Psychometric properties of the Mindsets of Depression, Anxiety, and Stress Scale (MDASS) in Chinese young adults and adolescents

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Abstract

Aim: Mindset has been found to be closely related to mental health symptoms. Yet no scale for the mindsets of depression, anxiety, and stress (MDASS) has been validated. This study developed a 12-item MDASS with 4 items in each domain and examined its psychometric properties among young adults and adolescents.

Methods. Young adults (Study 1: N =1,735, aged 18-25) and adolescents (Study 2, N = 1,648, aged 9-16) completed socio-demographics information, MDASS (unidirectional items in Study 1 and bi-directional items in Study 2), and mental health symptoms measures. Both samples were randomly divided into two equal sub-samples, one for exploratory factor analysis (EFA) to identify the factor structure, the other for confirmatory factor analysis (CFA) to assess the goodness-of-fit of EFA models. Spearman correlations were used to assess the convergent validity of MDASS with measures of depression, anxiety, and stress.

Results. In Study 1, EFA yielded a three-factor model with underlying factors of fixed mindsets on depression, anxiety, and stress; CFA revealed a good goodness-of-fit (CFI and TFI >0.95; RMSEA and SRMR <0.08). In Study 2 with reversed items, EFA and CFA yielded a complex model structure. Fixed mindsets were positively correlated with depression, anxiety, and stress symptoms (all absolute correlations > 0.3) in both studies.

Conclusion. MDASS is a reliable scale with clear factor structure to measure mindsets of negative emotions among early adults. MDASS is suggested to use only fixed-mindset statements. The mindsets of depression, anxiety, and stress are highly associated with symptoms of depression, anxiety, and stress.

KEYWORDS

fixed mindset, growth mindset, implicit theory, mental health, validation

1. INTRODUCTION

Mindsets, also referred to as implicit theories, are individuals' beliefs about the changeability of their attributes and are found to be closely related to negative affect and psychopathology (see reviews, Burnette et al., 2013; Schleider et al., 2015). Compared to youth who believed that personal traits were malleable (growth mindset), those who had fixed mindset, i.e., believed their attributes could not change, were more likely to show more mental health problems (Schleider et al., 2015). Schroder and colleagues found that beliefs about the malleability of anxiety buffer the association of life's stressful events and post-traumatic stress symptoms and associate with higher expectancy and credibility of treatment, while fixed mindsets of anxiety represent an important risk factor for onset of future psychological problems (Schroder, Kneeland, et al., 2019; Schroder et al., 2017). Also, people's belief concerning their emotions was found to affect the outcomes of mental health interventions (De Castella et al., 2015). Thus, measuring the mindsets of negative emotional states of depression, anxiety and stress not only provides useful information about clients' belief in change of their symptoms, but also may predict the subsequent emotion regulation, mental health symptoms, wellbeing, and treatment preference and engagement (Kneeland, Dovidio, et al., 2016; Zhu, Ni, et al., 2020), which have potential implications for clinical psychology and treatment, especially for early intervention.

The negative emotional states of depression, anxiety, or stress are not only ubiquitous emotional disturbances in daily life, but also core symptoms of more serious depression, anxiety, and stress (Lovibond & Lovibond, 1995). The existing measures of mental health mindsets mainly focus on some single emotional state, such as anxiety or depression. However, the negative emotional states of depression, anxiety and stress are closely related, especially for people who are suffering from symptoms of common mental disorders or people who are not able to differentiate multiple negative emotions. A validated scale of mindsets of depression, anxiety and stress (MDASS) can provide the measure of the general mindsets of negative emotions. Also, the extant literature of mental health mindsets is mainly in the Western society. Less is known about mental health mindsets and their association with mental health symptoms among the Chinese population. A Chinese MDASS will meet the requirements of both researchers and professional clinicians as measuring the belief of negative emotional states may provide an assessment tool for prevention and early intervention. Also, current studies on mindsets of anxiety and depression are mainly about emerging adulthood and adults. Less is known about adolescents' perceptions of the malleability of negative emotional states of depression, anxiety, and stress. The present study is to fill these gaps.

This study aims to develop MDASS and examine its psychometric properties among Chinese young adults and adolescents. These two populations are both in the transition stage and vulnerable to mental health problems (Kessler et al., 2007; World Health Organization, 2019). Individuals in early adulthood and adolescents are at the time of life in which many common psychological disorders begin to manifest (Dick & Ferguson, 2015). Preexisting knowledge and beliefs may guide the individual's perception and responses to the negative

emotion states. Also, this study of the two targeted populations will confirm the suitability of MDASS for more populations. We expected that young adults would be more sensitive to the difference of negative emotional states than adolescents.

Mindset is usually measured in a specific domain with three or four items for a single construct, and it has recorded reasonably high internal reliabilities (Chiu et al., 1997; Dweck et al., 1995). Some theorists suggest that measures of mindset only adopt fixed mindset statements because growth mindset worded statements are highly compelling and may bias responding in an incremental manner (Dweck et al., 1995). In some studies, mindset measures adopt both fixed and growth mindset statements (Schleider & Weisz, 2016; Tamir et al., 2007). Using reversed items may be useful to control acquiescence, disruption of non-substantive responding, and better coverage of the content domain of a construct (Weijters & Baumgartner, 2012). Thus, we examined the psychometric properties of MDASS in two versions: unidirectional items of fixed mindset statements in Study 1, and MDASS with both growth mindsets and fixed mindset items among adolescents in Study 2. Also, we also include the "self" form and the "other" form in each subscale (Dweck, 2013). The "self" form asked about their belief about their own negative emotions, and the "other" form asked about the belief in changes of people in general. Based on the literature (Schroder, Callahan, et al., 2019; Schroder et al., 2015), we hypothesize fixed mindset of depression, anxiety, and stress to be positively associated with the symptoms of depression, anxiety, and perceived stress level.

2. METHODS

2.1 Participants.

Participants were 1,735 university students aged 18-25 years (M = 20.65, SD = 1.34, 81.2% female) in Study 1 and 1,648 secondary school students aged 9-16 years (M = 12.41, SD = 0.82, 52.4% female) in Study 2. Demographics for the two studies are presented in Table 1.

2.2 Process

Data for young adults (Study 1) were collected through an online survey among university students of three universities in southern China. Five attention checking items (e.g., "Please choose answer Choice 2 to ensure you are paying attention") were used to ensure the quality of online survey and excluded participants who failed to answer all five items correctly (Maniaci & Rogge, 2014). Data for adolescents (Study 2) were collected through self-report pen-and-paper questionnaires by trained research assistants during a 35-minute class period in twelve secondary schools. Ethical approval was obtained from the Human Ethics Committee from the first author's university. Informed consent was collected from university students (Study 1) and parents (Study 2) and written assent was obtained from secondary school students.

2.3 Measures

Mindsets of Depression, Anxiety and Stress Scale (MDASS)

We used the translation and back-translation method (Maneesriwongul & Dixon, 2004; Zhu, Zhuang, et al., 2020) to translate the four-item six-point Likert scale of implicit theories of anxiety into Chinese (Schroder et al., 2015) . We adopted the design of self-statement items, such as (a) *When you have a certain amount of anxiety, you really cannot do much to change it*; (b) *Your anxiety is something about you that you cannot change very much*; (c) *To be honest, you cannot change how anxious you are*; and other-statement item, such as (d) *No matter how hard they try, people cannot change the anxiety that they have*. Then, we referred to the format of the measure of implicit theory of anxiety and used "find and replace" to develop the four-item subscales of fixed mindsets of depression and stress respectively (Dweck et al., 1995; Schroder et al., 2015). In Study 1, the items of MDASS are unidirectionally designed to measure the mindsets of depression, anxiety, and stress, respectively. Respondents indicate their agreement with these statements on a 6-point scale from 1 (strongly disagree) to 6 (strongly agree), and a higher score indicating a stronger fixed mindset.

Informed by Study 1, the unidirectional MDASS recorded clear factor structure and reliability among young adults; we further examined the psychometric properties of the MDASS with reversed items among adolescents. In Study 2, we modified the MDASS to a new version to test the performance of the scale. The first change is using mixed statements of growth mindset and fixed mindset. A growth mindset statement item was used to replace one fixed mindset statement in each subscale (Schleider & Weisz, 2016; Tamir et al., 2007). The items are *When people feel depressed / anxious / stressed, they can change the level of depression / anxiety / stress they have*". We aimed to examine whether the reversed items have the advantage of maintaining participants' attention by controlling acquiescence (Weijters & Baumgartner, 2012), and whether bidirectional items have similar measure reliability and factor structure. We also used three other-statement items and one self-statement item. Examining the performance of a different version will provide more empirical evidence of the item performance of MDASS.

Depression Anxiety Stress Scale (DASS-21; Study 1)

DASS-21 (Gong et al., 2010; Lovibond & Lovibond, 1995) was used to measure symptoms of depression, anxiety, and stress in Study 1. DASS (α = .92) comprises three seven-item sub-scales that assess depression (α = .84), anxiety (α = .80), and stress (α = .80) symptoms, respectively. Example item was "*I found it hard to wind down*". Each item was scored from 0 (did not apply to me at all) to 3 (applied to me very much or most of the time). Summary scores of each sub-scale were calculated. The higher the score, the higher the number of symptoms.

Patient Health Questionnaire (PHQ-9; Study 2)

PHQ-9 (PHQ-9, Kroenke et al., 2001; Wang et al., 2014) was used to measure participants' depression level. The PHQ-9 scale included nine items that assessed whether the depression symptom has bothered the individual in the previous two weeks, ranging in frequency from 0 (not at all) to 3 (nearly every day). Example item was "*Little interest or pleasure in doing things*". The Cronbach's α was .86.

Generalized Anxiety Disorder Scale (GAD-7; Study 2)

GAD-7 was used to for assessing generalized anxiety disorders (Qian et al., 2011; Spitzer et al., 2006). The scale consists of seven items with a four-point Likert-type scale (0 = not at all, 1 = several days, 2 = more than half the days, and 3 = nearly every day). Sample response item was "*Feeling nervous, anxious or on edge*". The Cronbach's α was .92.

Perceived stress (Study 2)

Perceived stress was measured with five questions about the perceived academic stress, school adaptation stress, self-requirement stress, family expectation stress, and family financial stress in the past two weeks. Each item is scored on a ten-point Likert-type scale (0 = no stress to 9 = very high stress). Mean score was calculated with higher score indicating higher stress. The Cronbach's α was .82.

Trait anxiety (Study 2)

Trait anxiety was measured by the subscale of the State-Trait Anxiety Inventory (STAI, Shek, 1993; Spielberger et al., 1983). The trait-anxiety subscale consists of twenty items with a four-point Likert-type scale (1= never, 2=sometimes, 3=often, 4=almost always). Sample response item was "*I feel satisfied with myself*". The Cronbach's α was .87.

2.4 Statistical analysis

Frequencies (percentages) and means (SDs) were used to describe the demographic characteristics of the participants and the MDASS. Pearson correlation examined MDASS inter-item correlations. We randomly divided the participants in Studies 1 and 2 into two equal-sized groups, respectively. The first half of the data was subjected to exploratory factor analysis (EFA), while the second half was fed to confirmatory factor analysis (CFA). Using a different sample to confirm the factor structure identified by EFA is more robust (Anderson & Gerbing, 1988). In both studies, factor loadings of EFA were estimated using maximum likelihood with oblique rotation, with the number of factors determined using the Kaiser's criterion. The Kaiser-Meyer-Olkin test for sampling adequacy were .91 and .93 for the two studies respectively, indicating an adequate sample for EFA. The result of Bartlett's test (chi-square = 9588, $p < .001$ for study 1, chi-square = 6217, $p < .001$ for study 2) supported the variable sphericity for both sub-samples. CFA was used to assess the goodness-of-fit of the

factor models derived in EFA with only absolute path loadings of 0.4 or above modeled in CFA.

Spearman correlations assessed the convergent validity of the MDASS with self-perceived depression, anxiety and stress. Descriptive analyses were performed using SPSS 23, and EFA and CFA were performed using the R package sem (Fox, 2006).

The data that support the findings of this study are available from the corresponding author upon reasonable request.

3. RESULTS

Study 1

The participants were 1,735 university students included in the analysis: 546 (31.5%) participants in year-one, 506 (29.2%) in year-two, 537 (31.0%) in year-three, and only 141 (8.1%) in year-four.

Mean (SD) and polychoric correlations of the 12 items in the MDASS are shown in Table 2.1. Correlations ranged between .45 and .90 (in all cases, $p < .01$) with a mean correlation of 0.60. The item-total correlations ranged from 0.72 to 0.85. The correlation among the personal items had high intercorrelations (.48-.90), while correlation with the item on other people's symptoms was lower (.45-.73)

EFA results are given in Table 3. The three-factor model explained 72.45% of the total variance. Items 1-4 fell into factor 1 (mindsets of depression), items 5-8 fell into factor 2 (mindsets of anxiety), and items 9-12 fell into factor 3 (mindsets of stress).

Table 3 also gives CFA results. The three-factor model yielded an acceptable goodness of fit (CFI and TFI >0.95; RMSEA and SRMR <0.08). Based on the three-factor model indicated by EFA and CFA results, the Cronbach's alphas of three subscales were .91, .89, and .90, respectively. Table 5.1 shows the convergent validity of the MDASS and three subscales. As expected, both MDASS and subscales were positively associated with depression, anxiety, and stress. The effect sizes of the correlations range from .46 to .91.

Study 2

The participants were 1,648 secondary school students from Hong Kong, including 869 (52.7%) S1students and 779 (47.3%) S2 students. Chinese students were 1,562 (94.8%), non-Chinese were 42 (2.5%), and 44 (2.7%) did not identify ethnicity. The non-Chinese students could read and write in Chinese and aids were provided by research assistants when needed.

Their family socioeconomic status (received financial aid or not, living conditions) and parental education level are presented in Table 1.

Mean (SD) and polychoric correlations of the 12 items in the MDASS are shown in Table 2.2. The reversed coded items 2, 6, 10, i.e., *"When people feel depressed/anxious/stressed, they can change the level of depression/anxiety/stress they have"* were significantly correlated with each other ($r_{i2\text{-}i6}$= .59, p < .01; $r_{i2\text{-}i10}$= .58, p <.01; $r_{i6\text{-}i10}$= .43, p <.01) but had no to low correlation with items in other factors (from .00, p >.05, to .15, p < .01). The inter-item correlation ranged from .55 to .80 (in all cases, p < .01) for the 9 fixed mindset statement items and .00 (p > .05)to .15 (p < .01) with the 3 reverse-coded items.

The EFA of Study 2 first identified a four-factor model with good model fit which explained 67.89% variance and CFA confirmed with good model fit (CFI > 0.97, TLI > .96, RMSEA < .08, SRMR < .05; see Table 4). However, the four-factor model presented a complex and unclear factor structure. The three reversed items formed one factor and the remaining presented one major factor and two minor ones. We then excluded the three reversed items and did an EFA of the remaining 9 items with appointed one factor and three factors. The EFA results of the one factor model explained 63.18% of the total variance. The CFA of one-factor model did not present a good model fit but the CFA of one-factor model with error covariance presented a merely acceptable goodness of fit except RMSEA (CFI > 0.95, TLI > .93, RMSEA < .11, SRMR < .03). CFA of the three-factor model presented a poorer goodness of fit (see supplementary tables). The Cronbach's alphas of one factor scale is .94. Table 5.2 shows the convergent validity of the MDASS. Like Study 1, fixed mindsets were positively associated with trait anxiety, depression, anxiety, and stress with effect sizes range from .34 to .57. However, the correlation coefficients between reversed items (Factor 4) and trait anxiety, depression, anxiety, and stress ranged from .06 to .12.

4. DISCUSSION

The present study examined psychometric properties of the measure of mindsets of negative emotional states in young adult and adolescent cohorts with two relatively large Chinese samples. We found that MDASS presented high internal reliability, a clear three-factor structure with unidirectional items, and the three subscales have good inter-item and item-total correlations. As hypothesized, higher fixed mindsets of depression, anxiety, and stress were significantly related with higher scores of depression, anxiety, and perceived stress level in both samples.

However, in Study 2 among adolescents, the results did not fit the three-factor model as Study 1 among university students. On the one hand, the reversed items can lead to low measure reliability and complex factor structures(Weijters & Baumgartner, 2012). As suggested by literature (Dweck et al., 1995), scales with unidirectional fixed mindset items

improved the comprehension of the meaning of the statements. Whether the items framed in fixed or growth mindset might have influenced respondents' comprehension and choice selection, which may be the main cause of the distorted factor structure. The reversed items in mindset scales should be used with caution. On the other hand, adolescents are developing emotional intelligences in early and middle adolescence and may not clearly differentiate the feelings of depression, anxiety, and stress (Chen, 2008; Krettenauer et al., 2008). This suggests MDASS should be used with unidirectional items among adolescents to measure their beliefs about changes of the general negative emotion states. However, to further examine whether the complex factor structure in Study 2 is caused by reversed items or the cognitive development of adolescents, further studies are suggested to examine the psychometric properties of MDASS with 12 fixed mindset statements among adolescents and the MDASS with reversed items among adults.

Moreover, the inter-correlation of three subscales is very high which suggests young people who believe one negative emotional state is fixed are more likely to think the other two are unchangeable. Also, the correlation between the mindsets and the symptoms of depression, anxiety, and stress were similar. This may suggest the mindsets of negative emotional states represent a general cognitive tendency which leads to similar mindsets of similar emotions (Zhu, Zhuang, et al., 2020). The potential reason may be twofold. First, anxiety, depression, and stress are highly comorbid symptoms. People who suffer from anxiety are likely to have depressive symptoms (Lam et al., 2015). Thus, they may have analogous thoughts on the changeability of their symptoms. Second, the development of mindset on negative emotional states ~~symptoms~~ may be related to some common factors, such as emotion regulation efficacy, helplessness, or one's level of emotion-related hormones, such as dopamine. On one hand, people who have successful emotion regulation experiences may present a growth mindset of negative emotional state (Kneeland, Dovidio, et al., 2016; Kneeland, Holen-Hoeksema, et al., 2016). On the other hand, one who developed learned helplessness from poor emotion regulation experiences would think the their negative emotional states are not likely to change or improve (Burnette et al., 2013). Thus, the mindsets of negative emotional states can also be a generalized belief about the changeability of their negative emotions. The MDASS would serve the purpose of measuring mindsets of general negative emotional states among young adults and adolescents, and the subscales can also measure mindsets on a single emotion domain among young adults.

The current studies examined the factorial validity, internal consistency, and convergent validity of MDASS among adolescents and young adults which are two very important transition stages in development. However, as wordings and targeted participants were changed in study 2, it is difficult to conclude which is the main cause of the difference in the item performance. Although we found that unidirectional items have better validity, further studies are needed to examine bi-directional items among young adults and unidirectional growth-mindset items among early adolescents. Also, we suggest further exploration of convergent and divergent validity of MDASS, such as the utility of this measure in relation to specific mental health presentations and its utility among clinical samples with affective disorders. In addition, participants with severe mental health

symptoms could have the stronger fixed mindset as they suffer more from their symptoms. Furthermore, psychometric properties of MDASS among people in middle age and late adults should also be tested. Mindset of some attributes (e.g. willpower) was found to be different among different age groups (Job et al., 2018), whether mindset of emotional states change across the various phases of adulthood was not tested yet. As emotional life change with age (Charles & Carstensen, 2010), one's beliefs about negative emotions may also change along with their emotional life experiences accumulate. Lastly, we recommend longitudinal or intervention studies to examine whether and how the mindsets of depression, anxiety, and stress are associated with future symptoms of depression, anxiety, stress, and coping styles.

Mindsets of depression, anxiety and stress have potential implications for treatment and early intervention. This measure not only provides explicit information of one's belief of the changeability of their mental health symptoms, but also provides some information about the potential direction of treatment choices and treatment engagement. It can be an assessment tool for prevention and early intervention.

5. CONCLUSION

Mindsets of Depression, Anxiety, and Stress Scale (MDASS) demonstrates good psychometric properties among young adults and adolescents. Informed by the EFA and CFA results, MDASS is suggested to be applied using only fixed-mindset statements. The mindsets of depression, anxiety, and stress are closely related to symptoms of depression, anxiety, and stress. Thus, MDASS, measuring people's beliefs about the malleability of their mental health symptoms, is helpful to provide important information for predicting psychological distress and intervention efforts, which are important considerations for prevention and early intervention in psychiatry.

DECLARATION OF INTEREST

There is *no conflict of interest* to declare with respect to the study and the present manuscript submitted for publication.

AUTHOR CONTRIBUTION

SZ was responsible for the conception of the research question, study design, data collection, and manuscript draft. YZ assisted with the study design and data collection and was responsible for data input and cleaning. PL was responsible for data analysis. All authors have approved the final version of the manuscript.

ETHICAL APPROVAL

All procedures performed in studies involving human participants were in line with the Human Subject Sub-committee of The Hong Kong Polytechnic University. We declare that ethical standards were in line with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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Table 1 Demographic Characteristics

	N (%)	**Study 1 (*N* = 1,735)**	**Study 2 (*N* =1,648)**
Age			
	Range	18-25	9-16
	Mean ± SD.	20.65 ± 1.34	12.41 ± 0.82
Gender			
	Males	327 (18.8)	748 (45.4)
	Females	1408 (81.2)	863 (52.4)
	Do not identify		37 (2.2)
Year of study			
	Secondary school, S1	n/a	869 (52.7)
	Secondary school, S2	n/a	779 (47.3)
	University, Year one	546 (31.5)	n/a
	University, Year two	506 (29.2)	n/a
	University, Year three	537 (31.0)	n/a
	University, Year four	141 (8.1)	n/a
	Do not identify	5 (0.3)	
Major			
	Liberal arts	473 (27.3)	n/a
	Science	1,262 (72.7)	n/a
GPA (Range 0 - 5)			
	4.00 or above	100 (5.8)	n/a
	3.50 – 3.99	459 (26.5)	n/a
	3.00 – 3.49	628 (36.2)	n/a
	2.50 – 2.99	395 (22.8)	n/a
	2.50 or below	146 (8.4)	n/a
	Do not identify	7 (0.4)	
Hometown			
	City	498 (28.7)	n/a
	Town	584 (33.7)	n/a
	Village	653 (37.6)	n/a
Ethnic			
	Chinese	1,735 (100)	1,562 (94.8)
	Non-Chinese	0 (0)	42 (2.5)
	Do not identify		44 (2.7)
Receive financial aid			
	No	n/a	554 (33.6)
	Yes	n/a	357 (21.7)
	Do not identify		737 (44.7)
Live with parent			
	None	n/a	65 (3.9)
	Live with father or mother	n/a	240 (14.6)
	Live with father and mother	n/a	1,302 (79.0)
	Do not identify		41 (2.5)
Size of flat			
	None	n/a	81 (4.9)
	One bedroom	n/a	123 (7.5)
	Two bedrooms	n/a	745 (45.2)
	Three bedrooms or above	n/a	661 (40.1)
	Do not identify		38 (2.3)
Father's education level			
	Primary school	255 (14.7)	59 (3.6)
	Middle school	1,144 (65.9)	629 (38.2)

	N (%)	**Study 1 (*N* = 1,735)**	**Study 2 (*N* =1,648)**
	University or above	177 (10.2)	401 (24.3)
	Do not identify	159 (9.2)	559 (33.9)
Mother's education level			
	Primary school	396 (22.8)	70 (4.2)
	Middle school	840 (48.4)	665 (40.4)
	University or above	138 (8.0)	403 (24.5)
	Do not identify	71 (20.8)	510 (30.9)

Table 2.1 Mean and Standard Deviation, and Polychoric Correlation in the Twelve Items of the Mindsets of Depression, Anxiety, and Stress Scale in Study 1 (N = 1,735)

Items	1	2	3	4	5	6	7	8	9	10	11	12	*Item-total correlation*
1. When you have a certain amount of anxiety, you really cannot do much to change it.	-	.78	.83	.56	.66	.62	.63	.48	.63	.61	.62	.45	.77
2. Your anxiety is something about you that you cannot change very much.		-	.84	.63	.64	.67	.64	.52	.59	.68	.64	.52	.81
3. To be honest, you cannot change how anxious you are.			-	.66	.69	.65	.68	.55	.64	.66	.69	.54	.85
4. No matter how hard they try, people can't really change the anxiety that they have.				-	.56	.58	.59	.73	.48	.55	.57	.70	.75
5. When you have a certain amount of depression, you really cannot do much to change it.					-	.88	.86	.62	.48	.50	.51	.46	.79
6. Your depression is something about you that you cannot change very much.						-	.90	.70	.48	.55	.52	.50	.80
7. To be honest, you cannot change how depressed you are.							-	.71	.52	.56	.58	.53	.81
8. No matter how hard they try, people can't really change the depression that they have.								-	.45	.52	.52	.67	.73
9. When you have a certain amount of stress and you really cannot do much to change it.									-	.79	.84	.61	.75
10. Your stress is something about you that you cannot change very much.										-	.85	.67	.79
11. To be honest, you cannot change how stressful you are.											-	.73	.80
12. No matter how hard they try, people can't really change the stress that they have.												-	.72
Mean	3.25	3.16	3.16	2.63	2.56	2.54	2.47	2.46	3.49	3.33	3.25	2.67	-
SD	1.23	1.19	1.26	1.10	1.29	1.27	1.27	1.16	1.17	1.15	1.20	1.11	-

All Polychoric correlation were significant at 0.01 percent level. Correlation coefficients between .30 and .49 represent a medium effect size, and coefficients of .50 and above represent a large effect size.

Table 2.2 Mean and Standard Deviation, and Polychoric Correlation in the Twelve Items of the Mindsets of Depression, Anxiety, and Stress Scale in Study 2 (N = 1,648)

Items	1	2	3	4	5	6	7	8	9	10	11	12	*Item-total correlation*
1. When you have a certain level of anxiety, you really cannot do much to change it.	-	.11**	.65**	.63**	.69**	.11**	.57**	.56**	.71**	.06	.59**	.59**	.77**
2. When people feel anxious, they can change the level of anxiety that they have.		-	.15**	.00	.07	.59**	.03	-.03	.05	.58**	.05	.04	.18**
3. To be honest, people cannot really change how anxious they are.			-	.69**	.65**	.11**	.72**	.66**	.61**	.08	.65**	.64**	.77**
4. No matter how hard people try, they can't really change the level of anxiety that they have.				-	.64**	.09**	.71**	.73**	.71**	.08*	.72**	.78**	.80**
5. When you have a certain level of depression, you really cannot do much to change it.					-	.03	.61**	.59**	.64**	.04	.55**	.56**	.71**
6. When people are depressed, they can change the level of depression that they have.						-	.01	.02	.02	.43**	.00	.01	.23**
7. To be honest, people cannot really change how depressed they are.							-	.77**	.59**	.01	.62**	.60**	.76**
8. No matter how hard people try, they can't really change the level of depression that they have.								-	.59**	.05	.61**	.64**	.79**
9. When you have a certain amount of stress, you really cannot do much to change it.									-	.04	.74**	.73**	.79**
10. When people feel stressed, they can change the level of stress that they have.										-	.04	-.01	.22**
11. To be honest, people cannot really change how stressful they are.											-	.80**	.78**
12. No matter how hard people try, they can't really change the level of stress that they have.												-	.80**
Mean	3.84	3.57	3.88	4.10	4.00	3.55	3.70	4.07	3.73	3.64	3.82	4.06	-
SD	1.44	1.33	1.40	1.31	1.43	1.37	1.47	1.40	1.45	1.30	1.36	1.38	-

** $p < .01$. * $p < .05$. Correlation coefficients between .10 and .29 represent a small effect size, between between .30 and .49 represent a medium effect size, and coefficients of .50 and above represent a large effect size.

Table 3 Exploratory Factor Analysis and Confirmatory Factor Analysis of the Mindsets of Depression, Anxiety, and Stress Scale in Study 1

	Exploratory Factor Analysis [a] (*N* = 867)			Confirmatory Factor Analysis [b] (*N* = 868)		
Items	Factor 1	Factor 2	Factor 3	Factor 1	Factor 2	Factor 3
1. When you have a certain amount of anxiety, you really cannot do much to change it.	0.80			0.84		
2. Your anxiety is something about you that you cannot change very much.	0.91			0.88		
3. To be honest, you cannot change how anxious you are.	0.90			0.92		
4. No matter how hard they try, people can't really change the anxiety that they have.	0.52			0.63		
5. When you have a certain amount of depression, you really cannot do much to change it.		0.84			0.89	
6. Your depression is something about you that you cannot change very much.		0.93			0.93	
7. To be honest, you cannot change how depressed you are.		0.92			0.93	
8. No matter how hard they try, people can't really change the depression that they have.		0.49			0.62	
9. When you have a certain amount of stress and you really cannot do much to change it.			0.86			0.85
10. Your stress is something about you that you cannot change very much.			0.93			0.88
11. To be honest, you cannot change how stressful you are.			0.85			0.93
12. No matter how hard they try, people can't really change the stress that they have.			0.51			0.65
Total variance explained, percentage		72.45				
Chi-square					297.51	
P					< .001	
CFI					.97	
TLI					.96	
RMSEA					.08	
SRMR					.05	

Only the factor loading > .40 shown in the table. CFI = Comparative Fit Index; TLI = Tucker Lewis Index; RMSEA = Root-mean-square Error of Approximation; SRMR = Standardized Root-mean-square Residual.

[a] The intra-factor correlation in EFA were F1-F2: 0.69; F1-F3: 0.74; and F2-F3: 0.58.

[b] The intra-factor correlations in CFA were F1-F2: 0.75; F1-F3: 0.76; and F2-F3: 0.60.

Table 4 Exploratory Factor Analysis and Confirmatory Factor Analysis of the Mindsets of Depression, Anxiety, and Stress Scale in Study 2

	Exploratory Factor Analysis [a] (N = 824)				Confirmatory Factor Analysis [b] (N = 824)			
Items	Factor 1	Factor 2	Factor 3	Factor 4	Factor 1	Factor 2	Factor 3	Factor 4
1. When you have a certain level of anxiety, you really cannot do much to change it.		0.99				0.84		
2. When people feel anxious, they can change the level of anxiety that they have.				0.78				0.89
3. To be honest, people cannot really change how anxious they are.							0.81	
4. No matter how hard people try, they can't really change the level of anxiety that they have.	0.80				0.84			
5. When you have a certain level of depression, you really cannot do much to change it.		0.43				0.77		
6. When people are depressed, they can change the level of depression that they have.				0.71				0.63
7. To be honest, people cannot really change how depressed they are.			-1.01				0.84	
8. No matter how hard people try, they can't really change the level of depression that they have.	0.43						0.84	
9. When you have a certain amount of stress, you really cannot do much to change it.	0.58				0.82			
10. When people feel stressed, they can change the level of stress that they have.				0.60				0.62
11. To be honest, people cannot really change how stressful they are.	0.82				0.84			
12. No matter how hard people try, they can't really change the level of stress that they have.	0.94				0.86			
Total variance explained, percentage		67.89						
Chi-square						278.59		
P						< .001		
CFI						.96		
TLI						.95		
RMSEA						.08		
SRMR						.03		

Only the factor loading > .40 shown in the table. CFI = Comparative Fit Index; TLI = Tucker Lewis Index; RMSEA = Root-mean-square Error of Approximation; SRMR = Standardized Root-mean-square Residual.

[a] The intra-factor correlation in EFA were F1-F2: 0.73; F1-F3: 0.69; F1-F4: 0.01; F2-F3: 0.60; F2-F4: 0.02; and F3-F4: 0.05.

[b] The intra-factor correlations in CFA were F1-F2: 0.82; F1-F3: 0.85; F1-F4: 0.06; F2-F3: 0.86; F2-F4: 0.15; and F3-F4: 0.14.

Table 5.1 Convergent Validity (Spearman Correlation) of the Mindsets of Depression, Anxiety, and Stress Scale and its Subscales in Study 1 (N = 1,735)

	2	3	4	5	6	7
1. MDASS	.91	.88	.85	.58	.55	.56
2. MDASS_Anxiety subscale		.71	.70	.54	.53	.55
3. MDASS_Depression subscale			.59	.52	.48	.47
4. MDASS_Stress subscale				.48	.46	.49
5. DASS_Depression subscale					.67	.69
6. DASS_Anxiety subscale						.77
7. DASS_Stress subscale						-

All correlation were significant at 0.01 percent level. MDASS = Mindset of Depression, Anxiety, and Stress Scale; DASS = Depression Anxiety Stress Scale.

Table 5.2 Convergent Validity (Spearman Correlation) of the Mindsets of Depression, Anxiety, and Stress Scale and its Subscales in Study 2 (N = 1,648)

	2	3	4	5	6	7	8	9
1. MDASS	.91**	.81**	.87**	.25**	.57**	.57**	.55**	.34**
2. MDASS_Factor 1		.70**	.76**	0.04	.52**	.52**	.50**	.31**
3. MDASS_Factor 2			.71**	0.03	.56**	.60**	.55**	.35**
4. MDASS_Factor 3				0.00	.46**	.48**	.47**	.28**
5. MDASS_Factor 4					.12**	.06*	.09**	.06*
6. Trait Anxiety						.69**	.71**	.43**
7. GAD							.79**	.42**
8. PHQ								.44**
9. Perceived Stress								-

** $p < .01$. * $p < .05$. MDASS = Mindsets of Depression, Anxiety, and Stress Scale; GAD = Generalized Anxiety Disorder; PHQ = Patient Health Questionnaire.

Supplementary Table 1 Confirmatory Factor Analysis of the Mindsets of Depression, Anxiety, and Stress Scale in Study 2, the 12-item, 2-factor model ($N = 824$)

Items		Factor 1	Factor 2
1.	When you have a certain level of anxiety, you really cannot do much to change it.	0.75	
2.	When people feel anxious, they can change the level of anxiety that they have.		0.88
3.	To be honest, people cannot really change how anxious they are.	0.78	
4.	No matter how hard people try, they can't really change the level of anxiety that they have.	0.83	
5.	When you have a certain level of depression, you really cannot do much to change it.	0.69	
6.	When people are depressed, they can change the level of depression that they have.		0.63
7.	To be honest, people cannot really change how depressed they are.	0.77	
8.	No matter how hard people try, they can't really change the level of depression that they have.	0.79	
9.	When you have a certain amount of stress, you really cannot do much to change it.	0.80	
10.	When people feel stressed, they can change the level of stress that they have.		0.62
11.	To be honest, people cannot really change how stressful they are.	0.80	
12.	No matter how hard people try, they can't really change the level of stress that they have.	0.81	
	Chi-square	609.19	
	P	< .001	
	CFI	.91	
	TLI	.88	
	RMSEA	.11	
	SRMR	.04	

Note. CFI = Comparative Fit Index; TLI = Tucker Lewis Index; RMSEA = Root-mean-square Error of Approximation; SRMR = Standardized Root-mean-square Residual.

Supplementary Table 2 Confirmatory Factor Analysis of the Mindsets of Depression, Anxiety, and Stress Scale in Study 2, the 9-item, 1-factor model ($N = 824$)

Items		One-Factor model	One factor model with error covariance
1.	When you have a certain level of anxiety, you really cannot do much to change it.	0.75	0.75
2.	When people feel anxious, they can change the level of anxiety that they have.		
3.	To be honest, people cannot really change how anxious they are.	0.78	0.78
4.	No matter how hard people try, they can't really change the level of anxiety that they have.	0.83	0.83
5.	When you have a certain level of depression, you really cannot do much to change it.	0.69	0.69
6.	When people are depressed, they can change the level of depression that they have.		
7.	To be honest, people cannot really change how depressed they are.	0.77	0.77
8.	No matter how hard people try, they can't really change the level of depression that they have.	0.79	0.79
9.	When you have a certain amount of stress, you really cannot do much to change it.	0.80	0.80
10.	When people feel stressed, they can change the level of stress that they have.		
11.	To be honest, people cannot really change how stressful they are.	0.80	0.80
12.	No matter how hard people try, they can't really change the level of stress that they have.	0.81	0.81
	Chi-square	536.01	271.11
	P	< .001	< .001
	CFI	.90	.95
	TLI	.87	.93
	RMSEA	.15	.11
	SRMR	.05	.04

Note. CFI = Comparative Fit Index; TLI = Tucker Lewis Index; RMSEA = Root-mean-square Error of Approximation; SRMR = Standardized Root-mean-square Residual.

Supplementary Table 3 Confirmatory Factor Analysis of the Mindsets of Depression, Anxiety, and Stress Scale in Study 2, the 9-item, 3-factor model ($N = 824$)

Items		Factor 1	Factor 2	Factor 3
1.	When you have a certain level of anxiety, you really cannot do much to change it.		0.74	
2.	When people feel anxious, they can change the level of anxiety that they have.			
3.	To be honest, people cannot really change how anxious they are.		0.78	
4.	No matter how hard people try, they can't really change the level of anxiety that they have.		0.82	
5.	When you have a certain level of depression, you really cannot do much to change it.	0.69		
6.	When people are depressed, they can change the level of depression that they have.			
7.	To be honest, people cannot really change how depressed they are.	0.83		
8.	No matter how hard people try, they can't really change the level of depression that they have.	0.85		
9.	When you have a certain amount of stress, you really cannot do much to change it.			0.83
10.	When people feel stressed, they can change the level of stress that they have.			
11.	To be honest, people cannot really change how stressful they are.			0.86
12.	No matter how hard people try, they can't really change the level of stress that they have.			0.86
	Chi-square		294.32	
	P		< .001	
	CFI		.95	
	TLI		.92	
	RMSEA		.12	
	SRMR		.04	

Note. CFI = Comparative Fit Index; TLI = Tucker Lewis Index; RMSEA = Root-mean-square Error of Approximation; SRMR = Standardized Root-mean-square Residual.