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Running Head: THE IPBI

**The development and initial validation of the Irrational Performance Beliefs Inventory
(iPBI)**

Brief Report

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Abstract

The growing use of Rational Emotive Behavior Therapy (REBT) in performance contexts (e.g., business, sport) has highlighted the absence of a contextually valid and reliable measure of irrational beliefs. This paper reports the development and initial validation of the Irrational Performance Beliefs Inventory (iPBI). The iPBI was developed to provide a validated measure of the four core irrational beliefs of REBT theory. Item development was completed in three stages comprising two expert panels and one novice panel, reducing and refining 176 items to 133. Then, exploratory and confirmatory factor analyses were used to refine the measure and reduce the number of items. A total of 665 business professionals completed the 133-item scale, alongside an established measure of irrational beliefs and a measure of negative emotion. A 28-item measure was developed (the iPBI) that showed an acceptable fit to the four-factor REBT structure. The iPBI correlated well with the established irrational beliefs measure, and with anxiety, depression, and anger, demonstrating concurrent and predictive validity. Further validation efforts are required to assess the validity and reliability of the iPBI in alternative samples in other performance-related contexts.

Keywords: Irrational beliefs; scale development; confirmatory factor analysis; negative emotion; REBT.

Development and initial validation of the Irrational Performance Beliefs Inventory (iPBI)

Rational Emotive Behavior Therapy (REBT) predicts that in adverse conditions it is not the situation that causes dysfunctional emotions, but rather individual beliefs about the situation (Ellis, 1957). In REBT, dysfunctional emotions (e.g., immobilizing emotions such as anxiety) and associated maladaptive behaviours (e.g., withdrawal) stem from irrational beliefs (see e.g., Browne, Dowd, & Freeman, 2010; Szentagotai & Jones, 2010). In contrast, functional emotions (e.g., mobilizing emotions such as concern) and associated adaptive behaviours (e.g., assertiveness) stem from rational beliefs (Ellis, Gordon, Neenan, & Palmer, 1997). In current REBT theory (Dryden, 2014) there are four core irrational beliefs – one primary (demandingness) and three secondary (awfulizing, low-frustration tolerance, and depreciation). In parallel, there are four types of rational belief, one primary (preferences) and three secondary (anti-awfulizing, high-frustration tolerance, and self-acceptance). Secondary beliefs are derived from the primary belief (Dryden, 2012). The goal of REBT is to reduce irrational beliefs in favour of rational beliefs.

Researchers have applied REBT to develop functional emotions and effective performance in contexts such as competitive sport (Turner, 2014; Turner & Barker, 2013) and business (Turner & Barker, 2015). However, one limitation hindering research developments in performance settings is the lack of a contextually-specific irrational beliefs measure that is short enough for test-retest purposes and aligns closely with contemporary REBT theory. A psychometric review of irrational beliefs measures concluded that current irrational beliefs scales are limited because they do not represent current manifestations of REBT theory and tend to focus on emotion and behaviour outcomes rather than irrational beliefs (Terjesen et al., 2009). The development of the Abbreviated Attitudes and Beliefs Scale-2 (Hyland, Shevlin, Adamson, & Boduszek, 2014) addressed some of these limitations

and provides a good generic measure of irrational beliefs in everyday life. Nevertheless, a context-specific measure of irrational beliefs for performance environments (that aligns with current REBT iterations) is currently absent from the REBT literature. In addition, recent recommendations (Ziegler & Horstmann, 2015) and research (Breevaart, Bakker, Demerouti, & Hetland, 2012) express the need to consider situational perception when developing new measures, so that a more accurate understanding of the specific conditions or subpopulation with which a tool works best in can be gained. Therefore, the development of a contextually specific irrational beliefs measure should consider the situational circumstances of the target population, who in the case of the present paper, could be performers operating within business, sport, academia, the performing arts, medicine, law, and the military. By developing a contextual and situational specific measure, a more accurate assessment of performance irrational beliefs can be achieved, helping to capture specific irrational beliefs rather than general irrational beliefs.

This short report describes the development and initial validation of a new performance-relevant irrational beliefs measure – the Irrational Performance Beliefs Inventory (iPBI). A new theory-driven performance-relevant irrational beliefs questionnaire will provide working consultants in performance domains with a practical tool for assessing core irrational beliefs – allowing for more valid diagnosis of irrational beliefs and more targeted theory-driven interventions.

Item Development

Because accurate item generation is central to the development of a good scale, we assembled an expert researcher panel to generate an initial pool of items (Hinkin, 1995). The panel consisted of five experienced performance psychology practitioners and researchers. Three members were qualified REBT practitioners (Centre for Rational Emotive Behavior Therapy [the UK affiliate of the Albert Ellis Institute, New York]), and three were registered

practitioner psychologists (Health Care Professions Council, UK). To ensure construct validity, we decided to target items towards the four core irrational beliefs with items reflecting various performance markers (see Macavei & McMahon, 2010). Ten contextual factors were selected that (based on the experience of the panel) reflected performance environments across business, sport, academia, the performing arts, medicine, law, and the military. The ten factors were achievement, approval, consistency, development, failure, fairness, opportunity, rejection, respect, and security.

The purpose of the expert panel was to develop a large number of items (the more the better; DeVellis, 2012) that reflect the construct and context to be measured. This ensures that content validity is built into the development of the measure (Holmbeck & Devine, 2009). The panel also ensured that item sentences were not extensive or difficult to understand. Indeed, some measures have received criticism for containing lengthy questions (e.g., Lindner, Kirkby, Wertheim, & Birch, 1999) or questions that measure other cognitive or emotional parameters in addition to irrational beliefs (e.g., Jones, 1969). The panel ensured that each item measured a single core irrational belief for a particular contextual factor, and that items did not contain emotional or behavioural wordings (Macavei & McMahon, 2010). In total, 176 items were constructed at this stage.

The 176 items were then subjected to an independent expert review panel ($n = 3$) to further ensure content (and context) validity, that items did not contain emotional and behavioural wording, and to allow for item refinement (Grant & Davis, 1997). In line with the Standard for Educational and Psychological Testing (American Educational Research Association, 1985), the experts were qualified REBT practitioners and experienced practitioner psychologists. Each expert was provided a definition of each core irrational belief and each contextual factor, and received an electronic document containing all items and instructions on item rating. The expert reviewers were asked to rate each item between 1

(*poor*) and 5 (*excellent*) regarding the extent to which the item assesses the four irrational beliefs and the ten contextual factors (Hinkin & Schrieshei, 1989). Items rated poorly were removed from the item pool. Items with a lack of clarity or poor wording were retained and revised for further validation. In total, 146 items were retained at this stage.

The 146 items were then subjected to an independent novice review panel ($n = 3$) to validate the clarity of the items among non-experts (DeVellis, 2012). The reviewers were psychology graduates but with little or no experience in using REBT or practicing as a psychologist. Each novice reviewer was provided with the same electronic document as the expert reviewers (but with 146 items) with some items amended based on expert reviewer suggestions. As before, items that rated poorly were removed from the item pool and others were amended based on comments regarding wording and clarity. In total, 133 items were retained (Demandingness = 33, Awfulizing = 33, Low-frustration tolerance = 34, Depreciation = 33). The 133 items were progressed to statistical validation analysis (DeVellis, 2012). Generally, shorter measures are preferred as they provide a more versatile assessment (e.g., can be used in time consuming contexts) and allow for accessible testing and retesting (Terjesen et al., 2009). A sample of five participants per item is recommended (DeVellis, 2012) for statistical validation analyses (133 items \times 5 = 665 participants).

Method

Sample

The sample consisted of 665 participants ($M_{\text{age}} = 44.56 \pm 12.47$ years) that were working in a professional business setting. All participants were in current employment or were self-employed within a private or public sector organization that had more than ten employees on a part-time or full-time basis. The sample (264 men, 295 women, 106 participants did not report their gender) had an average of 15.74 years' experience in their role as a professional worker ($Median = 12.00 \pm 11.16$ years). All participants were working

in the United Kingdom and data were collected in July and August of 2014. Questionnaires were completed through an anonymized online system.

Measures

Irrational performance beliefs inventory (iPBI). The iPBI included a similar stem to a previous irrational beliefs measure (SGABS). Participants were required to indicate the extent to which they agreed with each of the 133 statements on a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). We calculated summed scores for each irrational belief subscale and computed a composite irrational beliefs score by summing all subscale items (higher scores are indicative of stronger irrational beliefs).

Shortened general attitude and belief scale (SGABS). The SGABS (Lindner et al., 1999) comprises of 26 items forming eight subscales. Total irrationality (22 items) is made up of self-downing (4 items), other-downing (3 items), need for achievement (4 items), need for approval (3 items), need for comfort (4 items), and demand for fairness (4 items). A rationality (4 items) subscale is also included. Participants were asked to indicate the extent that they agreed with each of the 26 statements on a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*), with higher scores indicative of stronger beliefs. The SGABS has shown high test-retest reliability ($r = .91$; Lindner et al., 1999), and acceptable construct, concurrent, convergent, and discriminate validity (MacInnes, 2003). The SGABS was selected for comparison with the iPBI given its prior use in performance contexts (Turner & Barker, 2013).

State-trait personality inventory (STPI). Trait items from the STPI (Spielberger, 1979) were used to measure negative emotion. The 40-item STPI trait scales include 10-items per emotion, and assess individual differences in anxiety, anger, depression, and curiosity (Spielberger, 1979). Participants rated their experience of the emotion on a 4-point scale (1 =

almost never; 4 = *almost always*). STPI trait scales have demonstrated high internal consistency coefficients in previous studies ranging from .80 to .96 (Spielberger, 1979).

Preliminary analyses

In total, 38 participants were removed from the sample owing to missing data on one or more items (final sample, $n = 627$). Missing data analyses show that items were not missing completely at random, $\chi^2(4601) = 5309.07, p < .001$, but there were no more than two missing cases for any one item. For all items, skewness values were between -1.33 and 0.95 and kurtosis values were between -0.77 and 2.64 . Visual inspection of the data showed normal distribution curves on all items, but item 1 (“I absolutely should be treated fairly by my peers”) and item 43 (“I need to work in a way that works well for me”) showed nine and five potential univariate outliers, respectively (z scores > 3.29). For each of the four irrational belief subscales, exploratory principle components analyses were run and in each case a single component solution emerged. We selected items that showed high loadings for the confirmatory factor analyses ($n = 37$).

Data analysis

First, we aimed to confirm the theoretical four-factor structure of the iPBI through confirmatory factor analysis (CFA). Goodness of fit was assessed using the χ^2 statistic, the Comparative Fit Index (CFI), the non-normed fit index (NNFI), the standardised root mean square residual (SRMR), and the root mean square error of approximation (RMSEA). Values close to .06 for the RMSEA and .08 for the SRMR are indicative of a good model fit, as are values close to .95 for the CFI and NNFI (Hu & Bentler, 1999). In addition, we computed internal reliability coefficients (Cronbach’s alpha) for each irrational belief subscale. Coefficients greater than .70 indicate good test score reliability and coefficients greater than .90 indicate excellent test score reliability (Nunnally & Bernstein, 1994). Second, we tested the criterion validity of the new measure by correlating subscales with an existing

measure of irrational beliefs (concurrent validity) and several theoretical correlates of irrational beliefs (predictive validity). In particular, we correlated subscales of the new measure with subscales of the SGABS and STPI. We also compared the irrational beliefs of men and women, and correlated subscales with participant age and business experience. We hypothesized that women would report a greater number of irrational beliefs than men (see e.g., Walen & Greiger, 1988) and that a greater number of irrational beliefs would be reported by younger participants and by those with less business experience (see e.g., Ndika, Olagbaiye, & Agiobu-Kemmer, 2012). Support for these hypotheses would be considered further evidence for the predictive validity of the iPBI.

Results

Construct validity

The initial 37 items included in the CFA produced a somewhat unacceptable fit to the theoretically expected four-factor structure, $\chi^2(623) = 3175.27, p < .001$, CFI = .89, NNFI = .87, SRMR = .07, RMSEA = .08. Standardized factor loadings were generally high for all items but several items loaded on more than a single factor. These items were deleted in addition to several other items to develop a balanced questionnaire (i.e. the same number of items per factor). Twenty-eight items were retained (seven items per factor) and a subsequent CFA produced an acceptable fit to the theoretically expected four-factor structure, $\chi^2(344) = 1433.98, p < .001$, CFI = .93, NNFI = .92, SRMR = .06, RMSEA = .07. For the final 28-item iPBI, standardized factor loadings were between .61 and .91 and error variances were between .24 and .53. Internal consistency (alpha reliability) coefficients were between .90 and .96 (see Table 1).

Criterion validity

We first tested concurrent validity through correlations between the 28-item iPBI and SGABS dimensions. Table 2 demonstrates that medium to large positive correlations

emerged between subscales of the iPBI and those of the SGABS. The largest correlation was between self-downing and depreciation ($r = .86$). Based on the similar conceptualizations of these two dimensions it is not surprising that a strong correlation emerged. We next tested the predictive validity of the iPBI through correlations with trait subscales of the STPI. Small to medium positive correlations emerged between iPBI subscales and participants' trait anger, trait anxiety, and trait depression. This supports hypotheses that participants' reporting more irrational beliefs will have more negative emotional traits. Last, we tested the predictive validity of the iPBI through gender comparisons and correlations with participants' age and experience. Men scored lower on primary irrational beliefs, $t(523) = 2.57, p < .05, d = 0.23$, and awfulizing, $t(523) = 2.07, p < .05, d = 0.18$, and older participants (r 's = $-.13$ to $-.29$) and more experienced participants (r 's = $-.08$ to $-.14$) had fewer irrational beliefs (see Table 2).

Discussion

This short report outlines the development and initial validation of a performance-context specific measure of irrational beliefs. Confirmatory factor analysis supported the 28-item four-factor structure (seven items per subscale) in this sample. Criterion validity was established through high correlations between subscales of the iPBI and subscales of an established measure of irrational beliefs (concurrent validity) and through medium correlations between subscales of the iPBI and the experience of negative emotions (predictive validity). In particular, iPBI subscales were positively associated with trait anger, anxiety, and depression. Consistent with previous research (e.g., Nidika et al., 2012; Walen & Greiger, 1988), we also found that irrational beliefs (as measured using the iPBI) were higher in women than in men, and were higher in younger participants and those with less business experience. Taken together, these findings support the construct, concurrent and predictive validity of the iPBI in a professional working environment.

There are some potential shortcomings that should be considered prior to adopting the measure. First, the iPBI does not adhere to the recommendation that researchers assess rational beliefs alongside irrational beliefs (Terjesen et al., 2009). Because rational and irrational beliefs are relatively orthogonal (i.e., they do not correlate highly; see Bernard, 1998) a separate measure of rational beliefs may be required to gain a more rounded appreciation of performance beliefs. To achieve this, researchers might consider developing a corresponding rational beliefs measure (assessing the same dimensions as the iPBI) that would require validation through the same processes described in the validation of the iPBI. Second, the iPBI was validated in a single sample of organizational workers at a single time-point and therefore the test-retest reliability of the measure is unknown. Further validation studies are needed to ascertain whether the iPBI provides a valid assessment of irrational beliefs in other performance contexts (e.g., sport, academia, medicine, law, the military), in alternative cultures (outside of the UK), and in alternative populations such as adolescent and older samples.

In short, this study provides some preliminary evidence that the iPBI is a valid measure of irrational beliefs in organisational contexts. The iPBI addresses some of the limitations of extant measures, adheres closely to recommendations for scale development (see Terjesen et al., 2009), and meets recent recommendations that measures consider situational perceptions in assessing psychological constructs (Ziegler & Horstmann, 2015). We recommend further work on the psychometric properties of the iPBI and investigations into irrational beliefs and their relationship to outcomes such as performance and well-being.

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Table 1: Standardized solution and fit statistics for the full four-factor 28-item model

<i>Items</i>	Error variances	Standardized factor loadings			
		PIB	LFT	AWF	DEP
Decisions that affect me must be justified	.53	.61			
I have to be viewed favourably by people that matter to me	.40	.74			
I need others to think that I make a valuable contribution	.33	.80			
I absolutely should not be snubbed by people that matter to me	.45	.75			
I must not be dismissed by my peers	.33	.82			
I have to be respected by the members of my team	.36	.75			
I need my manager/coach to act respectfully towards me	.49	.71			
I can't bear not being given chances	.50		.69		
I can't stand not reaching my goals	.28		.82		
I can't bear not succeeding in things that are important to me	.25		.86		
I can't tolerate it when I fail at something that means a great deal to me	.34		.80		
I can't stand failing in things that are important to me	.28		.84		
I can't bear not getting better at what I do	.36		.77		
I couldn't stand it if my competencies did not continually develop and improve	.40		.76		
It's awful to not be treated fairly by my peers	.43			.76	
It's awful if others do not approve of me	.37			.82	

It's awful if others think I do not make a valuable contribution	.36	.80
It would be terrible to be dismissed by my peers	.52	.74
It is appalling if others do not give me chances	.46	.77
It would be awful if my position in my team was not secure	.41	.79
It's terrible if the members of my team do not respect me	.33	.83
If decisions that affect me are not justified, it shows that I am worthless	.26	.89
If others think I am no good at what I do, it shows I am worthless	.25	.91
If I face setbacks it goes to show how stupid I am	.28	.85
If I am not given opportunities, then it shows that I am not a worthwhile person	.28	.89
I am a loser if I do not succeed in things that matter to me	.43	.83
If my position in my team was not secure, then it would show I am worthless	.24	.90
If my competencies did not continually develop and improve, it would show what a failure I am	.34	.85

<i>Factor</i>	<i>Mean ± SD</i>	α (reliability coefficient)	Inter-factor correlations		
Primary irrational beliefs (PIB)	23.36 ± 5.29	.90			
Low frustration tolerance (LFT)	23.05 ± 5.54	.92	.71***		
Awfulizing (AWF)	21.28 ± 5.97	.92	.85***	.72***	
Depreciation (DEP)	16.03 ± 7.18	.96	.46***	.48***	.64***

Note: χ^2 (344) = 1433.98, $p < .001$, CFI = .93, NNFI = .92, SRMR = .06, RMSEA = .07

Table 2: Descriptive data of the SGASB, STPI and demographic variables, and correlations with IPBI dimensions

	<i>Mean ± SD</i>	α (reliability coefficient)	Primary irrational beliefs	Low frustration tolerance	Awfulizing	Depreciation	IPBI Composite score
<i>SGABS</i>							
Need for achievement	2.75 ± 0.82	.87	.60***	.72***	.70***	.64***	.78***
Need for approval	2.65 ± 0.83	.81	.60***	.54***	.71***	.64***	.73***
Need for comfort	3.02 ± 0.73	.81	.54***	.51***	.59***	.43***	.61***
Demand for fairness	3.14 ± 0.73	.83	.69***	.57***	.65***	.34***	.64***
Self-downing	1.99 ± 0.98	.95	.34***	.35***	.52***	.86***	.64***
Other-downing	2.88 ± 0.80	.78	.40***	.38***	.43***	.40***	.47***
SGABS Composite score	16.43 ± 3.88	.93	.65***	.64***	.75***	.72***	.81***
<i>STPI</i>							
Trait anxiety	19.48 ± 5.48	.86	.25***	.24***	.36***	.42***	.38***
Trait anger	18.24 ± 5.66	.89	.37***	.33***	.41***	.37***	.43***
Trait depression	19.83 ± 5.62	.89	.15***	.12**	.26***	.39***	.29***
<i>Demographics</i>							
Age	44.42 ± 12.42	-	-.13**	-.17***	-.15**	-.29***	-.22***
Experience	15.56 ± 11.08	-	-.08	-.14**	-.09*	-.14**	-.13**

Note: $n = 627$, * $p < .05$, ** $p < .01$, *** $p < .001$. IPBI composite score: mean = 83.72, $SD = 20.41$, $\alpha = .96$