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An application of belief–importance theory in the domain of academic achievement

K. V. Petrides* and Norah Frederickson

Department of Clinical, Educational, and Health Psychology, University College London, UK

Background. Belief–importance (belimp; Petrides, 2010a,b) theory posits that personality traits confer on the individual a propensity to perceive convergences and divergences between their belief that they can attain goals and the importance that they place on these goals. The theory suggests that these convergences and divergences have important implications for affect, motivation, and action.

Aims. To test belimp theory using performance-based criteria relating to academic achievement and constructs from the personality domain.

Samples. Two hundred and forty-two students, of whom 121 were male and 117 were female (4 unreported). They were approximately 18 years old at the time of testing.

Methods. Data were collected on the belief and importance of academic achievement, the Giant Three personality dimensions, and trait emotional intelligence (trait EI). Academic achievement was operationalized via Key Stage 3 and A-level assessment results.

Results. Four hypotheses concerning academic achievement were tested and confirmed, with the Motivation quadrant scoring higher than the other three belimp quadrants (Hubris, Depression, and Apathy). Four hypotheses concerning personality were tested, of which two were confirmed, with the Hubris quadrant scoring highest on psychoticism and the Depression quadrant scoring highest on neuroticism. Four hierarchical regressions demonstrated the incremental validity of the belief and importance belimp coordinates over the Giant Three personality dimensions in the prediction of academic achievement.

Conclusions. The results are encouraging for belimp theory and complement similarly supportive findings in Petrides (2010b,c).

This article tests belief-importance (belimp) theory (Petrides, 2010c) with reference to academic achievement, the Giant Three personality dimensions (psychoticism – extraversion–neuroticism; PEN), and trait emotional intelligence (trait EI or trait

*Correspondence should be addressed to K. V. Petrides, London Psychometric Laboratory, University College London (UCL), 26 Bedford Way, London WC1H 0AP, UK (e-mail: k.petrides@ucl.ac.uk).

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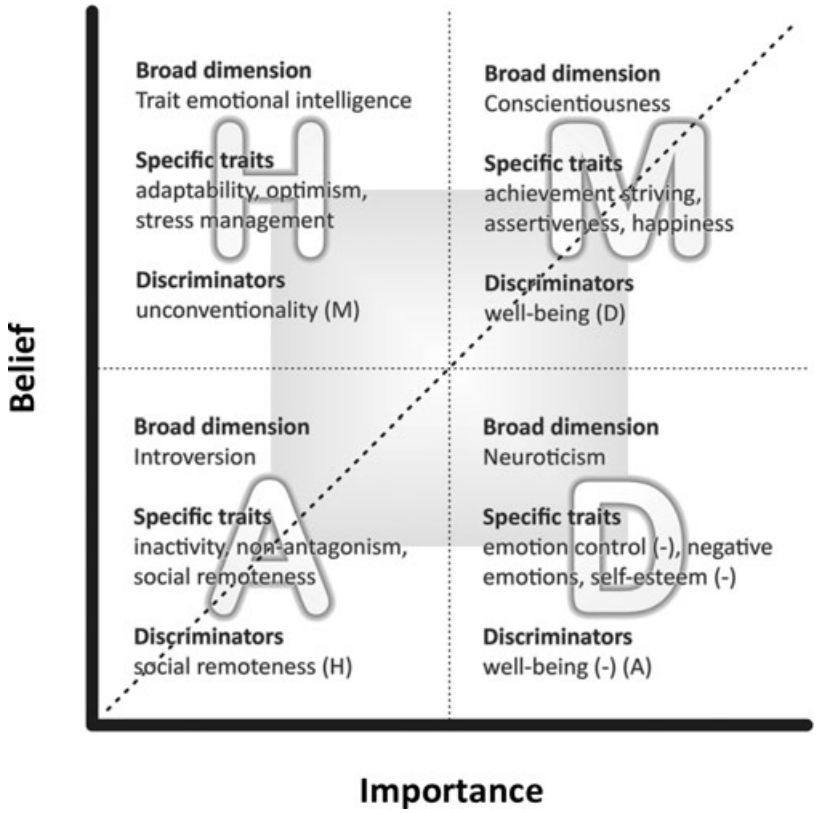

Figure 1. The figure presents the four belimp quadrants (Hubris, Motivation, Depression, and Apathy), along with the personality dimensions and specific traits that may underpin them. Because dimensions and traits will often cut across quadrants, we present, for each quadrant, a discriminating trait that helps distinguish it from adjacent quadrants. Discriminating traits are different from the key traits underpinning each quadrant and their function is to distinguish a quadrant from the adjacent quadrant specified in the parenthesis. For example, well being should specifically discriminate between the Motivation and Depression quadrants, but it should not be thought of as a key underlying characteristic of the former because other quadrants (in this case, Hubris) may be even more closely associated with well-being than it is. Also depicted are the axis of symmetry (see diagonal line), which divides the figure into two parts, such that when one part is folded over along the axis it coincides with the other part, as well as the inner and outer belimp plane regions (shaded and unshaded, respectively).

emotional self-efficacy). Below, we present a brief description of the theory. More details, including a discussion of similarities and differences with related theories (e.g., expectancy–value (EV) models), are available in Petrides (2010a; see also relevant section in 'Discussion' of the current paper). Two key differences between belimp theory and EV models are that the former (a) deals with characteristics other than motivation (notably affect) and (b) links specific personality traits to specific convergences and discrepancies between expectancies and values.

Belief and importance are conceptualized as two coordinates, together defining the *belimp plane* (see Figure 1 and 'belimp plane' subheading anon). Although they are depicted as orthogonal, in practice, the two coordinates will often be correlated because

people tend to invest in goals that they value more. The theory posits that certain traits confer on the individual a propensity to perceive convergences and divergences between their *belief* that they can attain goals and the *importance* that they place on these goals.

Aspects of traits such as conscientiousness and introversion confer a tendency to move *towards* the belimp *axis of symmetry* (see Figure 1), while aspects of traits such as neuroticism and trait EI confer a tendency to move *away* from the axis. Divergence from the axis creates residuals that can be either *positive* (belief > importance) or *negative* (belief < importance). It is postulated that personality traits determine both the individual's location on the axis of symmetry (high or low) and the direction of the residuals (positive or negative).

The two belimp coordinates are individually as well as jointly exposed to the effects of personality traits. Despite pronounced differences in value hierarchies, we propose that certain traits (e.g., aspects of conscientiousness) predispose people towards taking life more seriously and, thus, placing relatively high importance on multiple life domains (attractiveness, family, security, work, etc.; see 'life domains' subheading anon). This means that individuals who are high on certain aspects of conscientiousness will be generally more likely to agree with statements starting 'It is important to me to . . . ', irrespective of how they are completed (e.g., ' . . . attain financial security', ' . . . be attractive', or ' . . . do well at school'). Contrary to the view that confidence is essentially task-dependent (Bandura, 1997), we believe that certain personality traits (e.g., aspects of trait EI) predispose people towards being generally confident. This means that individuals who are high on certain aspects of trait EI will be generally more likely to agree with statements starting 'I really believe I can . . . ', irrespective of how they are completed (e.g., ' . . . attain financial security', ' . . . be attractive', or ' . . . do well at school').

Explanation of the belimp plane

Four quadrants are conceptualized within the belimp plane and, for heuristic purposes, labelled in terms of affect and motivation (see Figure 1). Clockwise from top left, we have the quadrants of Hubris, Motivation, Depression, and Apathy, loosely corresponding to the personality dimensions of trait EI, conscientiousness, neuroticism, and introversion. The Hubris quadrant also suggests unconventionality (because it is unusual to be uninterested in major life domains, even when you believe you can excel in them), the Motivation quadrant suggests conventionality (because we are socialized to achieve in major life domains), the Depression quadrant suggests humility (because it requires modesty to admit low confidence in life domains that you accept as important), and the Apathy quadrant suggests detachment (because it requires a certain degree of disinterest to have low confidence and be indifferent to major life domains). The labels are heuristic and intend to highlight connections between belimp processes and established dimensions of personality. These connections relate to specific facets of the dimensions, and not necessarily to their global scores, which often represent an amalgamation of rather disparate constructs.

A belimp quadrant assumes *focal* status when it becomes the most theoretically relevant in a particular analysis. When the criterion concerns self-confidence, the focal quadrant is Hubris, when it concerns achievement, the focal quadrant is Motivation, when it concerns indifference, the focal quadrant is Apathy, and when it concerns negative affect, the focal quadrant is Depression.

Two different types of belimp plane can be identified: the *conditional* belimp plane, of which there are many, and the *master* belimp plane, of which there is only one.

The former are planes specified in relation to a particular life domain and, therefore, conditional upon it. The latter is a hypothetical plane arising from averaging conditional planes over multiple life domains. An individual's position in the master belimp plane represents their *typical* belimp position.

Conditional belimp planes can be either *concordant* or *discordant* in relation to the master belimp plane and, more implicatively, in relation to a criterion. The degree of concordance between a conditional plane and the master plane is an empirical question (largely depending on the individual's value hierarchy), whereas the degree of concordance between a conditional plane and a particular criterion can be determined conceptually.

Mapping personality dimensions onto belimp quadrants

Belimp quadrants cannot be mapped injectively (one-to-one) onto broad personality dimensions because the latter often lack the necessary psychological coherence. In the quest for comprehensiveness, personality dimensions have been expanded voraciously to incorporate heterogeneous concepts (e.g., sociability, activity, and impulsivity within Extraversion; depression, hostility, and self-consciousness within neuroticism). What is more, their strictly empirical construction (Block, 1995) probably rules out the discovery of explicit processes underpinning the entire spectra of these dimensions. In due course, it is desirable to identify specific personality facets that are more closely associated with the four quadrants than any broad personality dimension could possibly be, and a first attempt to this end is presented in Figure 1.

Since the mapping between belimp quadrants and personality dimensions is non-injective, no single dimension can be conceived of as the preserve of any one quadrant. This is important to remember, especially when taking the ANalysis Of VAriance (ANOVA) approach to testing the theory (see 'testing' subheading anon). We must avoid hypothesizing that scores on, say, conscientiousness-related variables will be significantly higher in the Motivation quadrant than in the other three quadrants, since aspects of conscientiousness may well be implicated in all four quadrants. Nevertheless, we would expect that, over a number of randomly drawn life domains, pooled conscientiousness scores in the Motivation quadrant will be at least numerically higher than in the other quadrants.

Dominant personality traits

Central in belimp theory is the hypothesis that a person's position in a conditional plane will be a function of their personality, the life domain under consideration, and other, undetermined, factors of probably minor influence. Averaging over multiple conditional planes will cause all effects to cancel out, except those of the dominant personality traits that are expected to act as determinants of the individual's typical position in the master plane (from which positions in conditional planes will deviate to various extents).

Due to the hypothesized role of personality traits in determining conditional plane positions, we predict that the classification of individuals into belimp quadrants, particularly their *outer regions* (see Figure 1), will show statistically significant evidence of stability. For example, Study 2 in Petrides (2010b) showed that belimp classifications based on appearance overlapped significantly with belimp classifications based on popularity. The fact that both personality and life domains will affect positions in conditional planes means that the theory allows for a simultaneous consideration of traits

and contexts. A corollary of this advantage is *quadrant migration*, whereby someone is classified away from their typical quadrant as a part function of the life domain, with the effects of personality acting as stabilizers across classifications. Thus, someone may be classified into the Motivation quadrant based on the life domain of, say, family and into the Depression quadrant based on the life domain of financial security (quadrant migration). However, averaging over a sufficient number of different life domains will largely cancel out the life domain effects and allow the underlying personality dispositions to determine the individual's typical belimp position.

Life domains

Life domains can be construed as intelligible regions of life experience (Campbell, Converse, & Rodgers, 1976). Because life domains in belimp theory are hypothesized as partial mediators or moderators of the effects of personality traits, a life domain taxonomy along the lines proposed by Cummins (1996), who grouped 173 specific life domains under seven broad headings (material well-being, health, productivity, intimacy, safety, community, and emotional well-being), could help predict with greater precision positions in conditional planes. However, such a taxonomy would also have to map life domains onto meaningful dimensions, so that their differences may be quantified (competitive versus cooperative, individualistic versus collectivist, etc.).

In belimp theory, life domains must be relatively broad. Such stability as belimp classifications may exhibit will be the result of cross-contextual consistency in the effects of personality traits. Consequently, it is necessary that life domains be sufficiently general to allow mental aggregation over multiple narrow facets, each of which will be far less susceptible to the influence of personality than the domain as a whole. For example, personality is a stronger predictor of overall work performance than of specific job task performance that is affected by a multitude of variables and random factors (Motowidlo & Van Scotter, 1994). Belimp theory, then, is aligned to the trait self-efficacy perspective on confidence (Petrides, Pita, & Kokkinaki, 2007) and is fundamentally different from Bandurian self-efficacy (Bandura, 1997), which concerns highly specific tasks that may or may not be psychologically important. For more details about the nature, function, and consequences of life domains in the context of belimp theory, see Petrides (2010a,c).

Strategies for testing belimp theory

Three complementary statistical procedures can be used to test belimp theory. The first entails one-way ANOVAs, followed by *post hoc* tests. This approach has advantages, including simplicity and comparatively lower sample size requirements. Four groups can be derived from a 2×2 table combining high and low scores on the two coordinates of belief and importance. For an analysis of the whole belimp plane, the classification can be performed based on mean or median splits (median values will often be higher due to likely negative skewness). For an analysis of the outer regions, a type of partile- or *SD*-based classification is possible. In practice, the process will vary across studies as a function of the distributions of the belimp coordinates (with complications potentially arising from leptokurtosis). Splits based on theoretical means should be avoided because they could be severely misaligned in relation to empirical means. In due course, it may be desirable to develop standardized belimp instruments to aid the classification process.

The second procedure for testing belimp theory is moderated multiple regression (MMR) with belief, importance, and their multiplicative interaction as the regressors.

This complements the ANOVA approach by shedding light on how belimp positions relate to the dependent variables. It is not recommended as the sole testing approach due to its heavier demands on sample size.

The third approach to testing belimp theory is via latent variable modelling (LVM). This takes into account measurement error in the variables, although it requires still larger sample sizes than MMR. It cannot be handled by conventional LV models due to the non-linearity of the interaction terms and requires instead the use of numerical integration methods (Klein & Moosbrugger, 2000).

All three data analytic procedures can be applied to both whole plane and outer region data. Clearer results are expected in the latter case because outer regions ought to be less affected by quadrant migration. The three approaches vary in their focus and should be thought of as complementary (the main contrast being between the group differences approach of the ANOVA and the interaction approach of MMR and LVM). The order of the four groups in the ANOVA and the sign of the interaction terms in the other two approaches are of interest, in addition to formal tests of statistical significance. In this case, the expectation is that the focal quadrant will emerge with the highest (or lowest) score and that the sign of the interaction will be in the hypothesized direction. Thus, the order of the group means in the ANOVA and the signs of the interaction terms in the MMR and LVM approaches carry empirical weight and can be interpreted over and above any statistically significant results.

Present study

The study was designed to test key hypotheses of belimp theory and was predicated on one of the most central life domains during adolescence: academic achievement. We focused on two sets of dependent variables, one comprising indices of academic achievement and the other comprising personality variables assessed via self-report. The former included performance on Key Stage 3 national assessments in English, Maths, and Science as well as general performance on A-level public examinations, while the latter included the Giant Three personality dimensions (PEN; e.g., Eysenck & Eysenck, 1985) and trait EI, which refers to a constellation of emotional self-perceptions located at the lower levels of personality hierarchies (Petrides *et al.*, 2007). Thus, one set of criteria was proximal to the life domain of academic achievement (KS3 and A-level results) and another set were distal to it (personality and trait EI).

Following the theory as outlined above, eight hypotheses were advanced, which we organized around the four quadrants. It is crucial to keep in mind that these hypotheses are based solely on the properties of the master belimp plane and do not take into account the influence of the particular life domain (in this case, academic achievement) used for classifying participants into the four groups.

H1a: The Hubris quadrant will have the highest score on global trait EI because this is hypothesized as the broad personality dimension underlying this quadrant (see Figure 1).

H1b: The Hubris quadrant will score higher on psychoticism than the Motivation quadrant because a core component of this personality dimension is unconventionality, which has also been hypothesized as the discriminating trait between these two quadrants (see Figure 1).

H2a: The Motivation quadrant will have the highest score on KS3 English because academic achievement requires motivation.

H2b: The Motivation quadrant will have the highest score on KS3 Maths because academic achievement requires motivation.
H2c: The Motivation quadrant will have the highest score on KS3 Science because academic achievement requires motivation.
H2d: The Motivation quadrant will have the highest score on A levels because academic achievement requires motivation.
H3: The Depression quadrant will have the highest score on neuroticism because this is hypothesized as the broad personality dimension underlying this quadrant (see Figure 1).
H4: The Apathy quadrant will have the lowest score on extraversion because this is hypothesized as the broad personality dimension underlying this quadrant (see Figure 1).

Method

Participants

In 2000, we initiated a study into the relationships of cognitive ability, personality, and trait EI with academic achievement and behaviour at school (Petrides, Chamorro-Premuzic, Frederickson, & Furnham, 2005; Petrides, Frederickson, & Furnham, 2004). Full questionnaire data were collected from a convenience sample comprising 901 participants who completed compulsory schooling in 2001. In 2002, the eight schools involved in the original study were contacted again with regard to the subset of pupils known to be studying A levels. Seven of these agreed to: (a) distribute information about the study to students who had previously been involved and, where the students consented, to provide details of their A-level results; (b) provide information about the destination, where known, of students who had transferred to study for their A levels in another school or college. These institutions were then contacted with a request to assist as in (a) above. Two hundred and forty-two of the students contacted returned completed questionnaires, of whom 121 were male and 117 were female (4 unreported). Respondents were closely divided between those who had remained in their original school (127) and those who had transferred institution, to a college (17) or another school (98). They were approximately 16 years old at first testing and 18 years old at second testing.

Measures

Belimp instrument

We assessed a single-life domain with five questions concerning the belief that certain goals pertaining to academic achievement can be attained (e.g., 'I really believe I can do well at school' and 'I really believe I can get high grades in my exams') and five matching questions concerning the importance placed on those goals (e.g., 'It is important to me to do well at school' and 'It is important to me to get high grades in my exams'). The alphas for the two scales were, respectively, .87 and .92.

Eysenck Personality Questionnaire – Revised (EPQ-R; Eysenck, Eysenck, & Barrett, 1985). This is a benchmark personality questionnaire representing the best operationalization of the Eysenckian PEN system (Barrett, Petrides, Eysenck, & Eysenck,

1998). On this sample, the internal reliabilities for PEN were .65, .85, and .78, respectively.

Trait Emotional Intelligence Questionnaire-Short Form (TEIQue-SF; e.g., Sevdalis, Petrides, & Harvey, 2007). Trait EI was assessed with an early version of the TEIQue-SF. The internal consistency of the global score used in our analyses was .86.

Key Stage 3 Assessment (KS3) results

In England and Wales, pupils are statutorily assessed at the end of each of the four stages of the National Curriculum, which is followed by all publicly funded schools. Pupils will normally be about 14 years old when national testing occurs. This study used attainment scores in the three core National Curriculum subjects of English, Maths, and Science.

A levels

Advanced (A) and advanced subsidiary (AS) levels are the major entry qualifications for higher education in England and Wales. A wide range of academic subjects may be studied 16–18-year-olds in schools and colleges. Assessment of A levels is by external examination and coursework, resulting in the award of grades from A to G. In accordance with the University and Colleges Admission Service points system in place in the UK at the time, letter grades were assigned numerical values for A levels as follows: A = 10, B = 8, C = 6, D = 4, E = 2, F&G = 0. For AS awards, these values were halved. The A- and AS-level scores were totalled for each participant.

Procedure

The study was conducted under the auspices of the Buckinghamshire County Council Educational Authority (UK). A number of secondary schools in the county were contacted, of which seven participated across all phases of the study. The questionnaires were filled in class or at home in pupils' own time. Additional data were retrieved from school databases.

Results

Analysis of variance approach

Detailed results from the ANOVA approach, including Tukey *post hoc* tests, are given in Table 1 and we only present a broad qualitative summary of the main findings in the text. The four groups in Figure 1 were derived by combining high and low scores on belief and importance using mean splits. Thirty-seven pupils were classified into the Hubris quadrant, 108 into the Motivation quadrant, 29 into the Depression quadrant, and 68 into the Apathy quadrant.

In order to test the study hypotheses, eight one-way ANOVAs were performed, five of which reached statistical significance (see Table 1 for details). Of the eight hypotheses based on the properties of the master belimp plane, six were borne out by the data. More specifically, H1a was not supported, since Hubris had the second highest score on trait EI after Motivation. However, Hubris also scored highest on psychoticism, thus supporting H1b. As expected, the Motivation quadrant scored highest on every criterion of academic achievement, thus supporting H2a–H2d. Depression scored highest on neuroticism, supporting H3, while Apathy had only the second lowest score on Extraversion, thus

Table 1. Descriptive statistics and one-way ANOVA results

Variable	Hubris (*h*)	Motivation (*m*)	Depression (*d*)	Apathy (*a*)	*F*	Tukey *post hoc* tests
Stability – low *N*	19.69	18.05	16.97	18.01	4.49**	$h > a, d, m$
	(2.95)	(3.26)	(2.95)	(3.07)		
Introversion – low *E*	14.58	14.84	15.95	15.65	1.82	
	(3.20)	(3.03)	(3.18)	(3.59)		
Normality – low *P*	19.81	21.74	21.62	20.27	10.40**	$m, d > a, h$
	(2.38)	(2.11)	(1.95)	(2.43)		
Global trait EI	3.58	3.65	3.48	3.39	6.97**	$m, h^* > a$
	(.37)	(.38)	(.34)	(.41)		
KS3 English	5.79	6.32	5.93	5.83	4.93**	$m > a, h$
	(1.27)	(.87)	(.92)	(.93)		
KS3 Maths	6.06	6.40	6.07	5.96	1.83	
	(1.48)	(1.23)	(1.30)	(1.20)		
KS3 Science	5.71	5.95	5.79	5.70	.77	
	(1.31)	(1.18)	(1.13)	(1.09)		
A levels	33.43	34.44	29.88	27.68	3.19*	$m > a$
	(11.34)	(11.96)	(11.64)	(10.74)		

Note. All statistical tests were significant at either $p < .05$ or $p < .01$, except where marked with asterisks indicating significance at $p < .05$, one tailed.

failing to support H4. Many *post hoc* comparisons between quadrants reached statistical significance levels and these are summarized in Table 1.

Moderated multiple regression approach

This analysis allows for a complementary understanding of the link between the two belimp coordinates and the criterion variables. It is more methodologically challenging than the ANOVA approach both in terms of sample size requirements as well as in terms of the reliability demands it imposes on all variables, especially the criteria. We demonstrate the application of this approach with reference to KS3 English. The zero-order correlations between the key variables in the study are given in Table 2.

Table 2. Correlations between the key variables in the study

	1	2	3	4	5	6	7	8
1. Introversion (low *E*)	–							
2. Stability (low *N*)	−.301**	–						
3. Normality (low *P*)	−.106	−.076	–					
4. Belimp: importance	−.047	−.176**	.332**	–				
5. Belimp: belief	−.161*	.151**	.169**	.453**	–			
6. KS3 English	.117	−.042	−.064	.235**	.183**	–		
7. KS3 Maths	.132*	.025	−.101	.107	.195**	.691**	–	
8. KS3 Science	.161*	−.009	−.114	.106	.152*	.690**	.851**	–
9. A-level points	.132	−.033	.088	.111	.300**	.591**	.695**	.649**

Note. *$p < .05$; **$p < .01$.

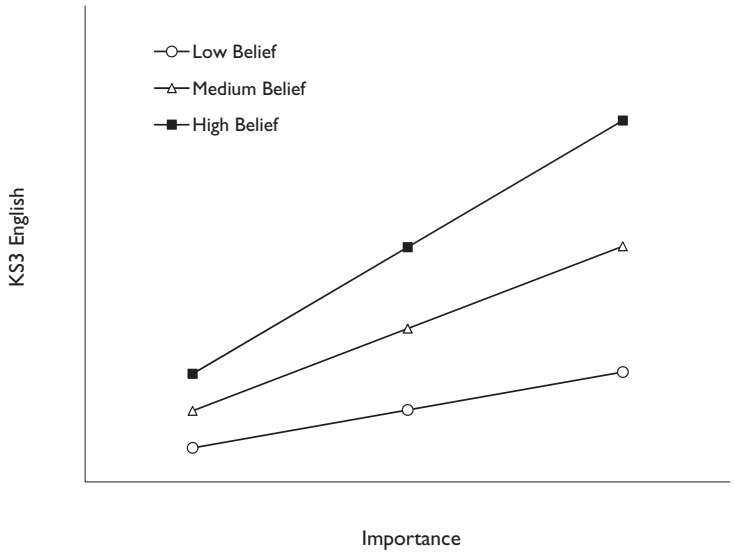

Figure 2. Simple slopes data plots of the bilinear belief × importance interaction for KS3 English. The figure illustrates that as belief in the ability to succeed academically increases, those who value this goal attain higher scores in the KS3 exam on English.

The multiplicative interaction between importance and belief was statistically significant ($R^2_{adj} = 0.10$; $F_{(3,228)} = 7.94$, $p < .01$; $t_{belimp} = 3.38$, $p < .01$), indicating that the effect of belief on academic achievement varies as a function of the importance participants attach to achievement (see Figure 2). It is interesting to note in that figure the relatively weak performance of the high belief – low importance group (Hubris), which is clear evidence that confidence (self-efficacy) is not, in itself, sufficient to promote achievement in the presence of low importance. The other two regressions with Maths and Science as the criteria did not reach significance levels, but both yielded interaction coefficients in the expected direction, mirroring the results for KS3 English. The details of these regressions are available from the corresponding author.

Latent variable modelling approach

This data analytic approach allows us to take into account measurement error in the exogenous and endogenous variables, although it requires still larger sample sizes than the MMR approach and cannot be handled by conventional structural equation modelling due to the non-linearity of interaction terms (Klein & Moosbrugger, 2000). Numerical integration methods based on full information maximum-likelihood estimation (Muthén & Asparouhov, 2003) were applied instead. Belief and importance were modelled as exogenous variables each comprising five indicators, while KS3 performance was modelled as an endogenous variable with English, Maths, and Science as its indicators. This yielded a statistically significant interaction term ($b_{belimp} = 1.51$, $z = 5.59$, $p < .01$) whose pattern was very similar to that depicted in Figure 2.

Hierarchical regressions

To explore the issue of predictive utility,[1] we carried out four hierarchical regressions with KS3 English, Maths, Science, and the total A-level scores as criteria, and the three personality dimensions, followed by the two belimp dimensions and their interaction as the predictors. In all four cases, the belimp variables (mainly belief) not only showed incremental validity over the Giant Three, but in fact explained substantially more variance. The statistical details of these analyses are reported in Table 3.

Discussion

Out of eight directional hypotheses generated from belimp theory, six were supported by the data. In those cases where hypotheses were not confirmed, the focal quadrant was always second (instead of first) in the hypothesized order. These are promising results, particularly when we take into account that the sample size was small and the distributions of the belimp variables showed considerable skewness and ceiling effects, which means that the four groups may not have been sufficiently differentiated. In other words, a larger sample with groups that are better differentiated could have yielded even more impressive findings.

The four hypotheses concerning academic achievement were corroborated by the data, with the Motivation quadrant scoring highest in each case. Of special import to belimp theory is that in three out of four cases (the exception being A-level scores), the Hubris group was not placed adjacent to the Motivation group, and in the case of KS3 English the difference between these two groups reached significance levels. This is worth noting because these quadrants have been the most difficult to differentiate on self-report measures and are involved in the majority of disconfirmations of belimp hypotheses (see Petrides, 2010b,c, and anon).

Further evidence that the Hubris and Motivation quadrants can be successfully differentiated came from the hypotheses concerning the four self-report criteria, two of which were corroborated. More specifically, Hubris scored highest on psychoticism, and significantly higher than Motivation, which is fully in line with belimp theory (H1b) and, in particular, with the discriminating traits as shown in Figure 1. Unconventionality is a core element of psychoticism (Eysenck & Eysenck, 1976) as well as a defining characteristic of the Hubris quadrant, which obtained the highest score on *P*, despite the relatively low alpha of this dimension. H4 was also borne out by the data, with the Depression quadrant scoring highest on neuroticism, thus lending empirical weight to the belimp hypothesis that this trait confers a propensity to perceive negative discrepancies between the goals someone believes they can attain and the value they place on these goals.

The other two hypotheses concerning self-report criteria were not supported by the data. First, Hubris was outscored by Motivation on global trait EI as was the case in Petrides (2010b – Study 1). This result underlines the difficulty of mapping injectively personality dimensions onto belimp quadrants, caused by the diverse nature of these dimensions. In the case of trait EI, the construct cuts across Hubris and Motivation, with some facets (e.g., optimism and stress management) more closely associated with the former and other facets (e.g., achievement striving and assertiveness) more closely associated with the latter quadrant. A further complication arises from the fact that

[1] *Strictly speaking, the design is predictive in relation to A levels and postdictive in relation to KS3 scores (Table 1).*

Table 3. Hierarchical regressions with the Giant Three at step 1, belief and importance at step 2, and belief × importance at step 3

	KS3 English		KS3 Maths		KS3 Science		A level	
Step 1	$F_{(3,222)} = 1.25$, $R^2_{adj} = .00$		$F_{(3,222)} = 2.20$, $R^2_{adj} = .02$		$F_{(3,223)} = 2.83^{*}$, $R^2_{adj} = .02$		$F_{(3,146)} = 1.40$, $R^2_{adj} = .01$	
Step 2	$F_{ch(2,220)} = 11.13^{**}$, $R^2_{adj} = .09$		$F_{ch(2,220)} = 7.16^{**}$, $R^2_{adj} = .07$		$F_{ch(2,221)} = 5.60^{**}$, $R^2_{adj} = .06$		$F_{ch(2,144)} = 9.34^{**}$, $R^2_{adj} = .11$	
Step 3	$F_{ch(1,219)} = 12.90^{**}$, $R^2_{adj} = .13$		–		–		–	
	Beta	*t*	Beta	*t*	Beta	*t*	Beta	*t*
P	−.145	1.96	−.145	2.11**	−.157	2.29*	.070	.80
E	.154	2.32*	1.72	2.51*	.186	2.71**	.196	2.36*
N	.015	.21	.45	.63	.029	.42	−.045	.55
Belief	−.424	2.57*	.204	2.73**	.156	2.09*	.383	4.13**
Importance	−.378	1.97	.087	1.12	.109	1.40	−.090	0.86
Bel × imp	.00002 (b coefficient)	3.59**	–	–	–	–	–	–

Note. $^{*}p < .05$; $^{**}p < .01$.

the Hubris quadrant may exaggerate its adaptation levels (hence its label). As a result, the Hubris and Motivation quadrants may not be easily distinguishable in self-report measures. Petrides (2010a) predicted that differentiation between these two quadrants will be maximized in measures of unconventionality and in performance-based outcomes examined with reference to congruent life domains, which is indeed what we have seen with hypotheses H1b and H2a–H2d.

H4 predicted that Apathy would score lowest on introversion and was the second hypothesis to be disconfirmed. This could well be due to the fact that Eysenckian extraversion, unlike its Big Five counterpart, does not encompass an activity component. A further difficulty with mapping broad personality dimensions onto the belimp quadrants relates to significant variation in the content domains assessed by the various personality inventories. Different operationalizations of the personality dimensions may well yield different results in relation to the same belimp planes (Petrides, 2010a).

For illustrative purposes, we analysed the data on KS3 English via MMR and the combined KS3 data on English, Maths, and Science via LVM. These analyses revealed that the effect of confidence (or, broadly speaking, academic self-concept) is contingent on the extent to which respondents value academic performance as a goal. In line with belimp theory, these results suggest that traits relating to drive (e.g., conscientiousness) propel individuals upwards the belimp axis of symmetry. The propensity to be confident about achieving goals that are valuable to us is highly motivational and results in superior performance as seen in the current dataset.

From an applied perspective, the incremental validity achieved by the two belimp coordinates is striking, given that they collectively comprised 10 short questions (in contrast to the 48 questions in the EPQ-R). This suggests that belimp theory has the potential to introduce efficiencies, and even improvements, in our ability to predict behaviour over existing personality inventories. As explained in Petrides (2010a), this is the result of the belimp mechanism being a more proximal determinant of behaviour than personality, and also of the fact that position on a concordant belimp plane will reflect both one's personality traits as well as one's attitudes towards a context (life domain), thus carrying more information than either personality or context alone. This is precisely what we witnessed with the academic achievement variables in this study, although our findings should be replicated with other belimp planes and criteria as well as with more comprehensive taxonomies of personality.

Links with other theories

A number of theories have proposed concepts that bear affinity to belimp theory (see Petrides 2010a, for a full discussion). In particular, the Motivation quadrant in the belimp plane echoes a class of incentive motivation models collectively known as EV theories (e.g., Ajzen, 1991; Rotter, 1966; Vroom, 1964). These models posit that motivation is the result of an additive or multiplicative combination of the expectation that certain actions will lead to certain outcomes (expectancy) and the desirability of these outcomes (value). Belimp theory is more general, addressing key concepts in addition to motivation (particularly affect), but perhaps also more parsimonious, since it relies only on the two coordinates of belief and importance. In contrast, EV theories are multi-variable theories involving several complex, albeit significant, constructs (e.g., intention in Ajzen, locus of control in Rotter, and instrumentality in Vroom).

These and other related theories (e.g., Higgins, 1987) have different aims, antecedents, and consequences from belimp theory and are, thus, not directly comparable

to it (or indeed between them). While the belief and importance coordinates can be roughly aligned to, respectively, the concepts of expectancy and value, they are certainly not interchangeable with them. The belief coordinate concerns, in effect, confidence that success can be achieved in a particular life domain, which is qualitatively different from the expectation that certain actions will lead to certain outcomes. Importance, in a sense, represents a truncation of the concept of value in EV theories, necessitated by the fact that belimp planes, in contrast to EV formulae, cannot accommodate negative values to indicate goal aversion (in belimp theory, goal aversion can be handled by adjusting the rubric: 'It is important to me to avoid being alone in life' – 'I really believe I can avoid being alone in life').

Conclusion

It should not be expected that hypotheses stemming from the master belimp plane will be corroborated on every conditional plane because, as pointed out in the introduction, the master plane reflects the individual's typical position from which positions in conditional planes will deviate as a function of the various life domains. With this in mind, the results of the present study are encouraging and complement similarly supportive findings reported in Petrides (2010b,c). Undoubtedly, further testing of the theory is required, whose validity, however, is strengthened by this study.

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