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ORIGINAL RESEARCH

The General Mattering Scale, the Anti-Mattering Scale, and the Fear of Not Mattering Inventory: Psychometric Properties and Links with Distress and Hope Among Chinese University Students

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Purpose: Mattering is essential to university students' mental health. Feeling valued by others or unimportant can affect their overall well-being. However, most measures for assessing mattering have been developed and tested in Western countries, with limited evaluation of the measures when administered to university students in other regions. This study evaluated the reliability and validity of three mattering-related instruments – the General Mattering Scale (GMS), Anti-Mattering Scale (AMS), and Fear of Not Mattering Inventory (FNMI) among Chinese university students using classical test theory and Rasch analysis.

Methods: The study comprised 3594 university students from 19 universities across 13 provinces in mainland China, with a balanced gender distribution of 47.2% females and 52.8% males. Participants' ages ranged from 18 to 37, averaging 20.02 years. Most (78.4%) were in four-year programs, with the rest in three-year programs. The majority were freshmen (54.2%), and 86.3% had siblings. The predominant major was engineering (43.4%), followed by roughly equal representations in science, social science, and literature/art.

Results: The three scales showed high reliability and factorial validity, with Rasch analysis confirming their unidimensionality and monotonicity, although 2 of 15 items (one GMS item and one FNMI item) had lower fit. There were no substantial differences in item functioning between male and female respondents. Further analyses indicated that mattering, anti-mattering, and fear of not mattering all explained significant unique variance in levels of hope and distress.

Conclusion: All three mattering-related instruments are suitable for assessing Chinese students' mattering, anti-mattering, and fear of not mattering and changes in levels of these mattering dimensions. Moreover, each measure represents a unique element of the mattering construct in terms of associations with levels of hope and distress assessed in during the COVID-19 pandemic.

Keywords: mattering, anti-mattering, fear of not mattering, university students, hope, distress

Introduction

The increasing number of university students has sparked global concerns regarding their mental health.[1] While emotional disorders can emerge at any stage in life, many experts still consider university to be a critical period for the onset of common mental illnesses.[2,3] A systematic review by Ibrahim et al[4] found that university students experience much higher rates of depression compared to the general population, with a weighted mean prevalence of 30.6% among university students and a range of 9% to 22% in the general population. This heightened vulnerability underscores the importance of understanding protective and risk factors in this demographic.

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Central to understanding the mental health of university students is the concept of "mattering". This term refers to the belief that one is significant and valued by others. First introduced by Rosenberg and McCullough,[5] this perception of importance acts as a protective shield against stress and allostatic load.[6,7] Mattering is conceptually and empirically distinct from self-esteem in that it specifically taps the need to be important and recognized as a person who other people care for and care about. Feeling trusted and missed by others provides individuals with the inner strength to cope with life's challenges and fosters a sense of mastery.[6,7] A series of studies has emphasized the profound impact of mattering on mental well-being, suggesting that a sense of mattering can be a protective factor against various mental health challenges, while its absence can exacerbate feelings of loneliness and depression.[8–12] In essence, mattering is important to consider because it has been suggested that it is a unique and potentially powerful factor with considerable knowledge mobilization potential.[13]

The relevance of mattering becomes even more pronounced when considering the unique challenges faced by university students.[14] They face numerous pressures during the transition from adolescence to adulthood, such as adjusting to living away from family, managing tuition expenses, forming new relationships, and coping with academic stress.[1,15] Given these challenges, understanding factors that can support students' mental well-being is paramount. To reduce the prevalence of mental illness among university students, various individual predictors have been investigated, including coping abilities,[16] self-esteem,[17] insecure attachment and rumination,[8] sense of school belonging,[18] and more. While many studies have delved into these predictors, the current study shifts its focus to "mattering", which has been linked to the aforementioned predictors.[9,10,19–23] Although mattering received relatively limited research attention during the first two decades,[13] the volume of research has recently surged. The field of mattering is developing rapidly, and the emergence of new measures underscores the need to evaluate them in terms of their psychometric attributes and their utility in predicting substantive outcomes. If, as suggested, mattering reflects a universal need to feel significant, it becomes crucial to evaluate mattering measures when administered to people from countries around the world. Accordingly, this study evaluates key psychometric issues and examines the relationship between mattering and both distress and positive outcome expectancies (ie, hope) among students from China.

This research was conducted during the global COVID-19 pandemic. The pandemic has exacerbated the challenges faced by university students, leading to increased stress and anxiety related to the virus and heightened feelings of loneliness due to physical distancing measures.[24] Given these circumstances, researchers have emphasized the importance of closely examining the role of mattering in the mental health of university students.[8,11,19,25] This is worth noting because it has been suggested that mattering and associated feelings related to interpersonal relationships and situations are particularly salient and relevant during the pandemic due to themes such as social isolation, loneliness, and loss.[25,26] Indeed, mattering has been characterized during this time as "a vital support".[26] Moreover, other research during the pandemic has provided indications of the unique predictive ability of mattering measures when considered along with measures tapping other constructs.[19]

At this moment, the COVID-19 pandemic represents an opportunity to re-examine the importance of mattering to people. However, it is important to note that most of the current research on university student mattering takes place in Western countries, and there are very few studies on mattering for Chinese university students. As far as we know, only Chen, et al[27] examined the relationship between mattering (ie, fear of not mattering), COVID-19 pandemic experience, state-anxiety, pandemic-specific adaptability, and academic burnout on Chinese university students. Another study also investigated the concept of mattering among Chinese university students, but it focused on their perceived significance of life in general[28] rather than their perceived importance of interpersonal relationships. Given that China has a staggering number of over 30 million university students,[29] the urgency for research on their sense of mattering is evident.

A reliable and valid measuring instrument is essential for conducting research on the issue of mattering among university students. Several instruments are available to measure mattering among university students, including the General Mattering Scale (GMS)[30] and Mattering Index[31] that measure an individual's mattering in the context of their overall relationships, the Mattering to Others Questionnaire for assessing mattering towards parents and friends,[23] and the University Mattering Scale,[32] that measures mattering specific to the university environment. Apart from the aforementioned measures for assessing the level of mattering, Flett and colleagues have also devised brief tools to gauge individuals' perceptions of feeling unvalued by others. These include the Anti-Mattering Scale (AMS)[21] and the

Fear of Not Mattering Inventory (FNMI), which captures the anxiety stemming from concerns about not mattering to others.[10] It is important to note that it has been argued by Flett, Nepon and Scott[12] that when it comes to a positively oriented measure (ie, the General Mattering Scale) versus those that are negatively oriented and tap feelings of not mattering (eg, feeling invisible) and fears of not mattering, mattering and anti-mattering are not simply the endpoints of the same continuum. The positive and negative orientations differ in key respects, including assumed cognitive and motivational tendencies as would be the case when considering the differences between optimism versus pessimism. Most notably, in several empirical studies, the concepts of general mattering and anti-mattering have their own unique associations with the risk factors of mental illness [eg, perceptions of stigma by others,[33] and pathological narcissism].[12] Additionally, fear of not mattering, as a newly developed construct, also demonstrated a unique variance contribution on university students' psychological distress after controlling general mattering and anti-mattering.[19]

Mattering is commonly perceived to have both positive and negative impacts. On the one hand, feeling that you matter can offer substantial protection, whereas feeling that you do not matter can be detrimental to your well-being.[13] As such, to conduct a comprehensive study on mattering among university students, it is crucial to thoroughly incorporate the constructs of general mattering, anti-mattering, and fear of not mattering in the analysis. This is particularly important for large-scale studies involving Chinese university students, and the Chinese versions of the GMS, AMS, and FNMI can be highly useful in this regard. These three scales have been translated into Chinese, among which GMS and AMS have been completed by Chang[34] and Chen et al.[35] However, no reports of psychometric characteristics of these two scales were found on these studies. Moreover, FNMI was recently translated by Chen, et al[27] and an acceptable factorial validity was confirmed.

In the present study, focusing on university students, we conducted a systematic psychometric test on the three mattering measurement tools of GMS, AMS, and FNMI, combined with classical test theory and Rasch analysis. Parenthetically, there is a particular need for additional information about the FNMI because it is a newer measure that has been less extensively used when compared with the GMS and AMS. Moreover, we have chosen to use psychological distress and hope as concurrent variables for our examination of the three mattering constructs, considering individuals with a strong sense of mattering tend to have more psychological resources to cope with challenges in their environment,[14,36] enabling them to resist mental illness and maintain confidence in pursuing future goals.

We felt it was essential to include an explicit focus on hope given that hope has been shown in previous research to have a robust link with mattering.[37] More generally, as conceptualized by Snyder et al[38] hope is a personal resource that is defined as a cognitive set that involves both a positive sense of "successful determination in meeting goals in the past, present, and future" (p. 570), along with "a sense of being able to generate successful plans to meet goals" (p. 570). While hope is linked closely with a highly positive motivational orientation, the absence of hope is regarded as a key aspect of poor psychological adjustment.[39–41] Given these observations, it seems important to further evaluate the extent to which mattering and feelings and fears of not mattering are linked with hope among students from China. The measure of hope included in this research[38] assesses hope in terms of the facets of agency and pathways. Links between mattering and hope would signify that students who feel like they matter to others and who are hopeful would be relatively rich in resources in terms of feeling important, having a positive outlook on the future, and having specific strategies and solutions to achieve hoped-for outcomes.

Materials and Methods

Participants

In this study, a comprehensive sample of 3594 university students was drawn from 19 universities across 13 provinces in mainland China. The participants' ages spanned from 18 to 37 years, with an average age of 20.02 and a standard deviation of 1.37. The majority (78.4%, n=2817) were enrolled in four-year university programs, while 21.6% (n=777) were in three-year programs. The sample's academic year distribution included 54.2% freshmen (n=1947), 20.1% sophomores (n=721), 18.2% juniors (n=653), and 7.5% seniors (n=273). Gender distribution was fairly balanced with 47.2% females (n=1696) and 52.8% males (n=1898). A significant 86.3% (n=3102) reported having siblings. In terms of academic majors, engineering was predominant at 43.4% (n=1560), while science, social science, and literature/art were similarly represented with 16.7% (n=602), 17.4% (n=625), and 16.4% (n=588) respectively. An additional 6.1% (n=219) were categorized under other majors.

Instruments

In this study, the focus was on exploring three different types of mattering, and the associations found between scores on these measures and measures of psychological distress and hope. Along with this investigation, personal background information, including sex, siblings, and school type, was also collected from participants. To better understand the constructs of interest, the reliability and validity of the measures were evaluated, with a more detailed explanation of the validity of each mattering-related instrument provided in the results section.

General Mattering Scale

The General Mattering Scale (GMS), developed by Marcus and Rosenberg[30] is a unidimensional measure consisting of five items that assess an individual's perceived significance to others. Items are rated on a 4-point scale ranging from 1 (Not at all) to 4 (A lot). It is the most widely used measure of overall feelings of mattering.[42] Respondents are required to indicate their degree of agreement with items such as "How important do you feel you are to other people?" and "How interested are people generally in terms of what you have to say?" This inventory has been used and found to be reliable in various countries, including Italy,[11] Indonesia and Malaysia,[43] Portugal,[44] and Great Britain.[45]

The Chinese version of GMS, translated by Chang,[34] was employed in this study to evaluate the perception of mattering among Chinese university students. The internal consistency reliability of the Chinese version of GMS was found to be quite satisfactory, with McDonald's ω of 0.87.

Anti-Mattering Scale

The Anti-Mattering Scale (AMS) is a five-item instrument designed to measure an individual's perception of their insignificance or unimportance to others.[21] Respondents rate items on a 4-point scale, ranging from 1 (Not at all) to 4 (A lot). Participants indicate their degree of agreement with items such as "To what extent have you been made to feel like you are invisible?" and "How much do you feel like you will never matter to certain people?" The AMS has now been used in multiple investigations.[11,12,33,46,47]

Flett, et al[21] found that the scale had a one-factor structure among university students, with satisfactory model fits and acceptable factor loadings. All five items had factor loadings greater than 0.60, indicating a strong relationship with the underlying construct.[21] The scale has been translated into Chinese by Chen et al[35] and our study demonstrated high internal consistency reliability, with McDonald's ω equaling 0.91.

Fear of Not Mattering Inventory

Flett and colleagues[48] developed the Fear of Not Mattering Inventory (FNMI), a five-item scale designed to assess anxiety related to the fear of not mattering to others. Items include an emphasis on a feared loss of mattering in the future. Respondents rated items on a Likert-type scale ranging from "not at all (0)" to "almost all of the time (3)". Participants indicate their degree of agreement with items such as, "How often do you worry that others will see you as unimportant or insignificant?" and "Do you worry that others will stop taking an interest in you?"

FNMI demonstrated unidimensionality, similar to other mattering measurement tools such as the GMS and AMS, and exhibited high internal reliability in previous studies with university students, including research with students from Israel[19] and Canadian students,[10] where Cronbach's alpha was 0.91. Recently, Chen et al[27] translated the FNMI into Chinese and confirmed its unidimensionality with satisfactory model fit and factor loadings all greater than 0.60. The internal consistency reliability of the FNMI in this study was excellent, with McDonald's ω equaling 0.92.

The Depression, Anxiety, and Stress Scale—8- Item Version (DASS-8)

To measure participants' psychological distress, we employed the Depression, Anxiety, and Stress Scale—8-Item Version (DASS-8). The original DASS, developed by Lovibond and Lovibond,[49] consisted of 42 items and three subscales: depression, anxiety, and stress, each containing 14 items. A recent ultra-brief version, the DASS-8, was proposed and demonstrated superior psychometric properties compared to the original scale. This version can differentiate between healthy individuals and those with psychiatric conditions.[50,51] The DASS-8 consists of eight items selected from the original DASS, including three from the depression subscale, three from the anxiety subscale, and two items from the stress subscale. Like the original DASS, the DASS-8 is graded on a four-point Likert scale ranging from 0 ("did not

apply to me at all") to 3 ("applied to me very much or most of the time"). A higher score on the overall scale indicates greater severity of psychological distress. Previous research has found that the Chinese version of the DASS has satisfactory psychometric properties, including high consistency and criterion validity.[52,53] In this study, the DASS-8 had satisfactory model fit on a second-order factor structure, with psychological distress as the higher-order factor and the three emotional disorders as lower-order factors (χ^2 (17) = 24.209, RMSEA = 0.011, SRMR = 0.018, CFI = 0.999, and NNFI = 0.999). A good level of internal consistency of the whole scale was also found, with McDonald's ω equaling 0.930.

Snyder's Hope Scale

We measured participants' sense of hope using the Chinese version of the Dispositional Hope Scale (DHS). This scale was developed by Snyder et al[38] and consists of 12 items, which are graded on a Likert scale ranging from 1 (definitely false) to 4 (definitely true). The items are divided into two subscales: agency (four items) and pathways (four items), and four filter items. Sun et al[54] translated the DHS into Chinese and systematically evaluated its quality. The results showed that the Chinese DHS has a factor structure that conforms to the original two-factor structure, and that the two latent factors in the scale are significantly correlated with burnout, general health status, and general well-being, indicating its criterion validity.[54] In our study, the DHS showed acceptable factorial validity for the higher-order factor structure (χ^2(17)=89.306, RMSEA=0.034, SRMR=0.032, CFI=0.995, and NNFI=0.992), as well as high internal reliability of the whole scale (McDonald's ω =0.903).

Procedure

The study, approved by the Jiangxi Psychological Consultant Association (IRB ref: JXSXL-2022-Jul13), utilized convenience sampling for data collection. We invited faculties from universities across mainland China, and those willing were provided a hyperlink or QR code to the survey for dissemination to potential participants. Data collection spanned from August to October 2022, with participants needing to be 18 years or older, enrolled in a mainland Chinese university, and willing to participate online. To ensure the understandability of survey items, especially for the newly developed scale, FNMI, we adopted a forward-backward translation approach and rigorously evaluated item clarity in a prior pilot study.[27] This process involved meticulous checking to confirm the understandability of each item. To encourage honest responses, the faculty members who forwarded the hyperlink to the participants emphasized the survey's anonymity. They assured participants of the confidentiality of their answers and emphasized that there would be no repercussions based on their feedback. This approach was designed to foster candidness. Additionally, participants could seek clarification on any ambiguous questions.

Data Analysis

Descriptive statistics were used to present the characteristics of the participants, as well as their levels of sense of mattering, psychological distress, and hope. We also examined the associations among these variables using Pearson correlations. To test the factorial validity of the three mattering scales, we conducted confirmatory factor analysis (CFA) with a one-factor structure. To evaluate the model fit, we applied the criteria proposed by Hu and Bentler,[55] which require a comparative fit index (CFI) and a non-normed fit index (NNFI) greater than 0.90, a root mean square error of approximation (RMSEA) less than 0.06, and a standardized root mean square residual (SRMR) less than 0.08. Additionally, we assessed convergent validity using the average variance extracted (AVE) approach, as recommended by Hair et al.[56] We considered convergent validity to be supported if the AVE for each construct was greater than 0.50. The CFA was conducted using the diagonally weighted least squares (DWLS) estimation method, as DWLS is more appropriate for ordinal Likert-type scales.[57]

As a result of the significant likelihood ratio test (χ^2=285.766, p<0.01), we used the Partial Credit Rasch Model (PCM) rather than the Andrich Rating Scale Model (RSM), which suggests that the distances between thresholds may vary. To ensure the validity of Rasch analysis, we evaluated three crucial assumptions: monotonicity, local independence, and unidimensionality.[58] To assess monotonicity, we visually examined the person-item map for PCM to determine whether category calibration increased in an orderly manner. For local independence, we applied the mean absolute deviation of the adjusted Q3 index (MADaQ3) with the criterion of a value less than 0.20, as recommended by Christensen et al.[59] To assess unidimensionality, we applied the criterion that the eigenvalue of the first component in the principal component analysis (PCA) of the residuals should be less than 2.00, following the guideline by Linacre.[60]

After verifying the assumptions, we assessed targeting (the correspondence between item difficulties and sample ability), model fit, and person reliability (the consistency of a person's underlying ability). To evaluate targeting, we used the Wright map and calculated the discrepancy between the mean person measure and the item measure. A value less than 1.00 indicated good targeting of persons and items.[61] To test model fit, we employed the information-weighted fit statistic (infit) mean square (MnSq) and the outlier-sensitive fit statistic (outfit) MnSq. Values of infit and outfit between 0.70 and 1.30 were considered indicative of good fit.[62] The criterion for person reliability was a value greater than 0.70.[63]

The study conducted a test of differential item functioning (DIF) for sex to investigate whether male and female respondents had different responses to certain items. To assess the presence or absence of DIF, the study followed the approach recommended by Cameron et al[64] which combines the magnitude of the DIF and statistical significance. The study used a general thumb rule of the DIF contrast >0.5 and conducted the likelihood ratio test using generalized logistic regression models for ordinal items that met significance.[65]

To assess concurrent validity, we utilized hierarchical regression analysis, with a focus on the factor scores of psychological distress and hope. In the initial model, we incorporated demographic variables such as sex (male or female), sibling status (with or without siblings), and school type (three or four-year university). The inclusion of these demographic variables was intended to control for potential extraneous factors, thus enhancing the validity of the results through statistical control. In subsequent models (2 to 4), factor scores for general mattering, anti-mattering, and fear of not mattering were sequentially added, along with the aforementioned control variables. This stepwise approach allowed us to determine the unique variance each type of mattering contributed to the dependent variable.

Before undertaking the formal statistical analyses, we meticulously evaluated the essential assumptions inherent to regression analysis, including linearity, multivariate normality, the absence of auto-correlation, the absence of homoscedasticity, and multicollinearity. To assess linearity, we utilized the Ramsey's RESET test. For the dependent variable "hope", this test revealed that neither the squared nor the cubed terms of the predicted variables were statistically significant when added to the extended regression model, affirming the linearity assumption for "hope". Conversely, for the dependent variable "psychological distress", both squared and cubed terms were statistically significant, necessitating their inclusion in the subsequent regression analysis. Additional diagnostic tests were conducted to verify other regression assumptions. The Quantile-Quantile (QQ) plots (see Figures S1 and S2), which were closely aligned with a straight line, indicated an approximate normal distribution of the residuals. The Goldfield-Quandt test verified the absence of heteroskedasticity (Statistic=0.76, p=1.00), the Durbin-Watson statistic (DW statistic=2.23, p=0.44) demonstrated no significant auto-correlation, and all Variance Inflation Factor (VIF) values were below 1.6, signifying no multicollinearity issues.

Results

In the results section, the statistical tests related to three mattering scales (GMS, AMS, and FNMI) and their concurrent validity with the variables, specifically psychological distress and hope, are presented. The rationale for selecting these variables to test concurrent validity is provided at the end of the introduction, as mentioned earlier. Table 1 presents the

Table 1 Mean and the Correlation Among the Observed Variables

	Mean (SD)	1	2	3	4	5	6	7
1. General mattering (range:5–20)	13.10 (3.03)	1.00						
2. Anti-mattering (range: 5–20)	10.93 (3.56)	−0.30	1.00					
3. Fear of not mattering (range: 0–15)	4.14 (3.24)	−0.04[a]	0.53	1.00				
4. Psychological distress (range:0–24)	4.91 (5.04)	−0.28	0.52	0.42	1.00			
5. Hope_Overall (range:8–32)	22.85 (4.66)	0.38	−0.32	−0.22	−0.36	1.00		
6. Hope_Agency (range:4–16)	11.16 (2.37)	0.39	−0.33	−0.21	−0.37	0.95	1.00	
7. Hope_Pathways (range:4–16)	11.69 (2.54)	0.34	−0.27	−0.22	−0.31	0.95	0.80	1.00

Notes: [a]The pair correlation here had a p-value of 0.03 while all other coefficients met p<0.01.

descriptive statistics and Pearson correlation coefficients of the variables in the study. Participants generally felt valued by others and were optimistic about the future. This sentiment is supported by their mean scores, which were notably above the scoring medians of 12.50 for general mattering (t=11.96, p<0.01, Cohen's d=0.20) and 20 for hope (t=36.59, p<0.01, Cohen's d=0.61). In contrast, they reported diminished feelings of anti-mattering, fear of not mattering, and psychological distress. This is evident from their scores, which were significantly below the respective scoring medians: 12.5 for anti-mattering (t=−26.34, p<0.01, Cohen's d=0.44), 7.5 for fear of not mattering (t=−62.13, p<0.01, Cohen's d=1.04), and 12 for psychological distress (t=−84.35, p<0.01, Cohen's d=1.41).

The correlation analysis revealed significant relationships among all variables. General mattering and anti-mattering exhibited a moderate negative correlation (r=−0.30), whereas general mattering and fear of not mattering showed a weak negative correlation (r=−0.04). While this negative correlation is statistically significant, caution is warranted. The effect size is trivial, likely influenced by the large sample size. In contrast, anti-mattering and fear of not mattering had a significant positive correlation (r=0.53) with a large effect size. Additionally, general mattering was negatively correlated with psychological distress, but positively correlated with overall hope and its two subscales of agency and pathways. The opposite was true for anti-mattering and fear of not mattering.

Table 2 shows the results of a CFA that assessed the factorial validity of the GMS, AMS, and FNMI. The one-factor model had a good fit for all three mattering scales, as indicated by the CFI and NNFI values above 0.95, and the RMSEA and SRMR values below 0.06. Moreover, all factor loadings were above 0.75, except for items 1 and 2 in the GMS (see Table 3). These results imply that the three scales have good convergent validity, with an AVE between 0.58 and 0.71. Furthermore, we also conducted a CFA including all items of GMS, AMS, and FNMI. The model fit was satisfactory (χ^2 (87)=383.079, RMSEA=0.031, SRMR=0.032, CFI=0.994, and NNFI=0.993). All items had factor loadings of 0.65 or higher (see Figure S3). In terms of the correlations among three latent factors in this measurement model, general mattering was moderately negatively correlated with anti-mattering (r=−0.34, p<0.01) and weakly negatively correlated with fear of not mattering (r=−0.05, p<0.01). Anti-mattering was strongly positively correlated with fear of not mattering (r=0.57, p<0.01). These results are consistent with the Pearson correlation mentioned above.

The three fundamental assumptions of monotonicity, local independence, and unidimensionality were assessed in the Rasch analysis. The person-item map for PCM indicated that the thresholds were appropriately ordered for each item (refer to Figure S4). Furthermore, local independence and unidimensionality were both supported as MADaQ3 was less than 0.20, and the first component's eigenvalue in the PCA of the standardized residuals was less than 2.00 across all three mattering scales (MADaQ3 was 0.13, 0.09, and 0.13 in GMS, AMS, and FNMI, respectively; the first component's eigenvalue in the PCA of the standardized residuals was 1.77, 1.61, 1.67 in GMS, AMS, and FNMI, respectively). Regarding the targeting of participants' abilities, the results showed that the range of items in the GMS was ideal and corresponded well with the participants' abilities, with a mean person measure of 0.43, which closely aligns with the mean item measure. This finding is consistent with the analysis displayed in the Wright map (see Figure 1). However, the items in AMS and FNMI did not target the participants' abilities accurately, with a mean person measure of −1.32 and −2.88, respectively. The Wright map revealed that participants in the AMS and FNMI were situated at the lower end of the figures. Therefore, compared to the difficulty of the items, the sample experienced lower levels of anti-mattering and felt less anxious about their non-significance to others (ie, the items of the two scales were difficult to endorse).

Table 2 Model Fit Among the Three Mattering Scales

	χ^2 (df)	CFI	NNFI	RMSEA (90% Confidence Interval)	SRMR
General mattering scale	53.25 (5)	0.994	0.988	0.052 (0.040–0.065)	0.033
Anti-mattering scale	20.47 (5)	0.999	0.998	0.029 (0.017–0.043)	0.019
Fear of Not Mattering Inventory	23.41 (5)	0.998	0.997	0.032 (0.020–0.046)	0.022
Measurement model of three mattering scales	383.08 (87)	0.994	0.993	0.031 (0.028–0.034)	0.032

Abbreviations: CFI, comparative fit index; NNFI, non-normed fit index; RMSEA, root mean square error of approximation; SRMR, standardized root mean square residual.

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Table 3 Psychometric Properties of Three Mattering Scales in Item Level

	Factor Loadings	Item–Rest Correlation	Infit MnSq	Outfit MnSq	Difficulty	Difficulty (Male)	Difficulty (Female)	DIF Contrast	Likelihood Ratio Test	Adj. *p*
General Mattering Scale McDonald's ω=0.87; AVE=0.575										
Item 1. How much do other people depend upon you?	0.69	0.64	0.92	0.89	0.28	0.41	0.14	−0.27	22.87	<0.01
Item 2. How much do others pay attention to you?	0.70	0.65	0.88	0.87	0.57	0.40	0.75	0.35	37.80	0.03
Item 3. How important are you to others?	0.84	0.76	0.69	0.66	−0.07	−0.07	−0.06	0.01	0.39	0.95
Item 4. How much would you be missed if you went away?	0.80	0.73	0.75	0.74	−0.45	−0.37	−0.52	−0.15	0.04	0.85
Item 5. How interested are others in what you have to say?	0.72	0.66	0.85	0.81	−0.34	−0.37	−0.31	0.06	0.29	0.93
Anti-Mattering Scale McDonald's ω=0.91; AVE=0.668										
Item 1. How much do you feel like you do not matter?	0.80	0.75	0.95	0.92	0.12	0.11	0.13	0.02	0.13	1.00
Item 2. How much do you feel like you will never matter to certain people?	0.79	0.75	0.97	0.95	−0.44	−0.39	−0.49	−0.10	0.00	1.00
Item 3. How often have you been made to feel by someone that they do not care what you think or what you have to say?	0.85	0.80	0.71	0.69	−0.20	−0.25	−0.14	0.11	0.58	1.00
Item 4. How often have you been treated in a way that makes you feel like you are insignificant?	0.84	0.79	0.76	0.73	0.15	0.08	0.21	0.13	5.38	0.10
Item 5. To what extent have you been made to feel like you are invisible	0.82	0.77	0.88	0.85	0.37	0.45	0.28	−0.17	1.87	0.86
Fear of Not Mattering Inventory McDonald's ω=0.92; AVE=0.706										
Item 1	0.82	0.79	0.80	0.76	−0.26	−0.20	−0.33	−0.13	1.09	1.00
Item 2	0.82	0.78	0.81	0.77	0.43	0.37	0.50	0.13	1.73	0.95
Item 3	0.89	0.85	0.57	0.54	0.28	0.21	0.35	0.14	1.09	1.00
Item 4	0.83	0.79	0.79	0.75	−0.52	−0.41	−0.65	−0.24	1.88	0.85
Item 5	0.84	0.80	0.76	0.73	0.08	0.03	0.13	0.10	2.71	0.49

Notes: Non-uniform DIF; Adj. *p*= The adjusted p-values by likelihood ratio test using Bonferroni comparison.
Abbreviations: AVE, Average variance extracted; MnSq, mean square.

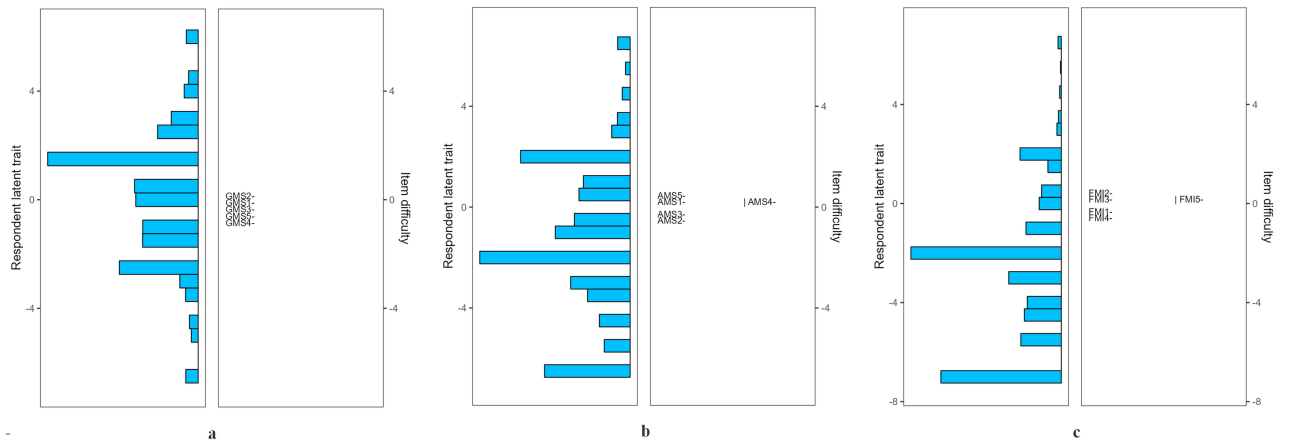

Figure 1 Wright map of three mattering scales: (**a**). General Mattering Scale; (**b**). Anti-Mattering Scale; (**c**). Fear of Not Mattering Inventory.

In terms of model fit, item 3 of the GMS and item 3 of the FNMI fell outside the acceptable range (ie, less than 0.70), with infit values of 0.69 and 0.57 and outfit values of 0.66 and 0.54, respectively. However, apart from these two items, the other 13 items across the three scales showed ideal fit (see Table 3), and the person reliability was high, with values of 0.81 for GMS, 0.83 for AMS, and 0.82 for FNMI. Furthermore, the DIF analysis revealed that even though the likelihood test was significant for items 1 and 2 of the GMS, DIF was not generally evident in the items due to a difference in difficulty magnitudes between male and female participants, with values less than 0.50 for all items. This result is in accordance with the CFA-approach of measurement invariance test that three mattering related instruments are invariant across males and females (see Table S1). Based on the premise of the invariance between males and females, we performed additional analyses- independent *t*-tests and the results revealed that there were no notable differences in the mean observed scores between sex, with Cohen's *d* effect sizes ranging from 0.14 to 0.17, all of which were considered trivial despite the significant results which may have been influenced by the large sample size.

Table 4 presents the results of a hierarchical regression analysis that examines the association of each mattering with the dependent variable, while controlling for the participants' demographic variables. The findings indicated that each mattering measure plays a significant role in explaining the variation of the dependent variable. Additionally, the contribution of each mattering provides additional variance explained in the dependent variable. Specifically, the analysis shows that general mattering has a stronger link with hope (β=0.32) than did anti-mattering (β=−0.13) and fear of not mattering (β=−0.14). Conversely, anti-mattering (β=0.32) and fear of not mattering (β=0.25) have a greater association with psychological distress than general mattering (β=−0.18). Additionally, given that the regression assumption test highlighted the need to account for polynomial terms in relation to psychological distress, we conducted a non-linear regression analysis on this variable, incorporating both quadratic and cubed terms. The results revealed that the cubed terms for all three "mattering" categories were not statistically significant. However, the quadratic terms were. Specifically, the coefficient for general mattering was 0.12 (t=4.57, p<0.01), for anti-mattering it stood at 0.07 (t=4.38, p<0.01), and for the fear of not mattering, it was 0.05 (t=2.91, p<0.01) (see Table S2).

Discussion

The current study evaluated the psychometric properties of three scales assessing mattering along with their ability to predict levels of hope and levels of distress. Our results suggest that the GMS, AMS, and FNMI scales possess favorable psychometric properties with respect to their construct validity for measuring various aspects of mattering and their respective internal reliability. While previous studies have established the good construct validity of these three instruments using methods such as exploratory factor analysis (EFA) or CFA,[11,21,66] it should be noted that these studies have primarily involved university students from Western countries. Our study, on the other hand, represents the first large-scale psychometric assessment of these scales in Chinese university students, providing preliminary support for their construct validity in this population. Furthermore, we found significant associations between the three mattering

Table 4 Regression of Psychological Distress and Hope

	Psychological Distress		Hope		Psychological Distress		Hope		Psychological Distress		Hope		Psychological Distress		Hope	
	Model 1				Model 2				Model 3				Model 4			
	Estimate (se)	*β*	Estimate (se)	*β*	Estimate (se)	*β*	Estimate (se)	*β*	Estimate (se)	*β*	Estimate (se)	*β*	Estimate (se)	*β*	Estimate (se)	*β*
Sex (Male)	0.03 (0.02)	0.06	−0.01 (0.02)	−0.01	0.06 (0.02)	0.11**	−0.04 (0.02)	−0.07*	0.01 (0.02)	0.03	−0.02 (0.02)	−0.03	0.01 (0.01)	0.02	−0.02 (0.02)	−0.03
Sibling (Yes)	−0.10 (0.02)	−0.20**	−0.04 (0.03)	−0.07	−0.10 (0.02)	−0.20**	−0.04 (0.03)	−0.08	−0.09 (0.02)	−0.19**	−0.05 (0.02)	−0.08	−0.10 (0.02)	−0.20**	−0.04 (0.02)	−0.07
School-type (Four-year)	0.04 (0.02)	0.07	−0.05 (0.02)	−0.09*	0.03 (0.02)	0.07	−0.05 (0.02)	−0.09*	0.04 (0.02)	0.08*	−0.05 (0.02)	−0.10*	0.04 (0.02)	0.08*	−0.05 (0.02)	−0.09*
General mattering					−0.31 (0.02)	−0.29**	0.44 (0.02)	0.37**	−0.16 (0.02)	−0.15**	0.36 (0.02)	0.30**	−0.19 (0.02)	−0.18**	0.38 (0.02)	0.32**
Anti-mattering									0.36 (0.01)	0.46**	−0.18 (0.01)	−0.21**	0.25 (0.01)	0.32**	−0.11 (0.02)	−0.13**
Fear of not mattering													0.21 (0.01)	0.25**	−0.13 (0.02)	−0.14**
R^2 or ΔR^2	0.01		0.02		0.08**		0.14**		0.19**		0.04**		0.04**		0.01**	

Notes: The terms provided in parentheses beneath the variable names serve as the baseline reference group; *p<0.05, **p<0.01; R^2 of mode 4 on psychological distress and hope was 0.32 and 0.19 respectively.

instruments and psychological distress and hope. The pattern of correlations indicated that anti-mattering had the strongest association with the distress measure, and this further attests to how emotional upset is often underscored by feelings of being unvalued, unheard, and invisible to other people. The associations with hope are consistent with previous research,[37] but with the caveat that this is one of the few investigations to simultaneously consider general mattering, anti-mattering, and fear of not mattering within the same study. These findings indicate excellent concurrent validity of the scales and highlight the dual nature of mattering, where it can have a highly protective effect (ie, hope) while feeling of not mattering can be detrimental (ie, psychological distress). Parenthetically, it is worth noting that in keeping with the GMS having a positive orientation, the GMS was the measure from among the three measures with the strongest link with hope. In contrast, the stronger links that the AMS and FNMI measures had with distress are in keeping with the notion that these measures tap a negative orientation. The findings involving the FNMI are particularly unique given that it is a newer measure.

The high reliability and satisfactory factorial validity of three mattering-related instruments are in line with previous studies that found a stable single factor for the three scales among university students[11,21] and early adults aged 20–23.[66] For example, in Krygsman et al's four-year longitudinal study, the factors of general mattering in GMS and anti-mattering in AMS emerged stably in the EFA conducted with data from each year.[66]

Our study also employed Rasch analysis to evaluate the three mattering scales. To our knowledge, this is the first study to utilize Rasch analysis in examining these scales. Our findings from Rasch analysis revealed that the unidimensionality of the three scales aligns with the one-factor structure in CFA. Furthermore, the verification of monotonicity holds significant implications for practical applications of mattering scale scores in the future. Given the potential link between mattering and mental illness, as demonstrated in previous studies,[13,45] scores on the three mattering scales may serve as useful indicators of university students' mental health and outlook on the future. However, proper utilization of these scores is crucial, particularly in summing up and applying them practically. We must ensure that the response categories are functioning appropriately. Our research provides solid evidence of monotonicity, supporting the use of summed scores, as the response categories of the three brief mattering-related instruments were demonstrated to be properly ordered.

Moreover, although the three scales as a whole are capable of measuring various types of mattering, as demonstrated by the results of the CFA or unidimensionality in Rasch analysis at scale level, we have identified specific items within the scales that require further investigation. Specifically, item 3 of the GMS (How important do you feel you are to other people?) and item 3 of the FNMI (Do you worry that others will see you as unimportant or insignificant?) both have infit/outfit values below 0.70, indicating potential issues with these items. The low value of infit/outfit occurs when there are several similar or highly correlated items or when one item is dependent on another[62] and may consider redundancy among items.[61,67,68] We found that the point biserial correlation coefficients of these two items are 0.85 and 0.90, respectively, which were the highest coefficients in the respective scale. This may be the reason for the low infit/outfit value of the item (ie, the high correlation is too high). However, it should be noted that some studies suggest an infit/outfit value higher than 0.50 is considered acceptable,[69,70] and in this case, the two items meet this criterion. Therefore, further evaluation of these two items is necessary.

Moreover, the item 1 (How much do other people depend on you?) and item 2 (How much do you feel other people pay attention to you?) of GMS may have slight DIF between males and females. The potential differential item functioning (DIF) in the GMS suggests that young men and young women have varying interpretations of the item descriptions for item 1 (How much do other people depend on you?) and item 2 (How much do you feel other people pay attention to you?). One possible explanation for this phenomenon is the influence of the "mabao man" culture in China. This term, coined by Chinese scholars, refers to young men who were raised under the excessive protection and education from their families, mostly from their mothers.[71,72] This upbringing may have resulted in personality traits that hinder independence and may also lead to a certain degree of narcissism among these young men.[71,72] Our speculation is that with the increasing proportion of "mabao man" among young adult males, male university students may have formed different interpretations of the word "dependence" compared with female students. Similarly, the latent narcissistic personality traits of "mabao man" could have caused boys and girls to have different judgments when they read the wordings "being paid attention". Further investigation is needed to test these possibilities.

Furthermore, it is important to note that cultural differences may also impact the validity and interpretation of the GMS scale. In our study, we found a weaker correlation between general mattering and anti-mattering (ie, r=−0.34) compared to previous studies conducted in Western countries where strong effects were often observed.[11,12,19,21,33,45,66] We hypothesize that traditional Chinese culture may have influenced our results, as humility and the golden mean are highly valued in this culture.[73] Some GMS items that relate to thinking that one is important to others or that others will miss them may be perceived as arrogant under the context of Chinese culture, leading Chinese university students to a reluctance to endorse certain responses. This blending of mattering with concerns about avoiding arrogance or being humiliated may have contributed to the weaker relationship between general mattering and anti-mattering in our sample. Further investigation is needed to explore the cross-cultural differences in the interpretation of the GMS items in various countries and cultures, and to examine its invariance.

In the Rasch analysis conducted in this study, it is evident that there was a significant mismatch between the difficulty of the AMS and FNMI and the capabilities of our participants, with most samples located at the bottom of the graph on the Wright map (see Figure 1). This situation resulted in poor targeting of the scales, which is not uncommon in studies where emotional disorder scales are implemented in the general population [eg, the implementation of the DASS-21.[58,74] Nevertheless, despite the less-than-optimal targeting of the AMS and FNMI, their application to normal university students remains meaningful, as both scales contributed uniquely to the variance explained for the concurrent variables. However, future studies should aim to analyze samples with higher social disabilities or marginalized population, and also consider using emotional disorder patients as participants, given the significant associations that anti-mattering and fear of not mattering had with psychological distress in the current study. This may further establish cutoff points of the AMS and FNMI that can be used in individual assessments to potentially detect the presence of emotional disorders.

Lastly, while the core objective of this study was the psychometric evaluation of the three mattering measurement tools - GMS, AMS, and FNMI, a notable finding emerged during the analysis of the relationship between these types of mattering and psychological distress. Contrary to prior research that primarily highlighted a linear relationship between mattering and distress (eg, references 11, 19), our data indicate the presence of both linear and quadratic associations. Specifically, general mattering demonstrated a negative linear correlation, coupled with a positive quadratic correlation, with psychological distress. This suggests that an initial increase in general mattering among university students offers a significant protective buffer, markedly reducing distress levels. However, as general mattering intensifies, this protective buffer may wane, potentially leading to increased distress. In contrast, both anti-mattering and the fear of not mattering exhibited positive linear and quadratic relationships with distress. This implies that a preliminary increase in these two types of mattering might not precipitate an immediate rise in psychological distress; there might even be an initial decline. Yet, as these forms of mattering continue to accumulate, a pronounced increase in distress becomes increasingly likely. These intricate, nonlinear relationships provide valuable insights into mattering research and underscore the need for further in-depth exploration in future studies.

There are limitations to the current study. First, the sampling method employed in this study yielded a convenience sample, and although the participation of university students from 13 provinces was achieved, it is important to note that the sample may not be entirely representative of Chinese university students. Therefore, the generalizability of our results may be limited to some extent. On a related note, the results should not be generalized beyond students and there is a need to consider the psychometric properties of mattering measures in people of various ages, for instance. It seems especially important to evaluate mattering, anti-mattering, and fear of not mattering among older adults who clearly still have a need to matter and to be valued by other people.

Second, substantial floor effects were observed in the targeting of AMS and FNMI. Future studies should aim to evaluate the replicability of this finding by using samples that include groups with higher levels of social disabilities, marginalized population or emotional-disordered patients.

Third, this study primarily emphasizes the systematic psychometric evaluation of three distinct mattering scales. Consequently, we did not extensively investigate the nonlinear associations between these variables and certain criterion measures. This constitutes a limitation of our research. Given the burgeoning nature of the mattering domain, future studies should further explore potential nonlinear relationships between mattering and other pertinent variables.

Conclusion

In summary, our study confirmed that three instruments representing different aspects of the mattering construct possess psychometric properties that seem mostly ideal and are suitable for use in the Chinese university student population. It

may be concluded that these instruments measure students' mattering, anti-mattering, and fear of not mattering with adequate reliability and validity. Additionally, each scale's scores contribute uniquely to the variance explained in a measure of poor functioning (ie, distress) and in a measure of positive future outlook (ie, hope) and did so in ways that suggest that each measure has incremental validity. Scores of these scales can be conveniently aggregated and verified through Rasch analysis, making them practical for use in various settings. Moving forward, future research can focus on implementing AMS and FNMI scales in groups with high-risk mental illnesses to establish predictive mechanisms for mental health issues and prevent their onset. Overall, the current results are in keeping with research that points to the complexity of the mattering construct and the need to consider the use of multiple mattering measures when seeking to capture key nuances in the construct.

Data Sharing Statement

The datasets generated and analyzed during the current study are available from the corresponding authors on reasonable request.

Compliance with Ethical Standards

All the methods were performed in accordance with the Declaration of Helsinki. The study was approved by the Jiangxi Psychological Consultant Association (IRB ref: JXSXL-2022-Jul13). Informed consent was obtained from all individual participants included in the study.

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Disclosure

The authors report no conflicts of interest in this work.

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