ORIGINAL PAPER

Evaluating the Psychometric Properties of the Gratitude Questionnaire in a Chinese Sample: Comparing the 6-Item and 5-Item Versions

Sai-fu Fung[1]

Abstract

Objectives There are controversies related to the item composition of the Gratitude Questionnaire-Six-Item Form (GQ-6). Recent literature has suggested removing Item 6 from the scale. This study evaluated both the 6- and 5-item versions and proposed an adapted Chinese version.

Method Nine hundred and three undergraduate students were recruited for this psychometric evaluation study. The internal consistency, concurrent validity, and construct validity of the GQ-6 were evaluated.

Results The results showed that the 5-item Gratitude Questionnaire (GQ-5), which excludes Item 6, demonstrated better internal consistency ($\alpha = 0.74$) compared to the original 6-item version (GQ-6) ($\alpha = 0.59$). Both the 6-item and 5-item versions of the Gratitude Questionnaire exhibited good concurrent validity with well-established measures of self-esteem, life satisfaction, happiness, and mental well-being, as reported in the gratitude literature. The confirmatory factor analysis (CFA) results indicated that the 5-item version possessed better construct validity than the original version. The CFA results also supported a unidimensional factor structure for the GQ-5 after post-hoc modifications.

Conclusions The findings suggest that the GQ-5 demonstrates better psychometric properties compared to the original GQ-6. These results will assist researchers in choosing the appropriate version of the Gratitude Questionnaire for research studies conducted in different Chinese contexts.

Preregistration This study is not preregistered.

Lustig et al. (2024) defined mindfulness as being commonly defined as "a state of consciousness in which attention is focused in present moment phenomena occurring both externally and internally" (p. 827). This involves observing one's thoughts, emotions, and physical sensations with an open and accepting attitude. The concept is also well integrated within the pan-Buddhist principles and Western literature, particularly in the practices of Cognitive-Behavioural Therapy through the concept of mindfulness (Phang & Oei, 2012). As argued by Bartholomew et al. (2022), gratitude or a grateful disposition is often referred to as the sister of mindfulness. It refers to an emotional state characterised by appreciation, thankfulness, and recognition of the positive aspects of life. This state is associated with positive affect, well-being, prosocial behaviours, and religiousness (McCullough et al., 2002). The origins of gratitude can be traced back to ancient philosophical and theological traditions across different civilisations, such as Buddhism, Christianity, Hinduism, Islam, and Judaism (Emmons & Crumpler, 2000; Rosmarin et al., 2016; Van Cappellen et al., 2024). Both mindfulness and gratitude are important positive personality traits that are attracting increasing attention in the literature (de Zavala et al., 2024; Marzabadi et al., 2021). There have been numerous studies exploring the relationships between these concepts and life satisfaction among athletes (Chen et al., 2017), quality of life among patients with advanced cancer (Tan et al., 2023), mood states of college students (Swickert et al., 2019), and self-compassion among parents (Nguyen et al., 2020).
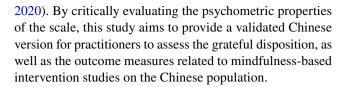
The connection between gratitude and mindfulness lies in the way they both cultivate a deeper awareness and connection with the present experience (Lustig et al., 2024). When we practice mindfulness, we become more attuned

✉ Sai-fu Fung
  sffung@cityu.edu.hk

[1] Department of Social and Behavioural Sciences, City University of Hong Kong, Kowloon, Hong Kong

to the richness of the here and now, which can naturally foster a sense of gratitude, cultivating a grateful mindset that enhances overall mindfulness (Giordano & Shuster, 2023; Hogan & Gordon, 2020; O' Leary and Dockray, 2015). Throughout the last two decades, gratitude has been considered a virtue and a pathway to contentment and well-being (Emmons & McCullough, 2003). In the field of social and positive psychology, the theoretical background of gratitude has been extensively conceptualised and explored (Bartlett & DeSteno, 2006; Wood et al., 2010). Recent research has shown a growing interest in studying gratitude and its positive impacts, such as its effects on perceived social support, emotional dissonance, and psychological well-being in various contexts like schools (Xin, 2022) and workplaces (Cho, 2019). Leong et al. (2020) in a longitudinal study based on the Actor-Partner Interdependence Model with 100 Chinese dyadic couples explored the interplay between grateful disposition and interpersonal relationship. Hence, understanding the meaning of gratitude and conducting research on this concept is crucial for both researchers and practitioners in the field of mindfulness.

The Gratitude Questionnaire-Six-Item Form (GQ-6) was developed as a measure of gratitude or grateful disposition, based on four studies conducted by McCullough et al. (2002). Since its introduction, the scale has been adapted and translated into multiple languages for use in various societies, including Brazil (Gouveia et al., 2021), Chile (Carmona-Halty et al., 2015; Langer et al., 2016), Germany (Hudecek et al., 2020), India (Bartholomew et al., 2022; Dixit & Sinha, 2023; Garg et al., 2021), Netherlands (Jans-Beken et al., 2015), China (Chen et al., 2009; Kong et al., 2017), and Romania (Balgiu, 2020). However, some studies have reported challenges related to the reliability and item composition of the GQ-6 (Balgiu, 2020; Bartholomew et al., 2022; Chen et al., 2009; Dixit & Sinha, 2023; Hudecek et al., 2020; Langer et al., 2016). For example, researchers in Taiwan and India found that Item 6, "Long amounts of time can go by before I feel grateful to something or someone", had low factor loadings in the Confirmatory Factor Analysis results and suggested its removal (Chen et al., 2009; Dixit & Sinha, 2023). Similarly, Langer et al. (2016) proposed "a 5 item version [removing Item 6] for the adolescents and 6 items for adults" (p. 1) based on the results from 668 high school adolescents and 331 adults in Chile.

Given these controversies, this study aims to evaluate the psychometric properties of the GQ-6 and develop a Simplified Chinese version for the Chinese population. Additionally, this study seeks to compare the Gratitude Questionnaire-Five-Item Form (GQ-5) and GQ-6 in terms of concurrent validity to ensure that the shortened version is conceptually comparable to the original Gratitude Questionnaire-Six-Item Form (Balgiu, 2020; Bartholomew et al., 2022; Chen et al., 2009; Dixit & Sinha, 2023; Hudecek et al.,

2020). By critically evaluating the psychometric properties of the scale, this study aims to provide a validated Chinese version for practitioners to assess the grateful disposition, as well as the outcome measures related to mindfulness-based intervention studies on the Chinese population.

Method

Participants

A cross-sectional study was conducted at a university in Guangdong, China, involving 903 valid participants between June and July 2018. The participants, who had an average age of 20.56 years ($SD = 2.85$), voluntarily took part in the study. The sample consisted of 111 male and 792 female participants, reflecting the gender ratio of the overall student population at the university. To recruit participants and administer the questionnaire, the study utilised the university's student intranet system. All data collected and stored within the system were completely anonymous to ensure participant confidentiality. Prior to their involvement, informed consent was obtained from all participants, and they were informed of their right to withdraw from the study at any point during the data collection process.

Measures

The Gratitude Questionnaire-Six-Item Form (McCullough et al., 2002) was translated from English to Simplified Chinese by two bilingual translators who possess postgraduate qualifications in translation. The standard procedure of back translation was employed, with particular focus on accounting for the geographical and cross-cultural distinctions between the northern and southern regions of China (Beaton et al., 2000; Cha et al., 2007). Two pilot studies were conducted with 10 participants who had undergraduate qualifications or higher, from the Guangdong and Shaanxi provinces. None of the pilot participants reported any difficulty in understanding the meaning of the items. The data collected from the pilot studies was excluded from the analysis.

The 12-item General Health Questionnaire (GHQ-12) comprises 12 items to evaluate the severity of health-related problems with a 4-point scale (Goldberg & Williams, 1988). Higher scores indicate worse health. The Chinese version of GHQ-12 has been validated in various settings (Liang et al., 2016; Ye, 2009; Zhong et al., 2022). The McDonald's ω reliability estimate in this study is 0.74.

The Rosenberg Self-Esteem (RSE) Scale includes 10 statements using a 4-point Likert-type scale (1 = *strongly disagree* to 4 = *strongly agree*) to evaluate self-esteem of individual (Rosenberg et al., 1989; Wu et al., 2017). Wu

et al. (2017) validated the Chinese version of the RSE. The reliability estimate for McDonald's ω in this study is 0.86.

The Satisfaction with Life Scale (SWLS) includes 5 items rated on a 7-point Likert-type scale, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*) (Diener et al., 1985; Pavot & Diener, 1993, 2008; Pavot et al., 1991). The Chinese version of the SWLS was validated with a nationally representative sample (Bai et al., 2011). The estimated reliability for McDonald's ω in this study is 0.89.

The Short Warwick Edinburgh Mental Well-Being Scale (SWEMWBS) is made up of 7 positively worded questions that evaluate hedonic and eudaimonic well-being on a 5-point scale (1 = *none of the time* to 5 = *all of the time*) (Stewart-Brown et al., 2009; Tennant et al., 2007). The Chinese version has been validated in various contexts (Dong et al., 2016, 2019; Fung, 2019; Sun et al., 2019). In this study, the reliability estimates for McDonald's ω is found to be 0.89.

The Subjective Happiness Scale (SHS) consists of 4 items to evaluate whether a person is happy or unhappy with a 7-point scale (Lyubomirsky & Lepper, 1999). The Chinese version of the scale has been validated in recent studies (Chien et al., 2020; Nan et al., 2013). The McDonald's ω reliability estimates in this study is 0.74.

Data Analyses

The internal consistency of the GQ-6 was evaluated using both McDonald's Omega (McDonald, 1999; Revelle & Zinbarg, 2009; Zinbarg et al., 2005) and Cronbach's alpha (Cronbach, 1951). With reference to Hair (2010), this study also examined the corrected item-total correlations between the 6 items.

Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were adopted for evaluation of the construct validity of the GQ-6. Fokkema and Greiff (2017) highlighted the potential danger of overfitting by running EFA and CFA on a cross-sectional study. To avoid this issue, this study followed existing practices in psychometrics and validation studies by randomly stratifying the entire dataset ($n = 903$) into two datasets (Sample 1, $n = 451$; Sample 2, $n = 452$) (Fung & Fung, 2020; Gouveia et al., 2021; Lau et al., 2022; Zeng et al., 2022). EFA with principal component analysis was only conducted on the Sample 1 ($n = 451$) (Jennrich & Sampson, 1966; Loewenthal, 2001). EFA adopted the cut-off values of the Kaiser–Mayer–Olkin (KMO) test (> 0.70) and Bartlett's test of sphericity ($p < 0.01$) to assess the suitability of the dataset for factor analysis. The identified factors should also have eigenvalues greater than 1 and their loadings should be greater than 0.350 (Field, 2018; Hair, 2010).

The construct validity of the GQ-6 was further evaluated with CFA based on the Sample 2 ($n = 452$). The CFA estimator adopted in this study was maximum likelihood with mean- and variance-adjusted likelihood ratio test (MLMV) due to better results in recent psychometrics and simulation studies (Fung et al., 2022; Gao et al., 2020; Maydeu-Olivares, 2017). The model fit and cut-off criteria were evaluated as follows: A comparative fit index (CFI) and Tucker-Lewis fit index (TLI) of over 0.950, an root mean square error of approximation (RMSEA) under 0.06, and a standardised root mean square residual (SRMR) under 0.08 were considered good model fit (Hu & Bentler, 1999). In addition to the above criteria, an acceptable model could be indicated by $\chi^2 / df \leq 3$ (Bentler & Bonett, 1980; Byrne, 1998; Kline, 2005; Satorra & Bentler, 2001).

The concurrent validity was assessed using the entire dataset ($n = 903$) along with other well-established construal-related measures reported in the literature of GQ-6. In the recent studies, GQ-6 has demonstrated a significant positive correlation with life satisfaction, self-esteem, and happiness (Balgiu, 2020; Carmona-Halty et al., 2015; Chen et al., 2009; Dixit & Sinha, 2023; Hudecek et al., 2020; Jans-Beken et al., 2015; Langer et al., 2016). Hence, the following measures were used: RSE scale, SWLS, and SHS. In contrast, the GQ-6 literature has shown to be significantly positively correlated with mental health and psychiatric morbidity (Dixit & Sinha, 2023; Gouveia et al., 2021; Langer et al., 2016). Therefore, the following two measures were used for the evaluation of the concurrent validity, i.e., GHQ-12 and SWEMWBS. The above analyses were conducted using the Mplus 8.8, R (4.3.1) computing environment with the psych package 2.3.6 and IBM SPSS 29.0.

Results

Table 1 presents the descriptive statistics, including the mean, standard deviation, skewness, kurtosis, corrected item-total correlations, and Cronbach's alpha (if an item was deleted) for the six items of the GQ-6 ($n = 903$). The GQ-6 exhibited poor internal consistency, with a Cronbach's alpha coefficient 0.590. The results showed that only the GQ-6 with Item 6 removed had acceptable internal consistency (Table 1). In the 5-item version of Gratitude Questionnaire, the Cronbach's alpha and McDonald's Omega values were above the acceptable range, with $\alpha = 0.74$ and $\omega = 0.78$, respectively. No significant differences and relationships were observed in the scale scores by gender. This conclusion is based on the independent-sample *t*-test and correlation results.

Table 2 illustrates the EFA results using principal component analysis for Sample 1 ($n = 451$). The results showed that the GQ-6 has KMO = 0.73 and Bartlett's test of sphericity with $\chi^2 = 768.340$, $p < 0.001$. However, the factor loading of Item 6 was -0.25, the results only explaining 45.15% of the total variance, and corrected item-total correlations was

Table 1 Descriptive statistics for the GQ-6 items

Item	M	SD	sk	ku	r_{it}	α_{iid}
GQ6-1	6.18	1.07	-1.52	2.30	0.61	0.44
GQ6-2	5.85	1.23	-0.96	0.35	0.58	0.44
GQ6-3 (R)	5.76	1.54	-1.48	1.61	0.34	0.54
GQ6-4	5.42	1.39	-0.77	0.19	0.37	0.52
GQ6-5	5.64	1.20	-0.86	0.76	0.40	0.51
GQ6-6 (R)	2.92	1.54	0.64	-0.25	-0.12	0.74

Reverse-scored items are denoted with (R); sk = Skewness; ku = Kurtosis; r_{it} = Corrected item-total correlations; α_{iid} = Cronbach's alpha, if item deleted

Table 2 Exploratory factor analysis with principal component analysis on GQ-5 and GQ-6 items

Item	GQ-5	GQ-6
1. I have so much in life to be thankful for 我生命中有许多值得感恩的事情。	0.86	0.85
2. If I had to list everything that I felt grateful for, it would be a very long list 假如要我列出每项值得感恩的事情，它将会是一份很长的清单。	0.85	0.85
3. When I look at the world, I don't see much to be grateful for. (R) 当我环顾世界周围的事物，我不觉得有什么可以感恩。(R)	0.53	0.50
4. I am grateful to a wide variety of people 我应该对身边各式各样的人表示感激。	0.65	0.65
5. As I get older I find myself more able to appreciate the people, events, and situations that have been part of my life history 随着成长，我越来越容易欣赏人、事和以前我的生活境遇。	0.71	0.72
6. Long amounts of time can go by before I feel grateful to something or someone. (R) 通常过了相当长的一段时间后我才会意识到应对某些人或事情表示感恩。(R)	-	-0.28

Reverse-scored items are denoted with (R); Source: McCullough et al., (2002)

below 0.30 (Hair, 2010). The results of the KMO and Bartlett's test of sphericity for the GQ-5, removing Item 6, were 0.74 ($\chi^2 = 727.570$, $p < 0.001$), indicating that it was appropriate for factor analysis (Watkins, 2018). The scale was unidimensional, with only one factor having an eigenvalue greater than 1. The factor loadings ranged from 0.53 to 0.86, explaining 53.19% of the total variance.

Table 3 shows the CFA results for the GQ-6 and GQ-5 based on Sample 2 ($n = 452$). Model 1 evaluated the GQ-6 based on a single factor, without correlating the error terms. The results showed poor model fit with RMSEA = 0.112, TLI = 0.849, and Item 6 with a factor loading of -0.17. With reference to the recent studies on the GQ-6 to remove Item 6 (Balgiu, 2020; Dixit & Sinha, 2023; Hudecek et al., 2020). In Model 2, the GQ-5 demonstrates a slightly better model fit results, such as CFI = 0.949. However, the model in general did not fulfil the criteria for adequate model fit, as RMSEA = 0.105, TLI = 0.898. Model 3 re-evaluated the scale with error correlations based on the modification indices. It included one covariance factor between the error terms for the GQ6-4 and GQ6-5. The CFA results indicated a good fit of the model, with χ^2 (4.372) / 4 = 1.083, SRMR = 0.012, CFI = 0.999, TLI = 0.998, and RMSEA = 0.014. Overall, the results indicated that the

GQ-5 had a good fit with a unidimensional factor structure after post-hoc modification.

The results from the entire dataset ($n = 903$) replicated the relationships between GQ-5 and the other construal-related scales suggested in the literature (Table 4). In particular, the GQ-5 had significant positive relationships with the RSE ($r = 0.33$, $p < 0.001$), SWLS ($r = 0.29$, $p < 0.001$), SWEMWBS ($r = 0.32$, $p < 0.001$) and SHS ($r = 0.38$, $p < 0.001$). The GQ scale was expected to demonstrate a negative relationship with psychological symptom-related scales. As expected, the GQ-5 holds significant and moderate negative relationship with the GHQ-12 ($r = -0.33$, $p < 0.001$). The aforementioned measures (RSE, SWLS, SWEMWBS, SHS, GHQ-12) exhibited comparable correlational patterns to the original GQ-6 in both direction and strength. There was a significant, strong positive relationship between the GQ-5 and GQ-6, with a correlation coefficient of $r = 0.94$ ($p < 0.001$).

Discussion

This study aimed to assess the psychometric properties of the Gratitude Questionnaire-Six-Item Form (GQ-6) among Chinese university students in mainland China. The findings

Table 3 Factor loadings and fit indices in CFA for the GQ-5 and GQ-6

	Model 1	Model 2	Model 3
Item	GQ-6	GQ-5	GQ-5[#]
GQ6-1	0.876	0.880	0.889
GQ6-2	0.876	0.874	0.871
GQ6-3	0.396	0.399	0.400
GQ6-4	0.470	0.467	0.444
GQ6-5	0.535	0.530	0.511
GQ6-6	-0.174	-	-
GQ6-4—GQ6-5	-	-	0.277
Model fit			
n	452	452	452
RMSEA	0.112	0.105	0.014
RMSEA 90% confidence interval	0.086–0.139	0.071–0.143	< 0.001–0.074
SRMR	0.056	0.045	0.012
χ^2	59.793	29.931	4.372
Df	9	5	4
χ^2/df	6.643	5.986	1.093
CFI	0.910	0.949	0.999
TLI	0.849	0.898	0.998

#=correlating the error terms between Item 4 and Item 5; RMSEA=root mean square error of approximation; SRMR=standardised root mean residual; CFI=Comparative Fit Index; TLI=Tucker Lewis Index

Table 4 Correlations between the GQ-5 and GQ-6 in relation to other well-established scales

Scale	GQ-5	GQ-6
GHQ-12	-0.33	-0.35
RSE	0.33	0.36
SWLS	0.29	0.26
SWEMWBS	0.32	0.32
SHS	0.38	0.39

All correlations are significant at the 0.001 level (2-tailed); GHQ-12=12-item General Health Questionnaire; RSE=Rosenberg self-esteem Scale; SWLS=Satisfaction with Life Scale; SWEMWBS=Short Warwick Edinburgh Mental Well-being Scale; SHS=Subjective Happiness Scale

feel grateful to something or someone.") was removed in this study.

The removal of Item 6 in the Gratitude Questionnaire has been attributed to several possible explanations in existing literature. Chen et al. (2009) suggested that the absence of diverse life experiences among undergraduate students may contribute to this outcome. Langer et al. (2016) also shared a similar view, noting that the 5-item version is more suitable for adolescents, including secondary school and university students, while the 6-item version is more appropriate for adults. As the participants in this study were predominantly undergraduate students, this may explain why the results supported the adoption of the 5-item version of the questionnaire.

Regarding psychometric properties, the adapted Chinese translation of the GQ-5 demonstrated an acceptable level of internal consistency, with a Cronbach's alpha coefficient over 0.70. Both the GQ-6 and GQ-5 exhibited strong and significant positive correlations ($r=0.94$, $p<0.001$), indicating that the abbreviated version is fully compatible with the original version. The adapted scale also demonstrated good concurrent validity when compared to other well-established measures related to gratitude (Balgiu, 2020; Carmona-Halty et al., 2015; Chen et al., 2009; Dixit & Sinha, 2023; Gouveia et al., 2021; Hudecek et al., 2020; Jans-Beken et al., 2015; Langer et al., 2016). As such, the GQ-5 showed a significant moderate relationship with self-esteem (RSE, $r=0.33$), quality of life (SWLS, $r=0.29$), happiness (SHS, $r=0.38$), and psychological and mental wellbeing (GHQ-12, $r=-0.33$; SWEMWBS, $r=0.32$). Notably, the above findings also align with the reported results found in the existing literature on mindfulness (Chen et al., 2017; Marzabadi et al., 2021; O' Leary et al., 2016).

When assessing the construct validity of the scale, both EFA and CFA results indicated that removing Item 6 improved the psychometric properties. In EFA, Item 6 exhibited a factor loading of -0.28 (Table 2). Similarly, in CFA, Model 1, which evaluated the GQ-6, failed to meet the minimum criteria for adequate model fit. However, after removing Item 6, both EFA and CFA results demonstrated that the GQ-5 exhibited good psychometric properties. It is worth noting that Model 3 involved correlating the error terms between Item 4 and Item 5, a practice commonly employed in GQ literature (Chen et al., 2009), as both items are related to life experiences. The student sample may have had fewer of those experiences compared to mature adults.

Gratitude and mindfulness are closely related positive personality traits. The findings of this study will significantly contribute to scholars studying related research domains in the Chinese context. For example, Swain et al. (2020) conducted a study using mindfulness and gratitude intervention for self-management of arthritis. The study suggested that the intervention would bring several positive health outcomes,

indicated that a shortened version of the questionnaire, the Gratitude Questionnaire-Five-Item Form (GQ-5), exhibited better psychometric properties and superior model fit in confirmatory factor analysis (CFA) compared to the original 6-item version. Consistent with previous studies on the GQ-6 (Balgiu, 2020; Dixit & Sinha, 2023; Hudecek et al., 2020), Item 6 ("Long amounts of time can go by before I
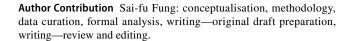
including decreased pain anxiety, intensity and interference, fear of movement, and increased pain self-efficacy. In addition, gratitude is one of the major outcome measurements for mindfulness-based intervention programs used by occupational therapists in school settings (Mattila et al., 2020). The validated Chinese version of the Gratitude Questionnaire can enable researchers and frontline practitioners to conduct studies monitoring the outcomes of mindfulness, particularly related to therapeutic client interactions. As highlighted at the beginning of this paper, numerous studies in the existing literature report the mediating effect of gratitude and mindfulness on various health-related outcome measures. Therefore, another important implication of a validated gratitude measure is that it can provide researchers with a useful tool to further explore the positive impacts of mindfulness in different cultural contexts.

Limitations and Future Research

This study has several potential limitations. First, the evaluation of concurrent validity for GQ-5 and GQ-6 included only a limited number of gratitude-related scales. Some well-established scales used in gratitude literature, such as the Life Orientation Test (Carmona-Halty et al., 2015), Positive and Negative Affect Schedule (Balgiu, 2020; Carmona-Halty et al., 2015; Garg et al., 2021; Jans-Beken et al., 2015), and The Big Five Inventory (Carmona-Halty et al., 2015; Chen et al., 2009), were not included due to questionnaire length and the availability of validated Chinese versions. Future validation studies on the gratitude questionnaire should consider incorporating these measures. Second, this study primarily recruited participants from a narrow sample, i.e., a university setting. As mentioned earlier, the GQ-6 has shown sensitivity to age (Chen et al., 2009), and results from adolescents may only support the use of the 5-item version of the GQ (Langer et al., 2016). Future research on the GQ should aim to include samples from diverse demographic profiles. Lastly, solely relying on a cross-sectional design and using self-reported measures can present potential issues, like common method bias. To address these concerns, further research should employ a longitudinal research design.

In conclusion, the study findings indicate that the 5-item version of the Gratitude Questionnaire (GQ-5) demonstrates reliability within Chinese culture and is suitable for Chinese college students in mainland China. The results suggest that the GQ-5, without Item 6, exhibits a unidimensional structure and meets the criteria for a good model fit in CFA. The adaptation of a Simplified Chinese version of the Gratitude Questionnaire provides researchers and practitioners with a convenient and comprehensive measure for conducting broader research amongst the Chinese speakers.

Declarations

References

Bai, X. W., Wu, C. H., Zheng, R., & Ren, X. P. (2011). The psychometric evaluation of the Satisfaction with Life Scale using a nationally representative sample of China. *Journal of Happiness Studies, 12*(2), 183–197. https://doi.org/10.1007/s10902-010-9186-x

Balgiu, B. A. (2020). The reliability and the construct validity of the Gratitude Questionnaire (GQ-6) in a sample of Romanian undergraduates. *Journal of Educational Sciences & Psychology, 10*(1), 101–109.

Bartholomew, E., Iqbal, N., & Medvedev, O. (2022). Enhancing the assessment of gratitude in mindfulness research: A Rasch analysis of the 6-Item Gratitude Questionnaire. *Mindfulness, 13*(12), 3017–3027. https://doi.org/10.1007/s12671-022-02006-2

Bartlett, M. Y., & DeSteno, D. (2006). Gratitude and prosocial behavior. *Psychological Science, 17*(4), 319–325. https://doi.org/10.1111/j.1467-9280.2006.01705.x

Beaton, D. E., Bombardier, C., Guillemin, F., & Ferraz, M. B. (2000). Guidelines for the process of cross-cultural adaptation of self-report measures. *Spine, 25*(24), 3186–3191. https://doi.org/10.1097/00007632-200012150-00014

Bentler, P. M., & Bonett, D. G. (1980). Significance tests and goodness of fit in the analysis of covariance structures. *Psychological Bulletin, 88*(3), 588–606. https://doi.org/10.1037/0033-2909.88.3.588

Byrne, B. M. (1998). *Structural equation modeling with LISREL, PRELIS, and SIMPLIS: Basic concepts, applications, and programming*. Lawrence Erlbaum Associates.

Carmona-Halty, M. A., Marin-Gutierrez, M., & Belmar-Saavedra, F. (2015). Psychometric analysis of Gratitude Questionnaire 6 (GQ-6) in Chilean population. *Universitas Psychologica, 14*(3), 881–888.

Cha, E. S., Kim, K. H., & Erlen, J. A. (2007). Translation of scales in cross-cultural research: Issues and techniques. *Journal of Advanced Nursing, 58*(4), 386–395. https://doi.org/10.1111/j.1365-2648.2007.04242.x

Chen, L. H., Chen, M.-Y., Kee, Y. H., & Tsai, Y.-M. (2009). Validation of the Gratitude Questionnaire (GQ) in Taiwanese undergraduate students. *Journal of Happiness Studies, 10*(6), 655–664. https://doi.org/10.1007/s10902-008-9112-7

Chen, L. H., Wu, C. H., & Chang, J. H. (2017). Gratitude and athletes' life satisfaction: The moderating role of mindfulness. *Journal of Happiness Studies, 18*(4), 1147–1159. https://doi.org/10.1007/s10902-016-9764-7

Chien, C. L., Chen, P. L., Chu, P. J., Wu, H. Y., Chen, Y. C., & Hsu, S. C. (2020). The Chinese version of the Subjective Happiness Scale: Validation and convergence with multidimensional measures. *Journal of Psychoeducational Assessment, 38*(2), 222–235. https://doi.org/10.1177/0734282919837403

Cho, S. (2019). Effects of social support and grateful disposition on employees' psychological well-being. *Service Industries Journal, 39*(11–12), 799–819. https://doi.org/10.1080/02642069.2018.1444755

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika, 16*(3), 297–334. https://doi.org/10.1007/bf02310555

de Zavala, A. G., Keenan, O., Ziegler, M., Mazurkiewicz, M., Nalberczak-Skóra, M., Ciesielski, P., Wahl, J. E., & Sedikides, C. (2024). Mindful-gratitude practice reduces prejudice at high levels of collective narcissism. *Psychological Science, 35*(2), 137–149. https://doi.org/10.1177/09567976231220902

Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The Satisfaction with Life Scale. *Journal of Personality Assessment, 49*(1), 71–75. https://doi.org/10.1207/s15327752jpa4901_13

Dixit, S. K., & Sinha, J. (2023). Adaptation and validation of the Gratitude Questionnaire (GQ-6) for the Indian context. *Current Psychology, 42*(11), 8722–8732. https://doi.org/10.1007/s12144-021-02143-2

Dong, A., Chen, X., Zhu, L., Shi, L., Cai, Y., Shi, B., Shao, L., & Guo, W. (2016). Translation and validation of a Chinese version of the Warwick-Edinburgh Mental Well-being Scale with undergraduate nursing trainees. *Journal of Psychiatric and Mental Health Nursing, 23*(9–10), 554–560. https://doi.org/10.1111/jpm.12344

Dong, A., Zhang, X. X., Zhou, H. T., Chen, S. Y., Zhao, W., Wu, M. M., Guo, J. Y., & Guo, W. J. (2019). Applicability and cross-cultural validation of the Chinese version of the Warwick-Edinburgh mental well-being scale in patients with chronic heart failure. *Health and Quality of Life Outcomes, 17*, 11. https://doi.org/10.1186/s12955-019-1120-2

Emmons, R. A., & Crumpler, C. A. (2000). Gratitude as a human strength: Appraising the evidence. *Journal of Social and Clinical Psychology, 19*(1), 56–69. https://doi.org/10.1521/jscp.2000.19.1.56

Emmons, R. A., & McCullough, M. E. (2003). Counting blessings versus burdens: An experimental investigation of gratitude and subjective well-being in daily life. *Journal of Personality and Social Psychology, 84*(2), 377–389. https://doi.org/10.1037/0022-3514.84.2.377

Field, A. P. (2018). *Discovering statistics using IBM SPSS statistics* (5th ed.). SAGE Publications.

Fokkema, M., & Greiff, S. (2017). How performing PCA and CFA on the same data equals trouble overfitting in the assessment of internal structure and some editorial thoughts on it. *European Journal of Psychological Assessment, 33*(6), 399–402. https://doi.org/10.1027/1015-5759/a000460

Fung, S. (2019). Psychometric evaluation of the Warwick-Edinburgh Mental Well-being Scale (WEMWBS) with Chinese university students. *Health and Quality of Life Outcomes, 17*, 46. https://doi.org/10.1186/s12955-019-1113-1

Fung, S., & Fung, A. L. C. (2020). Development and evaluation of the psychometric properties of a brief parenting scale (PS-7) for the parents of adolescents. *PLoS ONE, 15*(1), e0228287. https://doi.org/10.1371/journal.pone.0228287

Fung, S., Kong, C. Y. W., Liu, Y.-m., Huang, Q., Xiong, Z., Jiang, Z., Zhu, F., Chen, Z., Sun, K., Zhao, H., & Yu, P. (2022). Validity and psychometric evaluation of the Chinese version of the 5-Item WHO Well-Being Index. *Frontiers in Public Health*, *10*, 872436. https://doi.org/10.3389/fpubh.2022.872436

Gao, C., Shi, D., & Maydeu-Olivares, A. (2020). Estimating the maximum likelihood root mean square error of approximation (RMSEA) with non-normal data: A Monte-Carlo study. *Structural Equation Modeling, 27*(2), 192–201. https://doi.org/10.1080/10705511.2019.1637741

Garg, N., Katiyar, N., & Mehak. (2021). Gratitude Questionnaire (GQ-6): Exploring psychometric properties in India. *Journal of Religion & Health*, *60*(5), 3716-3731. https://doi.org/10.1007/s10943-021-01419-y

Giordano, A. N., & Shuster, D. B. (2023). Elevating beyond the content: The integration of mindfulness and gratitude in the chemistry classroom. *Journal of Chemical Education, 100*(5), 2050–2056. https://doi.org/10.1021/acs.jchemed.2c00895

Goldberg, D. P., & Williams, P. (1988). *A user's guide to the General Health Questionnaire*. NFER-NELSON.

Gouveia, V. V., Ribeiro, M. G. C., de Aquino, T. A. A., Loureto, G. D. L., Nascimento, B. S., & Rezende, A. T. (2021). Gratitude Questionnarie (GQ-6): Evidence of construct validity in Brazil. *Current Psychology, 40*(5), 2481–2489. https://doi.org/10.1007/s12144-019-00197-x

Hair, J. F. (2010). *Multivariate data analysis* (7 ed.). Prentice Hall.

Hogan, J. N., & Gordon, C. L. (2020). "Six of one, half a dozen of another" or do mindfulness and gratitude each add unique value to relationship functioning? *Contemporary Family Therapy, 42*(3), 299–304. https://doi.org/10.1007/s10591-020-09534-w

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal, 6*(1), 1–55. https://doi.org/10.1080/10705519909540118

Hudecek, M. F. C., Blabst, N., Morgan, B., & Lermer, E. (2020). Measuring gratitude in Germany: Validation study of the German version of the Gratitude Questionnaire-Six Item Form (GQ-6-G) and the Multi-Component Gratitude Measure (MCGM-G). *Frontiers in Psychology, 11*, 590108. https://doi.org/10.3389/fpsyg.2020.590108

Jans-Beken, L., Lataster, J., Leontjevas, R., & Jacobs, N. (2015). Measuring gratitude: A comparative validation of the Dutch Gratitude Questionnaire (GQ6) and Short Gratitude, Resentment, and Appreciation Test (SGRAT). *Psychologica Belgica*, *55*(1), 19–31. https://doi.org/10.5334/pb.bd

Jennrich, R. I., & Sampson, P. F. (1966). Rotation for simple loadings. *Psychometrika, 31*(3), 313–323. https://doi.org/10.1007/bf02289465

Kline, R. B. (2005). *Principles and practice of structural equation modeling* (2 ed.). Guilford Press.

Kong, F., You, X., & Zhao, J. (2017). Evaluation of the gratitude questionnaire in a Chinese sample of adults: factorial validity,

criterion-related validity, and measurement invariance across sex. *Frontiers in Psychology*, 8, 1498. https://doi.org/10.3389/fpsyg.2017.01498

Langer, A. I., Ulloa, V. G., Aguilar-Parra, J. M., Araya-Veliz, C., & Brito, G. (2016). Validation of a Spanish translation of the Gratitude Questionnaire (GQ-6) with a Chilean sample of adults and high schoolers. *Health and Quality of Life Outcomes, 14*, 53. https://doi.org/10.1186/s12955-016-0450-6

Lau, S. S. S., Ho, C. C. Y., Pang, R. C. K., Su, S., Kwok, H., Fung, S.-f., & Ho, R. C. (2022). Measurement of burnout during the prolonged pandemic in the Chinese zero-COVID context: COVID-19 burnout views scale. *Frontiers in Public Health*, 10, 1039450. https://doi.org/10.3389/fpubh.2022.1039450

Leong, J. L. T., Chen, S. X., Fung, H. H. L., Bond, M. H., Siu, N. Y. F., & Zhu, J. Y. (2020). Is gratitude always beneficial to interpersonal relationships? The interplay of grateful disposition, grateful mood, and grateful expression among married couples. *Personality and Social Psychology Bulletin, 46*(1), 64–78. https://doi.org/10.1177/0146167219842868

Liang, Y., Wang, L., & Yin, X. C. (2016). The factor structure of the 12-item General Health Qquestionnaire (GHQ-12) in young Chinese civil servants. *Health and Quality of Life Outcomes*, 14, 136. https://doi.org/10.1186/s12955-016-0539-y

Loewenthal, K. M. (2001). *An introduction to psychological tests and scales* (2 ed.). Psychology Press.

Lustig, J., Cardaciotto, L., Moon, S., & Spokas, M. (2024). Conceptualizations of mindfulness among experienced practitioners. *Mindfulness, 15*(4), 819–834. https://doi.org/10.1007/s12671-024-02339-0

Lyubomirsky, S., & Lepper, H. S. (1999). A measure of subjective happiness: Preliminary reliability and construct validation. *Social Indicators Research, 46*(2), 137–155. https://doi.org/10.1023/a:1006824100041

Marzabadi, E. A., Mills, P. J., & Valikhani, A. (2021). Positive personality: Relationships among mindful and grateful personality traits with quality of life and health outcomes. *Current Psychology, 40*(3), 1448–1465. https://doi.org/10.1007/s12144-018-0080-8

Mattila, A., DeIuliis, E. D., Martin, R. M., & Grogan, J. (2020). Mindfulness in the occupational therapy classroom: Infusing grit, gratitude practice, and a growth mindset into OT education. *Journal of Occupational Therapy Education*, 4(4), 10. https://doi.org/10.26681/jote.2020.040410

Maydeu-Olivares, A. (2017). Maximum likelihood estimation of structural equation models for continuous data: Standard errors and goodness of fit. *Structural Equation Modeling, 24*(3), 383–394. https://doi.org/10.1080/10705511.2016.1269606

McCullough, M. E., Emmons, R. A., & Tsang, J. A. (2002). The grateful disposition: A conceptual and empirical topography. *Journal of Personality and Social Psychology, 82*(1), 112–127. https://doi.org/10.1037//0022-3514.82.1.112

McDonald, R. P. (1999). *Test theory: A unified treatment*. L. Erlbaum Associates.

Nan, H. R., Ni, M. Y., Lee, P. H., Tam, W. W. S., Yu, Y. Y., Lam, T. H., Leung, G. M., & McDowell, I. (2013). Psychometric evaluation of the Chinese version of the Subjective Happiness Scale: evidence from the Hong Kong FAMILY Cohort. *American Journal of Epidemiology, 177*, S83–S83. https://doi.org/10.1007/s12529-014-9389-3

Nguyen, T. M., Bui, T. T. H., Xiao, X. X., & Le, V. H. (2020). The influence of self-compassion on mindful parenting: a mediation model of gratitude. *Family Journal, 28*(4), 455–462. https://doi.org/10.1177/1066480720950421

O' Leary, K., & Dockray, S. (2015). The effects of two novel gratitude and mindfulness interventions on well-being. *Journal of*

Alternative and Complementary Medicine, 21(4), 243–245. https://doi.org/10.1089/acm.2014.0119

O' Leary, K., Dockray, S., & Hammond, S. (2016). Positive prenatal well-being: Conceptualising and measuring mindfulness and gratitude in pregnancy. *Archives of Womens Mental Health, 19*(4), 665–673. https://doi.org/10.1007/s00737-016-0620-x

Pavot, W., & Diener, E. (1993). Review of the Satisfaction with Life Scale. *Psychological Assessment, 5*(2), 164–172. https://doi.org/10.1037/1040-3590.5.2.164

Pavot, W., & Diener, E. (2008). The Satisfaction with Life Scale and the emerging construct of life satisfaction. *The Journal of Positive Psychology, 3*(2), 137–152. https://doi.org/10.1080/17439760701756946

Pavot, W., Diener, E., Colvin, C. R., & Sandvik, E. (1991). Further validation of the Satisfaction with Life Scale: Evidence for the cross-method convergence of well-being measures. *Journal of Personality Assessment, 57*(1), 149–161. https://doi.org/10.1207/s15327752jpa5701_17

Phang, C. K., & Oei, T. P. S. (2012). From mindfulness to meta-mindfulness: Further integration of meta-mindfulness concept and strategies into cognitive-behavioral therapy. *Mindfulness, 3*(2), 104–116. https://doi.org/10.1007/s12671-011-0084-z

Revelle, W., & Zinbarg, R. E. (2009). Coefficients alpha, beta, omega, and the glb: Comments on Sijtsma. *Psychometrika, 74*(1), 145–154. https://doi.org/10.1007/s11336-008-9102-z

Rosenberg, M., Schooler, C., & Schoenbach, C. (1989). Self-Esteem and adolescent problems: Modeling reciprocal effects. *American Sociological Review, 54*(6), 1004–1018. https://doi.org/10.2307/2095720

Rosmarin, D. H., Pirutinsky, S., Greer, D., & Korbman, M. (2016). Maintaining a grateful disposition in the face of distress: The role of religious coping. *Psychology of Religion and Spirituality, 8*(2), 134–140. https://doi.org/10.1037/rel0000021

Satorra, A., & Bentler, P. M. (2001). A scaled difference chi-square test statistic for moment structure analysis. *Psychometrika, 66*(4), 507–514. https://doi.org/10.1007/bf02296192

Stewart-Brown, S., Tennant, A., Tennant, R., Platt, S., Parkinson, J., & Weich, S. (2009). Internal construct validity of the Warwick-Edinburgh Mental Well-being Scale (WEMWBS): A Rasch analysis using data from the Scottish Health Education Population Survey. *Health and Quality of Life Outcomes, 7*(1), 15. https://doi.org/10.1186/1477-7525-7-15

Sun, Y. Y., Luk, T. T., Wang, M. P., Shen, C., Ho, S. Y., Viswanath, K., Chan, S. S. C., & Lam, T. H. (2019). The reliability and validity of the Chinese Short Warwick-Edinburgh Mental Well-being Scale in the general population of Hong Kong. *Quality of Life Research, 28*(10), 2813–2820. https://doi.org/10.1007/s11136-019-02218-5

Swain, N., Lennox Thompson, B., Gallagher, S., Paddison, J., & Mercer, S. (2020). Gratitude Enhanced Mindfulness (GEM): A pilot study of an internet-delivered programme for self-management of pain and disability in people with arthritis. *The Journal of Positive Psychology, 15*(3), 420–426. https://doi.org/10.1080/17439760.2019.1627397

Swickert, R., Bailey, E., Hittner, J., Spector, A., Benson-Townsend, B., & Silver, N. C. (2019). The mediational roles of gratitude and perceived support in explaining the relationship between mindfulness and mood. *Journal of Happiness Studies, 20*(3), 815–828. https://doi.org/10.1007/s10902-017-9952-0

Tan, T. T., Tan, M. P., Lam, C. L., Loh, E. C., Capelle, D. P., Zainuddin, S. I., Ang, B., Lim, M. A., Lai, N. Z., Tung, Y. Z., Yee, H. A., Ng, C. G., Ho, G. F., See, M. H., Teh, M. S., Lai, L. L., Singh, R. K. P., Chai, C. S., Ng, D. L. C., & Tan, S. B. (2023). Mindful gratitude journaling: Psychological distress, quality of life and suffering in advanced cancer: A randomised controlled trial. *BMJ Supportive*

& Palliative Care, 13(E2), E389–E396. https://doi.org/10.1136/bmjspcare-2021-003068

Tennant, R., Hiller, L., Fishwick, R., Platt, S., Joseph, S., Weich, S., Parkinson, J., Secker, J., & Stewart-Brown, S. (2007). The Warwick-Edinburgh Mental Well-being Scale (WEMWBS): Development and UK validation. *Health and Quality of Life Outcomes, 5*(1), 63. https://doi.org/10.1186/1477-7525-5-63

Van Cappellen, P., Clapp, A. R., & Algoe, S. B. (2024). God of the good gaps: Prevalence, eliciting situations, and demonstrations of gratitude to God as compared to interpersonal gratitude. *The Journal of Positive Psychology, 19*(1), 66–82. https://doi.org/10.1080/17439760.2023.2190928

Watkins, M. W. (2018). Exploratory factor analysis: A guide to best practice. *Journal of Black Psychology, 44*(3), 219–246. https://doi.org/10.1177/0095798418771807

Wood, A. M., Froh, J. J., & Geraghty, A. W. A. (2010). Gratitude and well-being: A review and theoretical integration. *Clinical Psychology Review, 30*(7), 890–905. https://doi.org/10.1016/j.cpr.2010.03.005

Wu, Y., Zuo, B., Wen, F. F., & Yan, L. (2017). Rosenberg Self-Esteem Scale: Method effects, factorial structure and scale invariance across migrant child and urban child populations in China. *Journal of Personality Assessment, 99*(1), 83–93. https://doi.org/10.1080/00223891.2016.1217420

Xin, Z. Y. (2022). Perceived social support and college student engagement: moderating effects of a grateful disposition on the satisfaction of basic psychological needs as a mediator. *BMC Psychology, 10*(1), 298. https://doi.org/10.1186/s40359-022-01015-z

Ye, S. Q. (2009). Factor structure of the General Health Questionnaire (GHQ-12): The role of wording effects. *Personality and Individual Differences, 46*(2), 197–201. https://doi.org/10.1016/j.paid.2008.09.027

Zeng, G., Fung, S., Li, J. W., Hussain, N., & Yu, P. (2022). Evaluating the psychometric properties and factor structure of the general self-efficacy scale in China. *Current Psychology, 41*(6), 3970–3980. https://doi.org/10.1007/s12144-020-00924-9

Zhong, X. G., Jin, X., Yan, L., Yang, L., Long, H. Q., Wang, J., Wang, H. Y., Liu, Y. Y., Pu, J. C., Xie, P., & Ji, P. (2022). Reliability and validity of General Health Questionnaire-12 in Chinese dental healthcare workers during the COVID-19 pandemic. *Frontiers in Psychiatry, 12*, 792838. https://doi.org/10.3389/fpsyt.2021.792838

Zinbarg, R. E., Revelle, W., Yovel, I., & Li, W. (2005). Cronbach's alpha, Revelle's beta, and McDonald's (omega H): Their relations with each other and two alternative conceptualizations of reliability. *Psychometrika, 70*(1), 123–133. https://doi.org/10.1007/s11336-003-0974-7

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.