0.04/0.46 [*]	0.27 [*] /-0.06/0.47 [*]
Clarity	0.56 [*] /0.29 [*] /0.68 [*]	0.60 [*] /0.26/0.63 [*]	0.50 [*] /0.23/0.55 [*]	0.57 [*] /0.23/0.45 [*]	0.58 [*] /0.10/0.56 [*]	0.63 [*] /0.29 [*] /0.73 [*]	0.57 [*] /0.24/0.54 [*]	0.56 [*] /0.26/0.65 [*]	0.62 [*] /0.25/0.59 [*]	0.62 [*] /0.26/0.67 [*]	0.65 [*] /0.22/0.70 [*]
Nonacceptanc	0.52 [*] /0.64 [*] /0.46 [*]	0.47 [*] /0.61 [*] /0.33 [*]	0.43 [*] /0.62 [*] /0.43 [*]	0.42 [*] /0.60 [*] /0.19	0.44 [*] /0.44 [*] /0.12	0.53 [*] /0.66 [*] /0.44 [*]	0.45 [*] /0.62 [*] /0.34 [*]	0.50 [*] /0.64 [*] /0.48 [*]	0.47 [*] /0.61 [*] /0.29 [*]	0.51 [*] /0.65 [*] /0.41 [*]	0.52 [*] /0.60 [*] /0.34 [*]
Impulses	0.50 [*] /0.56 [*] /0.30 [*]	0.49 [*] /0.55 [*] /0.27	0.45 [*] /0.50 [*] /0.29 [*]	0.43 [*] /0.51 [*] /0.15	0.43 [*] /0.36 [*] /0.21	0.53 [*] /0.59 [*] /0.32 [*]	0.47 [*] /0.52 [*] /0.24	0.50 [*] /0.55 [*] /0.31 [*]	0.49 [*] /0.54 [*] /0.23	0.52 [*] /0.56 [*] /0.29 [*]	0.52 [*] /0.51 [*] /0.29 [*]
Goals	0.38 [*] /0.53 [*] /0.18	0.26 [*] /0.44 [*] /0.03	0.41 [*] /0.45 [*] /0.32 [*]	0.32 [*] /0.46 [*] /0.25	0.21 [*] /0.31 [*] /0.08	0.35 [*] /0.51 [*] /0.12	0.39 [*] /0.47 [*] /0.31 [*]	0.42 [*] /0.50 [*] /0.28	0.31 [*] /0.46 [*] /0.16	0.38 [*] /0.49 [*] /0.24	0.35 [*] /0.45 [*] /0.20
Strategies	0.50 [*] /0.61 [*] /0.37 [*]	0.45 [*] /0.59 [*] /0.16	0.45 [*] /0.53 [*] /0.44 [*]	0.42 [*] /0.58 [*] /0.19	0.41 [*] /0.45 [*] /0.22	0.51 [*] /0.63 [*] /0.30 [*]	0.46 [*] /0.56 [*] /0.35 [*]	0.50 [*] /0.58 [*] /0.44 [*]	0.46 [*] /0.60 [*] /0.20	0.50 [*] /0.60 [*] /0.35 [*]	0.50 [*] /0.57 [*] /0.34 [*]
Total	0.58 [*] /0.56 [*] /0.51 [*]	0.55 [*] /0.56 [*] /0.40 [*]	0.54 [*] /0.51 [*] /0.56 [*]	0.52 [*] /0.54 [*] /0.36 [*]	0.52 [*] /0.36 [*] /0.34 [*]	0.61 [*] /0.59 [*] /0.50 [*]	0.56 [*] /0.53 [*] /0.50 [*]	0.59 [*] /0.54 [*] /0.57 [*]	0.56 [*] /0.56 [*] /0.42 [*]	0.61 [*] /0.57 [*] /0.53 [*]	0.62 [*] /0.52 [*] /0.51 [*]

Note: ALEXI, alexithymia; DASS-21, Depression Anxiety Stress Scales-21; DDF, difficulty describing feelings; DERS, Difficulties in Emotion Regulation Scale; DIF, difficulty

identifying feelings; EOT, externally orientated thinking; ERQ, Emotion Regulation Questionnaire; G-DAF, general- difficulty appraising feelings; G-DDF, general-difficulty describing feelings; G-DIF, general-difficulty identifying feelings; G-EOT, general-externally orientated thinking; N-DAF, negative-difficulty appraising feelings; N-DDF, negative-difficulty describing feelings; N-DIF, negative-difficulty identifying feelings; PAQ, Perth Alexithymia Questionnaire; P-DAF, positive-difficulty appraising feelings; P-DDF, positive-difficulty describing feelings; P-DIF, positive-difficulty identifying feelings; TAS-20, Toronto Alexithymia Scale-20.

* $p < 0.05$.

Supplementary Table S2. Factor loadings from a second-order exploratory factor analysis of the Perth Alexithymia Questionnaire and Depression Anxiety Stress Scales-21 subscale scores.

	Factor 1 (General alexithymia)	Factor 2 (General distress)
PAQ		
N-DIF	0.83	0.02
P-DIF	0.85	0.03
N-DDF	0.84	-0.04
P-DDF	0.94	-0.06
G-EOT	0.72	0.07
DASS-21		
Stress	-0.04	0.95
Anxiety	0.003	0.92
Depression	0.05	0.84

Note: Principal components with direct oblimin rotation were used. Factor loadings ≥ 0.40 are in boldface. G-EOT, general-externally orientated thinking; N-DDF, negative-difficulty describing feelings; N-DIF, negative-difficulty identifying feelings; P-DDF, positive-difficulty describing feelings; P-DIF, positive-difficulty identifying feelings.

Supplementary Table S3. Pearson correlations between alexithymia and educational level in Study 2.

	PAQ					
	N-DIF	P-DIF	N-DDF	P-DDF	G-EOT	ALEXI
MDD group	-0.31*	-0.22	-0.26	-0.24	-0.18	-0.25
HC group for MDD	0.02	0.02	-0.08	-0.08	-0.18	-0.09
Subclinical depression group	-0.02	0.00	-0.12	0.08	-0.03	-0.03
HC group for subclinical depression	-0.25	-0.40**	-0.26	-0.42**	-0.17	-0.36**

Note: ALEXI, alexithymia; G-EOT, general-externally orientated thinking; HC, healthy controls;

MDD, major depressive disorder; N-DDF, negative-difficulty describing feelings; N-DIF,

negative-difficulty identifying feelings; P-DDF, positive-difficulty describing feelings; P-DIF,

positive-difficulty identifying feelings; PAQ, Perth Alexithymia Questionnaire.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Supplementary Table S4. Pearson correlations between the Perth Alexithymia Questionnaire and the Toronto Alexithymia Scale-20/Depression Anxiety Stress Scales-21/Emotion Regulation Questionnaire/Difficulties in Emotion Regulation Scale (the clinical depression control group/the subclinical depression control group).

Measure	PAQ subscales						G-DIF	G-DDF
	N-DIF	P-DIF	N-DDF	P-DDF	G-EOT			
TAS								
DIF	0.60*/0.49*	0.62*/0.36*	0.63*/0.44*	0.51*/0.51*	0.57*/0.16	0.65*/0.47*	0.59*/0.51*	
DDF	0.43*/0.55*	0.51*/0.45*	0.52*/0.64*	0.40*/0.61*	0.60*/0.05	0.50*/0.55*	0.48*/0.68*	
EOT	0.18/-0.04	0.29*/0.16	0.25/0.15	0.22/0.14	0.43*/0.14	0.24/0.06	0.24/0.16	
Total	0.48*/0.49*	0.56*/0.45*	0.55*/0.57*	0.45*/0.60*	0.62*/0.18	0.55*/0.52*	0.52*/0.63*	
DASS-21								
Stress	0.29*/0.47*	0.22/0.14	0.30*/0.32*	0.17/0.18	0.23/0.26	0.28*/0.34*	0.25*/0.27	
Anxiety	0.25/0.26	0.13/0.22	0.21/0.26	0.07/0.21	0.16/0.19	0.21/0.26	0.15/0.26	
Depression	0.28*/0.43*	0.25/0.38*	0.26/0.37*	0.16/0.45*	0.37*/0.30*	0.28*/0.44*	0.22/0.44*	
Total	0.30*/0.44*	0.21/0.26	0.28/0.35*	0.15/0.30*	0.26/0.28*	0.28/0.39*	0.22/0.35*	
ERQ								
Reappraisal	-0.06/0.05	-0.34*/-0.15	-0.08/0.21	-0.23/0.05	-0.16/-0.02	-0.19/-0.05	-0.16/0.14	
Suppression	0.36*/0.19	0.32*/0.23	0.39*/0.37*	0.19/0.30*	0.54*/0.43*	0.37*/0.23	0.30*/0.36*	
DERS								
Awareness	0.18/0.00	0.24/0.24	0.08/0.01	0.15/0.03	0.38*/0.24	0.22/0.13	0.12/0.02	
Clarity	0.50*/0.53*	0.61*/0.49*	0.62*/0.49*	0.60*/0.52*	0.43*/0.33*	0.58*/0.56*	0.63*/0.55*	
Nonacceptance	0.29*/0.28*	0.34*/0.08	0.35*/0.22	0.23/0.13	0.27/0.24	0.33*/0.20	0.30*/0.19	
Impulses	0.20/0.41*	0.28*/0.19	0.32*/0.13	0.27/0.22	0.23/0.24	0.25/0.33*	0.31*/0.19	
Goals	0.20/0.33*	0.23/-0.03	0.41*/0.22	0.40*/0.19	0.20/-0.02	0.23/0.17	0.42*/0.22	
Strategies	0.28*/0.41*	0.33*/0.14	0.40*/0.26	0.30*/0.29*	0.33*/0.14	0.33*/0.30*	0.36*/0.29*	
Total	0.36*/0.46*	0.44*/0.23	0.48*/0.30*	0.42*/0.31*	0.41*/0.26	0.42*/0.38*	0.47*/0.34*	

Note: ALEXI, alexithymia; DASS-21, Depression Anxiety Stress Scales-21; DDF, difficulty

describing feelings; DERS, Difficulties in Emotion Regulation Scale; DIF, difficulty identifying

feelings; EOT, externally orientated thinking; ERQ, Emotion Regulation Questionnaire; G-DAF,

general-difficulty appraising feelings; G-DDF, general-difficulty describing feelings; G-DIF,

general-difficulty identifying feelings; G-EOT, general-externally orientated thinking; N-DAF,

negative-difficulty appraising feelings; N-DDF, negative-difficulty describing feelings; N-DIF,

negative-difficulty identifying feelings; PAQ, Perth Alexithymia Questionnaire; P-DAF,

positive-difficulty appraising feelings; P-DDF, positive-difficulty describing feelings; P-DIF,

positive-difficulty identifying feelings; TAS-20, Toronto Alexithymia Scale-20.

* $p < 0.05$.

Supplementary Table S5. Pearson correlations and partial correlations between alexithymia and depressive symptoms in patients with major depressive disorder.

PAQ subscales					PAQ composite scales				
N-DIF	P-DIF	N-DDF	P-DDF	G-EOT	G-DIF	G-DDF	N-DAF	P-DAF	G-DAF
0.41***	0.31***	0.37***	0.34***	0.34***	0.38***	0.36***	0.40***	0.33***	0.38***
0.65***	0.69***	0.61***	0.67***	0.53***	0.71***	0.66***	0.65***	0.69***	0.69***
ing medication									
0.41***	0.31***	0.39***	0.34***	0.35***	0.38***	0.37***	0.41***	0.33***	0.38***
0.66***	0.69***	0.61***	0.68***	0.53***	0.71***	0.66***	0.65***	0.70***	0.69***

Note: ALEXI, alexithymia; BDI, Beck Depression Inventory; G-DAF, general-difficulty

appraising feelings; G-DDF, general-difficulty describing feelings; G-DIF, general-difficulty

identifying feelings; G-EOT, general-externally orientated thinking; HAMD, Hamilton Rating

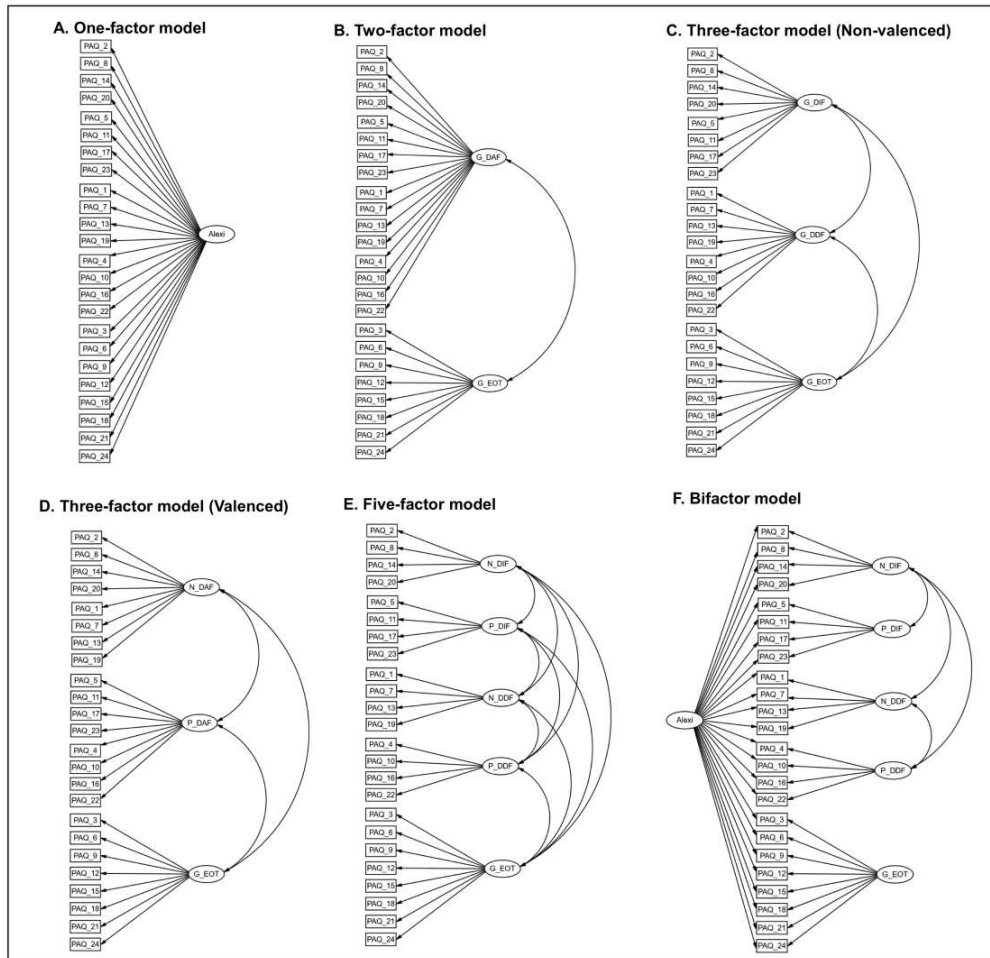
Scale for Depression; N-DAF, negative-difficulty appraising feelings; N-DDF, negative-difficulty

describing feelings; N-DIF, negative-difficulty identifying feelings; P-DAF, positive-difficulty

appraising feelings; P-DDF, positive-difficulty describing feelings; P-DIF, positive-difficulty

identifying feelings; PAQ, Perth Alexithymia Questionnaire.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.



Supplementary Figure S1. The confirmatory factor analysis models examined in Study 1. PAQ, Perth Alexithymia Questionnaire; Alexi, alexithymia; G-DAF, General-Difficulty appraising feelings; G-EOT, General-Externally orientated thinking; G-DIF, General-Difficulty identifying feelings; G-DDF, General-Difficulty describing feelings; N-DAF, Negative-Difficulty appraising feelings; P-DAF, Positive-Difficulty appraising feelings; N-DIF, Negative-Difficulty identifying feelings; P-DIF, Positive-Difficulty identifying feelings; N-DDF, Negative-Difficulty describing feelings; P-DDF, Positive-Difficulty describing feelings.