Development and Validation of Domain-Specific Grit Scale for Prisoners in Criminal Justice System in Kenya

Mahlon Juma

Adventist University of Africa, Ongata Rongai, Nairobi, Kenya

DOI: https://dx.doi.org/10.47772/IJRISS.2024.817PSY0001

Received: 31 October 2024; Accepted: 05 November 2024; Published: 10 December 2024

ABSTRACT

Grit – defined as perseverance and passion for long-term goals has been considered a prognosticator and requisite trait of success and achievement and has been utilizing the domain-general Grit-S - for its good internal consistency, and test-retest stability. The domain-specific aspects of grit are required and a valid tool has been an imperative need. This quantitative study introduced the Prison Grit Scale (P-GS) to recidivists (N =418) selected through purposive and systematic random sampling to ascertain the reliability and validity using the partial least squares structural equation modeling. The results demonstrate that P-GS possesses good psychometric properties. The factor loadings of courage, conscientiousness, excellence, resilience, and optimism were between 0.754 - 0.836, thus *acceptable*. P-GS's composite reliability of 0.895 is acceptable; a value greater than the recommended 0.70, and the rho-a value of 0.857 falls between Cronbach's Alpha (0.853) and composite reliability (0.895). The convergent validity's average variance extract was 0.631; above the accepted threshold of 0.50. Lastly, discriminant validity using Fornell and Larcker indicator loadings scored 0.794 and fell between 0.65 and 0.85. The conclusion is that P-GS has good internal reliability and convergent and discriminant validity. This implies the support of domain-specific aspects of grit and can benefit positive psychology researchers in the criminal justice system. A convergent parallel design in a mixed method is recommended for future research, utilizing more women respondents.

Keywords: recidivism, grit scale development, grit, prisoner

INTRODUCTION

Grit – defined as perseverance and passion for the long term has been considered a prognosticator and requisite trait of success and achievement beyond IQ has relied on Grit - Scale. Credited to Duckworth, et al., (2007), Grit-S is often preferred for its demonstrated internal consistency, test-retest stability, and convergent and discriminant validity (Duckworth & Quinn, 2009). The domain-general aspects of Grit-S have been administered in numerous fields (Akos & Kretchmar, 2017; Hill et al., 2016; Crane et al., 2020; Duckworth, 2016b; Hodge et al., 2018; Muenks et al., 2017; Schimschal et al., 2020). However, there's a dearth of literature on domain-specific grit scales for criminal justice systems. Duckworth and Quinn (2009) called for exploration of the domain-specific versus domain-general aspects of grit. In consonance, Schimschal et al. (2020) recommended further research to understand the best practice approaches for developing grit at both an individual and collective level. In response to the call of Duckworth and Quinn's (2009), Schimschal et al. (2020), and Li et al. (2023), the present study sought to create and seek valid evidence for a domain-specific Grit scale for recidivists in the criminal justice system in Kenya. The related literature follows the major studies on general and occupation-specific grit. It was hypothesized that grit would create an acceptable scale.

The grit trajectory moves along the thoughts of Galton, Cox, and William James to Angela Duckworth (Eskreis-Winkler et al., 2015a). James recommended that psychologists direct their efforts at two main

questions namely 1) what is the full range of human abilities? 2) through what diverse means are these abilities unleashed? In the analysis of the questions, Duckworth and colleagues opined that the past century witnessed more progress toward the first challenge (question) than the second. That showed how little was known about traits that enabled the expression of the abilities in which people are now well-versed. The attention was laid on the cognitive domain compared to the hares in the story of the hare-tortoise race. The earliest literature examined the predictors of achievement relied on non-cognitive constructs such as self-efficacy, optimistic explanatory style, and locus of control. Duckworth challenged scholars to think seriously now about the tortoises and what keeps them going.

Angela L. Duckworth, a former seventh-grade math teacher and contemporary and American psychologist, was greatly influenced by the works of William James who in 1907 posited that man was making use of only a small part of our possible mental resources; yet men the world over possessed amounts of resource, which only exceptional individuals pushed to their extremes of use (p. 322-323). Duckworth (2016b) noticed that intelligence quotient (IQ) was not a consistent determiner of who would perform best or worst in the class and was triggered to study the predictors of success and achievement. Across Duckworth‘s original (2007) studies, there was one variable that emerged as a significant predictor of success outcomes over and beyond that accounted for by IQ — grit.

Grit has been defined in different ways. It is non-cognitive skills or soft skills to economists (Bliss & Jacobson, 2020), personality traits to psychologists, and character traits to educators (Dweck et al., 2014). It is the tenacity and personal drive that allows one to rise and try again (Duckworth, 2016b), the ability to continue despite temporary setbacks which in turn are used as stepping stones for success; the ability to strenuously pursue long-term goals despite obstacles, and to maintain effort and interest over years despite failure, adversity, and plateaus in progress (Nemmi et al., 2016).

Grit comes in different scales - a 12-item Scale (Grit-O), an 8-item Scale (Grit-S), and an 8-item Scale for children (Duckworth et al., 2007). Grit-S is a reliable instrument, with good internal consistency for the composite grit score (α = .73 to .83), as well as for its two subscale scores (Consistency of Interests, α = .73 to .79; Perseverance of Effort, α = .60 to .78). The Grit-S is often preferred for its demonstrated internal consistency, test-retest stability, convergent and discriminant validity (Duckworth & Quinn, 2009). The Scales have been administered to participants in challenging environments including 2 samples of adults (N=1, 545 and N=690), grade point average among Ivy League undergraduates (N=138), retention in two classes of the US Military Academy (N=1, 218) and West Point cadets (N=1,308), and the ranking of children at the National Spelling Bee (N=175) (Duckworth et al., 2007, 2016b).

Grit-S has been administered not only in education and the military (Duckworth, 2016b) but also in different fields such as medicine, science, and competitive sports, (Maddi et al., 2012), suicidal ideation (Kleiman et al., 2013), to collegiate students (Muenks et al., 2017; Akos & Kretchmar, 2017), in sports (Crane et al., 2020) in business, engineering, healthcare (Hills et al., 2016; Hodge et al., 2018; Schimschal et al., 2020). Others included high school students in the Philippines (Datu & Restubog, 2020), nursing students in Korea (Kim et al., 2020), 9 surgical specialties (Salles et al., 2014), and a large group of leaders surveyed across the United States (Seguin, 2019). Park et al. (2020) examined how grit and mindset influenced each other among adolescents in the face of challenges, and found that grit and growth mindset were distinct but mutually reinforcing.

Literature (Arco-Tirado et al., 2018; Kim & Lee, 2015; Kramer et al., 2017; Schmidt et al., 2017; Tyumeneva et al., 2017), showed that the grit scales have been translated into multiple languages, including Russian, Japanese, German, Korean, Spanish, and Turkish. While literature (Wong et al., 2018; Crede, et al., 2017; Vazsonyi et al., 2019) questioned the validity of the grit scales due to the strong associations between the constructs of grit, conscientiousness, and self-control, others (Duckworth & Gross, 2014; Schmidt et al., 2017) based on the results of other studies dismissed these claims asserting that grit is indeed a unique psychological variable worthy of investigation.

The Korean version of the Grit-S showed good psychometric qualities and exhibited MI across gender and time in Korean teenagers, according to Bae et al.'s (2024) assessment of the short-form scale. The Chilean Version of the Oviedo Grit Scale was determined to be valid and reliable in a study on its psychometric qualities conducted in Chile (Postigo et al., 2023). When Datu et al. (2023) evaluated the triarchic model of grit scale's psychometric validity among Hong Kong high school students, they discovered that it was applicable and consistent. A study that looked at the psychometric qualities of the grit scale's Ukrainian translation (Yukhymenko-Lescroart & Voiedilova, 2023) was deemed to be a legitimate and trustworthy instrument for evaluating Ukrainian adults' consistency of interests and perseverance of effort.

Courage. This is the ability to persevere and keep going after failure (DeYoung, 2013; Duckworth, 2016b), the ability to effortfully persist in the face of struggle, and the ability to grow amidst obstacles when circumstances are filled with failure and are less than ideal (Clark, et al., 2019). It is the tenacity and personal drive that allows people to rise, speak out ideas, and try again without giving up (Duckworth, 2016b). Gritty individuals underscored the valuable lessons in failure and defeat and the vulnerability of perseverance was requisite for high achievement. Courage was likened to a muscle; it has to be exercised daily to grow; if ignored, it will atrophy (Duckworth, 2016b).

Conscientiousness. This is the dedication of effort to build skill and make skill productive (Duckworth, 2016b). On the famous Big Five - Openness, Conscientiousness, Extroversion, Agreeableness, and Neurotic (OCEAN), Duckworth posited that conscientiousness was the most closely associated with grit and used conscientiousness to mean being careful painstaking, and meticulous. Conscientiousness and success were important and required individuals to commit to going for the gold rather than just show up for practice. Or, to put it mildly, one would rather be a racehorse than an ass (Duckworth, 2016b). Sudina et al., (2021) indicated that grit overlapped with achievement aspects of conscientiousness but differed in its emphasis on patience or stamina rather than short-term intensity.

Excellence. Literature (Dhiman, 2020; Perlis, 2013) postulated the historicity of excellence as emanating from the stoic school of ancient Greco-Roman philosophy, from the Greek word Arete, associated with the notion of fulfillment of purpose or function, moral virtue (arête) used as cultivating excellent moral character. Excellence is the process of making and sustaining progress as a priority over the achievement of perfection. Dhiman (2020) posited that it lays great emphasis on resilience and mental freedom gained from living a life of moral virtue by nature, thereby gaining a state of ‘imperturbable tranquility. Completing tasks was part of excellence.

Excellence strives for accuracy as seen by Sigmundsson et al. (2020) in Norway that excellence in different skills requires a growth mindset. Excellent individuals completed tasks as observed by Tewell (2020) where individuals with grit and a growth mindset manifested an attitude of seeking, striving, finding, and never yielding until the task is completed. Excellence brooded achievement as seen among mothers entering university in Australia (Braund et al. (2020) who despite facing competing challenges, demonstrated the ability to succeed. McCabe (2016) gave an example of how grit benefitted nurses who used a combination of excellence, determination, and compassion in their practice and were often described as having grit – achievers.

Resilience. From the Latin *resilia*, resilience etymologically means the action of rebounding. To Caton (2020), resilience is the ability to bounce back from adversities while to Zolli (2012), it is ‘the ability of people, communities, and systems to maintain their core purpose and integrity among unforeseen shocks and surprises’ (p. 43). Literature (Caza et al., 2020; Lamberton et al., 2019), observed that resilient people remained calm during life’s stressful events. Resilient people are self-reliant. Bliss and Jacobson (2020) grit’s resilience was a non-cognitive trait associated with extrinsic motivation, and attitude and was increasingly recognized as an important skill to identify and develop in medical professionals.

Literature (Caza et al., 2020; Lamberton et al., 2019) opined that resilient people relied on their moral compass, and religious or spiritual practices, trained to be physically fit, and were emotionally strong.

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume VIII Issue XVII November 2024 | Special Issue on Psychology

Resilience overcomes peer pressure. To Duckworth (2016b) resilient individuals manifested an attitude of seeking, striving, finding, and never yielding, and appraised situations without distortion and positive feedback. Resilient people stick to goals. Caton (2020) and Zolli (2012) added that resilience combined optimism, creativity, and confidence, which together empowered an individual to re-appraise situations and regulate emotion. This virtue was a behavior that many social scientists referred to as 'hardiness' or 'grit.'

Optimism. This trait does not despair amidst challenging and tough situations where high-level performance is required (Duckworth, 2016b). Optimism reflects on setbacks as temporary. Dale et al. (2018) in consonance with Arya and Lal (2018) affirmed that optimists not only persisted in the face of difficulty but also persevered through difficulty until the end. Optimism hopes that all will turn out for the good, as seen among patients with cardiovascular health, stroke risk, cancer prognoses, physical symptoms, and pain The optimists look forward to a better future. Under highly stressful conditions, optimists were able to lower stress and stabilize the stress hormone cortisol (Martin et al., 2015). Optimists are motivated. Loftus et al. (2020) posited that surgeons who often faced seemingly inescapable challenges and failures, with unsustainable burnout rates still had optimal performance as a moral imperative.

The Scales used include the 12-item Scale, 8-item Scale, and 8-item Scale for children (Duckworth et al., 2007). In addition to these Scales, some researchers have gone further to adapt grit scales for specific populations and contexts. For instance, in sports, Cormier et al. (2019) adapted the Grit–O to assess grit in student-athletes, Park et al. (2020) utilized the 5-item scale with middle schoolers to evaluate their sustained perseverance and passion, while Sturman and Zappala-Piemme (2017) utilized a 12-item Grit Scale for Children and Adults with a lower reading level than Grit–O (Grades 4–5 compared to Grades 7–8). In concinnity, Clark and Malecki (2019) utilized a 10-item Academic Grit Scale, more suitable for adolescents. The Scales were in favor of domain-general aspects of grit.

Besides, a modified Grit–O was utilized to examine the predictive validity of grit in a sample of English as a foreign language learners in Japan using Rasch analysis (Kramer et al., 2017), with the general grit ($q = .39$, $p = .035$) and a small association between participants' grittiness and the number of words read during the extensive reading task ($q = .23$, $p = .056$). Robins (2019) employed Grit–O to examine the role of grit in the retention and academic achievement of English as a second language online learners studying in the US. Mooradian, et al., (2016) surveyed a sample of 281 Austrian entrepreneurs using 204 on the scale. Wong et al. (2018) measured the levels of grit, stress, and anxiety in emergency physicians in an urban medical center and found ($q = .70$, $p < .01$).

Notwithstanding, this utility Duckworth and Quinn (2009) raised questions about whether grit was a domain-general trait or whether an individual might possess various levels of grit depending on career, personal relationships, hobbies, and facets of life. Schimschal, et al. (2020) recommended further research to understand the best practice approaches for developing grit at both an individual and collective level.

Using stepwise regression analysis, reliability analysis, and CFA, Mikami (2022) aimed to reexamine the validity and reliability characteristics of the L2 Grit scale and discovered that it was a significant predictor across all models that were assessed. When Posamak et al. (2023) developed a grit measuring scale for Thai dramatic arts students, they discovered that the scale had good validity and great reliability, as shown by goodness of fit indices that met the criteria. The results of a different study that used Chinese and US samples to assess the psychometric grit scale confirmed the scale's multidimensionality and suggested that further research be done to examine the connections between the two components of grit and career outcomes (Li et al., 2023).

In response to Schimschal et al. (2020) and Duckworth and Quinn's (2009) call 'to explore the domain-specific versus domain-general aspects of grit' (p. 173), and Li et al. (2023) to explore the components, the present study sought an empirical base on the role of domain-specific aspects of grit among prisoners in Kenya's criminal justice system. The study sought the validity of the self-constructed literature-based

instrument to measure the grit of recidivists. The related literature follows the major studies on general and occupation-specific grit. It was hypothesized that P-GS would be an acceptable scale. Given the growing need for a solid base of evidence for domain-specific and occupation-specific grit, the role of grit among inmates deserves empirical attention. The data collected explored the following research questions:

1. What is the reliability of the instrument?
2. What is the validity of the instrument?

METHODOLOGY

Research Design

The study is a quantitative study utilizing descriptive statistics employing the partial least squares structural equation model (PLS-SEM) to investigate the validity of PGS for recidivists in criminal justice systems in Kenya. PLS-SEM) is used when the structural model is complex - many constructs and model relationships. It enables the estimation of complex models with many constructs, indicator variables, and structural paths without imposing distributional assumptions on the data (Hair, et al., 2019; Sarstedt et al., 2017a). SEM is preferred because it does path modeling, handles complex paths, and does regression analysis with latent variables (Hayes, 2018). Besides, the PLS-SEM algorithm makes it possible to compute measurement and structural model relationships separately instead of simultaneously even with s small sample size (Hair et al., 2019).

Population and sampling techniques

The participants for the study consisted of recidivists from 9 maximum prisons, 129 other facilities, and 42, 596 inmates across the 8 former provincial territories in Kenya. *Purposive sampling* was used to select the Maximum, Main, and Medium prison facilities. The participants came from a total of five prisons. *Purposive sampling* was used to obtain the sample size of 509 recidivists using several ways; 1) gleaning from the prison records, 2) honest self-disclosure, a survival prison *culture* in prisons, 3) recidivists identified friends, 4) co-principal Investigator's identification of repeat offenders. During the separate assembly of recidivists in an enclosed room, the last verification was done. *Systematic random sampling* was used to select the required quota from a pool of recidivists by use of neatly cut and folded papers. While squatted or seated, the participants randomly picked papers from a container and even/odd-numbered participants were picked. Thereafter, the selected participants were given the questionnaire which was answered under tight security presence and health protocols. The study utilized a sample size of 200 for the pilot study (Hair et al., 2007; MacCallum & Austin, 2000), and embracing the suggestion of Hair et al., (2019), a total of 509 questionnaires were distributed; out of which 418 questionnaires were retrieved, resulting in the response rate of 81%. The study included participants aged above 18 years, regardless of education level, religious affiliation, and sex at birth. They had to be proficient in the use of the English language, be physically fit to sit for at least an hour, be convicts, not civil prisoners, and with sentences 6 months and above.

Instrumentation

A self-constructed questionnaire was preferable for inmates because a hardcopy questionnaire is convenient, a normal class-like procedure, and easily administered. Ten experts at the Adventist University of the Philippines did the external validation of the instrument. A pilot study involving 300 recidivists took care of the internal validation. The Confirmatory Factor Analysis (CFA) reduced the original 35 questions to 15, each sub-variable with 3 indicators. The results from CFA on a 4-scale Likert scale indicated a good and acceptable Cronbach's Alpha; 0.883 for excellence, 0.778 for optimism, alpha 0.832 for resilience, alpha 0.763 for courage, and alpha. 0.760 for conscientiousness. Thus, all 15 indicators were within the *Good* and *Acceptable* range of internal consistency.

Data analysis

PLS-SEM algorithm was used to compute the reflective measurement and structural models. First, measurement invariance of composite models (MICOM) was performed to enable the application of multigroup group analysis (MGA) in the categorical demographics. There was partial MICOM. Secondly, the study examined the indicator loadings where loadings above 0.708 are recommended. Such loadings indicate that the construct explains more than 50 percent of the indicator variance. Thirdly, internal consistency reliability utilized Cronbach's alpha, rho-a, and Jöreskog's (1971) composite reliability to measure the extent to which all the variables in the scale were positively related to each other in terms of unidimensionality of a set of scale items (Hair et al., 2019). Moreover, when the rho-a value must fall between Cronbach's alpha and composite reliability and greater than 0.70. Fourthly, convergent validity was examined to measure the extent to which the construct converges to explain the variance of its items using the average variance extract (AVE). The acceptable AVE is 0.50 or higher to indicate that the construct explains at least 50 percent of the variance of its items (Hair et al., 2019; Sarstedt et al., 2017a). Fifth, discriminant validity measured the extent to which a construct was empirically distinct from other constructs and was measured using heterotrait–monotrait (HTMT), whose conservative threshold value suggested is lower than 0.90 or 0.85 (Hair et al., 2019; Henseler et al., 2016). For the cross-loading of Fornell and Larcker (1981), the acceptable range of indicator loadings should be between 0.65 and 0.85.

Ethical Considerations

The research went through strict clearances. The study received approval from the University's Ethics Review Board (AUP- ERB) and endorsement from the AVPA - Centre of Graduate Studies of the Adventist University of the Philippines, clearance from the Office of the Ethical Review Committee at Technical University – Mombasa, research permit from the National Commission for Science Technology and Innovation (NACOSTI), a letter of authority from the Commissioner - General of Kenya Prison Service, copies of notification were sent to County Governor, County Commissioner and County Director of Education for acknowledgment. The Regional Prison Commander was notified by copies. Even with such documents, the mandate to access the inmates rested with the Prison Officer-In-Charge. As per requirement, identities of specific locations and periods, names and numbers of personalities involved, contact offices and prison facilities involved (Prison Act Cap. 90), and NACOSTI were disclosed.

Confidentiality and privacy were maintained; the storage of data, and interests of respondents were protected and were treated fairly and equally in terms of participation. The respondents were given adequate information concerning the research, given a quiz to verify understanding, asked to decide on participation (some left), given the informed consent to mark or sign a consent form, given the questionnaire**,** and were free to share concerns while in the room/space. There was a contingency program in case of disturbances.

DATA ANALYSIS AND RESULTS

Participants

There 350 were males comprising 83.7% and 68 females comprising 16.3% of the total population. Out of the 418 respondents, 39 and below were 317 making 75.6%, while ages 40 and above 40 – 60 were 101 comprising 24.2% of the total population. There were more Post Certificate Primary Education (*Post* KCPE) than Kenya Certificate of Primary Education (KCPE). Specifically, *Post* KCPE were 215 or 51.4% while KCPE were 203 or 48.6% of the total population. The distribution by religious affiliation had fewer Catholics 115 or 29% than 275 or 71% Protestants. Of the 418 respondents, 166 were inmates with violent crimes comprising 39.7%, and 252 were inmates with initial non-violent offenses comprising 60.3%. In terms of distribution of the first length of sentences**,** there were 259 had first sentences 3 years and below comprising 62%, and 159 had first sentences 3 years and above comprising 32% of the total population. In terms of the current type of offense, there were 150 inmates with current violent offenses comprising 35.9%, and 268 inmates with non-violent crimes comprising 64.1% of the total population. There were 239 with

current length of sentences 3 years and below comprising 57.2%, and 179 inmates with sentences 3 years and above comprising 42.8% of the total population.

Reliability and Validity analysis

Measurement Invariance of Composite Models (MICOM). PLS-SEM was used to examine the measurement invariance of composite models (MICOM) to enable the application of multigroup group analysis (MGA) in the demographics of participants (Eberl, 2010; Henseler et al. 2016). Using the three-step procedure developed by Henseler, et al., (2015) to assess MICOM, namely 1) configural invariance, 2) compositional invariance, and 3) the equality of composite mean values and variances, the results showed a partial MICOM. In the configural invariance, the researcher assessed three things namely, identical indicators, identical data treatment, and identical algorithm settings/criteria were attained by using the recommended sample size for a statistical power of 80% (Cohen, 1992; Hair et al., 2014). The composite invariance using permutation-based confidence intervals allowed determining if a composite had correlations in Group A and Group B and found out that the values were equal or greater than 5% quantile. Based on these criteria, composite invariance was established. Composite equality was assessed using the mean original difference and variance original difference to be between 2.5% and 97.5% boundaries. If both conditions are met, then it is *full invariance of* MICOM. If one of the conditions is met, then it is *partial invariance*. The results show that some of the conditions were met, thus a *partial invariance* of MICOM was established. MICOM preceded MGA which facilitated the assessment of categorical variables.

The first step in assessing the model was examining the loadings and all the items in the model. Even though a factor loading of over 0.70 is desirable, social science researchers often obtain weaker loadings (<0.70) (Vinzi et al., 2010). The loadings of the indicators are 0.765 for courage, 0.754 for conscientiousness, 0.819 for excellence, 0.836 for resilience, and 0.796 for optimism. The loadings above 0.70 indicate that the construct explains more than 50 percent of the indicator's variance, thus providing an acceptable item reliability (Hair et al., 2019; Sarstedt et al., 2017a). Thus, the grit scale has an acceptable item reliability. Reliability was attained.

The first step in assessing the model was examining the loadings and all the items in the model. Even though a factor loading of over 0.70 is desirable, social science researchers often obtain weaker loadings (<0.70) (Vinzi et al., 2010). The loadings of the indicators are 0.765 for courage, 0.754 for conscientiousness, 0.819 for excellence, 0.836 for resilience, and 0.796 for optimism. The loadings above 0.70 indicate that the construct explains more than 50 percent of the indicator's variance, thus providing an acceptable item reliability (Hair et al., 2019; Sarstedt et al., 2017a). Thus, the grit scale has an acceptable item reliability. Reliability was attained.

Convergent validity measures the extent to which the construct converges to explain the variance of its items and the metric utilized is the average variance extract (AVE). The acceptable AVE is 0.50 or higher indicating that the construct explains at least 50 percent of the variance of its items (Hair et al., 2019; Sarstedt et al., 2017a). The results indicate that the AVE of the grit scale was 0.631. This means that the indicator loadings indicated that the grit scale had good internal reliability and convergent validity. Convergent validity was attained *(see Table 3).*

Discriminant validity is the extent to which a construct is empirically distinct from other constructs and is measured using heterotrait–monotrait (HTMT). The heterotrait–monotrait ratio of correlations is the mean value of the item correlations across constructs relative to the (geometric) mean of the average correlations for the items measuring the same construct. (Henseler et al., 2015). With the upper bound of the 95 percent confidence interval, the (conservative) threshold value suggested is lower than 0.90 or 0.85 (Hair et al., 2019; Henseler et al., 2015). The cross-loadings and discriminant validity values being within the accepted range showed that grit scale and recidivism are distinct (Hair et al., 2019; Sarstedt et al., 2017a). For the cross-loading of Fornell and Larcker (1981), the acceptable range of indicator loadings should be between

0.65 and 0.85. The results showed an indicator item cross-loading of 0.794. This indicates that discriminant validity was attained (*see Table 3).*

The measurement model was assessed to establish the factor loadings, reliability, and validity of the instrument (*see Table 3*).

Table 3 Factor loadings, reliability, and validity

Latent variable	**Convergent Validity**		**Internal Consistency reliability**			**Discriminant Validity**
	Loadings[a]	AVE[b]	Composite reliability rho[c]	Reliability rho *A*[d]	Cronbach's Alpha	
	>0.70	>0.50	>0.70	>0.70	>0.70-0.90	
Courage	0.765					
Conscientiousness	0.754					
Excellence	0.819					
Resilience	0.836					
Optimism	0.796					
GRIT		**0.631**	**0.895**	**0.857**	**0.853**	**0.794**

a. All item Loadings ≥ 0.5 indicates Indicator Reliability (Hair, et al., 2019; Hulland, 1999, p. 198)
b. All Average Variance Extracted (AVE) > 0.5 indicates Convergent Validity (Bagozzi & Yi, 1966; Fornell & Larcker, 1961; Hair, et al., 2019)
c. All Composite Reliability (CR) > 0.7 indicates internal consistency (Hair, et al., 2019)
d. All Cronbach's Alpha > 0.7 indicates Indicator Reliability (Hair, et al., 2019; Nunnally, 1978)
e. Discriminant Validity - Fornell and Larcker Criterion between is 0.65 and 0.85) (Fornell and Larcker (1981

The results show that the PGS is an acceptable measure of the grit of the inmates in Kenya, as shown by the factor loadings, reliability, and validity. The implication is that prisoner's perseverance and passion for long-term goals identified according to the extent to which they exhibited courage, conscientiousness, resilience, optimism, and excellence can now be understood by the use of P-GS. The scale will be beneficial for researchers focusing on positive psychology aspects in criminal justice systems. The scale provides additional knowledge in the field of study.

There are limitations in this study that should be addressed. To make the results more generalizable, it would be better to conduct the study with more women. Another limitation is the more restrictions in interaction caused by social distancing. This impeded scrutiny of respondents during the answering of the questionnaires. Since validation is a continuous and endless process, future researchers will employ multiple methods to validate the scale.

REFERENCES

1. Akos, P., & Kretchmar, J. (2017). Investigating grit as a non-cognitive predictor of college success. *The Review of Higher Education*, *40*(2), 163-186.
2. Arco-Tirado, J. L., Fernandez-Martın, F. D., & Hoyle, R. H. (2018). Development and validation of a Spanish version of the Grit–S Scale. *Frontiers in Psychology*, 9, https://doi.org/10.3389/fpsyg.2018.00096.
3. Arya, B., & Lal, D. S. (2018). Grit and sense of coherence as predictors of well-being. *Indian Journal of Positive Psychology*, *9*(1), 169–172. https://doi:10.15614/ijpp.v9i01.11766
4. Bae, S. W., Kim, J. G., Park, B. S., Lee, K., & Park, J. (2024). Psychometric properties and measurement invariance of the short form of grit scale in Korean adolescents. *Plos one*, *19*(1), e0296795.

5. Bliss, R., & Jacobson, E. (2020). Doctor of Physical Therapy Student Grit as a Predictor of Academic Success: A Pilot Study. *Health Professions Education*. https://doi.org/10.1016/j.hpe.2020.06.006
6. Bliss, R., & Jacobson, E. (2020). Doctor of Physical Therapy Student Grit as a Predictor of Academic Success: A Pilot Study. *Health Professions Education*. https://doi.org/10.1016/j.hpe.2020.06.006
7. Braund, A., James, T., Johnston, K., & Mullaney, L. (2020). Grit-ability: Which Grit Characteristics Enable Success for Mothers Entering University? *Student Success*, *11*(1), 22+.
8. Buckingham, A., & Richardson, E. J. (2020). The relationship between psychological resilience and pain threshold and tolerance: optimism and Grit as Moderators. *Journal of Clinical Psychology in Medical Settings*, 1-11. https://doi.org/10.1007/s10880-020-09731-7
9. Carmel, R., & Badash, M. (2018). Views on attrition and retention among beginning English as a foreign language (EFL) teachers in Israel and implications for teacher education. *Teaching and Teacher Education*, 70, 142–152.https://doi. org/10.1016/j.tate.2017.11.014.
10. Caton, M. T. (2020). The impact of spirituality, social support, and self-esteem on the resilience of Haitian nurses: Implications for nursing education. *Archives of Psychiatric Nursing*. https://doi.org/10.1016/j.apnu.2020.08.006
11. Caza, A., Caza, B. B., & Baloochi, M. E. (2020). Resilient personality: is grit a source of resilience? In *Research Handbook on Organizational Resilience*. Edward Elgar Publishing. https://doi.org/10.4337/9781788112215
12. Clark, K. N., & Malecki, C. K. (2019). Academic Grit Scale: Psychometric properties and associations with achievement and life satisfaction. *Journal of School Psychology*, 72, 49–66. https://doi.org/10.1016/j.jsp.2018.12.001
13. Clark, L. T., Lanners, T., Blecha, M., Lanners, H., & Eskitch, P. (2019). Develop Grit: How do you develop grit in the student who folds under pressure? *American Music Teacher*, *68*(4), 8–10.
14. Cohen, J. (1992). A power primer. *Psychological bulletin*, *112*(1), 155.
15. Cormier, D. L., Dunn, J. G. H., & Causgrove Dunn, J. (2019). Examining the domain specificity of grit. *Personality and Individual Differences*, 139, 349–354. https://doi.org/10.1016/j.paid.2018.11.026.
16. Crane, A., DaCosta, A., Webbe, F., & Logalbo, A. (2020). A-10 Grit Predicts Depression, Anxiety, and Subjective Cognitive Complaints Despite Normal Cognitive Performance in College Athletes. *Archives of Clinical Neuropsychology*, *35*(5), 606-606. https://doi.org/10.1093/arclin/acaa036.10
17. Credle, M., Tynan, M., & Harms, P. (2017). Much ado about grit: A meta-analytic synthesis of the grit literature. Journal of Personality and Social Psychology, 113, 492–511. https://doi.org/10.1037/pspp0000102.
18. Dale, G., Sampers, D., Loo, S., & Green, C. S. (2018). Individual differences in exploration and persistence: Grit and beliefs about ability and reward. PLoS ONE, *13*(9), 1–17. https://doi.org/10.1371/journal.pone.0203131
19. Datu, J. A. D., & Restubog, S. L. D. (2020). The emotional pay-off of staying gritty: linking grit with social-emotional learning and emotional well-being. *British Journal of Guidance & Counselling*, 1-12. https://doi.org/10.1080/03069885.2020.1758922
20. Datu, J. A. D., Fong, R. W. T., Buenconsejo, J. U., & Shek, C. Y. C. (2023). Psychometric validity of the triarchic model of grit scale among high school students in Hong Kong. *Psychology in the Schools*, *60*(12), 5115-5123.
21. Dyantari, K. R., & Simarmata, N. (2023). The role of grit for college students in Indonesia. *Insight: Jurnal Ilmiah Psikologi*, *25*(2), 18-29.
22. DeYoung, C. G. (2013). The neuromodulator of exploration: A unifying theory of the role of dopamine in personality. *Frontiers in human neuroscience*, *7*, 762.
23. Dhiman, S. (2020). More than Happiness: A Stoic Guide to Human Flourishing. *The Palgrave Handbook of Workplace Well-Being*, 1-40.
24. Duckworth, A., L. (2016). *Grit: the power of passion and perseverance*. New York: Scribner.
25. Duckworth, A. (2016a). Don't grade schools on grit. *New York Times.* NY. http://www.nytimes.com/2016/03/27/opinion/sunday/dont-grade-schools-on- grit.html
26. Duckworth, A. (2016b). *Grit: The power of passion and perseverance*. New York, NY: Scribner.

27. Duckworth, A., Peterson, C., Matthews, M., & Kelly, D. (2007). Grit: Perseverance and passion for long-term goals. *Journal of Personality and Social Psychology, 92*, 1087–1101. https:// doi:10.1037/0022-3514.92.6.1087 PMID: 17547490
28. Duckworth, A., & Quinn, P. (2009). Development and validation of the short grit scale (Grit–S). *Journal of Personality Assessment, 91*(2), 166–174. https://doi:10.1080/00223890802634290 PMID: 19205937
29. Dweck, C. S., Walton, G. M., & Cohen, G. L. (2014). Academic Tenacity: Mindsets and Skills that Promote Long-Term Learning. *Bill & Melinda Gates Foundation*.
30. Eberl, M. (2010). An application of PLS in multi-group analysis: The need for differentiated corporate-level marketing in the mobile communications industry. In *Handbook of partial least squares* (pp. 487-514). Springer, Berlin, Heidelberg.
31. 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 marriage. *Front Psychology*, 5, 36. https://doi.org/10.3389/fpsyg. 2014.00036 PMID: 24550863
32. Fornell, C., & Larcker, D. F. (1981). Structural equation models with unobservable variables and measurement error: Algebra and statistics, 382-388.
33. Hair, J.F., Hult, G.T.M., Ringle, C.M. and Sarstedt, M. (2017a), A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM), Sage, Thousand Oaks, CA.
34. Hair, J.F., Hult, G.T.M., Ringle, C.M., Sarstedt, M. and Thiele, K.O. (2017b). Mirror, Mirror on the wall: a comparative evaluation of composite-based structural equation modeling methods. *Journal of the Academy of Marketing Science*, *45*(5), 616-632.
35. Hair, J. F., Money, A. H., Samouel, P., & Page, M. (2007). Research methods for business. *Education+ Training*.
36. Hair Jr, J. F., Sarstedt, M., Hopkins, L., & Kuppelwieser, V. G. (2014). Partial least squares structural equation modeling (PLS-SEM): An emerging tool in business research. *European Business Review.*
37. Hair, J.F., Risher, J.J., Sarstedt, M. and Ringle, C.M. (2019), When to use and how to report the results of PLS-SEM. *European Business Review*, 31(1), 2-24. https://doi.org/10.1108/EBR-11-2018-0203
38. Hamdan, M., Haddad, B. I., Alshrouf, M. A., Al-Ani, A., Alisi, M. S., Hammad, Y., ... & Kawasmi, S. (2023). Burnout, grit and resilience among Jordanian orthopedic surgeons: a cross-sectional study. *BMC Medical Education*, *23*(1), 593.
39. Hayes, A. F. (2018). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. Guilford publications.
40. Henseler, J., Ringle, C. M., & Sarstedt, M. (2016), Testing measurement invariance of composites using partial least squares. *International Marketing Review*, 33(3), 405-43. https://doi.org/10.1108/IMR-09-2014-0304.
41. Hill, P., Burrow, A., & Bronk, K. (2016). Persevering with Positivity and Purpose: An Examination of Purpose Commitment and Positive Affect as Predictors of Grit. *Journal of Happiness Studies, 17*(1), 257–269. https://doi.org/10.1007/s10902-014- 9593-5
42. Hodge, B., Wright, B., & Bennett, P. (2018). The Role of Grit in Determining Engagement and Academic Outcomes for University Students. *Research in Higher Education, 59*(4), 448–460. https://doi.org/10.1007/s11162-017-9474-yv
43. Hodge, H., Philip, C. (2019). *Social Work Research.* (*43)*1, 43-52. 10. https://doi: 10.1093/swr/svy034.
44. Jöreskog, K. G. (1971). Statistical analysis of sets of congeneric tests. *Psychometrika*, *36*(2), 109-133.
45. Kenya Prison Act Cap 90. Government of Kenya Printing Press.
46. Kim, D. I., Jang, S. H., & Park, S. Y. (2020). An Analysis of the Relationship between Grit and the Psychological Well-Being of Psychiatry Residents. *Journal of Korean Society for Depressive and Bipolar Disorders*, *18*(3), 110-118.
47. Kim, Y. J., & Lee, C. S. (2015). Effects of grit on the successful aging of the elderly in Korea. Indian Journal of Science and Technology, 8, 373–378. https://doi.org/ 10.17485/ijst/2015/v8iS7/70421.

48. Kleiman, E. M., Adams, L. M., Kashdan, T. B., & Riskind, J. H. (2013). Gratitude and grit indirectly reduce risk of suicidal ideations by enhancing meaning in life: Evidence for a mediated moderation model. *Journal of Research in Personality*, 47, 539–546. https://doi:10.1016=j.jrp.2013.04.007
49. Kramer, B., McLean, S., & Shepherd Martin, E. (2017). Student grittiness: A pilot study investigating scholarly persistence in EFL classrooms. Osaka Jokaguin Junior College Kiyo, 47, 25–41. Wilmina. http://ir-lib.wilmina.ac.jp/dspace/ handle/10775/3498.
50. Kuruveettissery, S., Gupta, S., & Rajan, S. K. (2023). Development and psychometric validation of the three dimensional grit scale. *Current Psychology*, *42*(7), 5280-5289.
51. Mikami H. Revalidation of the L2-Grit scale: A conceptual replication of Teimouri, Y., Plonsky, L., & Tabandeh, F. (2022). L2 grit: Passion and perseverance for second-language
52. learning. *Language Teaching*. 2024;57(2):274-289. doi:10.1017/S0261444822000544
53. Lamberton H., Minor, L., Zeigler, D. (2019). *Human Relations: Strategies for Success*, (6th Edi.): McGraw Hill Education: New York.
54. Li, C., & Yang, Y. (2023). Domain-general grit and domain-specific grit: Conceptual structures, measurement, and associations with the achievement of German as a foreign language. *International Review of Applied Linguistics in Language Teaching*, (0).
55. Li, M., Fan, W., & Leong, F. T. (2023). Psychometric assessment of the grit scale: Evidence from US and Chinese samples. *Journal of Pacific Rim Psychology*, *17*, 18344909221147108
56. Loftus, T. J., Filiberto, A. C., Rosenthal, M. D., Arnaoutakis, G. J., Sarosi Jr, G. A., Dimick, J. B., & Upchurch Jr, G. R. (2020). Performance advantages for grit and optimism. *The American Journal of Surgery*. https://doi.org/10.1016/j.amjsurg.2020.01.057
57. Nemmi, F., Nymberg, C., Helander, E., & Klingberg, T. (2016). Grit Is Associated with Structure of Nucleus Accumbens and Gains in Cognitive Training. *Journal of Cognitive Neuroscience*, *28*(11), 1688–1699. https://doi.org/10.1162/jocn_a_01031
58. Maddi, S. R., Matthews, M. D., Kelly, D. R., Villarreal, B., & White, M. (2012). The role of hardiness and grit in predicting performance and retention of USMA cadets. *Military Psychology*, 24, 19–28. https://doi:10.1080=08995605.2012.639672
59. Martin, A. S. et al. (2015). 'Positive Psychological Traits.' Socioeconomic gradients and mental health: implications for public health. In *Positive Psychiatry*, edited by Dilip V. Jeste and Barton W. Palmer. Washington, D.C: *American Psychiatric Publishing*,19-44.
60. MacCallum, R. C., & Austin, J. T. (2000). Applications of structural equation modeling in psychological research. *Annual review of psychology*, *51*(1), 201-226.
61. McCabe, E. M. (2016). Can grit be nurtured in undergraduate nursing students? *NASN School Nurse*, *31*(3), 144-146. doi.org/10.1177/1942602X16634440
62. Mooradian, T., Matzler, K., Uzelac, B., & Bauer, F. (2016). Perspiration and inspiration: Grit and innovativeness as antecedents of entrepreneurial success. *Journal of Economic Psychology*, 56, 232–243. https://doi.org/10.1016/j.joep.2016.08. 001.
63. Muenks, K., Wigfield, A., Yang, J. S., & O'Neal, C. R. (2017). How true is grit? Assessing its relations to high school and college students' personality characteristics, self-regulation, engagement, and achievement. *Journal of Educational Psychology*, *109*(5), 599.
64. Park, D., Tsukayama, E., Yu, A., & Duckworth, A. L. (2020). The development of grit and growth mindset during adolescence. *Journal of Experimental Child Psychology*, *198*, 104889. https://doi.org/10.1016/j.jecp.2020.104889
65. Park, D., Tsukayama, E., Yu, A., & Duckworth, A. L. (2020). The development of grit and growth mindset during adolescence. *Journal of Experimental Child Psychology*, *198*, 104889. https://doi.org/10.1016/j.jecp.2020.104889
66. Perlis, R. H. (2013). A clinical risk stratification tool for predicting treatment resistance in major depressive disorder. *Biological psychiatry*, *74*(1), 7-14
67. Posamak, T., Songchan, S., Narkprom, N., Yotha, N., & Pommarang, W. (2023). Development of a Grit Measurement Scale for Thai Dramatic Arts Students. *Higher Education Studies*, *13*(4), 86-93.
68. Postigo Sr, A., Barria Sr, J., Cuesta Sr, M., & García-Cueto Sr, E. (2023). Psychometric Properties of the Chilean Version of the Oviedo Grit Scale. *Collabra: Psychology*, *9*(1), 57516.

69. Robins, S. (2019). Academic achievement and retention among ESL learners: A study of grit in an online context (Unpublished doctoral dissertation). Carrolton, GA: University of West Georgia.
70. Salles, A., Cohen, G. L., & Mueller, C. M. (2014). The relationship between grit and resident well-being. *American Journal of Surgery, 207*(2), 251–254. https://doi.org/10.1016/j.amjsurg.2013.09.006
71. Sarstedt, M., Ringle, C.M. and Hair, J.F. (2017a). 'Partial least squares structural equation Modeling', in Homburg, C., Klarmann, M. and Vomberg, A. (Eds), Handbook of Market Research, Springer, Heidelberg.
72. Schmidt, F. T. C., Fleckenstein, J., Retelsdorf, J., Eskreis-Winkler, L., & Mo€ller, J. (2017). Measuring grit: A German validation and a domain-specific approach to grit. *European Journal of Psychological Assessment,* 1, 1–12. https://doi.org/10. 1027/1015-5759/a000407.
73. Schimschal, S. E., Visentin, D., Kornhaber, R., & Cleary, M. (2020). Grit: A Concept Analysis. *Issues in Mental Health Nursing*, 1-11.
74. Seguin, C. (2019). A Survey of Nurse Leaders to Explore the Relationship Between Grit and Measures of Success and Well-being. *Journal of Nursing Administration*, 49(3), 125–131. https://doi.org/10.1097/NNA.0000000000000725
75. Sigmundsson, H., Clemente, F. M., & Loftesnes, J. M. (2020). Passion, grit, and mindset in football players. *New Ideas in Psychology*, *59*, 100797. https://doi.org/10.1016/j.newideapsych.2020.100797
76. Sturman, E. D., & Zappala-Piemme, K. (2017). Development of the Grit Scale for Children and Adults and its relation to student efficacy, test anxiety, and academic performance. *Learning and Individual Differences*, 59, 1–10. https://doi.org/10.1016/j.lindif.2017.08.004.
77. Sudina, E., Vernon, T., Foster, H., Del Villano, H., Hernandez, S., Beck, D., & Plonsky, L. (2021). Development and Initial Validation of the L2-Teacher Grit Scale. *TESOL Quarterly*, *55*(1), 156-184.
78. Teimouri, Y., Plonsky, L., & Tabandeh, F. (2022). L2 grit: Passion and perseverance for second-language learning. Language Teaching Research, 26(5), 893–918. doi:10.1177/1362168820921895.
79. Teuber, Z., Datu, J. A. D., Botes, E., Dicke, T., Jordan, G., Lan, X., ... & Greiff, S. (2024). Parental Grit as a Predictor of Parenting and Adolescent Development: The Development and Validation of the Parental Grit Scale.
80. Tewell, E. (2020). The Problem with Grit: Dismantling Deficit Thinking in Library Instruction. portal: Libraries and the Academy 20(1), 137-159. https://doi:10.1353/pla.2020.0007.
81. Tyumeneva, Y., Kardanova, E., & Kuzmina, J. (2017). Grit: Two related but independent constructs instead of one. Evidence from item response theory. *European Journal of Psychological Assessment*. https://doi: 10.1027/1015-5759/a000424
82. Umucu, E., Villegas, D., Viramontes, R., Jung, H., & Lee, B. (2020). Measuring grit in veterans with mental illnesses: Examining the model structure of grit. *Psychiatric Rehabilitation Journal*. Advanced online publication. doi.org/10.1037/prj0000420
83. Vazsonyi, A. T., Ksinan, A. J., Jiskrova, G. K., Mikuska, J., Javakhishvili, M., & Cui, G. (2019). To grit or not to grit, that is the question! Journal of Research in Personality, 78, 215–226. https://doi.org/10.1016/j.jrp.2018.12.006.
84. Vinzi, V. E., Chin, W. W., Henseler, J., & Wang, H. (2010). *Handbook of partial least squares*, 01, No. 0). Berlin: Springer.
85. Wong, J.S., Bouchard, J., Gravel, J., Bouchard, M., & Moserelli, C. (2016). Can at-risk youth be diverted from crime? A meta-analysis of restorative diversion programs. Sage. https://journals.sagepub.com/doi/pdf/10.1177/ 0093854816640835
86. Wong, M. L., Anderson, J., Knorr, T., Joseph, J. W., & Sanchez, L. D. (2018). Grit, anxiety, and stress in emergency physicians. *American Journal of Emergency Medicine*, 36, 1036–1039. https://doi.org/10.1016/j.ajem.2018.02.021.
87. Yeager, D. S., Hanselman, P., Walton, G. M., Murray, J. S., Crosnoe, R., Muller, C., Tipton, E., Schneider, B., Hulleman, C. S., Hinojosa, C. P., Paunesku, D., Romero, C., Flint, K., Roberts, A., Trott, J., Iachan, R., Buontempo, J., Yang, S. M., Carvalho, C. M., ... Dweck, C. S. (2019). A national experiment reveals where a growth mindset improves achievement. *Nature*, *573*(7774), 364-369. https://doi.org/10.1038/s41586-019-1466-y

88. Yukhymenko-Lescroart, M. A., & Voiedilova, O. (2023). The grit scale: Psychometric properties of the Ukrainian translation. *MethodsX*, *11*, 102469.
89. Zolli, A., & Healy, A. M. (2012). *Resilience: Why things bounce back.* Free Press.