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Perseverance Counts but Consistency Does Not! Validating the Short Grit Scale in a Collectivist Setting

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Abstract The present research aims to validate the Short Grit Scale (Duckworth et al. *Journal of Personality Assessment 91*:166–174, 2009) among a sample of university (n=220) and high school students (n=606) from a collectivist culture (i.e., the Philippines) using both within-network and between-network approaches to construct validation. Our results revealed interesting cross-cultural differences in grit. First, grit was comprised of two distinct dimensions rather than as a hierarchical construct. Only the *perseverance of effort* dimension loaded onto the higher-order grit factor. Second, *perseverance of effort* was more salient in predicting key psychological outcomes (i.e., academic engagement and subjective well-being) compared to *consistency of interests*. This suggests that in collectivist cultures, the *perseverance of effort* dimension of grit is more relevant compared to the *consistency of interest*. Theoretical and practical implications are discussed.

Keywords Academic engagement · Filipino students · Grit · Subjective well-being

Facilitating academic success is one of the major goals of educators. Empirical studies have explored individual factors that optimize key educational outcomes such as academic achievement, academic adjustment, academic retention, and school satisfaction. Early literature has mostly focused on the role of intelligence in shaping objective measures of school success (Gottfredson 1997; Kuncel et al. 2001), while more recent studies have focused on the role of non-cognitive factors. In recent years, psychologists have paid increasing attention to grit as a key predictor of well-being and academic outcomes (i.e. Duckworth et al. 2007; Duckworth and Quinn 2009; Eskreis-Winkler et al. 2014).

Grit pertains to trait-level determination and perseverance for long-term aspirations (Duckworth et al. 2007). It is comprised of two dimensions: *consistency of interests* and *perseverance of effort. Consistency of interests* refers to the proclivity of individuals to espouse a similar array of interests for a long period of time. *Perseverance of effort*, on the other hand, pertains to the extent to which people would exert durable effort in facing challenges. These hypothesized dimensions of grit were found to be closely associated with trait conscientiousness. Grit enables individuals to pursue goals that require a long time to accomplish.

To measure grit, Duckworth et al. (2007) initially developed the 12-item Grit Scale (Grit-O). However, given its poor psychometric properties, they later developed the 8-item Short Grit Scale (Grit-S) to address the limitations of Grit-O. Their psychometric studies showed that grit is best conceptualized as a higher-order construct underpinned by two inter-related yet distinct first-order factors: consistency of interests and perseverance of effort (Duckworth and Quinn 2009). Studies found that the hierarchical model of grit had better fit indices compared to a one-factor model. The *consistency of interests, perseverance of effort*, and composite grit construct had high internal consistency. Both factors have been found to be positively and strongly correlated (r=.59, p<. 001).

Previous studies revealed that grit positively predicted a diverse range of key psychological outcomes such as

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academic achievement, success in a National Spelling Bee competition (Duckworth et al. 2007, 2010), commitment in school, marriage, and work (Eskreis-Winkler et al. 2014), effectiveness in teaching (Duckworth et al. 2009), fewer career shifts (Duckworth et al. 2007, 2009), graduation rate in junior high school students (Eskreis-Winkler et al. 2014), intensity of physical exercise (Reed et al. 2013), meaning in life (Kleiman et al. 2013), and higher levels of well-being (Von Culin et al. 2014) among others.

Some empirical investigations were also carried out to elucidate the theoretical mechanisms that link grit to success. For instance, Duckworth et al. (2010) found that grittier children are likely to win in spelling competitions as they exerted more focused and planned efforts in enhancing their capabilities to effectively perform specific tasks. Kleiman et al. (2013) found a synergistic interaction between grit and gratitude which led to higher meaning in life, which in turn led to lower suicidal ideation. These findings suggest that grit may facilitate beneficial academic and well-being outcomes.

Although the extant literature has proposed that that Grit-S is a valid measure in American samples (i.e. Duckworth et al. 2009; Eskreis-Winkler et al. 2014), a notable drawback is that all of these were carried out in Western societies. As Henrich et al. (2010) argued, there is a need to practice caution in generalizing results of Western empirical studies in non-WEIRD (Western, educated, industrialized, rich, and democratic) contexts, it is important to validate Grit-S in a collectivist culture. To our knowledge, there is no existing study that examined the psychometric properties of Grit-S in a non-Western, collectivist setting. Assessing the factorial validity and reliability of Grit-S would provide notable insights on the cross-cultural generalizability of Grit-S even in interdependent contexts.

Hence, the primary objective of the current research is to assess the validity of the Grit-S among the Filipino student samples (Study 1=undergraduate sample; Study 2=high school sample) through within-network and between-network construct validation approaches (Marsh 1997). Within-construct network validation involves checking the factor structure, internal consistency reliability, and interfactorial correlation of Grit-S while between-network construct validation includes assessing how grit predicts theoretically pertinent constructs through regression and path analyses.

Cross-Cultural Similarities and Differences in Grit

Culture may have an important influence on grit. One of the well-researched dimensions of culture is individualism vs. collectivism (Hofstede 1980). In high individualism contexts (e.g., U.S.A.), there is a strong emphasis on personal autonomy and on pursuing self-set goals. People in individualistic cultures are more likely to define themselves in terms of their personal attributes and perceive themselves as more separate or distinct from others (Markus and Kitayama 1991). On the other hand, people in collectivist societies (e.g., Japan, China, Philippines), put greater emphasis on interpersonal harmony and on the pursuit of group goals (Kwan et al. 1997). Individuals in collectivist cultures are more likely to see themselves as deeply embedded in the social fabric.

Given this cultural backdrop, it is possible that the *consistency of interests* dimension of grit may not be that relevant for people in collectivist cultures. People in collectivist cultures are more likely to prioritize goals and that are congruent with the goals of others compared to those in individualist societies whose aspirations more likely represent personal preferences and dispositions (King et al. 2012; Markus and Kitayama 1991). If *consistency of interest* entails the continuous pursuit of goals that one has set and less flexibility in terms of adopting goals that is deemed important by significant others or the social context, then consistency might not always be adaptive in a collectivist setting. Indeed, studies have shown that people in collectivist societies have a lower need for consistency and exhibit higher levels of flexibility compared to their counterparts in individualist societies (e.g., Heine 2001; Suh 2002).

Furthermore, people in collectivist settings are more likely to espouse a dialectical cognitive style, which pertains to cognitive proclivity to accept and tolerate contradictions (Peng and Nisbett 1999). Some studies have also shown that collectivists espouse greater contradictory beliefs and attitudes about themselves as opposed to the Westerners who are inclined to show consistent self-belief and perceptions (Choi and Choi 2002; Wong et al. 2003). The ability to tolerate contradictions and the lower preference for cognitive consistency, which are conceptually related to *consistency of interest*, may make the *consistency of interest* dimension of grit less important in collectivist contexts.

On the other hand, there is no strong reason to suspect that the *perseverance of effort* dimension be equally important in a collectivist setting as it is in individualistic societies. Numerous studies have shown that perseverance is a strongly endorsed cultural value in both individualistic (e.g., Duckworth et al. 2007, 2009) and collectivistic cultural contexts (Zhou 2014).

Previous literature asserted that the Philippines is considered a collectivist context (e.g., Church et al. 2012; Datu 2014). Datu (2014) found that Filipino students are more likely to endorse a self-view that emphasized establishment of harmonious interpersonal connections (interdependent self-construal) than a self-view that put much premium on autonomy and independence (independent self-construal). Studies have also shown Filipino students to be especially likely to endorse goals that are set for them by significant others (King et al. 2012). Certain studies show that these social-oriented

goals are more salient compared to self-oriented goals (King et al. 2012, 2013). Given the collectivist nature of the Philippine setting, grit may operate differently in this context compared to what has been found in individualistic societies.

The Present Study

The central aim of the present research is to examine the cross-cultural applicability of Grit-S in a collectivist setting. We tested the psychometric properties of grit across two samples–undergraduate (Study 1) and high school (Study 2) students. Using two independent studies in different samples to test the validity of Grit-S in the Philippines would enable us to draw stronger conclusions. If enough evidence can be gathered in support of the model across both high school and undergraduate samples, one can be more confident in its overall validity and relevance. This methodological approach is consistent with that of Duckworth and Quinn (2009) who also utilized multiple studies which involved undergraduate and high school student samples to evaluate the psychometric validity of Grit-S among American student samples.

Both between and within-network approaches to construct validation approach (Marsh 1997) were used in the current study. For the within-network study, we examined the psychometric validity of Grit-S through confirmatory factor analyses, checking the interfactorial correlation, and internal consistency reliability across the two studies. In terms of between-network study, we investigated how grit was associated with well-being outcomes (i.e., life satisfaction, positive affect, and negative affect) among Filipino undergraduate students in Study 1. Regarding Study 2, we assessed the relations of grit with both academic (e.g., academic engagement) and well-being outcomes among Filipino high school students. We had two key research questions:

1. What is the factor structure of grit in the Philippine context?
2. How is grit associated with well-being and academic outcomes?

Study 1

We investigated the psychometric validity of Grit-S among Filipino undergraduate students in Study 1. In terms of within-network validity, we conducted confirmatory factor analysis. Given the exploratory nature of our study, we did not posit any specific hypotheses about the structure of grit. For the between-network study, we examined the extent to which grit would predict well-being as indexed by life satisfaction, positive affect, and negative affect. We hypothesized that *perseverance of effort* will positively predict both outcomes but *consistency of interest* will not predict any of the outcomes given the lesser importance attached to consistency in collectivist cultures.

Method

Participants

In Study 1, there were 220 Filipino college students in a private university who served as participants. The average age of the participants was *M= 18.22* with a standard deviation of 1.58. There were 149 female and 71 male participants.

Measures

It must be noted that the English version of the questionnaires were utilized in the current research since English serves as a major medium of instruction in the Philippine educational institutions (Bernardo 2004) and previous studies have shown that English psychological scales are also relevant in Filipino student samples (e.g. Datu 2014; Ganotice et al. 2012; King and Watkins 2012).

Grit The Short Grit Scale (Grit-S; Duckworth and Quinn 2009) is an 8-item instrument that measures dispositional tendency to endorse persistence for long-term goals. It has two dimensions; *consistency of interests* (e.g., "New ideas and projects sometimes distract me from previous ones.") and *perseverance of effort* (e.g., "I am diligent"). All items were measured on a 5-point likert scale wherein 1 would mean "not like me at all" and 5 would mean "very much like me". Both the *perseverance* (α=.61) and *consistency* (α=.61) dimensions had low reliability coefficients.

Subjective Well-Being The Concise Measure of Subjective Well-Being Scale (COMOSWB; Suh and Koo 2011) is a 9-item that gauges the cognitive (life satisfaction) and affective (positive affect and negative affect) dimensions of subjective well-being. The Cronbach's alpha reliability coefficients of the dimensions are; α=.83 (life satisfaction), α=.82 (positive affect), and α=.72 (negative affect).

Data Analysis

To examine the within-network validity of Grit-S, we used confirmatory factor analyses (CFA). We tested a series of CFA models to see which one would yield the best fit. The first model was the hierarchical model of grit which construes grit as a higher-order construct underpinned by perseverance and consistency (Model 1). The factor structure of Model 1 is well-accepted in the Western literature. Aside from testing

Model 1, we also tested alternative models. Model 2 proposes a two-factor structure of grit–perseverance and effort as correlated latent factors but without proposing a hierarchical structure. Model 3 is a unidimensional model of grit wherein all the items load onto a single latent grit factor.

Consistent with Hu and Bentler's recommendations (1999), several fit indices were assessed such as χ^2, CFI, GFI, TLI, and RMSEA to assess the validity of the aforementioned models. In terms of between-network construct validity, we performed path analysis wherein both factors of grit were entered as predictors of life satisfaction, positive affect, and negative affect.

Results

Within-Network Construct Validity

The assumptions in conducting CFA were satisfactorily met. Kurtosis ranged from −2.85 to .05, while skewness ranged from −.67 to .07. Finney and DiStefano (2006) contended that items with kurtosis and skewness that do not exceed 7 and 2 respectively are considered normally-distributed. There were no multivariate outliers (Table 1).

Model 1 tested a hierarchical model of grit wherein *consistency of interest* and *perseverance of effort* were posited as first order factors of a higher-order grit factor (See Fig. 1).

The hierarchical model of grit yielded excellent fit indices. However, a closer look at the model estimates suggested that the hierarchical model may not be appropriate. Only *perseverance of effort* significantly loaded on the higher-order grit factor while *consistency of interests* did not. The hierarchical structure of grit therefore was not supported in the present sample. For a hierarchical structure to be supported, both perseverance and consistency should load significantly on the higher-order grit construct.

Next, we tested the two-factor model of grit (Model 2) which had excellent fit indices. The one-factor model of grit (Model 3) yielded poor fit indices. All items significantly loaded on the unidimensional grit factor, it is evident that the items originally part of the *consistency* dimension had low factor loadings (β=.18 to .44). Therefore, the two-factor model of grit was chosen as the final model. These results were shown in Table 2.

In the two factor model, all items significantly loaded on the *consistency* and *perseverance* dimensions except for item no. 2 which did not load on the *perseverance* domain β (β=.18, p=.12). The two dimensions of Grit-S had low reliability coefficients; *consistency* (α=.61) and *perseverance* (α=.58). The whole Grit-S also had low reliability (α=.59). This is not surprising given that consistency and perseverance seem to be distinct and only weakly correlated with each other r=.15, p<.05.

Table 1 Descriptive statistics and reliability coefficients of the variables in Study 1

Variable	α	Range	*M*	*SD*
Perseverance	.58	1–5	3.64	.64
Consistency	.61	1–5	3.00	.68
Life satisfaction	.83	1–7	5.00	1.11
Positive affect	.82	1–7	5.24	1.07
Negative affect	.72	1–7	4.12	1.22

Between-Network Construct Validity

To examine the between-network construct validity of Grit-S, the two dimensions of grit were entered as predictors of life satisfaction, positive affect, and negative affect. The findings of path analysis revealed that *perseverance* positively predicted life satisfaction, β=.43, p<*.001*, and positive affect, β=.50, p<*.001. Consistency* negatively predicted negative affect, β=−.26, p<*.05. Perseverance* also negatively predicted negative affect, β=−.39, p<*.01*. The final path model had excellent fit indices; χ^2=3.108, df=3, χ^2/df=1.036, GFI=.994, CFI=.999, TLI=.998, RMSEA=0.13 (See Fig. 2).

Brief Discussion of Study 1

The results of Study 1 were consistent with the present hypotheses. *Perseverance of effort* was associated with greater life satisfaction and positive affect while *consistency of interests* was not linked to such well-being outcomes. Both *perseverance* and *consistency* were associated with lower negative affect. These findings imply that *perseverance* is more salient predictor of well-being in a collectivist context.

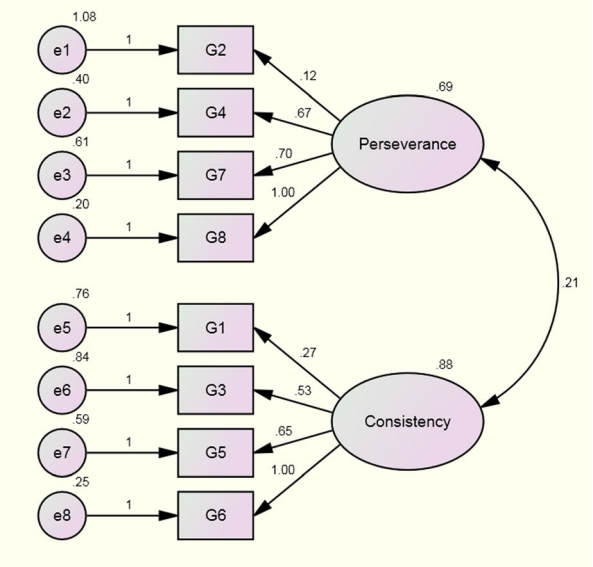


Fig. 1 Confirmatory Factor Analysis of the Grit-S in the Filipino undergraduate sample

Table 2 Fit indices of the hypothesized and alternative models of grit in Study 1

	χ^2	df	χ^2/df	p	CFI	GFI	TLI	RMSEA
Model 1 (Hierarchical model)	30.49	19	1.61	.05	.97	.98	.96	.05
Model 2 (Two-factor model)	30.49	19	1.61	.05	.97	.98	.96	.05
Model 3 (One-factor model)	189.05	20	9.45	<.001	.62	.86	.46	.17

However, while Duckworth and Quinn (2009) found some support on the hierarchical model of grit, Study 1 showed that the two-factor model of grit (with *perseverance* and *consistency* as dimensions) was applicable for Filipino undergraduate students.

Several limitations should be noted when interpreting the results of Study 1. Whereas the current study offered interesting insights on the beneficial role of grit in a collectivist context, the current research only focused on the relations of grit with well-being outcomes. Hence, there is a need to examine the association of grit with other key psychological outcomes in the academic context (e.g., academic engagement). Moreover, the sample was comprised of Filipino undergraduate students which could raise relevant issues regarding the generalizability of grit in other student populations (i.e., secondary or high school students).

Study 2

We aimed to replicate the findings of Study 1 among a high school sample. Moreover, we also wanted to examine how academic outcomes are associated with grit aside from focusing on the relationship of grit with well-being.

For the within-network study, our aim was to test whether the two-factor model of grit found among university students would also be replicated among high school students. We hypothesized that the two-factor model of grit would yield the best fit in this sample similar to what we found in Study 1. For the between-network study, we tested how grit predicts well-being as indexed by life satisfaction, positive affect, and negative affect. However, we measured positive and negative affect through the short form of the Positive and Negative Affective Scale (MacKinnon et al. 1999) to assess wider range of positive and negative emotions. We hypothesized that *perseverance of effort* will positively predict life satisfaction and positive affect but negatively predict negative affect.

Furthermore, we included additional academic outcome variables such as academic engagement and disaffection. Skinner et al. (2009) asserted that student engagement consists of the following dimensions: behavioral engagement (extent to which students actively take part in academic tasks), emotional engagement (degree to which students feel good and enjoy in participating academic activities), behavioral disaffection (extent to which students passively take part in academic endeavors), and emotional disaffection (degree to which students feel bad and bored in joining classroom activities). Since past studies have consistently shown that grit was positively associated with adaptive academic outcomes such as commitment to school work, and marriage (Eskreis-Winkler et al. 2014), we hypothesized that *perseverance of effort* would be positively related with behavioral and emotional engagement and negatively associated with behavioral and emotional disaffection. We hypothesized that *consistency of interest* would not predict any of the academic outcomes given its lesser importance in a collectivist setting.

Method

Participants

In Study 2, there were 606 Filipino high school students in a private high school who served as participants. The mean age of our sample was *M= 13.87* with a standard deviation of 1.26.

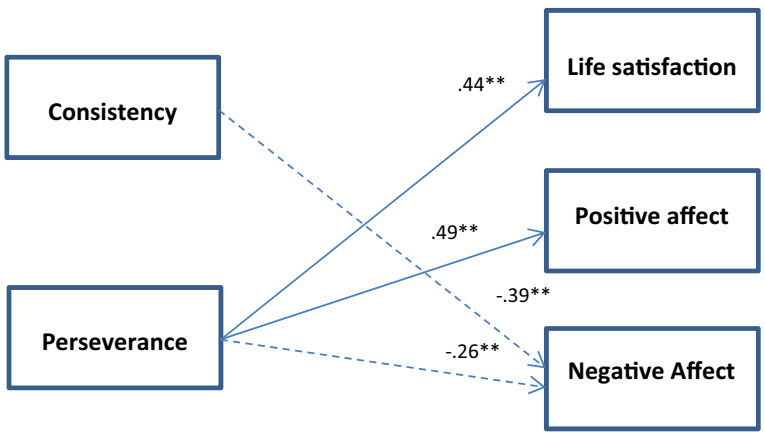


Fig. 2 Path analysis of grit dimensions as antecedents of well-being outcomes in Study 1

The sample was comprised of 305 male and 300 female students. Yet, 1 student failed to indicate gender in the questionnaire.

Measure

Consistent with the measures in Study 1, we utilized Grit-S and COMOSWB to assess passion and perseverance for long-term aspirations and life satisfaction respectively. In terms of Grit-S, *perseverance* (α=.60) and *consistency* (α=.63) had relatively low Cronbach's alpha reliability coefficients. The life satisfaction scale of the COMOSWB had an adequate Cronbach's alpha reliability coefficient (α=.77).

Positive Affect and Negative Affect The short form of the Positive and Negative Affect Scale (MacKinnon et al. 1999) is a 10-item scale which measures positive and negative affect. The items were marked on a 7-point likert scale (1=Very slightly or not at all; 7=Extremely). The reliability coefficients of positive affect and negative affect are .72 and .74 respectively.

Student Engagement The Academic Engagement and Disaffection Scale (Skinner et al. 2009) is a 20-item questionnaire that aims to measure behavioral engagement, emotional engagement, behavioral disaffection, and emotional disaffection. The items are gauged on a 4-point likert scale (1=Not at all true; 4=Very true). The Cronbach's alpha reliability coefficients of all engagement scale dimensions are adequate; behavioral engagement=.71; emotional engagement=.70; behavioral disaffection=.74; and emotional disaffection=.76.

Primary Data Analysis

In terms of within-network validation, we carried out the statistical analyses that were executed in Study 1 such as performing confirmatory factor analyses. Again, we tested a hierarchical model (Model 1), a two-factor model (Model 2), and a one-factor model (Model 3). We also examined the internal consistency reliability of both grit dimensions and interfactorial correlations. For the between-network validation, we used tested a path model wherein both *perseverance* and *consistency* were entered as predictors of academic and well-being outcomes.

Ancillary Data Analysis

Although not a main focus of our work, we also wanted to determine whether the factor structure of grit was invariant across the university and high school samples in our study. To do this, we conducted a multiple group confirmatory factor analysis. We followed a forward, stepwise approach, also called sequential constraint imposition (Dimitrov 2010). Three levels of invariance were tested: configural invariance, measurement invariance, and structural invariance (Byrne 2010).

The classical approach in arguing for evidence of invariance is based on $\chi 2$ difference (Hu and Bentler 1995); however, from a more practical perspective Cheung and Rensvold (2002) claimed that it is more reasonable to base invariance decisions on a difference in CFI. In line with this, we followed Cheung and Rensvold's (2002) criteria indicating that a decrease of 0.01 in the comparative fit index (CFI) is evidence for lack of invariance

Results

Within-Network Construct Validity

The range of critical ratios for skewness (−.19 to .42) and kurtosis (−.48 to 3.27) suggested that items were normally-distributed. There was no multivariate outlier (Table 3).

Although the hierarchical model (Model 1) had good fit indices, we found that only the perseverance dimension significantly loaded on the higher-order grit factor while *consistency* did not, β=.006, p=.78 (See Fig. 3). This meant that grit could not be conceptualized as a hierarchical construct. This result corresponds to what has been found in Study 1 (See Table 4).

Model 2 which tested the two-factor model of grit revealed very good fit indices. All items under the *perseverance* and *consistency* dimensions significantly loaded on the relevant dimensions. We found that the two factors were not significantly related to each other, r=0.008, p=.84. Model 3 tested one-factor model of grit which yielded poor fit indices. All items in the *consistency* dimension did not load on the grit factor. Therefore, Model 2 (the two-factor model) was chosen as the final model.

The scales of Grit-S had acceptable but low Cronbach's alpha reliability: *perseverance* (α=.60) and *consistency* (α=.63). The total Cronbach's alpha reliability was α=.60. The correlation between the two grit dimensions was not significant, r=0.008, p=.84.

Table 3 Descriptive statistics and reliability coefficients in Study 2

Variable	α	Range	*M*	*SD*
1. Perseverance	0.60	1–5	3.53	.65
2. Consistency	0.63	1–5	2.97	.72
3. Behavioral engagement	0.71	1–4	3.15	.52
4. Emotional engagement	0.70	1–4	3.17	.53
5. Behavioral disaffection	0.74	1–4	2.11	.64
6. Emotional disaffection	0.76	1–4	1.77	.61
7. Life satisfaction	0.77	1–7	5.47	1.12
8. Positive affect	0.70	1–7	5.41	.71
9. Negative affect	0.74	1–7	3.99	1.09

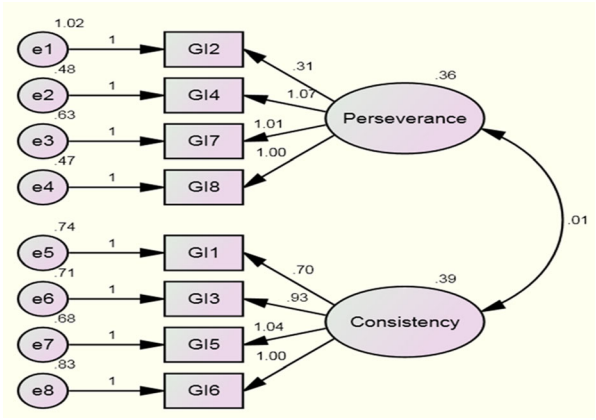


Fig. 3 Confirmatory factor analysis of the Grit-S in the Filipino high school sample

Between-Network Construct Validity

For the between-network study, we tested whether grit would predict theoretically relevant outcomes through path analysis. In the baseline model, all possible paths from *consistency* and *perseverance* to the outcome variables were tested which resulted in poor fit indices. After removing the non-significant paths, the final model had very good fit indices (Refer to Table 5). *Perseverance* positively predicted behavioral engagement, $\beta = .36$, $p < .001$, emotional engagement, $\beta = .30$, $p < .001$, life satisfaction, $\beta = .52$, $p < .001$, and positive affect, $\beta = .43$, $p < .001$. *Consistency* negatively predicted behavioral disaffection, $\beta = -.29$, $p < .001$ and emotional disaffection, $\beta = -.23$, $p < .001$ (See Fig. 4).

Multiple-Group Analysis

We followed a series of steps for the multiple group confirmatory factor analysis. First, we tested for configural invariance which tests whether the number of factors and pattern of indicator-factor loadings is identical across the university and high school samples. The configural invariance model is the model in which the same pattern of fixed and free factor loadings is specified for each of the two samples and is considered the "minimal condition for factorial invariance" (Marsh 1993, p. 851). It provides the basis for comparison with all subsequent models. Results of our study showed a good fit to the configural model providing evidence of configural invariance.

Second, we tested for measurement invariance where the factor loadings were constrained to be equal. This was done after we have established the configural invariance. The change in CFI from the configural model to the model with factor loadings constrained to be equal was greater than .01 (i.e., .04), showing lack of invariance. Third, we tested for structural invariance where equality constraints were placed on the factor variances and covariances across the two samples. Again, the change in CFI was greater than .01 (i.e., .04) showing that structural invariance was not supported. To summarize, results of our study showed evidence of configural invariance. However, there was no evidence of measurement and structural invariance. See Table 6 for the results of the multiple group CFA.

Brief Discussion of Study 2

Generally, most findings corroborated the results of Study 1 on the relation of grit with well-being outcomes since *perseverance of effort* was linked to higher life satisfaction and positive affect while *consistency* did not predict such outcomes. These results suggest that grit could potentially promote greater well-being even in a high school sample. We also found that the two-factor model of grit was valid in Filipino high school students.

However, the present study expanded Study 1 as we found that *perseverance* was associated with greater behavioral and emotional engagement while *consistency* was linked to lower behavioral and emotional disaffection. Further, we found that number of factors and pattern structures of grit were similar across undergraduate and high school samples.

General Discussion

The first research question pertains to the factor structure of grit in the Philippine context. The findings of within-network construct validation did not support the theorized factor structure of grit as proposed by Duckworth et al. (2009). Across both Studies 1 and 2, the hierarchical model of grit was not

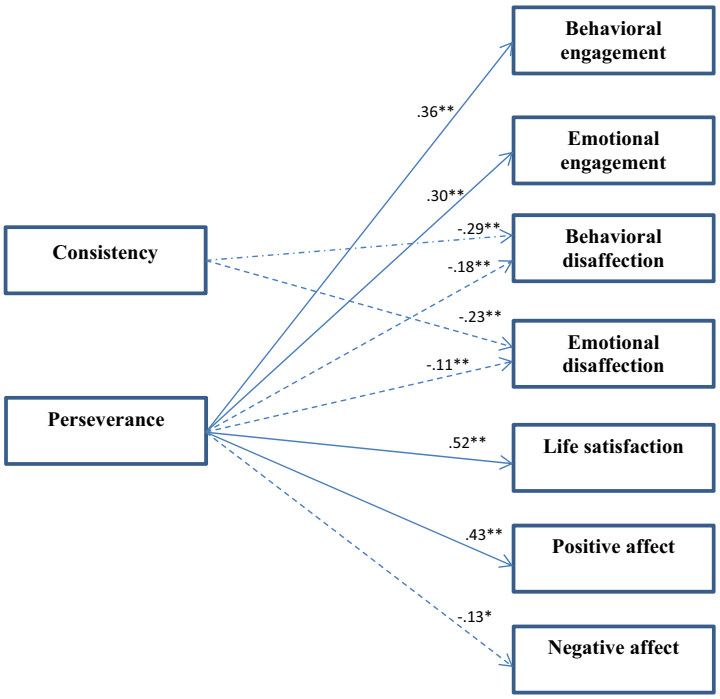
Table 4 Fit indices of the hypothesized and alternative models of grit in Study 2

	χ^2	df	χ^2/df	p	CFI	GFI	TLI	RMSEA
Model 1 (Hierarchical model)	55.90	19	2.94	<.001	.94	.98	.92	.06
Model 2 (Two-factor model)	55.90	19	2.94	<.001	.94	.98	.92	.06
Model 3 (One-factor model)	363.63	20	18.18	<.001	.46	.85	.25	.17

CFI comparative fit index, *GFI* goodness of fit index, *TLI* Tucker Lewis index, *RMSEA* root mean square error of approximation

Table 5 Fit indices of the path model in Study 2

	χ^2	df	χ^2/df	p	CFI	GFI	TLI	RMSEA
Baseline model	224.27	19	11.80	<.001	.800	.921	.852	.134
Final model	84.06	18	4.67	<.001	.936	.970	.871	.078



Note: ** Significant at the p < .001 level; * Significant at the p < .05 level

Fig. 4 Path analysis of grit dimensions as antecedents of educational and well-being outcomes. *Note*: ** Significant at the $p<.001$ level; * Significant at the $p<.05$ level

supported. We found that *consistency of interests* did not load on the second-order grit factor. This suggests that in the Philippine context, grit is better conceptualized as comprised of two distinct components. We found that the number of factors and pattern of their structure was similar for the university and high school sample as shown in the configural invariance model.

Note that the correlation between perseverance and consistency was very weak in Study 1 and not significant in Study 2 which contradicted results from past studies on the relatively strong correlation between *perseverance* and *consistency*. The low correlation between the two dimensions could explain why the reliability of Grit-S in Study 1 and Study 2 were lower than what were reported in past literature ($\alpha=.77$ to 82).

The second research questions focuses on the relationship of grit to well-being and academic outcomes. In general, we found that the *perseverance* dimension of grit was positively associated with adaptive well-being and academic outcomes. However, the *consistency of interest* dimension seemed to be a less important predictor of these outcomes. Across both Study 1 and 2, *perseverance of effort* positively predicted life satisfaction and positive affect. However, *consistency of interest* was not a significant predictor of aforementioned well-being outcomes but was a negative predictor of negative affect which provided partial support on our conjectures regarding the non-significant predictive impact of *consistency* on optimal psychological outcomes. This differs significantly from Western findings wherein both *perseverance* and *consistency* were positively linked to various indices of well-being (e.g., Duckworth et al. 2007, 2009).

In Study 2, we also examined academic outcomes and how they are associated with grit. Consistent with our hypotheses in Study 2 on the advantageous impact of grit on positive student outcomes, we found that *perseverance* positively predicted both behavioral and emotional engagement. *Perseverance* also negatively predicted both behavioral and emotional disaffection.

The positive impact of *perseverance* on academic engagement implies that students who are determined and passionate towards fulfilling long-term goals are inclined to actively participate in classroom activities and to feel good about taking

Table 6 Fit indices of the path model in Study 2

	χ^2	df	χ^2/df	p	CFI	Δ CFI	TLI	GFI	RMSEA
Configural invariance model (Model A)	73.22	38	1.93	.001	.96	–	.94	.98	.03
Invariant factor loadings (Model B)	114.20	44	2.60	<.001	.92	.04	.90	.97	.04
Invariant factor variances and covariances (Model C)	117.83	47	2.51	<.001	.92	.04	.91	.97	.04

part in academic endeavors. Likewise, the advantageous consequence of *perseverance* on subjective well-being suggests that gritty students are likely to achieve greater satisfaction in life and emotional well-being. In general, these findings corroborate with existing studies regarding the valuable impact of individual differences in *perseverance* on optimal educational outcomes (e.g. Duckworth et al. 2007; Duckworth and Quinn 2009; Eskreis-Winkler et al. 2014) and orientation to happiness (Von Culin et al. 2014).

While the non-significant path of *consistency of interests* on the higher-order grit construct and negligible relationship between *perseverance of effort* and *consistency of interests* may appear conceptually problematic based on Duckworth et al.'s (2007) original conceptualization, we argue that these results are theoretically plausible especially in the case of Filipino students who are embedded in a collectivist culture. This finding suggests that an individual does not need to endorse constant interests towards long-term goals to be considered as "gritty". Suh (2007) asserted that people in collectivist cultures are inclined to espouse a "context-sensitive self" where the emphasis is on adjusting oneself to the relevant social-contextual conditions.

Collectivists live in a culture where relationship harmony is highly valued (Markus and Kitayama 1991). It is likely that their interests would vary across time depending on the wants of significant others since fulfilling others' expectation is important in such contexts. For instance, a gritty high school student could fervently work towards completing diploma even if he is not always interested about pursuing it because his family is expecting him to graduate on time. Hence, in cultures that reward a "context-sensitive self", it is possible that those who are gritty will not realize the advantages of espousing consistent interests as the need to adjust to social demands is more salient.

Moreover, individuals in collectivist societies also tend to have a more dialectical mind set, which involves a higher degree of tolerance for contradiction (Peng and Nisbett 1999). It is possible that for such individuals, *consistency of interest* may not be an important a predictor of key psychological outcomes. This has some empirical support from our study given that *consistency* did not significantly predict two well-being indices (positive affect and life satisfaction) across Study 1 and Study 2 and did not significantly predict the key educational outcomes (behavioral engagement and emotional engagement) in Study 2. That said, it is likely that gritty students in an interdependent context would remain passionate about accomplishing long-term academic and relevant life goals even without steady interests on such desires since they have cognitive styles that are more able to deal with multiple and conflicting interests.

This study has some limitations. First, the study is cross-sectional in nature so causation cannot be inferred. Future empirical studies utilizing longitudinal approaches are needed. Second, the present research selected Filipino sample only which would delimit the generalizability of the findings. Future researchers are encouraged to recruit sample from other collectivist cultures (i.e. Hong Kong, China, Japan, and South Korea) to assess if the sample pattern of relationships between grit and optimal psychological outcomes will be observed. Third, as *consistency of interests* did not significantly load on the second-order grit factor and the same dimension was not correlated with *perseverance of effort* dimension, future studies are recommended to refine the conceptual model and develop a culturally-sensitive measure of grit that is more appropriate to individuals in interdependent cultural settings.

Nevertheless, our study had strong theoretical and empirical contributions. As regards to theory, our research provided interesting cross-cultural insights into the structure of grit. The Western conceptualization of grit as comprised of *consistency of interests* and *perseverance of effort* may not be valid in collectivist contexts where *consistency* is not that highly valued. In other words, our findings point to the distinct way that grit operates in an interdependent setting. Moreover, we found that *perseverance* was a more salient predictor of key psychological outcomes compared to *consistency*. These results point to the advantages of implementing *perseverance*-oriented educational programs in optimizing student success. This also contradicted Western research which showed that both *perseverance* and *consistency* were equally important in predicting psychological outcomes. Clearly, additional research is needed to examine how grit functions across diverse socio-cultural milieus.

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Compliance with Ethical Standards

Conflict of interest There is no conflict of interest in the present study as the authors did not receive funds from any institution.

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