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COMPARING INTERNALIZATION OF LEARNING MOTIVATION BETWEEN AMERICAN AND CHINESE COLLEGE STUDENTS

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Abstract
The trend of high average academic performance of Chinese students on international large-scale assessments has drawn the attention of researchers and practitioners. In this paper, we explored motivation as a fundamental factor that contributes to academic performance in order to explore the degree to which differences in students' learning motivation are present between Chinese and American students. We considered motivation as a potential contributing factor to differences in student achievement between these populations. With a sample of 1833 college students (1337 Chinese students and 496 American students), we used the Internalization of Learning Motivation (ILM) Scale to compare Chinese and American students' learning motivation in terms of stages of learning motivation. Using the Many-Facet Rasch (MFR) model, we identified differences in student responses at both the individual item level and between stages of motivation. Our results showed that items within the lack of internalization stage and items within the partial-ego internalization stage were easier to endorse among Chinese students, while items in the identified internalization stage and the integrated internalization stage were easier to endorse among American students. The results indicated that, compared to their American counterparts, Chinese students tend to exhibit lower stages of internalization. American and Chinese students also exhibited distinct motivational forces. We consider the specific motivational forces and potential underlying reasons for these differences.

Keywords: motivation; internalization; cultural comparison; Many-Facet Rasch model

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Introduction

Internationally, in large-scale assessments such as the OECD's Programme for International Student Assessment (PISA) and the Trends in International Mathematics and Science Study (TIMSS), Chinese students have consistently performed well - often ranking among the top ten countries (Schleicher, 2019; Wößmann, 2005). Within the US, students who have East Asian origins (*e.g.*, students from China, Korea, or Japan) have often been characterized "model minorities" in terms of academic performance (Chou & Feagin, 2015). In order to better understand these students' high performance, researchers have considered a variety of aspects of the East Asian population (Lee, 2015; Schneider & Lee, 1990; Wong & Halgin, 2006), and different countries have attempted to imitate certain components of Chinese education systems (*e.g.*, the U.S. (Tucker, 2016); the UK (Boylan, 2016); Pakistan (Nisar. 2019)). In this article, we explore a basic factor that contributes to academic performance-motivation-in order to better understand differences between US and Chinese students.

Learning motivation, or a drive to learn, emerges from learners' cultural contexts (National Academies of Sciences, Engineering, and Medicine, 2018). Over several decades, researchers have attempted to understand cultural differences in motivation. In most previous studies, researchers have focused on intrinsic and extrinsic motivation (Lin, McKeachie, & Kim, 2003), performance and mastery goal orientation (Elliot & Covington, 2001; Zusho & Clayton, 2011), and positive and negative incidence (Heine et al., 2001). However, few researchers have examined motivation from the perspective of basic motivational forces and the stages of internalization. As the dichotomization of motivation studies (*e.g.*, intrinsic motivation vs extrinsic motivation, performance goal vs mastery goal) is still a subject of much debate, it is imperative to examine cultural differences related to internalization as a developmental continuum. The purpose of this study is to use the Internalization of Leaning Motivation (ILM) Scale to explore the degree to which Chinese and US students' motivation reflects different stages in the internalization of learning motivation, and to discuss how the different stages may reflect these students' education systems and, as a result, influence students' academic performance.

Cultural differences in motivation

Although researchers have considered cultural differences in motivation using both theoretical and empirical studies, there have been few studies in which researchers have explored cultural differences in motivation using an internalization approach. Hofstede (1980) suggested that motivation is conditioned by education and life experiences, because environments substantially impact brain development. However, when researchers have considered motivation theory as it applies to learning in previous work, they have done so mostly using motivation theories that were generated based on Western culture. Currently, there is not a fully developed motivation theory that can be used to describe and explore learning motivation based on East Asian culture.

Comparing Freud's and Maslow's motivation theory could demonstrate the relationship between cultural characteristics and motivation theory. Specifically, Freud, who was born and raised in Austria, developed the *drive theory* to describe motivation (Freud, 1915). He argued that there were two kinds of drives: life force and death force. This theory primarily reflects biological motivations, such as sex, violence, and selfishness. Many motivation theorists opposed Freud's drive theory; however, this work can be viewed as an entry point to widespread study of motivation. On the other hand, Maslow, who was born in the US, generated the *hierarchy of needs* (Maslow, 1943), which includes physiological, safety, love and belonging, esteem, and self-actualization needs. Compared to Freud, Maslow placed a stronger emphasis on the cognitive aspect of motivation and drive. It is plausible that the differences between these theorists stemmed from their cultural characteristics. According to Hofstede (1980), Austrian people tend to have strong tendencies toward uncertainty avoidance, so people may try to relieve stress that is triggered by their inner passion. Austria is also a collectivist country, so members of this culture may perceive that they have an obligation to contribute to their country and the society. From a cultural perspective, China can be considered similar to Austria in terms of the collectivist culture with high uncertainty avoidance. In contrast, the US could be considered a largely individualistic culture with low uncertainty avoidance; as a group, members of this culture may be less stressed and therefore motivated to do things based on their own self-interests or to satisfy their own needs.

In addition to theories of motivation, researchers have conducted empirical studies to explore cultural differences in motivation. For example, Heine and his colleagues (1999) used a collectivist view and presented the theory of self-improvement. Based on this work, East Asian students showed more self-improvement motivation than Western students, since East Asian students were more likely to criticize themselves and work harder when they experienced "failures" such as lower scores or academic difficulty in certain subjects. On the contrary, North American students tended to work harder when they experienced "successes", such as high academic achievement in certain subject areas; this type of motivation was called *self-enhancement motivation* (Heine et al., 2001). Henderlong and Lepper (2002) suggested similar results as Heine and his colleagues (1999, 2001). These researchers found that students from typically individualistic cultures (*e.g.*, the US and the UK) were generally motivated by praise. On the other hand, although praise should, in theory, have a positive effect on students from typically collectivist cultures, students in China and Japan were less frequently motivated by praise compared to students from typically individualistic cultures, as they view working hard at school as an obligation.

Using an intrinsic and extrinsic approach to examine learning motivation, Zhu and Leung (2010) found that for East Asian students, intrinsic and extrinsic motivation work together to promote academic performance. However, for students in Australia, England, the Netherlands, and the USA, extrinsic motivation tended to diminish intrinsic motivation. Moreover, these authors found that many of their Western student participants were more strongly motivated by pleasure-oriented learning, while the results were unclear with regard to the specific type of learning motivated Eastern students most strongly.

Some researchers have also conducted cultural comparisons of motivation using an achievement goal theory approach. In most of this literature, researchers emphasized that mastery-approach goals are ideal and performance-avoidance goals are maladaptive (Huang, 2012; Payne, Youngcourt, & Beaubien, 2007; Zusho & Clayton, 2011). However, when taking culture into account, researchers have presented different conclusions. Specifically, performance-avoidance goals showed a negative effect in individualistic cultures, such as in many Western countries, but they were not necessarily negative for students from collectivist cultures (King, 2016).

From the research discussed above, it can be concluded that researchers have largely acknowledged cultural differences in motivation. However,

regardless of the perspective that researchers have used to consider motivation (*e.g.*, self-improvement/self-enhancement, intrinsic/extrinsic, or achievement goal theory), each of the researchers who have considered cultural impacts on motivation did so using a static view of motivation, and they did not consider specific motivational forces. For example, although East Asian students, as a group, may be characterized by self-improvement motivation and be more motivated by criticism, does that mean these students really want to study, or could it mean that they are simply required or expected to study, given their collectivist cultural context? Even though performance-avoidance goals or extrinsic motivation does not diminish East Asian students' academic performance, does that mean that they are happy and truly willing to study? In a recent review, Elmer and colleagues (2019) found that East Asian students were the unhappiest students in the world, although they tend to perform better in many international large-scale assessments (*e.g.*, the Programme for International Student Assessment (PISA) and Trends in International Mathematics and Science Study (TIMSS). These seeming discrepancies are a prime example of why it is important to consider cultural differences in motivation in a more nuanced way, by taking into account the fundamental motivational forces. Using internalization as a guiding perspective could provide such insight.

Internalization of learning motivation

In this study, we use an internalization approach based on a developmental continuum for learning motivation to explore cultural differences in US and Chinese students' motivation. Internalization is one of the most influential concepts in self-determination theory. It describes the process of turning external regulation into internal regulation and using external values and information to form one's own values (Deci, Eghrari, Patrick, & Leone, 1994). It is more specific than intrinsic and extrinsic approaches, as it considers different motivational forces.

As mentioned above, it is not appropriate to simplify motivation into intrinsic and extrinsic motivation. Instead, it is necessary to consider motivation theories, including the origin of learning motivation. Students share some common motivational forces for learning. If the environment and conditions are optimal (*e.g.*, supportive teachers), students can internalize external regulations (*e.g.*, rewards, parents' comments) into internal regulation (*e.g.*, excitement or

enjoyment of learning). Deci and his colleagues (1994) called this process *internalization*. According to Deci and Ryan (2002), and Vansteenkiste et al. (2018), internalization theory synthesizes different kinds of motivational forces, and then categorizes them and puts them into a continuum (*see* Figure 1).

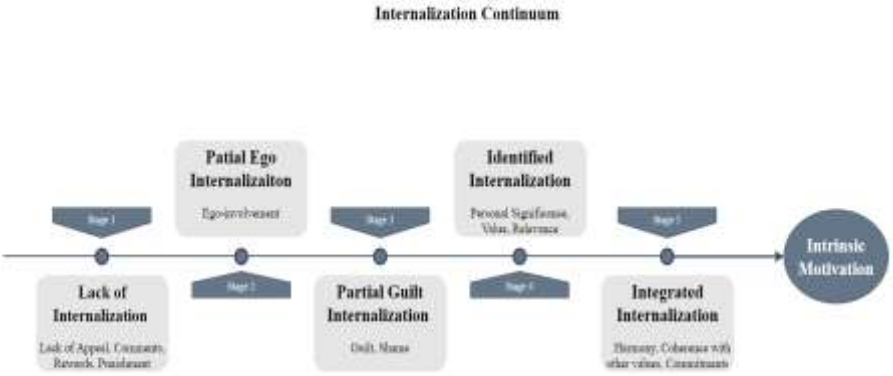

Figure 1. Internalization continuum

Stages of internalization. The internalization continuum reflects students' levels of self-determination as a progression from *non-self-determined*, where students study in response to external regulation, to *self-determined*, where students study because it is meaningful, relevant, and enjoyable. Combining previous research, Figure 1 shows five hypothesized stages of internalization on this continuum. As internalization reflects a process *towards* intrinsic motivation, none of the five stages fully reflect intrinsic regulation.

Lack of internalization. With little or no self-determination, at this stage, students engage in learning activities purely to obtain a reward or avoid punishment. Students categorized in this type of internalization will show little interest in learning. Most of the time, they study because other people expect them to do so, or there is a reward or punishment associated with the learning activity.

Partial-Ego & Partial-Guilt internalization. Partial internalization was first identified as one type of internalization (Deci & Ryan, 2002; Vansteenkiste

et al., 2018). However, Wang and Wind (2020) identified that even though they share the characteristic of introjected regulation, ego and guilt are different motivational forces, especially within different cultures (*e.g*., American and Chinese cultures). Partial-ego internalization means students internalize part of the external learning value and involve their ego when conducting specific tasks. Students at the partial ego internalization stage are motivated to learn in order to look better or smarter than others.

On the other hand, students at the partial-guilt internalization stage are motivated by shame and guilt. They study because they want to avoid feeling guilty or ashamed. For example, some students finish homework because they think it is their responsibility, and if they do not finish it, they will feel guilty. Because researchers have not fully explored the degree to which motivation based on ego or guilt has a higher level of self-determination, we have combined the partial-ego and partial-guilt internalization stages on the continuum of internalization. Additional research is needed to explore differences between ego and guilt as ordered developmental stages toward internalization.

Identified internalization & Integrated internalization. In the *identified internalization* stage, individuals focus on external information as a motivating force for learning. If they perceive a task as relevant, meaningful, and important, they choose to finish it by themselves. Deci and Ryan (2008) called this stage *full internalization.* For students at the *integrated internalization* stage, behavior becomes more and more intrinsically motivated and characterized by a higher level of self-determination; Deci and Ryan (2008) called this *fullest internalization*. In this stage, an individual's external behaviors become fully autonomous or self-determined. To avoid confusion related to the terms "full" and "fullest" in the current study, we call these two types of internalization *identified internalization* and *integrated internalization.* Students who exhibit these two types of internalization are considered to have optimal regulation and to be located toward the intrinsic end of the spectrum. However, according to the theory, these students still do not fully fall under the intrinsic motivation category. Such a conclusion requires more empirical evidence.

Purpose

The Internalization of Leaning Motivation (ILM) Scale was designed according to the structure of internalization stated above, and the purpose of this study is to examine the degree to which the ILM Scale has a consistent

interpretation between American and Chinese participants. The following research questions guide the analysis:

1. To what extent do individual items in the ILM scale exhibit consistent difficulty between American and Chinese participants?
2. To what extent do the components of persistence represented in the ILM scale exhibit the same relative ordering between American and Chinese participants?

Method

Participants

The participants are college students from China (n=1337 students) and America (n=496 students). The Chinese sample was collected from Wen Juan Xin, which is a survey-generating engine similar to Qualtrics (frequently used in the US). The American sample was collected from Amazon's Mturk platform. Our measurement scale included four attention checking items to ensure all the response from our participants were attentive. An example of the attention checking item is "*For this question, please answer disagree*." Participants who answered two or more checking item incorrectly were removed from the sample. We also identified and removed participants who provided potentially dogmatic responses. Specifically, we excluded participants who responded in the same category (*e.g.*, "4") for 70% or more of the questions.

The final sample size for Chinese students was 860 and for American students was 393. Within the Chinese sample, 63.1% were female, 5.7% were freshman, 13.2% were sophomore, 23.9% were junior, and 32.2% were senior. The age range was 17-25 years old. In the American sample, 37.5% were female, 5.7% were freshman, 13.2% were sophomore, 23.9% were junior, 32.2% were senior, and 25% graduated from university within five years. The age range was 18-62 years old.

Instrument

The Internalization of Learning Motivation (ILM) Scale was a newly developed instrument aiming at measuring the internalization stages of students' learning motivation (Wang & Wind, 2020). The scale was developed and evaluated using Confirmatory Factor Analysis (CFA) on both Chinese students' responses, as well as American student responses, The final model had

acceptable fit from the perspective of CFA (CFI=0.929, TLI=0.920, and RMSEA=0.047) based on Kline's (2015) criteria (CFI and TLI>0.90, RMSEA<0.08). In addition, analyses of the combined samples' responses exhibited acceptable item and person fit statistics based on the Partial Credit Model (Masters, 1982).

The ILM scale has 24 items and includes five subscales: lack of internalization (six items), partial-ego internalization (four items), partial-guilt internalization (four items), identified internalization (four items), and integrated internalization (six items). The lack of internalization subscale contains items measuring no motivation (*e.g., Studying is hardly ever exciting*), learning motivated by others' comments (*e.g., I learn in school because my parents say I have to*), and learning to avoid punishment (*e.g., I study to avoid my parents scolding me*). The partial-ego internalization subscale includes items testing ego involvement comparison (*e.g., I study so I will not look incompetent compared to others*), and ego involvement personal quality (*e.g., I study because I want my teacher to think I am smart*). The partial-guilt internalization subscale contains items measuring guilt around academic performance (*e.g., I feel guilty if I do not learn something well*). The identified internalization subscale evaluates the degree to which the student finds learning valuable (*e.g., I study in school because I personally value what I learn*), important (*e.g., It is important that I study regularly/consistently*), and meaningful (*e.g., I am motivated to learn because I find the content meaningful*). Finally, the integrated internalization subscale measures students' view of learning as part of their personal identity (*e.g., I study because I am passionate about learning*), as an instrument (*e.g., I motivated to learning in school because it teaches me how to solve problems*), as career guidance (*e.g., Learning in school helps me figure out what careers fit my personality*), and as a lifelong quality (*I study because it increases my desire to learn more*).

The results for the internal consistency of these subscales were as follows: lack of internalization α=.841, partial-ego internalization α=.895, partial-guilt internalization α=.864, identified internalization α=.874, and integrated internalization α=.913.

Data analysis

We analyzed the ILM scale data using analyses based on a Partial Credit (PC) model (Masters, 1982) formulation of the Many-Facet Rasch (MFR) model

(Linacre, 1989). We selected this model for several reasons. First, the PC-MFR model belongs to the family of Rasch models (Wright & Mok, 2004); as a result, it is based on stringent requirements for relationships between persons and items that reflect the principles of measurement in the physical sciences. For example, the PC-MFR model requires unidimensionality (*i.e.*, one latent variable is sufficient to explain most of the variability in item responses), local item independence (after controlling for the primary latent variable, there is no statistical association between item responses), invariant item ordering over persons (*i.e.*, item difficulty does not depend on person locations on the latent variable), and invariant person ordering over items (*i.e.*, person location estimates do not depend on the items to which a person responded). In practice, researchers do not expect perfect adherence to these requirements but rather use them as a framework in which to examine item response data. With these strict requirements as a framework, one can identify items and persons for whom the instrument does not reflect measurement principles in order to better understand the nature of the construct, identify directions for future research, and identify areas for improvement for the measurement procedure.

Among Rasch models, the PC formulation of the MFR model is relatively flexible because it allows the structure of the rating scale (*i.e.*, the difficulty to endorse each rating scale category) to vary across components of the measurement instrument, such as items or groups of items. In the current study, we specified the PC-MFR model such that the rating scale could vary over the five components of internalization. This allowed us to examine differences in participants' use of the rating scale across components. The model can be stated as follows:

$$\ln[P_{nij(x=k)}/ P_{nij(x=k-1)}] = \theta_n - \delta_i - \gamma_j - \tau_{jk},$$

where $\ln[P_{nij(x=k)}/ P_{nij(x=k-1)}]$ is the log of the odds that Student *n* when responding to Item *i* related to Internalization Component *j* will answer in category *k* rather than in category *k* minus one, θ_n is the overall estimated internalization level for Student *n*, δ_i is the level of internalization required to endorse Item *i* (*i.e.*, item difficulty), γ_j is the overall level of internalization required to endorse items in Internalization Component *j* (*i.e.*, component difficulty), and τ_{jk} is the level of internalization required to answer in category *k* rather than in category *k* minus one, specific to Internalization Component *j*. We oriented the scale such that higher item measures indicate that the item was more difficult to endorse, and lower measures indicate that the item was easier to endorse.

We estimated the PC-MFR model using Facets (Linacre, 2015). Because our research questions focused on differences in item difficulty and component difficulty between subgroups, we did not examine the item and component difficulty estimates for the complete sample. Instead, we used the Bias/Interaction analysis procedure in Facets to examine and compare subgroup-specific item and component estimates for the subgroups of American and Chinese students. Specifically, we conducted a post-hoc analysis in which we calculated item difficulty and component difficulty estimates specific to each subgroup. Then, we compared these estimates between subgroups and evaluated the magnitude of the difference using a *z*-test. For items, the *z*-test was specified as:

$$z_{\text{iA,C}} = (\delta_{iA} - \delta_{iC})/\sqrt{(SE_{iA}^2 + SE_{iC}^2)}$$

where δ_{iA} is the difficulty estimate for Item *i* specific to the subgroup of American students, δ_{iC} is the difficulty estimate for Item *i* specific to the subgroup of Chinese students, SE_{iA}^2 is the squared standard error (*SE*) for Item *i* specific to the subgroup of American students, and SE_{iC}^2 is the squared *SE* for Item *i* specific to the subgroup of Chinese students. For Internalization Components, the z-test was specified as:

$$z_{j\text{A,C}} = (\gamma_{jA} - \gamma_{jC})/\sqrt{(SE_{jA}^2 + SE_{jC}^2)}$$

where γ_{jA} is the difficulty estimate for Internalization Component *j* specific to the subgroup of American students, γ_{jC} is the difficulty estimate for Internalization Component *j* specific to the subgroup of Chinese students, SE_{jA}^2 is the squared *SE* for Component *j* specific to the subgroup of American students, and SE_{jC}^2 is the squared *SE* for Component *j* specific to the subgroup of Chinese students.

In addition, to avoid the limitations associated with statistical hypothesis testing (*e.g.*, sensitivity to sample size and arbitrary *p*-values), we evaluated differences between subgroups using the differences in the subgroup-specific logit scale estimates. In Facets, the subgroup-specific estimates are adjusted to have the same mean and standard deviation between subgroups, such that they can be compared within the same frame of reference. For Rasch models, the difference in logit scale estimates is equivalent to the difference between item response functions (*i.e.*, differential item functioning; Gamerman Goncalves, & Soares, 2018; Raju, 1988). Recognizing that DIF is a continuous variable, we considered both the magnitude and the direction of the differences between subgroups. We also considered the differences in light of Wright and Panchapakesan's (1969) recommended criterion of 0.5 logits as a rough

guideline with which to identify substantively meaningful differences in item difficulty.

Results

Preliminary analyses indicated acceptable overall fit between the item responses and the model for the complete sample and within each subgroup. For the complete sample, the average unweighted and weighted mean square error (*MSE*) fit statistics were around 1.00 for all of the facets in the model. In addition, the Rasch measures explained 63.91% of the variance in responses, which is higher than the critical value of 20% that Reckase (1979) proposed for interpreting Rasch model results for potentially multidimensional scales. Within the samples of American students and Chinese students, the average *MSE* statistics were also around 1.00 for all facets. For the American sample, the Rasch measures explained 51.63% of the variance in responses, and for the Chinese sample, the Rasch measures explained 67.32% of the variance in responses. Together, these results provide support for conducting the comparison analyses to examine differences in item difficulty and component difficulty between the subgroups.

Differences in item difficulty

Table 1 and Figure 2 provide a summary of the results from the item difficulty comparisons between the American and Chinese subgroups. For each item, Table 1 presents the item calibration on the logit scale (*i.e.*, item difficulty measure) estimated separately for each subgroup along with the standard error (*SE*) for the estimate, and the comparison between the logit scale calibrations between the American and Chinese subgroups. We calculated the logit difference such that positive differences indicate that the item was easier to endorse among Chinese participants, and negative differences indicate that the item was easier to endorse among American participants.

The differences in item locations ranged from -1.31 logits to 1.44 logits. The differences exceeded 0.5 logits for all but 4 items: Items 10, 13, 14, and 15. Figure 2 illustrates the differences in item difficulty using a bar plot. In the plot, the x-axis reflects the difference in logit-scale locations for the items, and the y-axis shows the items, ordered in the original sequence from the survey. Bars are used to represent the logit difference between

subgroups for each item. Dark blue bars indicate that the difference was greater than |0.5| logits, and light green bars indicate that the difference was less than |0.5| logits. Dashed vertical lines are used to highlight -0.5 and +0.5 logits on the *x*-axis.

Table 1. Item difficulty comparisons between the American and Chinese subgroups

Item	American Subgroup		Chinese Subgroup		Difference in Item Measures (American–Chinese)	Joint SE	*t*	*df*	*p*
	Measure	SE	Measure	SE					
1	0.66	0.15	-0.78	0.07	1.43	0.16	8.95	173	0.00
2	0.41	0.14	-0.77	0.07	1.17	0.16	7.49	182	0.00
3	0.21	0.15	-0.91	0.07	1.12	0.16	7.02	171	0.00
4	0.42	0.15	-1.02	0.07	1.44	0.16	8.87	171	0.00
5	0.25	0.14	-0.91	0.07	1.16	0.16	7.45	189	0.00
6	0.32	0.14	-0.48	0.07	0.79	0.16	5.08	183	0.00
7	0.64	0.14	-0.44	0.07	1.08	0.16	6.91	181	0.00
8	0.46	0.15	-0.45	0.07	0.91	0.16	5.70	169	0.00
9	0.25	0.15	-0.43	0.07	0.68	0.16	4.21	165	0.00
10	0.57	0.16	0.11	0.07	0.46	0.17	2.71	166	0.01
11	0.36	0.16	-0.59	0.07	0.95	0.17	5.46	162	0.00
12	0.14	0.15	-0.43	0.07	0.57	0.17	3.36	171	0.00
13	-0.08	0.12	-0.03	0.05	-0.05	0.13	-0.39	154	0.70
14	-0.06	0.12	0.03	0.05	-0.10	0.13	-0.73	162	0.47
15	-0.04	0.13	0.27	0.05	-0.31	0.13	-2.34	152	0.02
16	-0.42	0.12	0.61	0.05	-1.03	0.13	-7.81	176	0.00
17	-0.41	0.13	0.71	0.05	-1.12	0.14	-8.18	159	0.00
18	-0.33	0.13	0.72	0.05	-1.05	0.14	-7.68	166	0.00
19	-0.15	0.14	0.43	0.05	-0.58	0.15	-3.98	149	0.00
20	-0.17	0.13	0.68	0.05	-0.85	0.14	-6.22	178	0.00
21	-0.24	0.13	0.62	0.05	-0.86	0.14	-6.22	167	0.00
22	-0.30	0.13	0.75	0.05	-1.05	0.14	-7.45	159	0.00
23	-0.46	0.13	0.70	0.05	-1.16	0.14	-8.35	163	0.00
24	-0.49	0.13	0.82	0.05	-1.31	0.14	-9.66	170	0.00

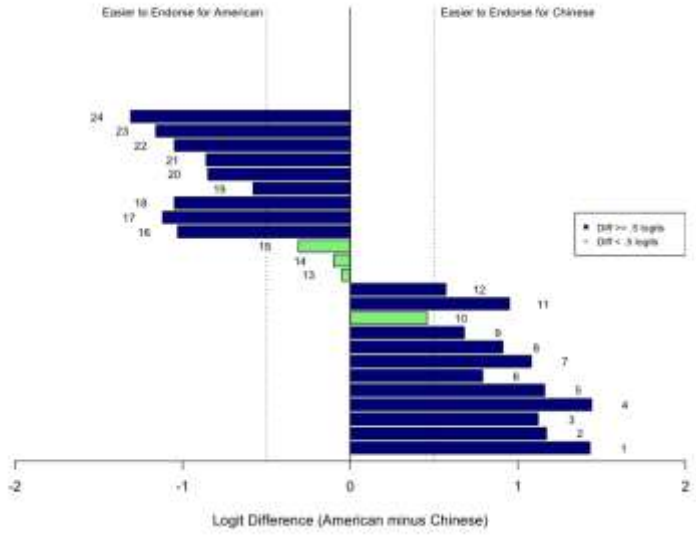

Figure 2. Item difficulty comparisons between the American and Chinese subgroups

Differences in component difficulty

Table 2 and Figure 3 provide a summary of the results from the Internalization Component comparisons between the American and Chinese subgroups. Table 2 presents the component calibrations on the logit scale (*i.e.*, component difficulty measure) estimated separately for each subgroup along with the standard error (*SE*) for the estimate, and the comparison between the logit scale calibrations between the American and Chinese subgroups. We calculated the logit difference such that positive differences indicate that the component was easier to endorse among Chinese participants, and negative differences indicate that the component was easier to endorse among American participants.

The differences in component locations ranged from -1.07 logits to 1.09 logits. The absolute value of the differences exceeded |0.5| logits for all of the components except for INPG. Figure 3 illustrates the differences in component difficulty using a bar plot using the same format as Figure 3. The first two components of internalization (INL and INPE) were substantially easier to

endorse for the subgroup of Chinese students, and the last two components (INID and ININ) were substantially easier to endorse for the subgroup of American students.

Table 2. Component difficulty comparisons between the American and Chinese subgroups

SN	SL	American Subgroup		Chinese Subgroup		Difference in Item Measures (American –Chinese)	Joint SE	*t*	*df*	*p*
		M	SE	M	SE					
1	INL	0.31	0.05	-0.77	0.02	1.09	0.05	20.56	1602.00	0.00
2	INPE	0.26	0.09	-0.40	0.04	0.66	0.10	6.65	503.00	0.00
3	INPG	-0.15	0.07	0.00	0.03	-0.15	0.08	-1.97	472.00	0.05
4	INID	-0.40	0.05	0.58	0.02	-0.97	0.06	-17.10	998.00	0.00
5	ININ	-0.48	0.07	0.59	0.03	-1.07	0.08	-13.60	506.00	0.00

Note: SN=Scale Number; SL=Scale Lable; M=Measure

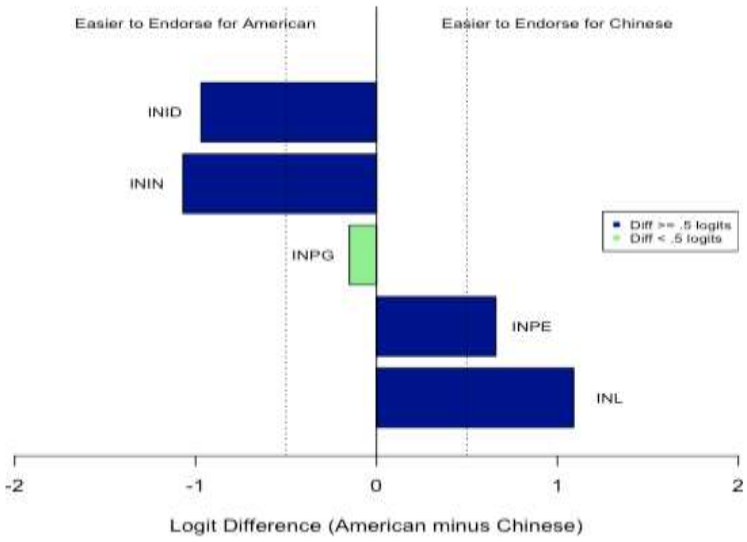

Figure 3. Component difficulty comparisons between the American and Chinese subgroups

Discussion

To our knowledge, as the first cultural comparison study using an internalization perspective to examine learning motivation, this research identified a number of potential cultural differences between American and Chinese students related to learning motivation, as self-reported in the ILM scale. A number of the findings relate to past research, and also provide a more nuanced perspective on this construct. For example, we observed that the Chinese students more readily endorsed the lower stages on the internalization continuum while the American students more readily endorsed the higher stages, which were closer to the intrinsic end of the continuum (*see* Figure 1). More specifically, the Chinese students typically reported that they were more motivated by external forces (*e.g.*, learning because of comments or punishment) and that learning was associated with negative feelings (*e.g.* guilty). On the other hand, American students reported that their motivation forces were more internalized (*e.g.*, learning to find personal meaning and life purpose).

The results from the comparison of item difficulties between the subgroups showed that motivation forces like lack of appeal (item 1), comments (item 2, 3, 4,5), punishment (item 6, 7, 8, 9), and ego (item 12) were relatively easier to endorse for Chinese students. On the other hand, motivational forces such as life meaning and purpose (item 18), personal value/quality (item 16, 24), instrumental (item 21, 22), identity (item 19), goal value (item 21) and future career (item 17) were relatively easier to endorse for American students. The results from the component difficulties demonstrated that lack of internalization and partial-ego internalization were easier to endorse among Chinese students, while identified and integrated internalization were easier to endorse among American students. There was no significant cultural difference related to the partial-guilt component of internalization.

Both the item level and the component level differences revealed similar information. Compared to their American counterparts, our sample of Chinese students reported that they were more motivated to learn because of parents or teachers' comments or punishments. On the other hand, our sample of American students reported that they were more likely to connect learning with their personal goals, career, and identity. Importantly, these results do not necessarily imply that Chinese students do not have higher stage of internalization. However,

compared to the sample of American students, they tended to endorse lower stage of internalization more readily.

In previous studies, other researchers have theorized about the significance of understanding cultural differences in motivation. Such differences could help explain our findings. In particular, education as a contextual factor could shape students' motivation (Vallerand & Ratelle, 2002). Chinese education is largely influenced by Confucius ideology, which emphasizes individuals' contribution to the whole society and the value of filial piety (Farh & Cheng, 1998), so they are often pushed to learn by their teachers and parents. In the Confucius ideology, authority figures' wisdom is considered a primary source of knowledge, so students may be used to listening to authorities rather than deciding for themselves what they should learn or what they want to learn (Li, 2005). The typically highly controlled school environment (Zhou, Main, & Wang, 2010), as well as authoritative parenting (Wu et al., 2002) in China may limit students' opportunities to make independent choices or explore personal interests. Student autonomy is frequently suppressed by "guan" (discipline) and obedience (Tweed & Lehman, 2002). As a consequence, the ideology along with the school and family environment has largely shaped Chinese students' internalization-and potentially leading them to exhibit lower levels of internalization, where their learning motivation is largely driven by comments, punishment and the ego to perform better than others. On the contrary, American education systems have largely adopted Socratism and individualism ideologies. This approach emphasizes the importance of "I", and it advocates questioning authorities as well as the self-generation of knowledge (Tweed & Lehman, 2002, 2003). Concerning parenting style, Wu and his colleagues (2002) found that compared to Chinese parents, American parents were more likely to conduct warmth/acceptance parenting styles rather than authoritarian parenting styles. Therefore, American students were more likely to find that learning was helpful in understanding themselves and associate learning with their future careers and life goals.

The differences in internalization between American and Chinese students could also be explained by the *basic needs theory* within self-determination theory (Deci & Ryan, 2000). In order to form a more optimal stage of motivation (*i.e.*, intrinsic motivation or integrated internalization stage) for students, their needs for *competence*, *autonomy*, and *relatedness* should be satisfied (Deci & Cascio, 1972). Precisely, students should feel *competent* in

what they are learning. They should also have choice over what they learn in order to satisfy their *autonomy*. Moreover, students should be able to *relate* to what they learn. The highly controlled learning environment and exam-oriented teaching (Kirkpatrick & Zhang, 2011) that is prevalent in China may not satisfy students' needs for competence, autonomy, and relatedness. As a result, intrinsic motivation, or a higher level of internalization may be less likely among Chinese students. On the other hand, within a less controlled and less structured education system that is more prevalent in America (Zhao, 2009), students are more likely to develop internalization in learning as a method of self-recognition and to inform future careers.

The current findings have significant implications for motivation researchers and education policy makers. Research on how to facilitate students' development of internalization is sorely lacking. Most previous research in this area focuses mainly on the effects of intrinsic motivation and neglects the process of guiding student towards intrinsic motivation and tracking the process. For motivation researchers, it is important to move away from an excessive focus on intrinsic motivation in which it is assumed that every student has intrinsic motivation to learn. We need to see motivation as a process that can be formed and modified along an internalization continuum. Humans are purposeful, but we are not born with a complete understanding of the significance of learning. We internalize our parents' values, and these values form our own understanding of learning. If we are pushed and controlled by parents or school when we are young, we may develop negative emotional associations with learning experiences in general (Elmore, 2019), and, as a result, we may not be able to progress toward an ideal type of internalization for learning.

For policy makers, findings from this study could show that even though Chinese students, along with many other East Asian students, are often the top performers in PISA or TIMMS as a group, the side effects of these students' education system may be considered implacable. Students' ability to make independent choices and to develop their own passion for lifelong learning may be diminished by significant pressure from an exam-orientation education. It may be useful for policy makers from Western countries such as the US and the UK to note that many characteristics of the Chinese education system are often detrimental-so much so that many Chinese policy makers are trying to reform their own system. As Zhao (2009) stated:

> "*what China wants is what America is eager to throw away - what America is eager to throw away-an education that respects individual talents, supports divergent thinking, tolerates deviation, and encourages creativity; a system in which the government does not dictate what students learn or how teachers teach; and culture that does not rank or judge the success of a school, a teacher, or a child based on only test scores in a few subjects determined by the government.* (p. vi)*"*

Rather than imitating education systems, it is essential that policy makers focus on exploring methods to form a learning environment in which students can develop an optimal type of motivation that will benefit their learning experiences in long-term.

Our results also have implications for classroom teaching. Specifically, teachers who understand students' internalization process could use this information to inform instructional practices. For example, teachers could explicitly teach students and parents about identifying their own level of internalization. This instruction could potentially benefit students with low achievement scores or those who from minority groups. Students in typically disadvantaged may particularly benefit from such instruction (Mitchall & Jaeger, 2018). Additional research is needed to explore the utility of this approach.

Limitations and future directions

In terms of study limitations, we acknowledge that self-report is inadequate for fully capturing students' stages of learning motivation. However, we have followed a strict data cleaning process to ensure data quality as much as possible. In particular, our use of attention checking items and identification of dogmatic response patterns served to improve the rigor of the current study. In future studies, researchers could consider alternative data collection techniques to more fully explore the development of internalization as well as cultural differences in this construct.

In addition, our cultural comparison was limited to the two samples of college students that we included in the current analysis. In future studies, researchers could conduct additional cultural comparisons between samples from the same or different populations in order to explore the degree to which our findings generalize beyond the current samples.

Finally, it is important to note that additional research is needed to more fully understand the development of internalization in general. For example,

research is needed to more fully explore relationships between internalization and academic performance, as well as between internalization and learning persistence. Moreover, research is needed to understand how different emotions during learning experiences are associated with different stages of internalization.

Conflict of interest

On behalf of all authors, the corresponding author states that there is no conflict of interest.

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