New wine in new bottles: L2 Grit in comparison to domain-general Grit, Conscientiousness, and Cognitive Ability as a predictor of language learning

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ABSTRACT

Domain-general Grit has been criticised extensively in the literature as being indistinguishable from Conscientiousness and as a predictor of lesser import than Cognitive Ability. Given the recent rise of L2 Grit literature – a domain-specific form of Grit in foreign language learning – we examine whether these criticisms of general Grit are also applicable to L2 Grit. We compared the predictor variables of domain-general Grit, L2 Grit, Cognitive Ability, and Conscientiousness as predictors of language learning outcomes. Data were collected from 182 EFL students and analysed via multiple regression with dominance analyses. L2 Grit was found to be the dominant predictor of L2 academic achievement, L2 engagement, and L2 motivation. L2 Grit outperformed domain-general Grit as a predictor variable in all models tested. We found that methodological concerns regarding domain-general Grit and Conscientiousness do not apply to L2 Grit. Cognitive Ability was an important predictor of L2 learning, but was in the majority of cases outperformed by L2 Grit. This study advocates for the use of L2 Grit above that of domain-general Grit in L2 learning research.

Keywords: L2 Grit; Grit; Conscientiousness; Cognitive Ability; L2 academic achievement; L2 engagement

INTRODUCTION

Success in life outcomes and activities such as in career growth and income (Danner et al., 2019), and education (Lam & Zhou, 2019) have been linked to long-term determination and drive. The construct that is said to encompass this inner, long-term drive to succeed has been labelled as Grit, defined as the 'perseverance and passion for long-term goals' (Duckworth et al., 2007, p. 1087). Within this definition, 'goals' are not necessarily linked to any specific outcome but rather to a general drive, persistence, tenacity, and determination throughout the years (Credé et al., 2017). Grit, as a non-domain specific trait, has been shown to predict academic and job success (Danner et al., 2019; Neroni et al., 2022), and specifically second language (L2) learning success (Teimouri et al., 2022). The underlying hypothesis thus being that more 'gritty' individuals will be more successful in L2 learning as they will have the long-term perseverance and passion to succeed in acquiring a target language.

Grit has been praised in popular media with some even touting its predictive ability to be superior to other known indicators (Duckworth, 2013; Scelfo, 2016), such as Conscientiousness and Cognitive Ability. Conscientiousness, a domain-general personality trait defined as 'the propensity to follow socially prescribed norms for impulse control, to be goal directed, to plan, and to be able to delay gratification' (Roberts et al., 2009, p. 369) has been regarded as a strong predictor of long-term success – much like Grit. Indeed, many authors have speculated whether Grit is merely Conscientiousness relabelled (Ponnock et al., 2020; Schmidt et al., 2018), which has led to considerable debate in the literature regarding the distinctiveness of Grit and its use in predicting outcome variables (see Li & Yang, 2023; Werner et al., 2019). In addition, after strong claims made in popular media regarding Grit as a predictor above and beyond Cognitive Ability (Duckworth, 2013; Scelfo, 2016), numerous studies have questioned this notion and found Grit

explained little to no additional variance in outcome variables above and beyond Cognitive Ability (Credé, 2018; Ponnock et al., 2020). As such, Grit is often seen as a controversial predictor variable, hampered by comparisons to Conscientiousness and Cognitive Ability (see Ponnock et al., 2020).

In contrast, the field of L2 learning research may have elegantly side-stepped the criticisms of Grit, by developing a domain-specific version of Grit, namely L2 Grit. L2 Grit can be defined as a perseverance and long-term interest to learn the target language (Teimouri et al., 2022). L2 Grit as a domain specific-trait has developed specifically as many studies have criticised domain-general Grit and called for more domain specificity (Oxford & Khajavy, 2021; Teimouri et al. 2022; Yang et al., 2022). For instance, Teimouri et al. (2022) argued that the effects of Grit in language learning should be examined in a domain-specific fashion because it improves its predictive and construct validity and can better represent its effects in various domains and across different languages. Thus far, L2 Grit has been proven to be a moderate predictor of language learning outcomes such as academic achievement in the foreign language class (Teimouri et al., 2022) and perceived proficiency in the target language (Li & Yang, 2023).

In comparing L2 Grit and domain-general Grit, recent studies have argued for the use of L2 Grit as a predictor variable, as opposed to domain-general Grit, if language learning outcomes are concerned as it is the stronger predictor (Li & Yang, 2023). However, the criticisms often lobbied at domain-general Grit, in that it may be considerably less useful as a predictor in comparison to Cognitive Ability and indistinctive from Conscientiousness, have not yet been investigated with regards to L2 Grit. As such, this study will investigate whether the most common criticisms of domain-general Grit can be applied to L2 Grit. Through the use of dominance analysis, we examine to what extent L2 Grit, Grit, Conscientiousness, and Cognitive Ability

predict language learning success in terms of academic achievement and self-perceived achievement, as well as language learning motivation and engagement. We therefore examine not only what the unique contribution is of L2 Grit, but also where it ranks as a predictor of language learning.

LITERATURE REVIEW

GRIT IN L2 LEARNING RESEARCH

Language learning is a challenging and lengthy process and there are lots of instances when learners encounter discouragement and failure. Thus, language learners who show L2 Grit and maintain consistency of interest as well as perseverance of effort are hypothesised to continue their L2 learning until they achieve their goals (Teimouri et al., 2022). The introduction of L2 Grit to the applied linguistics research lexicon has led to a growing body of research investigating this construct and its educational, motivational, and psychological effects in various language learning contexts (e.g., Azari Noughabi et al., 2022; Feng & Papi, 2020; Sudina & Plonsky, 2021).

The positive outcomes of L2 Grit are reported by many researchers in the L2 learning context. These findings include the association of high levels of L2 Grit and L2 proficiency and achievement (Sudina et al. 2021), reading comprehension (Khajavy et al., 2022), ideal L2 self (Feng & Papi, 2020), and willingness to communicate (Lan et al, 2021). A negative correlation was also reported between L2 Grit and anxiety (Li & Dewaele, 2021), boredom (Pawlak et al., 2020), and fixed mindsets (Teimouri et al., 2022). Moreover, in the multicultural study of Yang et al. (2022), positive correlations were found between EFL learners' domain-specific Grit, academic buoyancy, and self-efficacy. Indicating the better predictive ability of domain-specific L2 Grit over domain-general Grit, Teimouri et al. (2022) found that L2 Grit was positively correlated to

students' language learning motivation and achievement above and beyond domain-general Grit. In addition, L2 Grit has also been linked to L2 engagement (Khajavy, 2021) and motivation (Pawlak et al., 2022). The research thus far has therefore found L2 Grit to be a valuable construct in the greater L2 learning nomological network.

GRIT, CONSCIENTIOUSNESS, AND COGNITIVE ABILITY

In turn, domain-general Grit is often likened to physical stamina, with Duckworth et al. (2007) explaining, 'the Gritty individual approaches achievement as a marathon; his or her advantage is stamina' (p. 1088). The individual with more Grit, as with the athlete with more stamina, is therefore assumed to be able to outperform peers even with the same levels of ability. The research on domain-general Grit does to some extent support this advantage theory, with Grit predicting academic success and retention (Lam & Zhou, 2019), spelling competition success (Duckworth et al., 2011), and long-term career satisfaction and job income (Danner et al., 2019). The variable has also been linked with more deliberate practice (Duckworth et al., 2011), higher engagement (Hodge et al., 2018), and greater motivation (Werner et al., 2019). In short, domain-general Grit is often associated with positive outcomes in terms of academic and life success.

Similarly, the personality trait of Conscientiousness is also often associated with these exact same academic and life success outcomes. In addition, Conscientiousness and domain-general Grit are often defined and conceptualised in a similar manner, with some nearly identical items used to measure both constructs. For example, the Short Grit Scale includes the item 'I am a hard worker' (Duckworth & Quinn, 2009), whereas the Conscientiousness subscale in the IPIP-NEO-60 includes the item 'I work hard' (Maples-Keller et al., 2019). Consequently, Conscientiousness and domain-general Grit have considerable overlap in nomological networks,

with Conscientiousness also associated with academic success in school and university studies (Poropat, 2009), with long-term career success and job income (Spengler et al., 2014), and with learning engagement and motivation (Richardson & Abraham, 2009). Indeed, the overlap between domain-general Grit and Conscientiousness is such that it is often accused of being a jangle fallacy – i.e., when two constructs are assumed to be different merely because they have different names and not due to any substantive evidence (Gonzalez et al., 2021). Previous construct validity evidence supports this possibility of a jangle fallacy, with separate but correlating factor structures not supported in a structural equation model (see Ponnock et al., 2020; Schmidt et al., 2018). However, support has been found for Grit as a subfactor of Conscientiousness and thus loading onto Conscientiousness as an indicator variable (Schmidt et al., 2018). In addition, correlational studies have found extremely high correlations between the two factors ($r > .90$; Engel, 2013; Reed et al., 2012; Duckworth et al., 2007) and a meta-analytic correlation of .84 ($k = 22$, $N = 18{,}826$; Credé et al., 2017). It is therefore not surprising that domain-general Grit has often been criticised as merely a repackaged and relabelled version of Conscientiousness (Ponnock et al., 2020; Schmidt et al., 2020).

In turn, domain-general Grit is often also compared and examined alongside Cognitive Ability (Perkins-Gough, 2013; Duckworth & Quinn, 2009). In part, this may be due to the rather strong claims made in popular media about Grit as a predictor of success by its proponents. Duckworth stated in a New York Times interview that ‘this measure beats the pants off I.Q., SAT scores, … to help us know in advance which individuals will be more successful in some situations’ (Scelfo, 2016, p. 1), and her popular TED Talk is entitled ‘Grit: The strongest predictor of success’ (Duckworth, 2013). Given that Cognitive Ability has long been held as a clear predictor of both academic and career success (Rohde & Thompson, 2007; Hunter, 1986), such claims that

domain-general Grit may explain greater levels of variance are perhaps rather bold. Research literature thus far have not fully supported the popular media claims of the success of Grit above and beyond Cognitive Ability (Credé, 2018). An effect size of $r = .18$ for the overall relationship between Grit and academic success was found (Credé et al., 2017), whilst admission test scores – a common proxy of Cognitive Ability – share a much stronger relationship with academic achievement ($.40 < r < .60$; Kuncel & Hezlett, 2007).

The position of domain-general Grit as a predictor of importance for achievement and learning outcomes, as opposed to Conscientiousness and Cognitive Ability, is therefore uncertain. In addition, the uniqueness of domain-general Grit as a variable in comparison to Conscientiousness can also be questioned. However, these domain-general criticisms do not necessarily apply to the domain-specific L2 Grit.

GRIT, CONSCIENTIOUSNESS, AND COGNITIVE ABILITY IN L2 LEARNING RESEARCH

Domain-general Grit has been researched quite extensively in the L2 learning context, with studies linking the construct to academic achievement in the L2 (Khajavy & Aghaee, 2022), self-perceived achievement in the language classroom (Li & Yang, 2023), language learning emotions (Li & Dewaele, 2021), as well as motivation (Liu, 2022) and engagement (Liu, 2021). As such, domain-general Grit has been found to be a positive predictor of the language learning process.

In contrast, personality factors in language learning studies have been a consistently under-researched topic, in large part due to the small effect sizes often reported between personality predictors and language learning outcomes (Dewaele, 2012). Indeed, Dörnyei (2005) has remarked that “the role and impact of personality factors are of less importance than those of some other individual difference variables such as aptitude and motivation” (p. 10). However, that is not to

say that no studies have examined personality in the context of language learning. Chen et al. (2022) in a meta-analysis of 40 years of research (k = 137) showed that Openness to Experience ($r = .23$), Conscientiousness ($r = .18$), Extraversion ($r = .12$), and Agreeableness ($r = .10$) had positive correlations with L2 learning achievement, while Neuroticism ($r = -.04$) had a negative non-significant correlation with L2 learning achievement. This highlights the significance of Conscientiousness as a personality trait that, after Openness to Experience, had the strongest correlation with L2 learning achievement. In addition, Conscientiousness has also been linked to additional outcome variables, such as learning strategies (Chamorro-Premuzic & Furnham, 2008), engagement (Cilliers et al., 2018), motivation (Komarraju et al., 2009), and emotions (Botes et al., 2023).

In comparison to personality traits, the role of Cognitive Ability – or as it is more commonly referred to in applied linguistics research, general intelligence – is also a heavily debated topic. Language aptitude or ability is generally seen and argued to be a separate and unique construct from general Cognitive Ability (Sparks et al., 2012; Carroll, 1962). Language aptitude is commonly measured through specifically designed instruments, such as the Modern Language Aptitude Test (MLAT; Carroll & Sapon, 1959), which purports to tap into the underlying mechanisms that results in successful language learning, such as working memory and grammatical sensitivity. However, in a factor analytic study, Wesche et al. (1982) argued for language learning aptitude to be subsumed under a higher-order general intelligence factor and found strong correlations between the MLAT and general intelligence tests (r = .67; Wesche et al., 1982). Furthermore, significant intelligence differences between high and low achieving foreign language (FL) learners have been found (Sparks et al., 2012). Lastly, the strongest argument supporting the relationship between intelligence – or Cognitive Ability – and FL learning is the

breadth of research examining the bilingual advantage theory (see Lehtonen et al., 2018). FL acquisition and Cognitive Abilities seem to share a reciprocal relationship, where the acquisition of an additional language has been shown to improve cognitive abilities (Bialystok, 2017; Woumans et al., 2016) and the acquisition of a language itself is predicted by initial cognitive ability (Woumans et al., 2019). Therefore, Cognitive Ability, whether it can be seen as linked directly or indirectly to language aptitude, is undoubtedly connected to language learning. However, due to the limited amount of research examining the broader nomological network of Cognitive Ability in language learning, very little could be found regarding Cognitive Ability as a predictor beyond its links to language learning achievement and proficiency. In general education contexts, Cognitive Ability has been linked to numerous positive learning outcomes, including academic achievement (Zaboski et al., 2018), engagement (Furnham et al., 2009), and motivation (Spinath et al., 2006). As such, it may be inferred that if Cognitive Ability could be associated with engagement and motivation in general education settings, a similar finding may be made in the L2 learning context.

In summary, previous research has linked L2 Grit, domain-general Grit, Conscientiousness, and Cognitive Ability to positive learning outcomes. Specifically, all these predictor variables have been linked to achievement, engagement, and motivation – whether in the context of language classrooms or general education. Therefore, there is an assumed shared nomological network between L2 Grit, Grit, Conscientiousness, and Cognitive Ability as predictors of learning outcomes. In addition, domain-general Grit has been criticised as a variable of substance in comparison to Conscientiousness and Cognitive Ability. This study therefore aims to explore the predictor variables of Grit, Conscientiousness, and Cognitive Ability within the context of L2 learning and to determine whether the criticisms levelled against

domain-general Grit can also be levelled at L2 Grit. As such, the following exploratory research questions will be investigated:

1. Which predictor variable of L2 Grit, Grit, Conscientiousness, and Cognitive Ability explained the most variance and was subsequently the most dominant in the regression equation with L2 academic achievement as outcome variable?
2. Which predictor variable of L2 Grit, Grit, Conscientiousness, and Cognitive Ability explained the most variance and was subsequently the most dominant in the regression equation with L2 self-perceived proficiency as outcome variable?
3. Which predictor variable of L2 Grit, Grit, Conscientiousness, and Cognitive Ability explained the most variance and was subsequently the most dominant in the regression equation with L2 motivation as outcome variable?
4. Which predictor variable of L2 Grit, Grit, Conscientiousness, and Cognitive Ability explained the most variance and was subsequently the most dominant in the regression equation with L2 engagement as outcome variable?

METHOD

PARTICIPANTS

Data were collected from n = 182 participants enrolled in English summer school courses at three private language institutes in Iran. Data were collected through the online platform SoSci Survey and the questionnaire link was shared in the English classrooms. A total of 127 females and 43 males participated (12 participants did not indicate sex). The average age was 19.89 years (SD = 7.04). The average number of languages in the linguistic repertoire was 2.22 (SD = .43),

with all participants listing fluency in Farsi and some level of proficiency in English. A total of *n* = 34 were beginner proficiency, followed by *n* = 30 low-intermediate learners, *n* = 51 intermediate learners, *n* = 56 high-intermediate learners, and *n* = 11 advanced learners. Ethical clearance for the study was received from the University of [BLINDED].

INSTRUMENTS

All items were administered using a 5-point Likert scale ranging from 'strongly disagree' to 'strongly agree'. The following instruments were used:

L2 Grit Scale (ω = .813; α = .801). The nine-item multidimensional scale developed by Teimouri et al. (2022) was utilised to measure a domain-specific version of Grit. The scale consists of two factors, namely Perseverance of Effort (e.g. 'I am a diligent English language learner') and Consistency of Effort (e.g. 'I think I have lost my interest in learning English').

Short Grit Scale (ω = .726; α = .720). The eight-item short-form version of the original Grit scale developed by Duckworth and Quinn (2009) was used to examine domain-general Grit. The scale also consisted of two subscales, namely Consistency of Interest (e.g., 'I often set a goal, but later choose to pursue a different one') and Perseverance of Effort (e.g., 'I finish what I begin').

IPIP-NEO-60 Conscientiousness (ω = .711; α = .707). Conscientiousness was measured via the 12-item subscale of the IPIP-NEO-60, an open-source personality measure developed and validated by Maples-Keller et al. (2019). Example items included 'I handle tasks smoothly' and 'I set high standards for myself and others.'.

ICAR16 (ω = .739; α = .722). The 16-item open-source cognitive ability measure from the International Cognitive Ability Resource (Condon & Revelle, 2014) was used to examine the

cognitive ability of participants. The measure examined fluid intelligence via letter-number series style questions and visual-spatial reasoning via three-dimensional rotation tasks, verbal reasoning puzzles, and matrix reasoning questions (Young & Keith, 2020).

L2 Motivational Self System Scale (ω = .793; α = .789)**.** Motivation in FL learning was examined via the 18-item version of the L2 Motivational Self System Scale developed by Papi (2010) based on the L2 Motivational Self System theory proposed by Dörnyei (2014). The theory stipulated that the motivational self of FL learners comprised of three sub-factors, the ideal L2 self (e.g. 'I can imagine myself speaking English as if I were a native speaker of English'), the ought-to L2 self (e.g. 'Learning English is important to me because other people surrounding me expect me to do so'), and intended learning effort (e.g. 'I would like to spend lots of the time learning English').

L2 Engagement Scale (ω = .885; α = .878). Engagement was measured through a multidimensional 24-item scale developed by Hiver et al. (2020). The measure consists of three subscales of engagement, namely behavioural engagement (e.g., 'I put effort into learning in my English class.'), emotional engagement (e.g., 'I look forward to my English class.'), and cognitive engagement (e.g., 'I go through work carefully in my English class to make sure it is right.').

L2 Academic Achievement. The final grade of the summer school courses of participants were used to indicate academic achievement. Student grades were an average of 89.25% (*SD* = 7.07), with 70% constituting a passing grade. Grades were categorised in consultation with EFL teachers in Iran to the following categories: Fail (<70%), poor (70%-80%), average (81%-90%), good (91%-95%), and excellent (96%-100%).

Self-Perceived Proficiency. Self-perceived proficiency (SPP) was measured through a single question asking participants to what extent they felt they were proficient in English in comparison to other learners in their class or cohort – i.e., at the same learning level, the low-intermediate level class. Participants ranked their proficiency on a 5-point Likert scale from 'far below average' to 'far above average'.

DATA ANALYSIS

Descriptive statistics, correlations, and multiple linear regressions were analysed through JASP (version 16.2, JASP Team, 2022). Dominance analyses were conducted through the domir package in R (Luchman & Luchman, 2022).

Four separate multiple linear regressions were analysed and interpreted, one for each outcome variable (L2 Academic Achievement, SPP, L2 Motivation, and L2 Engagement). All predictor variables were included in each regression equation (L2 Grit, Grit, Conscientiousness, and Cognitive Ability). Forced entry was utilised to enter the predictors into the regression models, as no hierarchy of importance was pre-assumed in the predictors (Field, 2013). Since the predictor variables have been found to correlate to a considerable extent, specifically Grit and Conscientiousness (Credé et al., 2017), multicollinearity was monitored via the tolerance and variance inflation factors (VIFs). A VIF of > 10 and a tolerance below 0.2 indicated multicollinearity (Field, 2013). The model fit and standardised beta coefficients were interpreted to determine which predictors were significant. However, traditional indicators of relative importance, such as the standardised beta coefficients in a multiple linear regression, can fail to properly partition variance when correlated (Tonidandel & LeBreton, 2011). As such, dominance analyses were used to determine which predictors were the most important.

Dominance analysis attempts to uncover the contribution each individual predictor makes towards explaining variance in the outcome variable (Tonidandel & LeBreton, 2011). The analysis examines the R^2 change that occurs when adding a predictor to all possible subset regression models and therefore examines the contribution of the variable 'by itself and in combination with other predictors' (Tonidandel & LeBreton, 2011, p. 3). The general dominance weight generated by the average R^2 change provides insight into which predictor is the most important in terms of explaining variance in the outcome variable, without the possibility of skewed results due to correlated predictors (Azen & Budescu, 2003). Using the general dominance weights, the four predictors (L2 Grit, Grit, Conscientiousness, and Cognitive Ability) could therefore be ranked in terms of relative importance for each of the outcome variables (L2 Academic Achievement, SPP, L2 Motivation, and L2 Engagement).

RESULTS

DESCRIPTIVE STATISTICS AND CORRELATION COEFFICIENTS

Descriptive statistics for all variables can be found in Table 1.

Table 1

Descriptive Statistics

	M	*SD*	Min	Max	Skewness	Kurtosis
L2 Grit	3.94	.58	2.53	5.00	-.439	-.420
Grit	3.55	.51	2.54	4.92	.421	-.015
Conscientiousness	3.81	.43	2.58	4.83	.078	-.137
Cognitive Ability	5.19	2.76	1.00	13.00	.336	-.322
L2 Academic Achievement	3.51	.99	2.00	5.00	.117	-1.034
L2 Self-Perceived Proficiency	3.40	.70	1.00	5.00	-.153	.791
L2 Motivation	3.85	.41	2.89	4.89	-.003	-.293
L2 Engagement	3.94	.44	2.71	4.83	-.212	-.247

The correlation coefficients between all variables are presented in Table 2.

Table 2.

Correlation Coefficient Matrix

	1.	2.	3.	4.	5.	6.	7	8
1. L2 Grit	-	.425**	.432**	.225**	.270**	.320**	.443**	.630**
2. Grit		-	.763**	.062	.038	.177*	.089	.448**
3. Conscientiousness			-	.012	.060	.153*	.147*	.444**
4. Cognitive Ability				-	.242**	.312**	.063	.357**
5. L2 Academic Achievement					-	.299**	.195*	.325**
6. L2 Self-Perceived Proficiency						-	.173*	.362**
7. L2 Motivation							-	.435**
7. L2 Engagement								-

**$p < .001$ *$p < .01$

RESEARCH QUESTION 1: OUTCOME VARIABLE L2 ACADEMIC ACHIEVEMENT

The regression equation for the first outcome variable of Academic Achievement was found to be statistically significant (F (4, 135) = 4.271; $p < .01$), however the predictors explained only 11.2% of variance in the outcome variable ($R^2 = .112$). Of the four predictor variables, only L2 Grit ($\beta = .248$; $p < .01$) and Cognitive Ability ($\beta = .193$; $p < .05$) were found to be significant (see Table 3). The tolerance and VIF values indicated no multicollinearity concerns in the regression model.

Table 3

L2 Academic Achievement Regression Coefficients

	B	*p*-value	Tolerance	VIF	General dominance	Standardised dominance %	Rank
L2 Grit	.248	< .01	.770	1.299	.061	54.13	1
Grit	-.098	.428	.434	2.304	.003	2.28	3
Conscientiousness	.040	.749	.419	2.387	.002	2.16	4
Cognitive Ability	.193	< .05	.923	1.084	.047	41.42	2

The dominance analysis reflected the results of the regression model (see Table 3). L2 Grit was shown to be most dominant factor (d_j = .061), followed by Cognitive Ability (d_j = .047). Therefore, with regards to explaining variance in the outcome variable of L2 Academic Achievement, L2 Grit was the relatively most important predictor.

RESEARCH QUESTION 2: OUTCOME VARIABLE OF SELF-PERCEIVED PROFICIENCY

The overall regression of SPP as outcome variable and the four predictors of L2 Grit, Grit, Conscientiousness, and Cognitive Ability, was statistically significant (F (4, 177) = 8.803; p < .001). The predictors explained 16.6% of variance in the outcome variable (R^2 = .166). Similar to L2 Academic Achievement, only L2 Grit (β = .236; p < .01) and Cognitive Ability (β = .255; p < .001) were statistically significant predictors (see Table 4). No indication of multicollinearity amongst the predictors was found.

Table 4

Self-Perceived Proficiency Regression Coefficients

	B	*p*-value	Tolerance	VIF	General dominance	Standardised dominance %	Rank
L2 Grit	.236	< .01	.748	1.336	.068	40.78	2
Grit	.057	.595	.406	2.465	.012	7.17	3
Conscientiousness	.004	.972	.400	2.502	.008	4.89	4
Cognitive Ability	.255	< .001	.939	1.065	.078	47.15	1

The dominance analysis results indicated that Cognitive Ability was the most dominant predictor of SPP (d_j = .078), followed by L2 Grit (d_j = .068; see Table 4). It should be noted, however, that the percentage of the variance explained by both Cognitive Ability (47.15%) and L2 Grit (40.78%), were very similar. Nevertheless, Cognitive Ability was found to be the most important predictor of SPP in the regression model, followed by L2 Grit, Grit, and Conscientiousness.

RESEARCH QUESTION 3: OUTCOME VARIABLE OF L2 MOTIVATON

The multiple regression equation for L2 Motivation was statistically significant ($F(4, 177) = 11.833$; $p < .001$), with a $R^2 = .193$. Surprisingly, only L2 Grit was found to be a significant indicator of L2 Motivation ($\beta = .236$; $p < .01$; see Table 5). This is reflected in the findings of the dominance analysis, where L2 Grit was responsible for 89.68% of the variance explained. Thus, L2 Grit was the most important predictor for L2 Motivation by a considerable margin.

Table 5

L2 Motivation Regression Coefficients and Dominance Analysis

	B	*p*-value	Tolerance	VIF	General dominance	Standardised dominance %	Rank
L2 Grit	.496	< .001	.748	1.336	.189	89.68	1
Grit	-.163	.122	.406	2.465	.008	4.01	3
Conscientiousness	.057	.587	.400	2.502	.011	5.03	2
Cognitive Ability	-.039	.567	.939	1.065	.003	1.28	4

RESEARCH QUESTION 4: OUTCOME VARIABLE OF L2 ENGAGEMENT

Lastly, the regression model for L2 Engagement as outcome variable was found to be statistically significant ($F(4, 177) = 43.727$; $p < .001$), with the predictors explaining a large amount of variance ($R^2 = .497$). Similar to L2 Academic Achievement and SPP, only L2 Grit ($\beta = .458$; $p < .01$) and Cognitive Ability ($\beta = .244$; $p < .01$) were statistically significant predictors (see Table 6). The dominance analysis indicated that L2 Grit was a particularly strong predictor of L2 Engagement ($d_j = .251$), followed distantly by Cognitive Ability ($d_j = .088$).

Table 6

L2 Engagement Regression Coefficients

	B	*p*-value	Tolerance	VIF	General dominance	Standardised dominance %	Rank
L2 Grit	.458	<.001	.748	1.336	.251	50.56	1
Grit	.127	.131	.406	2.465	.079	15.83	4
Conscientiousness	.146	.085	.400	2.502	.079	15.93	3
Cognitive Ability	.244	<.001	.939	1.065	.088	17.67	2

DISCUSSION

This study set out to examine which predictor (domain-general Grit, L2 Grit, Conscientiousness, or Cognitive Ability) would be the strongest predictor of L2 learning outcome variables. In doing so, we placed L2 Grit under the same scrutiny regarding comparisons to Conscientiousness and Cognitive Ability that is often applied to domain-general Grit (Credé, 2018).

Of the four research questions explored, L2 Grit was the most dominant predictor of L2 academic achievement (β = .248; p < .01), as well as of L2 motivation (β = .496; p < .001), and L2 engagement (β = .458; p < .001). As such, we can conclude that L2 Grit was a moderate predictor of L2 academic achievement and a strong predictor of L2 motivation and L2 engagement. L2 learners with a greater interest and perseverance in terms of L2 learning are therefore expected to have higher grades in the L2, to be more motivated, and to be more engaged in the L2 classroom. With regards to predicting L2 motivation and L2 engagement, L2 Grit outperformed the competing predictors (domain-general Grit, Conscientiousness, and Cognitive Ability) and was responsible for 89.68% and 50.56% of standardised dominance, respectively. As such, the criticisms regarding domain-general Grit as indistinct from Conscientiousness and a lesser predictor than Cognitive Ability, do not apply to L2 Grit. L2 Grit explained unique variance in all of the outcome variables above and beyond Conscientiousness and cannot be considered a jangle fallacy.

The dominance of L2 Grit as predictor variable may be explained through the lens of the specificity matching principle (Swann et al., 2007). The specificity matching principle rests upon the assumption that the level of specificity of the predictor and outcome variable ought to match

in order to have an honest indication regarding possible effect size. Therefore, ‘when a predictor variable is relatively specific, then the impact of rival influences on the predictor-criterion relationship can be minimised by selecting an equally specific behaviour’ (Swann et al., 2007, p. 87). In the context of this study, therefore, L2 Grit was the only predictor variable defined on the same level as the outcome variables of L2 academic achievement, L2 motivation, and L2 engagement, and as such was a better predictor of L2 learning than a broad domain-general predictor such as Grit, Conscientiousness, or Cognitive Ability. Future researchers in L2 acquisition research ought therefore to keep the specificity level of predictors in mind when attempting to model L2 learning outcomes. In addition, it should be noted that although L2 Grit outperformed general Cognitive Ability in the majority of models tested, the same will not necessarily hold for an ability predictor of similar specificity, i.e. language aptitude. A fruitful avenue for future research may be found in comparing language aptitude and L2 Grit as predictors of L2 learning outcomes.

Emphasis ought also to be placed on the comparison between L2 Grit and domain-general Grit as predictors of L2 learning. The two variables correlated moderately ($r = .425$; $p < .001$) and are therefore related, yet separate constructs. With regards to the broader nomological network of language learning variables, L2 Grit outperformed Grit as a predictor variable in each of the models tested. Indeed, Grit was not a significant predictor in a single model examined ($p > .05$). As such, in future research examining the role of interest and perseverance in language learning, we recommend the use of L2 Grit as opposed to domain-general Grit. Furthermore, given the large correlation found between Grit and Conscientiousness ($r = .763$; $p < .001$) in this study, and the existing jangle fallacy accusations regarding Grit and Conscientiousness (Ponnock et al., 2020; Schmidt et al., 2020), the use of the domain-general Grit variable in L2 research

should be questioned. It is not possible for researchers to discount the possibility that domain-general Grit may be relabelled Conscientiousness. In contrast, the results of this study have shown a moderate relationship between L2 Grit and Conscientiousness (r = .432; p < .001), with L2 Grit consistently outperforming Conscientiousness as a predictor variable. As such, L2 acquisition researchers can easily avoid the controversies regarding the domain-general Grit variable, as well as adhere to the specificity matching principle, by utilising L2 Grit as opposed to domain-general Grit in predictive models. If researchers do want to include a global or domain-general goal-directedness variable, considerations ought to be given to Conscientiousness above and beyond domain-general Grit.

The only outcome variable that was not the most strongly predicted by L2 Grit, was that of the outcome variable of L2 self-perceived proficiency (Research Question 2). Instead of L2 Grit (β = .236; p < .01), Cognitive Ability was the strongest predictor (β = .255; p < .001). Students with a greater level of Cognitive Ability therefore had a greater perceived competence in the target language. The relationship between Cognitive Ability and self-beliefs has been confirmed in previous research (Litster & Roberts, 2010), with Papadopoulos (2021) finding a significant correlation between intelligence, perceived scholastic competence and self-esteem in gifted children. In addition, Harris et al. (1993) found complex positive relationships between cognitive ability, task performance and perceived task performance. The measure utilised to capture L2 self-perceived proficiency ought also to be noted. Participants were asked to rate their proficiency in comparison to peers, therefore if they were more or less proficient that those in the same class. Individuals with a higher Cognitive Ability therefore rated themselves as better as their peers. This assessment of self may be accurate, although previous research has demonstrated that several biases can be present in the assessment of one's own skill, with a

higher level of intelligence – or cognitive ability – leading individuals to have an inflated idea of their own competence (see Ehrlinger, 2007). As such, Cognitive Ability may be boosting L2 self-perceived proficiency, but this level of perceived proficiency may not necessarily be an accurate reflection of true proficiency. This finding also hints at an avenue for fruitful future research in examining the complex relationship between Cognitive Ability, perceived competence and actual competence in the target language.

Overall, the study not only demonstrated the importance of L2 Grit and the specificity matching principle, but a light was also shone on Cognitive Ability as a predictor variable in language learning. Cognitive Ability was not only the strongest predictor of L2 self-perceived proficiency, but the second strongest predictor of both L2 academic achievement and L2 engagement. The finding that Cognitive Ability is a significant predictor of L2 engagement is especially novel ($\beta = .244$; $p < .001$), as the variable is more often linked to utilitarian outcomes such as academic achievement in the form of grades (Rohde & Thompson, 2007; Furnham et al., 2003) and not often associated with L2 learning behaviours themselves. As such, L2 learners with a higher Cognitive Ability were found to be more engaged in the L2 classroom. Thus, Cognitive Ability therefore seems to play a role in the L2 learning process, even though the variable is often dismissed in favour of language aptitude variables (Sparks et al., 2012). Based on the findings of this study, we hope that considerable future research attention is given to Cognitive Ability as an individual difference variable in L2 acquisition.

It should also be noted that this study is not without limitations. The sample was comparably small and did not lend itself to latent testing, as such no measurement error could be taken into account in the manifest predictive models. The smaller sample may also have contributed to the null effects found for both domain-general Grit and Conscientiousness, as a

larger sample would be needed to demonstrate the expected small effect size between broad predictors and narrow outcome variables. In addition, Cognitive Ability measures are often difficult to reliably conduct in research settings, as participants may not be particularly motivated to fully engage with difficult items (Chan et al., 1997), this may also have led to the lower reliabilities found for the Cognitive Ability measure used. Furthermore, Cognitive Ability as captured in this study does not reflect or include possible language aptitudes that participants may have. As such, Cognitive Ability predictor results found in this study ought to be interpreted with caution.

CONCLUSION

Previous research have likened domain-general Grit as an 'old wine in a new bottle', in that it is an old concept accepted in research (the personality trait of Conscientiousness) merely newly relabelled and repackaged as 'Grit' (Credé et al., 2017; Schmidt et al., 2020). In addition, strong claims about the predictive ability of domain-general Grit above and beyond that of Cognitive Ability has been criticised in the literature (Credé, 2018). In this study, we examined whether these criticisms hold regarding the domain-specific L2 Grit and in the specific context of L2 learning. We confirmed the usefulness of L2 Grit as a predictor of language learning outcome variables and demonstrated its dominance as a predictor of L2 academic achievement, L2 motivation, and L2 engagement. As such, we conclude that L2 Grit is not susceptible to the criticisms of its predecessor and can indeed be considered as new wine in new bottles.

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