Development and validation of the English version of the Moral Growth Mindset measure [version 1; peer review: awaiting peer review]

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Abstract

**Background:** Moral Growth Mindset (MGM) is a belief about whether one can become a morally better person through efforts. Prior research showed that MGM is positively associated with promotion of moral motivation among adolescents and young adults. We developed and tested the English version of the MGM measure in this study with data collected from college student participants.

**Methods:** In Study 1, we tested the reliability and validity of the MGM measure with two-wave data (N = 212, Age mean = 24.18 years, SD = 7.82 years). In Study 2, we retested the construct validity of the MGM measure once again and its association with other moral and positive psychological indicators to test its convergent and discriminant validity (N = 275, Age mean = 22.02 years, SD = 6.34 years).

**Results:** We found that the MGM measure was reliable and valid from Study 1. In Study 2, the results indicated that the MGM was well correlated with other moral and positive psychological indicators as expected.

**Conclusions:** We developed and validated the English version of the MGM measure in the present study. The results from studies 1 and 2 supported the reliability and validity of the MGM measure. Given these, we found that the English version of the MGM measure can well measure one's MGM as we intended.

**Keywords**
moral growth mindset, growth mindset, reliability, validity, moral development
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**Introduction**

In the present study, we aimed to create and validate the English version of the Moral Growth Mindset (MGM) measure, which was originally developed in Korean. Growth mindset refers to the belief that it is possible to improve aspects of one’s life, such as intelligence or personality. Those with growth mindset generally have higher motivation based on attitudes such as viewing hardships as a chance to work harder rather than an indication of failure, and genuinely wanting to learn instead of being concerned with how others view them. Since those with growth mindset believe that their skills and abilities can be improved through effort and learning, their motivation is fostered. A study found that an intervention that taught students how to endorse a growth mindset reduced levels of aggression as well as depressive symptoms that resulted from being a victim of bullying. It suggested that growth mindset might be beneficial for promoting a sense of resilience when faced with social challenges or other difficulties.

MGM refers to growth mindset in the domain of morality. This mindset is related to one’s belief that it is possible to become a morally better person and improve one’s morals through efforts. A study showed that MGM was positively associated with increases in voluntary service engagement among adolescents and young adults. It suggested that MGM might increase participants’ prosocial behavior due to the belief that participating in this type of behavior will make them morally better among youth. Given this, MGM would be considered as a factor that contributes to moral development.

MGM was previously included as a three-item subscale in a general measure of growth mindset called the Theory Measures. However, because it is important to include four or more items per factor to perform psychometric tests, the psychometrical qualities of the MGM subscale could not be sufficiently tested in the original studies. In a previous study, we developed and tested a Korean version of the MGM measure. We evaluated the internal consistency and structure of the measure, but the test-retest consistency and discriminant validity of the measure were not examined. Hence, in the present study, we created an English version of the MGM measure and tested its psychometric properties. In Study 1, we tested the internal and test-retest consistency and validity of the MGM measure and modified the measure to improve the model fit. In Study 2, we examined correlations between the MGM and other moral and positive psychological indicators associated with youth development to test the convergent and discriminant validity of the measure.

**Study 1**

In Study 1, we translated the MGM measure to English and tested its reliability and validity with two-wave data. We also modified the items to improve the model fit.

**Methods**

**Translation of the MGM measure to English.** Based on the Korean version of the MGM measure and the Implicit Theory measure, we developed the English version of MGM measure. Although the English version was created based on the Korean version, we did not do direct translation because of cultural differences in concepts and terms related to morals and characters (e.g., “no matter who you are, you can significantly improve your morals and character”) and answers were anchored to a six-point Likert scale (see Extended data for the full measure).

Although Chiu, Hong, and Dweck originally used more nuanced keywords such as “responsible and sincere” as well as “conscientiousness, uprightness, and honesty,” we decided to use the more general terms, “morals and character.” This was due to the concern that such nuanced terms in the original measure may be associated with specific moral foundations and biased towards certain groups of people. In fact, conservatives have been found to score higher on measures of conscientiousness whereas liberals have been found to rely primarily on the value of fairness, which is closely related to honesty, when dealing with moral issues (see research on Moral Foundation Theory; e.g., ). Thus, we used “morals and characters” in order for participants to be able to define morality without bias.

Our measure is in line with the original measure consisting of six items. In fact, although all of the items were meant to measure whether or not participants endorse a growth mindset and seemingly similar to each other, the wordings varied slightly to include core concepts of growth mindset such as being able to improve regardless of who you are (i.e., “no matter who you are”), the point in time (i.e., “always”), or the degree (i.e., “considerably”). In addition, because we were interested in whether MGM can be differentiated from general growth mindset measured by the original growth mindset measure, we decided to use the same terms and format that were adopted in the original measure.

**Participants.** Study 1 was conducted during the 2018 fall semester. Participants were recruited from an undergraduate subject pool. The pool consisted of students who were enrolled in educational psychology classes. Only the students who were enrolled in either of the aforementioned classes and at least 18 years of age were eligible to complete the survey. Participants who were younger than 18 years of age were excluded from the present study. The participants visited the subject pool system, checked the list of active research projects, and selected and signed up for our study. We decided to recruit at least 200 participants since N = 200 has been regarded as the recommended minimum sample size for confirmatory factor analysis (CFA).

A total of 212 college students (89.15% females; Age mean = 24.18 years, SD = 7.88 years; 177 Caucasian, 34 African American, 1 Native American, 1 Asian, 1 Pacific Islander, 3 Latinx, 2 multi-ethnic) from the southern USA completed the English MGM measure online via Qualtrics. They were re-invited to complete the same survey again one week later (N = 207 for Wave 2; 89.37% females; Age mean = 24.28 years, SD = 7.88 years).
Participants received a link to the Qualtrics survey where they completed the MGM measure, followed by a demographics survey. Only the participants who voluntarily signed up for study 1 were provided with the link. When the participants signed up for the study, the subject pool manager provided us with their email addresses, and we sent the participants the survey link via email. We created our Qualtrics survey in a way so that only the participants who answered all survey questions were able to complete the survey and receive a credit for their class. Thus, there was no missing data in the present study.

A consent form was sent out to the students alongside the MGM measure. This form was reviewed by the Institutional Review Board at the University of Alabama (IRB approval numbers for studies 1 and 2: 18-04-1156, 18-10-1633, 18-12-1842), who also approved the studies, and was presented at the beginning of the Qualtrics form. Only students who read the form and agreed to participate in this study were presented with the survey forms.

**Analysis.** When examining test-retest reliability, we excluded participants who failed to complete the second survey within two weeks to control for the time gap between the two surveys as an effort to minimize the dispersion of the time gap, which left 168 cases for examining test-retest reliability (Mean time gap between Waves 1 and 2 = 7.78 days, SD = 1.66 days).

First, we examined consistency indicators, i.e., Cronbach’s α and test-retest consistency. Second, we performed CFA to examine the internal structure of the measure. We used robust weighted least squares (WLSMV) because it is more suitable for testing Likert-type items in a small sample10. During this process, we checked whether any item should be excluded from the measure to achieve a good model fit. If the measure was modified, we calculated all reliability and validity indicators again. We used R (3.6.1) for statistical analyses. All data files and source codes are available as Underlying data10.

**Results**

First, all consistency indicators indicated that the measure demonstrated at least acceptable reliability (> .7; see Table 1). Second, we performed CFA – the original model with all six items did not show good model fit (see Table 1). Thus, we excluded items 1 and 2 while referring to Han et al. (2018), because in that study we showed the relatively lower factor loadings in the six-item and five-item models respectively. The CFA demonstrated that the four-item model was the best model given excellent model fit indicators (chi-square test p-value > .05, RMSEA and SRMR < .05, TLI and CFI > .95; see Table 2 for the best model16). As shown

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Table 1. MGM measure English reliability check and confirmatory factor analysis (CFA) results.

<table>
<thead>
<tr>
<th>Model</th>
<th>Reliability</th>
<th>Classical CFA</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cronbach α</td>
<td>Test-retest r</td>
<td>χ²</td>
<td>df</td>
<td>p</td>
<td>CFI</td>
</tr>
<tr>
<td>Study 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-item</td>
<td>.86</td>
<td>.76</td>
<td>60.08</td>
<td>9</td>
<td>.000</td>
<td>.84</td>
</tr>
<tr>
<td>5-item (without item 1)</td>
<td>.86</td>
<td>.74</td>
<td>26.73</td>
<td>5</td>
<td>.000</td>
<td>.92</td>
</tr>
<tr>
<td>4-item (without items 1 and 2)</td>
<td>.85</td>
<td>.70</td>
<td>1.79</td>
<td>2</td>
<td>.41</td>
<td>1.00</td>
</tr>
<tr>
<td>Study 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-item (without items 1 and 2)</td>
<td>.77</td>
<td>-</td>
<td>1.60</td>
<td>2</td>
<td>.45</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Table 2. Factor loadings from CFA in both studies.

<table>
<thead>
<tr>
<th>Item</th>
<th>Study 1</th>
<th>Study 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>No matter who you are, you can significantly improve your morals and character.</td>
<td>.72</td>
<td>.69</td>
</tr>
<tr>
<td>To be honest, you can't really improve your morals and character.</td>
<td>-.73</td>
<td>-.73</td>
</tr>
<tr>
<td>You can always substantially improve your morals and character.</td>
<td>.75</td>
<td>.75</td>
</tr>
<tr>
<td>You can improve your basic morals and character considerably.</td>
<td>.86</td>
<td>.89</td>
</tr>
</tbody>
</table>

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in Table 1, when we recalculated reliability indicators after exclusion of the items, all indicators remained greater than .7.

In addition to the low factor loadings, we also decided to remove items 1 and 2 due to the fact that they may have been too vague. For example, item 1 stated “you can’t really do much” and item 2 stated “you can’t improve very much” whereas the other items used words such as “significantly improve,” “always substantially improve,” and “improve...considerably” that conveyed more specific magnitude. Using the less extreme terms in items 1 and 2 may have put the items at risk of inconsistency since it would be easier for participants’ opinions to shift regarding whether or not you can change “much.”

Study 2
In Study 2, we tested correlation between MGM and other moral and positive psychological indicators associated with positive youth development. In addition, we performed CFA for model confirmation.

Methods
Participants. As per Study 1, participants were recruited from the educational psychology and psychology subject pools during the 2019 spring semester. Only the students who were enrolled in the aforementioned classes and at least 18 years of age were eligible to complete the survey. Participants who were younger than 18 years of age were excluded from the present study. Participants in educational psychology classes visited the subject pool system, checked the list of active research projects, and selected and signed up for our study. Participants in psychology classes who intended to sign up for our study visited the SONA system, reviewed the list of active studies, and then selected and signed up for the present study.

When participants signed up for the present study, in the cases of educational psychology students, the subject pool manager provided us with their email addresses, and we sent the participants the survey link via email. In the cases of psychology students, they were automatically provided with a link to a Qualtrics survey via the SONA system. They were presented with the MGM measure and other moral and positive psychological measures, all of which were presented in a randomized order, followed by a demographics survey. Similar to Study 1, only the participants who answered all questions were able to complete the survey and receive a credit, so there was no missing data in the present study. For sample size estimation, similar to Study 1, we followed the guidelines for CFA, so we determined that at least 200 participants were required.

In total, 275 college students (81.45% females; Age mean = 22.02 years, SD = 6.34 years; 223 Caucasian, 39 African American, 2 Native American, 1 Asian, 1 Pacific Islander, 5 Latinx, 4 multi-ethnic) in the Southern United States of America were recruited. The consent procedure was identical to that in Study 1.

Measures. MGM measure. We used the four-item MGM measure used in Study 1.

Moral and positive psychological measures for convergent validity check. To test the convergent validity of the MGM measure, we employed moral and positive psychological measures. These include the Implicit Theory Measure, Behavioral Defining Issues Test (bDIT), Interpersonal Reactivity Index, Moral Identity Scale, Propensity to Morally Disengage Scale, and Claremont Purpose Scale. Further details regarding these measures, such as brief descriptions and links or citations to full measures, are provided as Extended data.

Analysis. First, we performed CFA with the MGM data again to test the internal structure of the MGM measure. Second, we performed correlation analyses to examine how MGM was associated with other moral and positive psychological indicators. According to the previous studies that examined the relationship between growth mindset, positive psychological indicators, and antisocial tendency (e.g., 24–26), we hypothesized that the sizes of correlation coefficients between MGM and other indicators would be between .10 and .30. Third, we tested whether discriminant validity existed between MGM and general growth mindset in order to determine if the MGM measure examines a construct independent from general growth mindset. The examination of discriminant validity was tested with the Fornell-Larcker criterion.

We also used R in Study 2. All data files and source codes are available as Underlying data.

Results
The results of the reliability check showed that the MGM measure as well as all other measures possessed at least acceptable reliability (> .7; see Table 3). Moreover, CFA supported good internal structure of the MGM measure (see Table 1 and Table 2).

Correlation analysis demonstrated a positive association between MGM, general growth mindset, and other moral psychological indicators in general except those relatively less relevant to morality among individuals, such as personal distress, symbolization, and meaningfulness (see Table 3). MGM was marginally correlated with the bDIT and was not significantly correlated with PD and CPS meaning. The correlation between MGM and moral disengagement was significantly negative. We found that the correlation coefficient between MGM and general growth mindset (r = .37) was smaller than the square root of the average variance extracted (\(\sqrt{AVE} = .84\)), so MGM showed discriminant validity from general growth mindset.

Discussion
We developed and tested the English version of the MGM measure in this study with data collected from youth participants. In Study 1, we found that the four-item MGM measure possessed good consistency and internal structure. In Study 2, we found that MGM was positively associated with moral and positive psychological indicators as hypothesized. In addition, moral disengagement was negatively correlated with MGM. Furthermore, we found good discriminant validity between the MGM measure and the general growth mindset measure.
Our results from both studies suggest that the English version of the MGM measure can well measure one’s MGM as we intended. In fact, the previous studies that developed and tested measurements for the mindset with diverse domains have shown that the measurements possessed good reliability and validity (e.g., 29,30), so growth mindset can be feasibly measured with self-report measures. Consistent with previous studies about measuring growth mindset in other domains, we were able to show that the MGM can also be appropriately measured by a self-report measure, the MGM measure. Moreover, the results from our correlation analysis are consistent with findings in previous studies that have examined the positive relationship between growth mindset and successful social adjustment and positive youth development in general2,24,28. Hence, our study that tested and validated the MGM measure demonstrated that first, MGM can be well measured by the MGM measure as growth mindset in general was measured by reliable and valid tools in previous studies; and second, MGM is associated with moral and positive youth development as shown in previous growth mindset studies in other domains.

This English version of the MGM measure will contribute to research in moral development and education. For instance, researchers and educators who are interested in how MGM is associated with moral development may use the MGM measure in their studies. In addition, given that we created the English version of MGM measure, scholars who are using languages other than Korean or English will be able to translate the measure into their languages. By doing so, it would be possible to accumulate large-scale datasets for testing the measure in diverse backgrounds and contexts, and to examine the roles of MGM in moral development in the long term.

However, there are limitation in this study that warrant future studies. First, we collected data only from undergraduate students and male students were underrepresented in both studies; such issues may limit the generalizability of our findings. Second, due to the small sample size, we could not conduct CFA for the measures used in Study 2 although they were validated in previous studies. Third, although we used unnnounced terms (e.g., morals and characters), we could not test whether the measure was actually unbiased according to one’s political orientation of endorsed moral foundations; measurement invariance test is needed to examine the point.

**Data availability**

Open Science Framework: Moral Growth Mindset is Associated with Change in Voluntary Service Engagement, https://doi.org/10.17605/OSF.IO/AC6RH.

This project contains the following underlying data:

- Data and source code files that support the findings of this study (contained in folder ‘English version MGM’).

- MGM measure in English and information about additional moral and positive psychological measures used in Study 2 (contained in folder ‘English version MGM’, Supplementary materials.docx)

Data are available under the terms of the Creative Commons Attribution 4.0 International license (CC-BY 4.0).
References


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