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Alternative Grit Models: Explorations Into the Psychometric Properties of Grit-S and Academic Performance

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Abstract

Grit, the passion for achieving long-term goals, has been conceived as a two-dimensional construct (Consistency of interest and Perseverance of effort). The construct is well known for its easy measurement and its relationship with performance, including academic performance. However, there have been different criticisms, such as the overlap of grit with other personality characteristics, the variability in the psychometric structure of the Grit-O and Grit-S tests, and the fact that some work reports a weak influence of grit on academic performance. Within this framework, this study contrasts different psychometric structures of the Grit-S scale and its relationship with the academic performance of higher education students. So, with this purpose, a dichotomous model of high and low grit, a K-medias clustering model, and three structural equation models have been tested. The results indicate that (a) there is a statistically significant relationship between grit —mainly determined by the consistency dimension— and academic performance, although it decreases when controlling for contextual variables, and (b) Consistency mediates the relationship between Perseverance and academic performance. The instability of grit to predict performance is discussed, and the thesis of a two-sub-dimensional structure is supported.

Keywords

Grit, consistency, perseverance, academic performance, structural equation modelling

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Modelos Alternativos De Grit: Exploraciones Sobre Las Propiedades Psicométricas De Grit-S y El Rendimiento Académico

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Resumen

Grit, entendido como la pasión por alcanzar metas de largo plazo, ha sido concebido como un constructo bidimensional (consistencia de interés y la perseverancia del esfuerzo). El constructo es popular por su fácil medición y por su relación con el desempeño; incluido el académico. Sin embargo, diferentes críticas han emergido, a saber, el solapamiento de grit con otras características de la personalidad, la variabilidad en la estructura psicométrica de las pruebas Grit-O y Grit-S y que algunos trabajos reportan una influencia débil de grit en el desempeño académico. En este marco, este estudio contrasta diferentes estructuras psicométricas de la escala Grit-S y su relación con el desempeño académico de estudiantes de educación superior. Con este fin, se prueba un modelo dicotómico de alto y bajo grit, un modelo de agrupación tipo k-medias y tres modelos de ecuaciones estructurales. Los resultados indican que (a) existe una relación estadísticamente significativa entre grit —determinada principalmente por la dimensión consistencia— y rendimiento académico, aunque disminuye al controlar variables contextuales, y (b) que la consistencia media la relación entre perseverancia y rendimiento académico. Se discute la inestabilidad de grit para predecir el desempeño, y se apoya la tesis de una estructura de dos subdimensiones.

Palabras clave

Grit, consistencia, perseverancia, rendimiento académico, modelo de ecuaciones estructurales

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Grit, in its most traditional definition, is the passion for achieving long-term goals and overcoming the difficulties that arise during their achievement (Duckworth et al., 2007). In its original formulation, it is proposed that this personality characteristic comprises two dimensions. One is the Consistency of interest, understood as the ability to maintain long-term goals and work towards the objectives set. The other one is Perseverance of effort, understood as the ability to overcome the difficulties that may arise in the process of working in pursuit of the objectives set.

From the beginning, the instruments designed to assess grit have shown to be an acceptable predictor of performance in various domains (Duckworth & Quinn, 2009; Eskreis-Winkler et al., 2014). Different studies have found that initial scores on the grit test are associated with good performance in academic contexts. For example, Dixson (2021) discovered that grit, engagement, and self-concept could explain the variance in GPA among a group of urban students (r = .28, p < .01). Similarly, Collantes et al. (2021) found that grit scores correlate with academic performance in Latin American university students (r = .32, p < .01). Likewise, Duckworth et al. (2009) found that the effectiveness of teaching processes, in terms of the academic gains of students, could be predicted by grit among other factors. Additionally, significant associations of grit have been found with various aspects related to well-being. Clark and Malecki (2019) identified a correlation between grit and satisfaction with life (r = .41, p < .001). Moreover, Hill et al. (2016) found a relationship between grit and the sense of purpose in a group of students. Although emotional management seems to have no connection with grit (Ivcevic & Brackett, 2014).

Concerning academic performance, Lam and Zhou (2022) develop a meta-analysis with studies from different cultures and find moderate relationships between grit and academic performance (r = .19), with a greater association of this with the dimension of perseverance (r = .21) than with the consistency dimension (r = .08).

However, parallel to its development, critical voices have emerged pointing out two types of problems in the construct proposed by Duckworth et al. (2007): on the one hand, the apparent overlap of grit with other related constructs such as self-control or consciousness (Datu, 2021; Ponnock et al., 2020; Tynan, 2021). On the other hand, the stability of the psychometric structure found in the various test versions remains in question, as two non-equivalent psychometric structures have been identified so far. Firstly, a structure in which Consistency of interest and Perseverance in the effort are grouped in the latent variable grit. Secondly, a psychometric structure in which Consistency of interest and Perseverance in the effort are related variables but independent. That is, they are not subsumed in a latent variable. (See Collantes et al., 2021 for an inventory of these two trends).

In respect to the first group of criticisms that point to the possible overlapping of the construct with other personality constructs, Duckworth's response has focused on showing the semantic distinctions between grit and other constructs, such as self-control or consciousness, based on the differentiation that grit has in the period in which that develops since neither self-control nor responsibility involves maintaining the same goals in the long term (Duckworth & Gross, 2014) or the relative independence of the effects of grit compared to the effects of the level of responsibility on people's performance (Abuhassàn & Bates, 2015; Duckworth et al., 2007).

Regarding the second group of criticisms, related to the psychometric structure of the construct and the evidence that supports it, Marcus Credé has developed one of the most systematic reviews of the grit construct, which includes the conceptual and psychometric orders involved in the evaluation of this (Credé, 2018; Credé et al., 2017). The following section presents some of these elements, which are tested in this research.

Criticism About Grit by Marcus Credé

The criticism prepared by Credé (2018) and Credé et al. (2017), dealt with in this study, focuses on the potential problems with the psychometric structure proposed for grit. One of the main critiques developed by Credé is based on the inconvenience of the mathematical model that supports grit as a high-level construct (i.e., as a construct that subsumes the dimensions Consistency and Perseverance); specifically, the fact that the total grit score is built from the direct sum of the scores of each of the dimensions that comprise it (Duckworth et al., 2007).

Three reasons lead Credé (2018) to defend the inadequacy of the original grit model (Duckworth et al., 2007; 2009). First, in the original model that directly sums up the dimensions' scores, two individuals could have identical total Grit scores though they have opposite scores on the perseverance and consistency dimensions. The same author suggests observing how common this phenomenon is by applying a cluster analysis that differentiates in a particular population the possible differential performance of the possible configurations of high or low levels of Perseverance and Consistency. It should be noted that, as Credé (2018) points out, this type of analysis has not been reported so far, and it constitutes one of the important analyses intended to be carried out in the present study.

The second and third criticisms developed by the author are related to each other and deal, on the one hand, with the possible equivalence in the fit of the two most reported psychometric models of grit in the literature (i.e., the latent variable model —grit— which subsumes two dimensions —Perseverance and Consistency— vs. the model of independence and the partial relationship between the dimensions of Perseverance and Consistency). On the other hand, the possible loss of criterion validity may occur when the two scores are added together (latent variable model) compared to the analysis that would arise when considering each separately. In order to observe the validity of this criticism is based on comparing the adjustment of the two rival models and their predictive validity concerning a criterion, for example, academic performance.

In regard to this group of criticisms, the evidence is diverse since recent reviews have found both the unifactorial structure, in which grit subsumes Consistency and Perseverance (González et al., 2020; Jachimowicz et al., 2018) as well as the bifactorial (Tyumeneva et al., 2019; Xu et al., 2020). That is why it cannot be considered that the data favor one of the two models. Credé (2017) suggests that a line of development consists of evaluating the possible interactions between Consistency and Perseverance. In other words, to see if moderating effects increase the predictive efficacy of grit with respect to some performance measure. In this line of development, Jachimowicz et al. (2018) conducted three studies attempting to verify the interaction between perseverance and passion to address this issue. However, they have

received severe criticisms from Credé (2019) for both conceptual and psychometric reasons - in making the total score of grit equivalent to the measure of perseverance.

Given this panorama, it is clear that the literature offers ambiguous results regarding the psychometric structure of the Grit-S test. This element is especially important if one takes into account the widespread use that the grit scale has had in recent years in the Spanish-speaking media, both in terms of its validation (Marentes-Castillo et al., 2019; Uribe-Moreno et al., 2022) as well as its application to predicting performance in different areas (Postigo et al., 2021; Tortul et al., 2020). Thus, in this study, we consider it pertinent to broaden the evidence on the psychometric structure that the Grit-S test reveals in the different applications. Specifically, it is intended, at first, to investigate whether different forms of the internal grouping of the scores can improve the predictive validity of the test, either through a dichotomous grouping of the attribute (i.e., people with and without grit) or through a cluster analysis to find out if obtaining a total grit score through the sum of the scores of the two dimensions that make up the scale hides different groups that would have different predictive properties regarding performance. In a second moment, we want to analyze which of the three psychometric structures (i.e., unifactorial, bifactorial, and the mediation model between Consistency and Perseverance) fit the data on the relationship between grit and academic performance in the university population with the final goal of contributing to the current discussion on the different possible models in the psychometric structure of grit.

Method

Following the classification of Ato et al. (2013), this study is empirical, with an associative-predictive strategy since it uses analysis techniques to identify the existence of relationships between grit and the academic performance of Colombian undergraduate university students. In this sense, it uses comparisons between groups of individuals, simple correlational techniques, and structural equation models that allow testing hypotheses about the ability to grit and its dimensions to predict the academic performance of individuals. Statistical analyzes were performed using the IBM SPSS Statistics 23 software.

Participants

This research included a sample of 343 Colombian undergraduate university students from two intentionally selected private universities. With prior authorization from the university academic authorities, the students received the instrument and informed consent through their institutional email. The academic registration offices shared the information on the academic averages with the prior authorization of the students participating in the research.

The 343 students (n) included in the sample are primarily female (56.27%), with an average age of 31 years (*SD* = 10.34), studying between the first and second semester (41.11%), with an academic average of 4.0/5.0 (*SD* = 0.57) and 21% of them have lost at least one subject during their higher education. Table 1 (see Note 1) presents the distribution of the population characteristics.

Table 1
Participants' sociodemographic characteristics

Characteristics		*n*	Percentage
Gender			
	Male	150	43.73%
	Female	193	56.27%
Age			
	17 - 21	95	27.70%
	22 - 26	47	13.70%
	27 - 31	52	15.16%
	32 - 36	45	13.12%
	37 - 41	42	12.24%
	42 - 46	31	9.04%
	47 - 51	17	4.96%
	52 - 56	12	3.50%
	57 - 60	2	0.58%
Semester			
	1	70	20.41%
	2	71	20.70%
	3	20	5.83%
	4	45	13.12%
	5	18	5.25%
	6	29	8.45%
	7	50	14.58%
	8	33	9.62%
	9	4	1.17%
	10	3	0.87%
Grade Point Average			
	1.0 - 2	4	1.17%
	2.1 - 3	15	4.37%
	3.1 - 4	145	42.27%
	4.1 - 5	179	52.19%

Instruments

The Short Grit Scale (Grit-S) by Duckworth and Quinn (2009) was applied. This scale is a short and psychometrically equivalent version of the Grit-O (Duckworth et al., 2007). The instrument comprises eight items: four in each dimension, Consistency, and Perseverance, obtained from the original scale. The scale is of the Likert type, with ratings ranging from 1 ("It does not describe me at all") to 4 ("It describes me totally"). The statements of the consistency dimension are written in negative form. Therefore, people with a greater agreement with the statements will have less Consistency. For its part, the perseverance dimension evaluates the effort over time, despite difficulties or negative results. Thus, the greater the agreement, the greater the Perseverance.

The scale has studies of adaptation, validation, and confirmation of the structure in Colombia (Collantes et al., 2021; Uribe-Moreno, Castiblanco-Moreno et al., 2022). A bifactorial structure was reported in the first study (*n*= 500 people), which explained 55% of

the variance (factor 1: 33.84% and factor 2: 21.16%). General reliability was Cronbach's alpha (α) = .834 in the exploratory factor analysis (EFA) and .826 in the confirmatory factor analysis (CFA). The test presents evidence of validity in the CFA: $\chi 2/df = 1.892$, CFI = .959, TLI = .945, GFI = .989, RMSEA = .060 [90% CI: .042-.078] (Collantes -Tique et al., 2021).

In a second study with a Colombian population, Uribe-Moreno, Castiblanco-Moreno et al. (2022) ratified the factorial structure of eight items, four per dimension. Regarding the measurement of goodness of fit, the results were $\chi 2/df = 1.569$; the comparative goodness of fit index (CFI = .940), the Tucker-Lewis index (TLI= .911); global goodness-of-fit index (GFI = .979) and root-mean-square error of approximation (RMSEA = .043; 90% CI: 0.00-.071); indicating excellent goodness of fit in the CFA.

Analysis Technique

This research seeks to establish the predictive capacity of different organization models of the grit construct, using academic performance as a criterion variable. Following Credé (2017), three analysis tests were carried out for this.

First, a mean difference test and a correlational analysis (Field, 2014) were performed, transforming the original variable grit into a dichotomous variable that assumed the value of 0 if the two subdimensions showed scores below 3 and 1, scores equal to or higher than 3.

Secondly, a cluster analysis was carried out in order to determine the existence of groups of individuals that share characteristics, in this case, scores of the two sub-dimensions of the grit construct, and that, in turn, are as heterogeneous as possible among them. In other words, the technique maximizes within-group similarity and minimizes between-group similarity. Two clustering techniques were used, the so-called non-hierarchical clustering of the k-means type, in which the number of desired groups is previously chosen (Morissette & Chartier, 2013), and two-stage hierarchical clustering that, unlike the previous one, it does not require previously establishing the number of clusters, but rather estimate the simple Euclidean distance for different groupings until finding the best one (Rubio-Hurtado & Vilà-Baños, 2017). Since this last estimation technique requires that the continuous quantitative variables be normally distributed, which assumption is not fulfilled in this case, a bootstrapping estimation was used to obtain more robust estimates.

Third, to validate the hypotheses related to the functioning of the two structures of the grit test and the mediation model of the consistency dimension, a Structural Equation Model (SEM) was used. This technique, an extension of multivariate regression models, makes it possible to establish the dependency relationship between the variables through the inclusion of different linear equations in which the variables alternate their role between dependent and independent so that more accurate and robust modeling of the relationship between variables can be obtained (Bagozzi & Yi, 2012; Escobedo et al., 2016).

Ethical Considerations

Studies on the application of instruments for the identification of traits and academic performance are considered by Colombian legislation as having minimal risk. This

classification was ratified by the Institutional Ethics Committee of one of the cooperating universities (Act 12 of 2020). The participants were informed of the purpose of the study and explicitly approved their participation. Regarding the information processing between universities, this was done encrypted, with prior authorization to process information (habeas data).

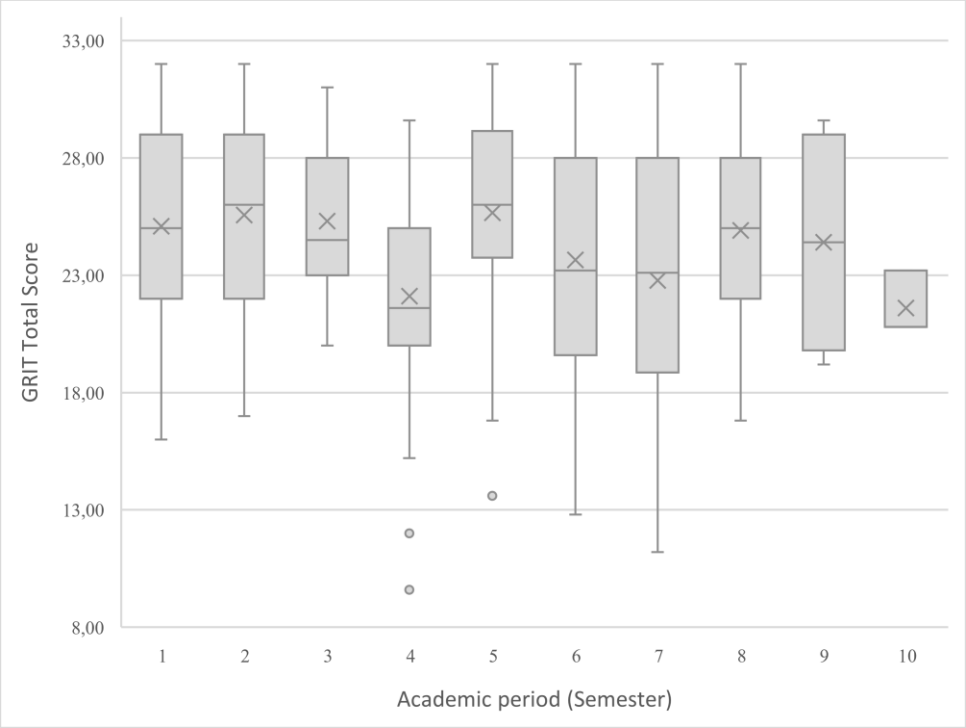
Finally, regarding the conceptual unit of the research, independent and partial publications of sections of the data have been made by Uribe-Moreno, Castiblanco-Moreno et al. (2022) and in the second study by Collantes et al. (2021). These publications focused on the report of the psychometric qualities of the Grit-S instrument but not on the predictive characteristics or the conceptual and psychometric structure analyzed in this study. The verification and report of the instrumental conditions are considered a desirable previous phase that increases the certainty of the conclusions of the predictive studies.

Results

The application of the instrument indicates an average value of the grit construct of 24.32 points (*SD* = 4.51) with a minimum value of 9.6 and a maximum value of 32. Figure 1 presents the test results applied according to the academic semester of the students. Likewise, the scores by dimensions show an average value of 11.29 (*SD* = 3.03) for the consistency subdimension and an average value of 13.03 (*SD* = 2.54) for the perseverance subdimension.

Figure 1

GRIT Score According to Academic Semester



Test 1. Grit As a Dichotomous Variable

First, a simple bivariate Spearman correlation test established the correlation between the grit construct and academic performance. The results indicate a statistically significant and positive correlation (*rho* = .1228; $p<.05$). This relationship is maintained between the Consistency and academic performance subdimension (*rho* = .1470; $p<.01$), but not with the Perseverance subdimension (*rho* = .083).

After establishing the individual relationship, a multivariate analysis was performed including other variables that may affect academic performance such as gender, academic semester, and age of the students. The results of the multivariate regression by Ordinary Least Squares (OLS) and robust methods are presented in Table 2.

Table 2
Multiple Linear Regression Estimate (Y = Academic Performance)

	OLS	Robust Methods
Grit Total	0.009	0.010
	(0.007)	(0.006)
Gender	0.153**	0.093*
(Male = 1; Female = 0)	(0.063)	(0.055)
Age	0.001	0.003
	(0.003)	(0.003)
Semester	-0.018	-0.023**
	(0.012)	(0.011)
Constant	3.644***	3.717***
	(0.209)	(0.181)
Observations	343	343
R^2	0.027	
R^2 adjusted	0.015	
Residual Standard Error (df=338)	0.572	
F Test	2.333* (df=4; 338)	

Note. Standard errors in parenthesis. $p < .10$ *; $p < .05$**; $p < .001$***

The regression results point to a loss of significance in the ability of the grit construct to predict student academic performance in the presence of other variables, specifically gender and academic semester. It is also striking that the variables, including grit, explain only 2.7% of the academic performance variance.

Based on the above, the behavior of the dichotomous variable grit was analyzed. This variable categorized students into two groups: *low* grit (0) and *high* grit (1) (Figure 2). It was expected that, if the grit variable is important for academic performance, statistically significant differences would be found in the academic average of the two groups of students.

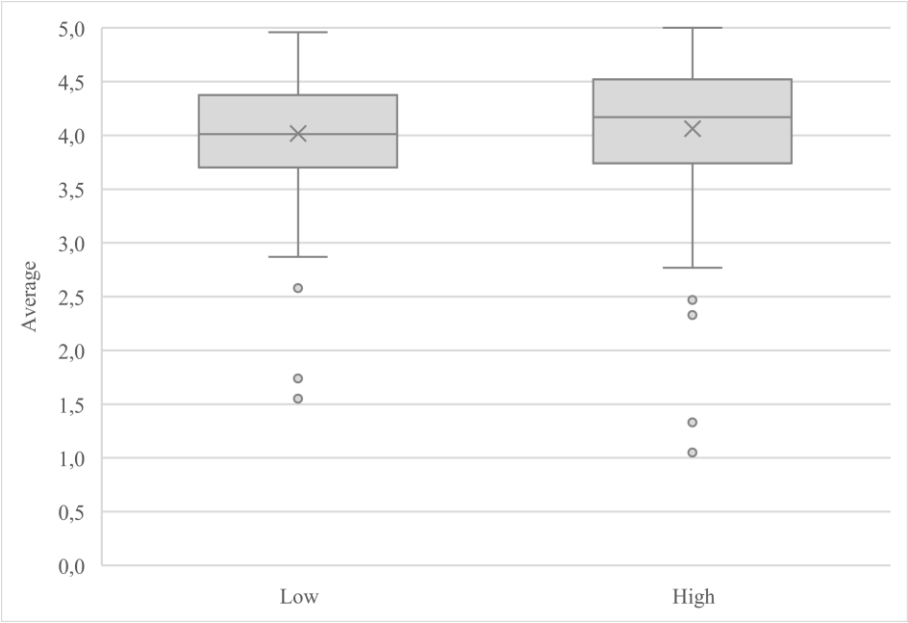
The estimation of the robust *t*-test for the comparison of means shows the existence of statistically significant differences between the two groups -low vs high grit- (t = 0.1234; $p<.05$) but a null effect size (d = 0.013) (Cohen, 1988).

Test 2. Clusters

Given that the first tests indicate that the grit construct does not have a significant relationship with academic performance measured through the students' general average, a second analysis was applied to identify the existence of different student profiles according to their level of grit. In this sense, first, we resorted to creating four clusters through the K-means technique, which presupposes knowing what type of groups is expected to be found. For this case, four groups were expected: high consistency (HC), high persistence (HP), low persistence (LP), and low consistency (LC) (Figure 3).

Figure 2

Academic average according to grit level



The characteristics of the four groups formed are described in Table 3. The results of the F Test are also presented for group comparison, which indicates that the differences in the academic average of the different groups are not statistically significant.

Table 3

Comparison of Academic Average between Clusters (K-means non-hierarchical technique)

Clusters	*n*	Average	*F* Test
1	65	4.03 (*SD* = 0.63)	1.287
2	137	4.06 (*SD* = 0.65)	
3	105	4.07 (*SD* = 0.48)	
4	36	3.86 (*SD* = 0.57)	

Note. Standard errors in parenthesis. $p < .10$ *; $p < .05$**; $p < .001$***

A hierarchical estimation of clusters was used to contrast the results obtained through the non-hierarchical technique. This estimation generated three clusters classified as high Perseverance–high Consistency, high Perseverance–low Consistency, and medium Consistency–medium Perseverance (Figure 4). Despite going from four to three groups, the differences in the academic average of the groups are not significant.

Figure 3

Academic Average According to Grit Cluster (K-means Technique)

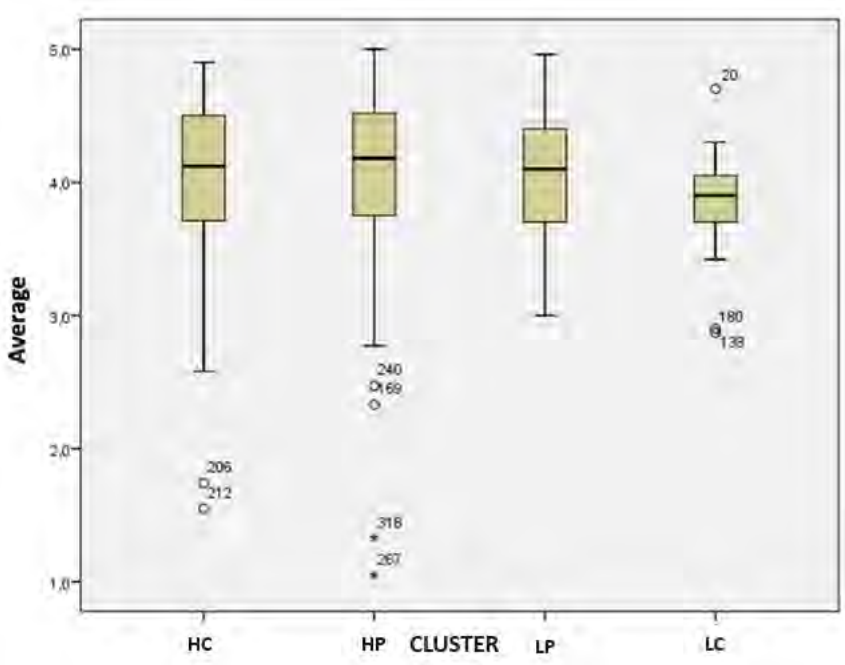


Table 4

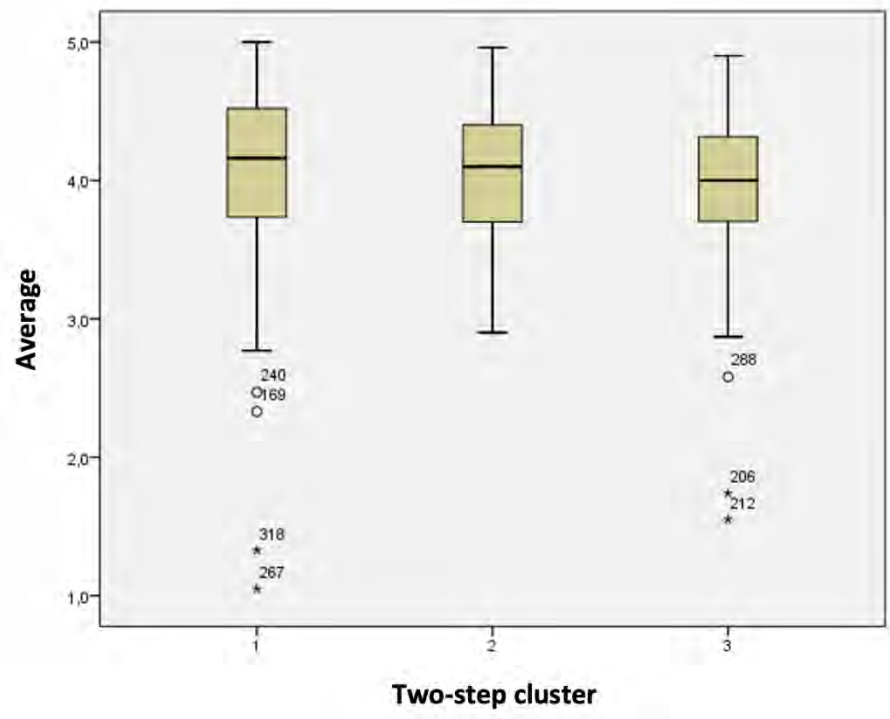
Comparison of Academic Average between Clusters (Two-stage hierarchical technique)

Clusters		*n*	Average	*F* Test
1	Perseverance = 14.46 Consistency = 13.79	155	4.05 (*SD* = 0.64)	0.415
2	Perseverance = 13.82 Consistency = 8.72	101	4.07 (*SD* = 0.48)	
3	Perseverance = 9.57 Consistency = 9.82	187	3.97 (*SD* = 0.56)	

Note. Standard errors in parenthesis. $p < .10$ *; $p < .05$**; $p < .001$***

Figure 4

Academic Average According to Grit Cluster (Two-Stage Technique)



Test 3. Analysis of Structural Equations

Finally, a third hypothesis was evaluated that compares the different grit models, including the mediation of the Consistency dimension to the Perseverance variable. Table 5 (see Note 2) shows the bivariate correlations of the Grit-S total score, Consistency subdimension, and Perseverance subdimension with the academic average. Subsequently, a structural equations model was estimated in which the Consistency subdimension works as a mediating variable between the Perseverance subdimension and the academic average. Figure 5 presents the non-standardized results of the model estimation through an asymptotically distribution-free method suitable for cases in which the observed variables are measured in ordinal terms (Finney & Di Stefano, 2006; Rigo & Donolo, 2018).

Table 5

Bivariate Correlation Results (n=343)

Relation	Kendall's Tau Coefficient	Significance
Average – Grit Total	0.086**	0.020
Average – Grit Consistency	0.103***	0.006
Average – Grit Perseverance	0.058	0.130

Note. $p < .10$ *; $p < .05$**; $p < .001$***

Table 6 presents the results of validating the hypotheses about the relationship between the subdimensions of the grit construct and the academic average. As Note 2 describes, the model, in which Consistency mediates the relationship between perseverance and grade point average,

has a better fit to the data than the alternative models: the one-factor model ($\chi 2$ (27) =3.209; p<.01, CFI= 0.700, TLI=0.600, RMSEA (90% CI) =0.080(0.062; 0.100)) and the bifactorial ($\chi 2$ (26) =2.473; p<.01, CFI=0.807, TLI=0.733, RMSEA (90% CI) = 0.066(0.046; 0.086). These two models -one factor and bifactorial- present a mediocre fit according to Rigo & Donolo (2018).

Table 6

Validation of the Structural Equations Model Hypothesis

		Standardised Betas
H1	Consistency --> Perseverance	0.398*** (.089)
H2	Average --> Consistency	0.099** (0.043)

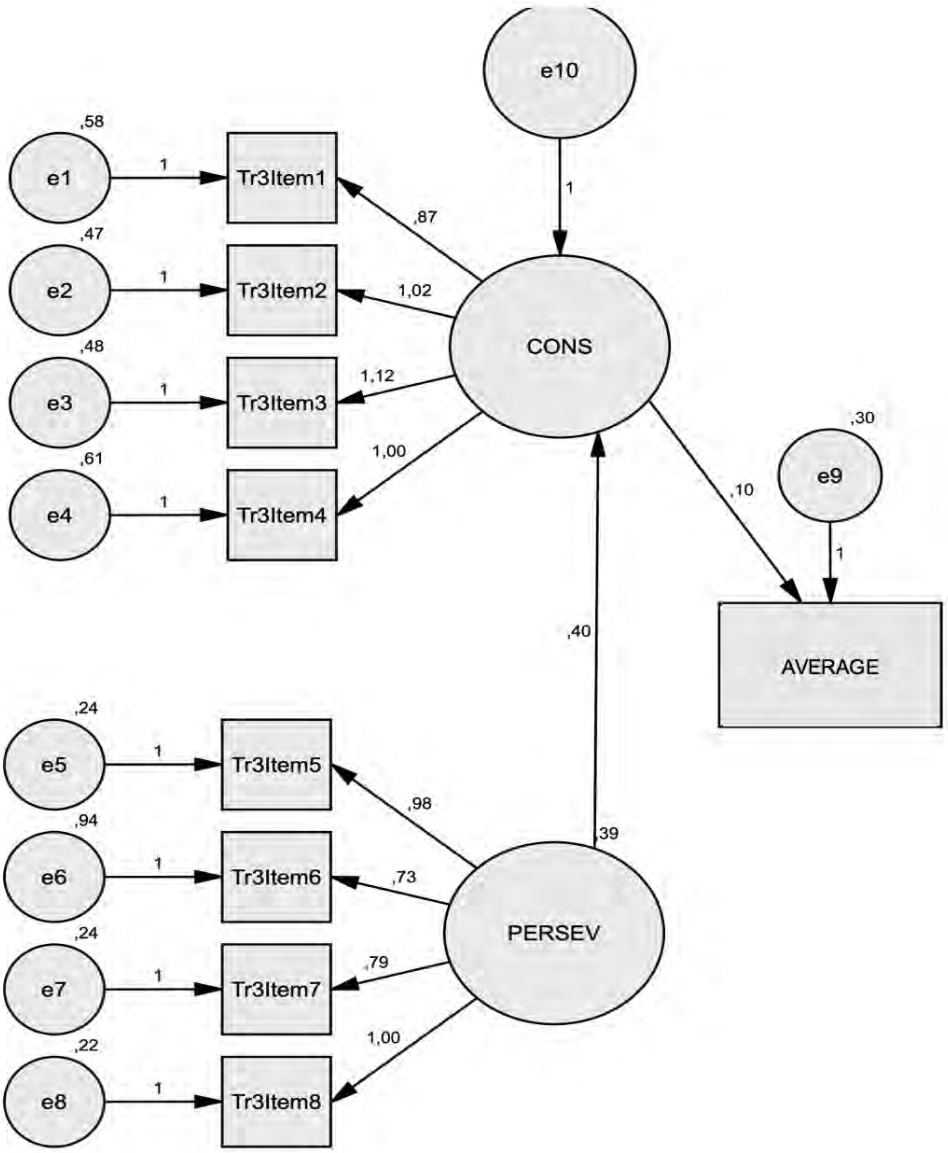
Note. Standard errors in parenthesis. $p < .10$ *; $p < .05$**; $p < .001$***

Discussion and Conclusions

The study aimed to empirically evaluate some of the theoretical points of discussion that have emerged recently about the construct and structure of the Grit-S and Grit-O tests: (a) the shadowing in the total sum of different grit profiles, which in turn would give rise to characteristic performances related to academic performance, and (b) the adjustment of the most recurrent models (unifactorial and bifactorial) concerning the criterion of academic performance, including the test of the moderation alternative between subdimensions proposed by Credé (2019) and Jachimowicz et al. (2018).

With respect to the first analysis group, partial correlations between academic performance, the total grit score, and the sub-dimension of consistency were found. Moreover, it was not possible to identify a statistically significant relationship between academic performance and perseverance, contrary to the original Grit theoretical proposal of two dimensions (Duckworth et al., 2007) and others, such as the three dimensions proposal (Datu, 2021; Datu et al., 2017). These findings align with the position that one sub-dimension may be responsible for the grit factor (Credé, 2018).

Figure 5
Structural Equation Model



*** p<.001; ** p< .05; * p< .01. Standard errors in parentheses.

On the other hand, exploring subgroups by scores in the dimensions did not show differences in academic performance under the condition of the expected four groups nor by the automatic generation of groups through clusters. Therefore, although theoretically expected (Credé, 2018), the identified profiles did not validate the predictive power of grit on the criterion of academic performance.

Additionally, it stands out in this first group of analysis, the loss of significance of grit to predict academic performance in the presence of other variables. The values are below the robust variance estimations reported by Lam and Zhou (2022). In turn, the results of the partial

correlations differ from those of the meta-analytic reports (Credé et al., 2018; Lam & Zhou, 2022) since the most related dimension was Consistency and not the one of Perseverance.

These results add to the considerations of Credé et al. (2017) in terms of the weak relationships of grit with academic performance, at least in isolation from other psychological and socioeconomic variables (Chaustre, 2019), and in the variability of the psychometric model of the tests that evaluate grit, for the Grit-S case. The alternative model with the best performance obtained is Consistency mediation and not that of Perseverance, contrary to what was expected according to the reviews by Credé et al. (2017) and Chaustre (2019).

Such variability may be related to macrostructural aspects of the functioning of educational systems that are blurred in approaches that are predominantly focused on individual differences. In this regard, the review by Uribe et al. (2022) shows that motivational factors and psychological differences in the educational field lose much of the explanatory statistical power when the studies come from samples in developing countries, for example, Latin America. For this reason, further work must consider the cultural and psychological distance regarding the comparison between samples, for example, using some distance scale, particularly if it is considered that such cultural and socioeconomic differences can affect the results. (Muthukrishna et al., 2020).

Another possible source of variability and limitation of the findings comes from the methodological considerations of the study. The research used convenience sampling in two educational institutions in a geographic region of Colombia, so generalization efforts must be taken cautiously. On the other hand, part of the sample of this study comes from training programs in virtual modality, which, although did not show statistically significant differences in the Grit-S scores in comparison to other works with Colombian samples (Collantes et al. 2021; Uribe et al., 2022), they could have them considering other works on academic performance.

Likewise, in the exploration of rival models of grit, we found that the model in which Consistency of interest mediates the relationship between Perseverance and academic performance has better levels of adjustment than the models that have traditionally been used to conceptualize grit, this is the model unifactorial and the bifactorial model. This finding coincides with the study by Jachimowicz et al. (2018) but considers the corrections made by Credé (2019), referring to the inconvenience of taking all the grit test scores solely as an indicator of Perseverance. On the contrary, in our study, the mediation model was explored based on each of the subcomponents of the scale, finding the same mediation relationship suggested by the first authors.

At a theoretical level, the mediation relationship between Consistency and Perseverance found in this study supports the idea that each of the two components of grit is essential to explain the search for and achievement of goals since, as Duckworth et al. (2021) show, despite the possible psychometric equivalences "grit is better conceptualized as composed of two orientations towards long-term goals that are nevertheless different" (p. 2), due to the reason that each of the elements is related to different aspects of the achievement of a goal, namely: the commitment to the goal and the search for it, the two are fundamental for the achievement of long-term goals reiterating the idea that in long-term goals constant work is effective only in the presence of goal maintenance.

In a practical sense, the present study's findings suggest that it is important to focus interventions on grit, addressing both perseverance and consistency. Despite the literature in the field emphasizing the importance of intervening in perseverance to strengthen the achievement of goals in individuals with relative success (Friese et al., 2017), this study points out that the work on consistency in interest cannot be neglected, as it serves as a mediating factor in students' performance. However, this should not be interpreted as a suggestion that only some components of grit should be intervened upon since, as derived from this study, the two dimensions of grit appear interconnected. Finally, based on the data found in this study, we adhere to the latest considerations of the original authors of the scale (Duckworth et al., 2021). We consider it necessary to continue strengthening the grit model through the exploration of new models that collect more dynamically the relationship between Consistency and Perseverance, as well as the need to expand the studies on the relationship of grit with other constructs such as passion or with some contextual factors that, as observed in the present study, can affect the predictive validity of grit in the Colombian population. This type of study will make it possible to parameterize grit's effect on the performance of subjects in different fields, especially in education.

Notes

Note 1. In the participating universities, grades vary between 0 (the lowest) and 5 (the highest). The minimum grade to pass a subject in undergraduate programs is 3.0.

Note 2. $\chi 2$ (26) = 1.605**; IFC=0.921; TLI=0.890; RMSEA (90% CI) = 0.042 (0.015, 0.065).

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