

Mapping personality markers in a Portuguese sample: The factor structure, reliability and incremental validity of the Big Five Mini-Markers

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Abstract: This study reports the psychometric characteristics of a Portuguese form of the 40-item Big Five Mini-Markers, relying upon a cross-sectional design with a sample of 673 Portuguese undergraduates from a Portuguese public university. Results supported the five-factor structure of the translated version and the internal consistency levels of the sub-scales were equivalent to the original version. However, nine items were identified as problematic and dropped from the analysis, due to low component loadings or relatively high cross-loadings. Further evidence from the remaining 31 items supported this instrument's incremental validity for predicting students' self-handicapping behaviours over previous academic achievement. Key implications for further research with the Portuguese version of this instrument are briefly presented and discussed.

Keywords: *Five-factor model; Academic performance; Self-handicapping.*

The relevance of the Big Five taxonomy as a useful model to map personality structure and comprising traits, and its potential to predict behavioural phenomena across achievement contexts and cultural settings is undoubted (Bainbridge et al., 2022; Stanek & Ones, 2018). In this domain, the Big Five Mini-Markers are a widely used instrument in research and applied settings, given their brevity and psychometric robustness (Mammadov, 2022; Thompson, 2008). Developed by Saucier (1994) as a short form of Goldberg's (1992) 100 unipolar adjective markers' measure of phenotypic personality traits, the Mini-Markers share the assumption that the Big Five factor structure can be uniformly captured through a small number of adjectives or markers, available within a given language lexicon, while preserving subscale orthogonality and reliability. Like other five-factor measures, the Big Five Mini-Markers (Saucier, 1994) assess the personality dimensions of conscientiousness (i.e. self-discipline, dependability, organisation), emotional stability (i.e. calmness, emotional adjustment, self-confidence), extraversion (i.e. sociability, activity, assertiveness), agreeableness (i.e. likeability, empathy, friendliness) and openness to experience (i.e. originality, imagination, intellectance).

Given its psychometric soundness across achievement contexts (see Ellen et al., 2022; Mammadov, 2022), this instrument belongs to a set of Big Five measures that have been identified in previous studies (e.g. Dwight et al., 1998; Saucier, 1994) and meta-analyses (i.e. McAbee & Oswald, 2013; Vedel, 2014) as particularly relevant to the academic setting. It is here that this study is developed, due to the validity of the Mini-Markers in predicting key academic outcomes, including student satisfaction and performance (operationalised as GPA, Grade Point Average). There are other instruments in the set for predicting GPA (see Mammadov, 2022; McAbee & Oswald, 2013): i.e. the NEO Personality Inventory - Revised (240-items, NEO-PI-R, Costa & McCrae, 1992); the NEO Five-Factor Inventory (60-item NEO-FFI, Costa & McCrae, 1992); the Big Five Inventory (BFI, 44-items, John et al., 1991; Soto & John, 2017); the Big Five Markers (100 unipolar markers, Goldberg, 1992); and the Big Five International Personality Item Pool (e.g. 100 and 50-item measures from the IPIP, Goldberg, 1999, see Goldberg et al., 2006, <https://ipip.ori.org/index.htm>). Although these have equivalent or even stronger merits, none of them outperforms the Mini-Markers (40 items, Saucier, 1994; Thompson, 2008) in maximising the brevity of administration (approx. 5 minutes), while maintaining fairly acceptable psychometric properties in terms of validity and reliability. Since respondents are often under time constraints in most assessment settings, these advantages are critical to enable the collection of personality ratings from multiple sources (i.e. self and observer ratings), to

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maximise survey space and to prevent response fatigue (Dwight et al., 1998; Ellen et al., 2022; Saucier, 1994; Soto & John, 2017).

Despite the Mini-Markers' acknowledged advantages, to the best of our knowledge, there is no previous Portuguese translation of its original English form. Therefore, the current study aimed to produce a Portuguese version of this instrument, following standard translation procedures (Brislin, 1986), and to examine its psychometric characteristics in the academic setting, using a large sample of Portuguese university students. Specifically, its factor structure, item adequacy and subscale reliability were assessed, along with its validity in predicting student performance (GPA), which is the most widely used objective indicator of student achievement and success (Bücker et al., 2018; Richardson et al., 2012). Compelling evidence from previous meta-analyses has shown that the Big Five framework and its measures make a relevant contribution, not redundant with cognitive ability, to the prediction of this criterion at the post-secondary or higher education level (Mammadov, 2022; Poropat, 2009; Richardson et al., 2012). Nonetheless, this contribution comes mostly from the factor of conscientiousness ($.22 \leq \rho \leq .26$), as openness and agreeableness show modest validity ($\rho \leq .10$) and the corresponding validity of extraversion and emotional stability is approximately null (Mammadov, 2022; Richardson et al., 2012; Vedel, 2014).

To strengthen the contribution of the present study to the literature, in addition to the adaptation of the Big Five Mini-Markers and the focus on GPA for its validation in the Portuguese higher education context, this study also includes student self-handicapping as a further criterion, due to its implications for student success and well-being (Schwinger et al., 2022; Török et al., 2018; Urdan et al., 1998). Self-handicapping refers to maladaptive behavioural strategies used by students to avoid the self-esteem threat triggered by the anticipation of academic failure (Schwinger et al., 2014; 2022). Despite protecting students' self-esteem in the short term, the use of these strategies is self-injurious in the long run, due to their negative impact on academic adjustment, performance and well-being, by eliciting negative mood states, lower perceived competence, anxiety and substance abuse (Schwinger et al., 2022; Török et al., 2018; Zuckerman & Tsai, 2005).

As modelled by Schwinger et al. (2022) integrative theoretical framework of academic self-handicapping, previous positive performance/achievement represents an antecedent of self-handicapping. It acts as an indicator of students' perceived level of ability and favourable expectations of future performance, thereby reducing the potential perceived self-esteem threat and subsequent use of self-handicapping strategies. Similarly, personality factors, especially emotional stability (by mitigating concerns about one's own self-worth and social acceptance) and conscientiousness (by enacting a stronger expectancy of achievement success), are purported to play a critical role in suppressing students' self-handicapping propensity. Despite extant meta-analytic evidence (see Schwinger et al., 2022) supporting these effects, i.e. for prior academic performance ($\rho = -.17$), emotional stability ($\rho = -.38$) and conscientiousness ($\rho = -.40$), empirical research remains uninformative about whether each of these predictors yields an independent and meaningful contribution to the prediction of self-handicapping. Hence, this study intends to further contribute to the literature by examining the incremental validity of conscientiousness and emotional stability, operationalised through the Big Five Mini-Markers, over previous academic performance, in predicting this criterion.

METHOD

Participants and procedure

This study was conducted using a cross-sectional design and a convenience sample of 673 undergraduates from a Portuguese public university. Prior to data collection, approval to conduct this research was obtained from the scientific committee of the department of psychology, confirming adherence to the ethical standards for research in psychology, the 1964 Helsinki Declaration, and its subsequent amendments, or comparable ethical standards.

Students volunteered to participate and provided the respective informed consent, with no incentives for their participation, under the guarantee of data anonymity, confidentiality, and exclusive use for research purposes. At the end of the semester, after the academic assessment period, the participants completed a Portuguese version of all the scales, which had previously been developed following standard translation procedures (Brislin, 1986). All scales were included in a paper-and-pencil questionnaire, administered by the research team during class time with teachers' permission. Specifically, students were asked to rate the frequency with which they had exhibited self-handicapping behaviours during the current semester; whereas for academic performance, they were instructed to report their last semester's GPA as an operationalization of previous academic achievement. Participants took an average of 12-16 minutes to complete the survey. The sample was 54.7% female and 45.3% male, with a mean age of $M = 21.24$ ($SD = 4.52$), ranging from 17 to 56 years. It was composed of 30.7% first-year, 25.6% second-year and 43.7%

third-year students from various university degrees, including psychical education and sport (14%), computer and informatic engineering (12.3%), languages and business relations (11.6%), biochemistry (11.2%), education sciences (9.3%), psychology (7.9%), communication, culture and organizations (7.8%), design (7.0%), management (6.2%), economics (6.2%), nursing (3.4%) and medicine (3.1%).

Measures

Big Five. As noted, the Big Five was assessed with Saucier's (1994) 40-item set of Mini-Markers, a short form of Goldberg's (1992) 100 unipolar adjective markers of the Big Five factor structure of personality, consistently found in previous research (see Bainbridge et al., 2022; Stanek & Ones, 2018, for a review). As reported by Saucier (1994) and Dwight et al. (1998), the original English version of the Big Five Mini-Markers has sound psychological properties, for a short form, as it effectively reproduces the expected/accepted five-factor structure, by sampling a set of adjectives that are more closely aligned with the core prototypical features of each Big Five, compared to the 100 Big Five markers (Goldberg, 1992). In terms of reliability, the Big Five Mini-Markers show lower levels of internal consistency (.78 to .83) than the larger marker set (.84 to .90). This is often the case with abbreviated inventories, but the levels of internal consistency obtained are quite acceptable according to recommended research standards (Nunnally, 1978). Participants of the current study completed the Portuguese version of this instrument using a 5-point Likert-type scale, ranging from 1 = *extremely inaccurate* to 5 = *extremely accurate*.

Academic performance (previous achievement). Consistent with previous meta-analytic research (Mammadov, 2022; Richardson et al., 2012), this construct was measured using students' GPA. During the data collection sessions, respondents were asked to report their cumulative GPA up to the last semester after checking their academic transcripts, available online. It ranged from 10 to 20 scores, with 10 being the minimum score for passing a subject in the Portuguese Higher Education System, with a higher score indicating a better grade average. Previous meta-analytic research indicates that self-reported GPA, although susceptible to self-distortion, is highly correlated with official GPA ($r = .90$, see Kuncel et al., 2005), making it a reliable proxy, when access to university formal records is not attainable or may compromise the anonymity of the survey (Islam et al., 2018).

Self-handicapping. This construct was assessed using Urdan et al.'s (1998) 6-item Academic Self-Handicapping Scale (ASHS), which is a commonly used instrument for measuring this variable (see Schwinger et al., 2022). Prior research has reported exploratory and confirmatory evidence indicating that these items are reflective indicators of a single construct of self-handicapping, as well as internal consistency estimates that support adequate levels of reliability for this scale (Török et al., 2018; Urdan et al., 1998). Participants were instructed to rate a Portuguese version of this scale, built for the current study, indicating how true each item was for them during the current semester, using a 5-point Likert scale where 1=*not true at all* and 5=*very true*. An example item was "Some students put off doing their academic work until the last minute so that if they don't do well, they can say that is the reason. How true is this of you?" In line with cumulative research, a confirmatory analysis carried out on the present sample showed that the hypothesised one-factor measurement model displayed a good level of fit (Hu & Bentler, 1999) to the data ($\chi^2 [9, N = 673] = 31.73, p = .001, CFI = .973, TLI = .956, RMSEA = .061, SRMR = .031$). Cronbach's alpha was .77.

Control variables. Students reported socio-demographic data on sex, age, academic year, and socio-economic status, given the potential non-trivial impact of these variables on prior achievement and self-handicapping (Islam et al., 2018). Their parents' average level of educational attainment was used as a feasible indicator of students' socio-economic status (Dickinson & Adelson, 2014).

RESULTS

Factor structure and reliability

To allow a more accurate comparison of results, the same analytic strategy employed by Saucier (1994) in the development of the Mini-Markers was followed, consisting of submitting the 40 items to a principal component analysis, with varimax rotation. Analyses were performed using IBM SPSS (version 27) for Windows. A value of KMO = .82 was obtained and Bartlett's test of sphericity [$\chi^2 (780) = 9018.07, p < .001$] reached statistical significance supporting the factorability of the data and the adequacy of the sample, respectively (Tabachnick & Fidell, 2019). Consistent with the theoretical framework of this instrument, the scree test and a parallel analysis for the 95th percentile in 1000 random samples (Horn, 1965; O'Connor,

2000) suggested the retention of a five-component solution accounting for 44.31% of the total variance. Most items showed appropriate loadings in the expected component. Yet, nine items were signalled as problematic, since they displayed relatively equivalent loadings in more than one component (*Practical, Efficient and Systematic* for conscientiousness, *Unenvious and Relaxed* for emotional stability, *Cooperative* for agreeableness and *Bashful* for extraversion) or showed very low component loadings (*Complex* for openness and *Envious* for emotional stability).

Thus, these items were dropped from the solution and analyses were repeated with the remaining 31 items. Applying the same criteria for component retention (i.e. scree test and parallel analysis), results effectively reproduced the specified Big Five factorial structure explaining 50.75% of the total variance and showed a clean and appropriate pattern of item loadings on the respective components (See Table 1). Moreover, with the exception of *Inefficient* and *Jealous*, all the items showed rather low cross-loadings (< .28) and met Saucier’s (1994) narrow criterion of item purity (p. 509), i.e. a factor-pure adjective “not only has its highest loading on the expected factor but also had a loading on that factor that was at least double the loading on any other factor”. Overall, conscientiousness and emotional stability subscales showed a greater number of dropped items with three items each, whereas extraversion, agreeableness and openness subscales only lost one item each. The mean interscale correlation of .15 obtained for this subset of items was somewhat higher but close to the analogous value of .11 reported by Saucier (1994), suggesting subscale orthogonality.

Table 1. Factor loadings from principal components analysis of the Portuguese version of Big Five Mini-Markers, using varimax rotation.

Items: English (original)/Portuguese	EX	A	C	OP	ES
Extroverted/ <i>Extrovertido</i>	.78	-.06	-.05	.07	.04
Quiet/ <i>Calado</i>	-.77	.03	-.02	.06	.02
Shy/ <i>Tímido</i>	-.73	-.06	.10	.01	.27
Withdrawn/ <i>Reservado</i>	-.68	.01	-.03	.04	.23
Talkative/ <i>Falador</i>	.68	-.02	.08	.06	.27
Energetic/ <i>Enérgico</i>	.62	-.14	-.10	.14	.04
Bold/ <i>Desinibido</i>	.59	.11	.01	.13	-.04
Rude/ <i>Desagradável</i>	.10	-.69	-.17	-.11	-.23
Harsh/ <i>Indelicado</i>	-.02	-.69	-.22	-.07	-.23
Kind/ <i>Gentil</i>	.06	.66	.11	-.23	-.16
Unsympathetic/ <i>Insensível</i>	.04	-.66	-.08	.11	-.17
Cold/ <i>Frio</i>	.02	-.59	-.02	-.06	-.18
Warm/ <i>Afetuosos</i>	-.12	.55	.11	-.20	-.28
Sympathetic/ <i>Compreensivo</i>	.08	.55	.08	-.17	-.21
Disorganized/ <i>Desorganizado</i>	.00	-.09	-.85	-.09	-.04
Organized/ <i>Organizado</i>	-.01	.06	.83	-.05	-.11
Sloppy/ <i>Desleixado</i>	.06	-.20	-.75	.00	-.12
Careless/ <i>Descuidado</i>	-.07	-.12	-.71	.03	-.14
Inefficient/ <i>Ineficiente</i>	.18	-.29	-.48	.10	-.17
Creative/ <i>Criativo</i>	.19	-.06	-.11	.68	-.06
Imaginative/ <i>Imaginativo</i>	.21	-.13	.04	.66	.15
Intellectual/ <i>Intelectual</i>	.00	.02	.08	.64	-.03
Uncreative/ <i>Não criativo</i>	-.05	.16	.09	-.60	.24
Philosophical/ <i>Filosófico</i>	.01	.14	.06	.58	.11
Unintellectual/ <i>Não intelectual</i>	.02	.06	.00	-.55	.25
Deep/ <i>Reflexivo</i>	-.10	-.23	-.11	.54	.16
Fretful/ <i>Nervoso</i>	.18	.24	-.06	.09	-.67
Jealous/ <i>Inseguro</i>	.33	.16	-.18	.07	-.66
Moody/ <i>Instável</i>	.07	-.21	-.20	-.06	-.64
Touchy/ <i>Ressentido</i>	-.04	-.20	-.06	.06	-.63
Temperamental/ <i>Temperamental</i>	-.22	-.19	.11	.00	-.58

Table 1. (Continued)

Empirical eigenvalue	4.88	3.69	2.94	2.31	1.91
Random eigenvalue	1.49	1.44	1.40	1.36	1.33
% of variance explained	15.73	11.91	9.48	7.46	6.17

Note. $N = 673$. Random eigenvalues were estimated by parallel analysis for the 95th percentile in 1000 random samples.

Regarding reliability, Cronbach's alphas, albeit lower, were almost equivalent to those obtained by Saucier (1994) with the original form of this instrument (specifically, .81 vs .83 for extraversion, .81 vs .83 for conscientiousness, .77 vs .81 for agreeableness, .73 vs .78 for openness and .72 vs .78 for emotional stability). Further results concerning final solution item statistics and scale reliability are summarised in Table 2.

Table 2. Scale/Item descriptive and reliability statistics of the Portuguese version of Big Five Mini-Markers.

Scale/Item	<i>M</i>	<i>DP</i>	r_t	Alpha if item deleted	α
<i>Extroversão (Extraversion)</i>					.81
Extrovertido	3.15	1.14	.69	.76	
Calado	3.03	1.20	.65	.77	
Tímido	2.99	1.22	.64	.77	
Reservado	3.26	1.11	.41	.81	
Falador	3.18	1.13	.51	.79	
Enérgico	3.53	0.97	.49	.80	
Desinibido	2.87	1.25	.46	.80	
<i>Amabilidade (Agreeableness)</i>					.77
Desagradável	1.60	0.81	.54	.73	
Indelicado	1.83	0.94	.57	.72	
Gentil	3.97	0.83	.54	.73	
Insensível	1.95	0.97	.54	.73	
Frio	2.34	1.19	.44	.76	
Afetoso	3.62	0.91	.45	.75	
Compreensivo	4.09	0.75	.39	.76	
<i>Conscienciosidade (Conscientiousness)</i>					.81
Desorganizado	2.42	1.25	.71	.74	
Organizado	3.53	1.07	.65	.76	
Desleixado	2.08	1.08	.66	.76	
Descuidado	2.34	1.14	.57	.78	
Ineficiente	1.86	0.88	.41	.81	
<i>Intelecto/Abertura à Experiência (Intellectance or Openness)</i>					.73
Criativo	3.54	0.96	.54	.68	
Imaginativo	3.61	1.00	.53	.68	
Intelectual	3.27	0.90	.44	.70	
Não criativo	2.28	1.20	.49	.69	
Filosófico	2.63	1.21	.37	.72	
Não intelectual	2.38	1.12	.40	.71	
Reflexivo	3.80	0.96	.37	.68	
<i>Estabilidade Emocional (Emotional Stability)</i>					.72
Nervoso	3.41	1.18	.52	.66	
Inseguro	3.03	1.24	.54	.65	
Instável	2.36	1.09	.52	.66	
Ressentido	2.33	1.07	.36	.71	
Temperamental	2.85	1.12	.46	.68	

Notes. r_t = item-total correlation. All items' minimum and maximum values were 1 and 5, respectively.

Criteria-related and incremental validity

Table 3 summarises the correlations observed between the variables under study. Consistent with previous meta-analytic evidence, conscientiousness and openness emerged as significant predictors of academic

performance in the current sample (Mammadov, 2022; Vedel, 2014). Emotional stability also emerged as a significant predictor of this criterion in the current sample, albeit the respective link showed a comparably lower magnitude. Despite being identified as a valid, but modest, predictor of GPA in cited meta-analyses, agreeableness was not significantly linked with this criterion in our study, although the observed effect size was equivalent ($r = .08$). Results were also aligned with recent meta-analytic findings for self-handicapping (see Schwinger et al., 2022), given that the factors of conscientiousness and emotional stability (albeit with comparatively lower observed estimates), as well as previous academic achievement (i.e. GPA), emerged as significant predictors of this criterion. In addition, students' academic year and agreeableness established negative and significant correlates with this variable.

Table 3. Means, standard deviations and zero-order Pearson correlations.

Variable	M	SD	1	2	3	4	5	6	7	8	9	10	11
1. Sex ^a	--	--	--										
2. Age	21.24	4.52	-.11**	--									
3. Year	2.13	0.85	-.03	.24***	--								
4. SES	2.96	1.20	-.12**	-.18**	-.05	--							
5. ES	3.20	0.78	-.27***	.07	.00	-.07	--						
6. EX	3.16	0.77	.01	.06	.01	.02	.20***	--					
7. A	3.99	0.60	.13**	.01	-.02	.00	.13**	.06	--				
8. C	3.76	0.82	.29***	-.02	.01	-.07	.20***	.10**	.35***	--			
9. OP	3.45	0.65	-.13**	.01	.00	.10*	-.07	.14***	.20***	.08	--		
10. GPA	13.90	1.88	.10*	-.17***	-.24***	.09*	.10*	.03	.08	.18**	.18**	--	
11. SH	2.05	0.67	-.07	-.01	.09*	-.03	-.12**	-.02	-.13*	-.30***	.06	-.18**	--

Note: $N = 673$. M = Mean, SD = Standard Deviation. ^aMale = 0, Female = 1. Year = Academic year, SES = Socio-economic status, ES = Emotional stability, EX = Extraversion, A = Agreeableness, C = Conscientiousness, OP = Openness, GPA = Grade point average, SH = Self-handicapping. * $p < .05$. ** $p < .01$. *** $p < .001$.

Results of hierarchical regression analysis to examine whether and to what extent these personality factors, as measured by the Mini-Markers, show incremental validity over GPA are reported in Table 4. Students' academic year was included in the first step of the analysis, given its link with the criterion. As shown, in step 2, GPA yields a significant contribution to predicting self-handicapping. Moreover, in line with our expectations, adding emotional stability, agreeableness, and conscientiousness to the model in step 3 produces a significant increase of approximately 8% in this criterion variance ($\Delta R^2 = .075$, $p < .001$), yet this increase is exclusively produced by conscientiousness.

Table 4. Incremental validity analyses of the Big Five for predicting self-handicapping, over previous academic achievement.

Independent variables	R	R^2	R^2_{adj}	F_{change}	ΔR^2	β	B	SE	95% CI
<i>Self-handicapping</i>									
Step 1	.090*	.008	.007	5.49*	---				
Academic year						-.090*	-.057	.024	[-.105, -.009]
Step 2	.225***	.051	.048	29.96***	.042***				
Previous academic achievement						-.212***	-.061	.011	[-.083, -.039]
Step 3	.354***	.125	.119	18.98***	.075***				
Emotional stability						-.052	-.036	.026	[-.086, .014]
Agreeableness						-.028	-.025	.035	[-.093, .043]
Conscientiousness						-.252***	-.166	.026	[-.217, -.114]

Notes. $N = 673$. * $p < .05$. *** $p < .001$.

DISCUSSION

This paper reports the results of the psychometric assessment of the first Portuguese translation of the 40-item Big Five Mini-Markers (Saucier, 1994), using a sample of university students. The evidence supports its five-factor structure and indicates that a significant number of its items fulfil factor purity criteria. This suggests that these adjectives, already mapped in the English language as effective markers of the Big Five

(Goldberg, 1992; Saucier, 19994), also seem to hold that status in the Portuguese language. Yet, analyses also signalled a set of nine problematic items in the Portuguese translation, specifically one in the subscales of extraversion, agreeableness and openness, and three items each in the subscales of conscientiousness and emotional stability. These findings point to the need to make additional efforts to identify alternative markers, e.g. through a complementary qualitative approach (see Thompson, 2008), to avoid potentially unfamiliar and ambiguous adjectives in the Portuguese context, such as *Complex*, *Practical* and *Bashful*, as well as those with a particularly negative meaning in terms of social reputation in Portuguese culture, such as *Envious*. Collectivism is a characteristic of Portuguese culture, which is manifest in a tendency to close and long-term orientation to groups' membership. Unlike an individualistic culture, belonging to groups and loyalty to the other members are core values (Hofstede, 2001; Hofstede-insights, 2023). Despite of the scarcity of literature on the values of university students, previous findings support the role of collectivism as a Portuguese cultural dimension, suggesting that they tend to value getting along with others and being respectful, tolerant, and loyal in social relationships (Marques et al., 2020). Portuguese culture also scores low in the masculinity dimension, which means that excessive competitiveness is not appreciated; standing out from the crowd is not especially desired and more than being the best, it is important to like what you do (Hofstede, 2001; Hofstede-insights, 2023). These Portuguese cultural orientations may generate avoidance of self-perceiving some characteristics, such as envy.

Despite dropping these items from the final solution, a five-factor solution emerged with subscales that preserve levels of internal consistency close to those reported for the original version. This suggests that some advancements have been made towards the development and validation of a Portuguese version of the Big Five Mini-Markers. Accordingly, the convergence of our findings with previous meta-analyses indicating the Big Five, as assessed by this instrument, are valid predictors of academic performance (Mammadov, 2022; Richardson et al., 2012, Vedel, 2014) and self-handicapping (Mammadov, 2022; Richardson et al., 2012, Vedel, 2014) seems to support this conclusion. Specifically, conscientiousness and openness emerged as positive predictors of academic performance, whereas conscientiousness, emotional stability and agreeableness emerged as negative predictors of self-handicapping. Although the observed estimates of some of these effects obtained with the Mini-Markers in the current sample are somewhat lower than the analogous ones reported by more recent meta-analyses, for example for the effects of conscientiousness on academic performance ($r = .18$ vs. $\rho = .26$ from Mammadov, 2022) and self-handicapping ($r = -.30$ vs. $\rho = -.40$ from Schwinger et al., 2022), they appear to capture a similar pattern of findings. For the link between emotional stability and self-handicapping, the validity loss is more pronounced, ($r = -.12$ vs. $\rho = -.38$ from Schwinger et al., 2022). However, this loss of validity for the prediction of both criteria is not as marked as it might appear, as the reported correlations are to some extent underestimated because, unlike corresponding meta-analytic estimates, they are not corrected for attenuation.

While reduced validity and reliability are expected from the reliance on brief measures (see Ellen et al., 2022), future research is still needed with other abbreviated inventories of the Big Five available in the Portuguese language, like the NEO-FFI (60 items, Costa & McCrae, 1992; Magalhães et al., 2014) and the Mini-IPIP (20 items, Donnellan et al., 2006, Oliveira, 2019) to compare their psychometric virtues with those of the Mini-Markers. As noted, regarding reliability, the alpha's estimates of the Mini Markers' scales obtained in the current sample (ranging from .73 to .81) were similar to the original version, being equal or higher (with the sole exception of emotional stability when measured with the NEO-FFI) than the corresponding estimates reported by Magalhães et al. (2014) and Oliveira (2019) for the respective Portuguese versions of the NEO-FFI (ranging from .71 to .81) and of the Mini-IPIP (ranging from .67 to .80). For criterion-related validity, additional studies are needed to compare the potential of the Portuguese version of the Mini Markers with alternative versions of other Big Five inventories, using key academic, work and health outcomes, such as relevant performance and well-being criteria (Anglim et al., 2020; Mammadov, 2022; Stanek & Ones, 2018).

Beyond its implications for the adequacy of the Mini-Markers in measuring the Big Five personality factors in the Portuguese context and its predictive validity regarding academic performance and self-handicapping, this study also contributes to the literature on the combined influence of personality and prior achievement on students' self-handicapping behaviour. Specifically, our findings indicate that the influence of conscientiousness in detracting from self-handicapping behaviours occurs independently of the effect of students' previous achievement. Thus, they support the acknowledged role of this personality dimension as a protective factor for students (Schwinger et al., 2022) but extend the understanding of the antecedents of self-handicapping by suggesting that more conscientious students are less prone to adopt self-handicapping strategies, even in situations of prior underachievement.

From an applied perspective, our findings support the use of the Portuguese version of the Mini-Markers for personality assessment and screening purposes to prioritise psychoeducational interventions

for college students with low levels of scores in conscientiousness, given the significant impact of this factor on academic performance and self-handicapping. Previous research has shown that interventions focused on enhancing the study of students' motivation, engagement and commitment to the university are effective in mitigating their propensity to self-handicapping (Martin, 2005; Török et al., 2018).

Despite the aforementioned contributions, the current study has some limitations, particularly its reliance upon an objective measure of academic performance (GPA) and students' self-ratings of self-handicapping, which are vulnerable to deliberate distortion. Further studies should add peer and teacher ratings of student performance and self-handicapping to capture an expanded criteria domain allowing a more complete picture of the impact of personality on these key student behaviours (Islam et al., 2018; Oswald et al., 2004; Vedel & Poropat, 2017).

In conclusion, the Portuguese version of the Big Five Mini-Markers, despite being composed of fewer personality markers, displayed reasonably adequate psychometric characteristics and stands as a promising personality assessment instrument that deserves future research towards its refinement. Additional efforts are needed to identify alternative markers through a complementary qualitative approach, as already mentioned. Apart from this, further research including invariance studies using different samples and behavioural criteria, such as those related to social, organisational and sports settings, is crucial for a comprehensive assessment of the psychometric merits of this instrument for the Portuguese context.

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Nuno Rodrigues: Conceptualization, Methodology, Investigation, Data Curation, Formal Analysis, Writing - Original Draft, Writing - Review & Editing. **Teresa Rebelo:** Methodology, Investigation, Writing - Original Draft, Writing - Review & Editing.

ACKNOWLEDGMENTS

This work was supported by a PhD Grant (SFRH/47004) to the first author from the Portuguese Foundation for Science and Technology (FCT). Further support came from national funding through FCT, I.P., Project UIDB/05037/2020.

History of the manuscript

Received	22/03/2023
Accepted	05/12/2023
Published (online)	26/03/2024
Published	30/06/2024