Psychometric Properties and Confirmatory Factor Analysis of the Grit Scale (Grit-O) for Indian Nurses

Dr. Preet Kumari[1], Jincy Cherian[2]

[1] *Associate Professor, Department of Psychology, Dayalbagh Educational Institute, Agra, U.P. India*

[2] *Research Scholar, Department of Psychology, Dayalbagh Educational Institute, Agra, U.P. India*

Abstract: **Grit is defined as "perseverance and passion for long-term goals" by psychologist Angela Duckworth and colleagues (2007), who extensively studied grit as a personality trait. The aim of the present study was to investigate the reliability and validity of the standardized tool The Grit Scale (Grit-O) among Indian nurses. The sample of 349 nurses were included and assessed with The Grit Scale (Grit-O) developed by Duckworth et al. (2007). Reliability and validity have been proved with the help of exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). The model showed moderate goodness-of-fit. The results supported multidimensionality of the scale. Cronbach's Alpha and Validity measures were also calculated. The 12 item grit scale provides a valid and reliable scale to measure grit among Indian nurses.**

Keywords: **Grit, Exploratory Factor Analysis, Confirmatory Factor Analysis, Nurses, Reliability, Validity**

INTRODUCTION

Various psychological research have brought to light about various factors like intelligence and personality traits play an important role in a person's accomplishments (e.g., academic success) and behaviours (e.g., workers' retention) (Caprara et al., 2011; Deary et al., 2007). Just a short time ago a new facet-grit- was announced as a way of foretelling the educational performance and also worker retention levels (Eskreis-Wrinkler et al., 2014). Grit is theorized as the determination that constructs the possibility to continue the passion and determination towards a long-term goal. In order to encapsulate the real meaning of 'grit', Duckworth et al. (2007) developed The Grit Scale having 12 items to be marked at a five-point likert scale. Even though Duckworth and her colleagues (2007) found satisfactory psychometric properties among their chosen sample, various other researchers like Datu, Valdez and King (2016) found

the contradictory. Such discrepancies indicate that cultural differences could be discovered in conceptualizing grit among samples around the world. Thus, the present research was commenced to explore the factorial structure of the Grit Scale on an Indian sample.

Grit indicates towards the concept of working painstakingly towards a particular goal, putting in persistent efforts and passion in insolence of hardships, adversities, challenges, and complexities. Duckworth et al. (2007) explains grit to specifically compose of two factors- Consistency of interest and Perseverance of efforts. Consistency of interests indicate towards the propensity of concentration and commitment to a vital long-term goal, while perseverance of efforts signifies the magnitude of dedication and work one puts in towards the same long-term goals. An individual who is gritty will perform his/her tasks energetically, maintaining the efforts and interests towards the goal notwithstanding the disappointments, hardships and trails.

Studies have found grit playing an important part in estimating the achievements of an individual in challenging situations (Eskreis-Wrinkler et al., 2014), success in variety of demanding areas comprising the retainment of trainees at West Point Military Academy and also the final rankings in the National Spelling Bees (Duckworth et al., 2007). Grit also successfully helped the researchers assess its role in estimating the Grade Point Average (GPA) amongst adolescents (Duckworth & Quinn, 2009). Moreover, grit was connected to the positive teaching functioning and persistence while considering the encounters related to teaching, especially during the initial years of teaching (Duckworth, Quinn, & Seligman, 2009). Research also stand evidence that grit promotes wellbeing. Singh and Jha (2008) found positive results indicating

that grittier individuals experience superior life satisfaction along with subjective wellbeing.

The process of development of the Grit scale started with Duckworth and colleagues identifying of 27 items and then removing 10 items on account of low internal consistency and redundancy of the items. Then exploratory factor analysis was performed on the remaining 17 items. Five items were then removed as the factor loading for these items were found to be lower than 0.40. 12 items were retained and then presented to confirmatory factor analysis. The two-factor model was accepted. The Grit Scale (Grit-O) with 12 items confirmed good reliability (α=0.85). The Grit-O comprises of two dimensions: Perseverance of efforts and consistency of interest, thus it is a bi-faceted model.

The Grit Scale (Grit-O) has been translated to various languages according to the sample needs of many researchers. For example, Tymeneva et al. (2014) attempted to translate Grit-O to Russian language and also modified some items to avoid the double negative words used together that created ironic meanings for the Russian participants. Analysis using the Item Response Theory of the Russian adaptation stood as support for the two-factor model. Some modified items were loaded wrongly on the other factor, thus, demonstrating an oddity. Likewise, Areepattamannil and Khine (2019) in a study performed on 777 adolescents from Arab found various items from Grit-O to be a misfit with the Rasch structure. Furthermore, the results gathered by Duckworth et al. (2007) revealed unsatisfactory model fit (CFA= 0.83, RMSEA=0.11), thus indicating the need of further improvement.

The scale has been validated on students and adults but scarce on the Indian nursing population. Although the Grit-S version of the scale is used widely along with the translated versions, the original version is still preferred. Lee and Sohn (2013) used the scale on 240 nurses and translated the scale to its Korean version. This motivated the researcher to investigate the psychometric properties of the Grit Scale (Grit-O) among Indian nurses.

METHODOLOGY

Exploratory Factor Analysis and Confirmatory Factor Analysis
Participants and Procedure

A total of 349 (249 female, 100 male) nurses having completed a three year professional degree course-B.Sc Nursing, and working in a hospital setup were included in the sample. The sample was recruited from various cities of Uttar Pradesh, Delhi-NCR and Chandigarh. Their age ranged from 25 years to 45 years. The data was collected through paper and pencil form. Informed consent form was duly filled by the participants indicating their willingness to be involved in the study. Then the subjects were given 20 minutes time to fill in the questionnaire.

Instruments

The English version of the Grit Scale (Grit-O; Duckworth et al, 2007) was used to collect data. It consists of 12 items that taps into perseverance and the consistency of interest for long-term goals. The participants were instructed to read the statements and indicate to what extent the items describe their personality on a five-point Likert scale that ranged from 1 (not at all like me) to 5 (very much like me). Reverse scoring was done for the six items belonging to the consistency of interest dimension. The individuals who reported higher scores tend to survive for their long-term aims in life.

Analytical Approach

EFA was used to examine the theoretical two-factor construct of the Grit-O scale in the Indian nurses' context. Following the analysis, the data was examined using maximum likelihood and Varimax rotation. Measurements including Kaiser-Meyer-Olkin (KMO) value, Bartlett's test of sphericity were estimated.

CFA using AMOS 23 was brought about to compare the competing models and recognize the best fit model. The bi-factor model that comprised of a general factor and two specific factors- perseverance and consistency was tested for the Grit-O with 12 items. Various measurements like that of the ratio of the chi-square value to degrees of freedom (χ^2/df), Goodness of Fit Index (GFI), Adjusted Goodness of Fit Index (AGFI), Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA) along with the Normal Fit Index (NFI) were used to measure model fit.

RESULTS

Exploratory Factor Analysis

The results of the sampling adequacy measures stated the Kaiser-Meyer-Olkin (KMO) value to be 0.725. The Bartlett's test of sphericity was also found significant at 0.01 level having χ^2 (66) = 657.369. These values supported the appropriateness of factor analysis. All the factor loadings were higher than 0.40. The α for the whole scale was calculated to be 0.70 (Cronbach's Alpha). The subscales namely- consistency of interests and perseverance showed acceptable internal consistency through the values of 0.801 and 0.699 respectively. A positive relationship was estimated between the subscales calculating to r=0.132, significant at 0.05 level.

Confirmatory Factor Analysis

The results showed that the bi-factor model is a good fit to the data. The estimated values along with the standard values are showed in Table-1 below.

Table-1: Model fit indices

Model Fit Index	GFI	AGFI	RMSEA	χ^2/df	TLI	CFI
Standard	>.80	>.90	<.08	<5	>.90	>.90
Estimated	.945	.919	.063	2.396	.847	.877

From the above values of model fit indices, it can be clearly understood that the proposed model of the Grit Scale (Grit-O) fits the data real well. The estimated values were discovered in accord to the standard values thus, depicting the estimated two factor model of the Grit Scale in Indian situations is satisfactorily justified by the selected sample of Indian nurses.

The Goodness of Fit Index (GFI)- 0.945, AGFI- 0.919, RMSEA- 0.063 and CMIN/df- 2.396 values are in accord with the standard values, respectively. The values of TLI- 0.847 and CFI- 0.877 are observed to have slightly lower values as compared to the standard values; this brings support to moderately fitting model. Following the model fit indices, the path diagram for validation of the constructs was constructed and the regression weights were also estimated. The path diagram is shown in the figure below:
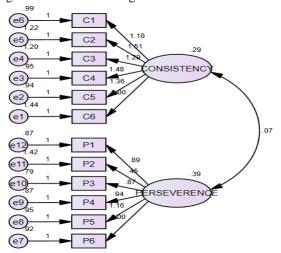

Figure 1: Path Diagram showing Two Factor Model of the Grit Scale on Indian nurses

DISCUSSION

The Grit-O was developed by Duckworth et al. (2007) to measure the non-cognitive personality trait defined by perseverance and consistency for long term goals. Though most studies support the two factor model of the scale, discrepancies were found on the account of cultural dissimilarities in the items. Therefore, the present study aimed to scrutinize the factorial construction of the Grit-O on Indian nurses.

The EFA revealed that the two factor model of the Grit-O having consistency of interest and perseverance as dimension to be a success. The results lie in alliance with the previous discoveries by Duckworth et al. (2009). This explains that the consistency of the model of Grit-O is embraced across diverse cultures. To rephrase it, participants from various cultural backgrounds largely observe that the twelve items describe two different paradigms. Furthermore, the reliability also contributes further backing to the factorial legitimacy of the Grit-O.

The CFA results provide enough exposure to the fact that the data fit the hypothesized model based on the construct proposed by Duckworth et al. (2007). The values obtained are in line with the standard values of goodness fit indices. The standardised factor loadings were all estimated to be significant at 0.01 level.

The two subscales of Grit-O were positively correlated with each other, r=0.132, p<0.05. Cronbach's alpha for the scale was 0.70. The subscales- perseverance and consistency confirmed satisfactory internal

consistency with values of 0.699 and .801 respectively.

CONCLUSION

In inference, the present study demonstrates that the two-factor model of the Grit-O is both rational and appropriate in Indian context and especially on Indian nurses. The discoveries also provide added cross-cultural confirmation to the theoretic structure of the Grit-O. Though, language differences and cultural disparities were detected in the understanding of the items in the scale. Thus, it is suggested that researchers keep caution to guarantee that the participants of the study do not face any struggle in understanding the meaning of the items.

REFERENCES

[1] Caprara, G. V., Vecchione, M., Alessandri, G., Gerbino, M., & Barbaranelli, C. (2011). The contribution of personality traits and self-efficacy beliefs to academic achievement: A longitudinal study. *British Journal of Educational Psychology*, *81*, 78-96. doi: 10.1348/2044- 8279.002004.

[2] Deary, I. J., Strand, S., Smith, P., & Fernandes, C. (2007). Intelligence and educational achievement. *Intelligence*, *35*, 13-21. doi: 10.1016/j.intell.2006.02.0 01.

[3] Eskreis-Winkler, L., Shulman, E. P., Beal, S. A., & Duckworth, A. L. (2014). The grit effect: Predicting retention in the military, the workplace, school and the marriage. Frontiers in Psychology: *Personality Science and Individual Differences*, *5*(36), 1-12. doi: 10.3389/fp syg.2014.00036.

[4] Duckworth, A. L., Peterson, C., Matthews, M. D., & Kelly, D. R. (2007). Grit: Perseverance and passion for long-term goals. *Journal of Personality and Social Psychology*, *92*(6), 1087-1101. doi: 10.1037/0022-351 4.92.6.1087.

[5] Duckworth, A. L., & Quinn, P. D. (2009). Development and validation of the Short Grit Scale (Grit-S). *Journal of Personality Assessment*, *91*(2), 166-174. doi: 10.10 80/00223890802634290.

[6] Lee S, & Sohn YW. (2013). What are the strong predictors of academic achievement? -Deliberate practice and grit. *Korean Journal of School Psychology*, *10*(3), 349–366. doi: 10.16983/kjsp.2013.10.3.349.

[7] Singh, K., & Jha, S. D. (2008). Positive and negative effect, and grit as predictors of happiness and life satisfaction. *Journal of the Indian Academy of Applied Psychology*, *34*, 40-45. Retrieved from http://medind.n ic.in/jak/t08/s1/jakt08s1p40.pdf.

[8] Datu, J. A. D., Valdez, J. P. M., & King, R. B. (2016). Perseverance counts but consistency does not! Validating the short Grit Scale in a collectivist setting. *Current Psychology*, *35*, 121-130. doi: 10.1007/s12144- 015-9374-2

[9] Duckworth, A. L., Quinn, P. D., & Seligman, M. E. (2009). Positive predictors of teacher effectiveness. *The Journal of Positive Psychology*, *4*(6), 540-547. doi:10.1 080/17439760903157232.

[10] Tyumeneva, Y., Kuzmina, J., & Kardanova, E. (2014). IRT Analysis and validation of the Grit Scale: A Russian investigation. *SSRN Electronic Journal*. Retrieved from https://www.h se.ru/data/2014/11/19/1101023281/24PSY2014. pdf

[11] Areepattamannil, S., & Khine, M. S. (2018). Evaluating the psychometric properties of the Original Grit Scale using Rasch Analysis in an Arab adolescent sample. *Journal of Psychoeducational Assessment*, *36*, 856-862. doi: 10.1177/0734282917719976.