The Development and Validation of the Thai-translated Irrational Performance Beliefs Inventory (T-iPBI)

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Abstract

One of the most commonly employed cognitive-behavioural approaches to psychotherapy is rational-emotive behaviour therapy (REBT), but researchers have been troubled by some of the limitations of irrational beliefs psychometrics. As a result, Turner et al. (2018a) developed the Irrational Performance Beliefs Inventory (iPBI), a novel measure of irrational beliefs for use within performance domains. However, the linguistic and cross-cultural adaptation of the iPBI into other languages is necessary for its multinational and multicultural use. The purpose of this paper is to develop the Thai-translated version of the iPBI (T-iPBI) and examine the validity and reliability of the T-iPBI. Data retrieved from 166 participants were analysed using SPSS and AMOS software packages. Thirty-three participants completed two follow-up T-iPBI measurements (1-week and 3-week repeat assessment). After the linguistic and cross-cultural adaptation processes, the T-iPBI demonstrated excellent levels of reliability, with internal consistency and test-retest reliability, as well as construct, concurrent, and predictive validity. The current findings indicate that the 20-item T-iPBI can be used as a self-assessment instrument to evaluate individual's irrational performance beliefs in a Thai population. We also highlight the implications of this study and suggest a variety of future research directions that stem from the results.

Keywords: Irrational beliefs; iPBI; REBT; Thai; Cross-cultural adaptation

The Development and Validation of the Thai-translated Irrational Performance Beliefs Inventory (T-iPBI)

Irrational beliefs as defined within rational emotive behaviour therapy (REBT; Ellis, 1957) are extreme, rigid, and illogical beliefs that hinder human functioning (Ellis & Dryden, 1997). Research consistently reveals that greater irrational beliefs are related to poorer psychological wellbeing and mental health (Turner, 2016), associated with a vast array of dysfunctional emotions and maladaptive behaviours (Szentagotai & Jones, 2010; Visla, Fluckiger, Holtforth, & David, 2016). Researchers have begun to investigate irrational beliefs within performance contexts such as academic (Allen, El-Cheikh, & Turner, 2017), occupational (Turner et al., 2018a), and athletic (Turner & Moore, 2016) settings. The extant research demonstrates that irrational beliefs are related to poorer mood in university students (Allen et al., 2017), greater psychological distress (anger, anxiety, and depression) in occupational workers (Turner et al., 2018a), greater psychological distress in athletes (Turner, Carrington, & Miller, 2017), and greater threat appraisals in soccer coaches (Dixon, Turner, & Gillman, 2017).

Research investigating irrational beliefs in performance settings has been limited by the lack of a contextually specific psychometric of irrational performance beliefs in recent years (Turner & Barker, 2014). In response to the apparent need for a valid measure of irrational performance beliefs, Turner et al. (2018a) developed the irrational performance beliefs inventory (iPBI). The iPBI is a 28-item measure of the four core irrational beliefs (7-items per core belief) of REBT (Dryden & Branch, 2008), namely primary irrational beliefs (PIB), and the three secondary irrational beliefs of awfulizing (AWF), low frustration tolerance (LFT), and depreciation (DEP). Importantly, the four core irrational beliefs are measured in relation to

performance situations such as success and failure, and therefore the iPBI is supposedly generalizable to all achievement contexts (e.g., occupational, athletic, military, and academic).

The majority of research examining the use of REBT in performance settings has been conducted using Western, mainly European, participant samples. There are two exceptions that have applied REBT with athletes in a Malaysian (Deen, Turner, & Wong, 2017) and a Chinese (Si & Lee, 2008) sample. Deen et al. (2017) found that REBT was able to reduce irrational beliefs and increase self-reported resilience in Malaysian squash players, and Si and Lee (2008) found a reduction in behaviors related to LFT, and performance enhancement in competition, in an Olympic table tennis athlete. However, whether and to what extent REBT can be applied in Eastern samples is not fully understood, and research findings using Western samples cannot be automatically generalised to Eastern samples. The current trend of psychology research tends to motivate researchers to determine the multicultural validity and reliability of their theories (Lega & Ellis, 2001). If a greater understanding is to be garnered about how REBT can be used with Eastern populations, first an understanding must be garnered about whether the relationships between irrational beliefs and psychological distress found in past research with Western populations hold true in Eastern populations.

One major challenge to this endeavour is the lack of translated and validated psychometrics of irrational beliefs in Eastern populations. One exception is the Thai-translated version of the irrational beliefs test (IBT; Ruangjun, 1996). The original IBT (Jones, 1968) is a 100-item self-report instrument comprising 10-items for each of the 10 irrational belief facets. In the Thai-translated version of the IBT 60-items were retained for reasons unexplained by Ruangjun (1996), where each of the 10

irrational belief facets are measured by 6-items. To the current authors' knowledge, the Thai IBT is the first and only instrument measuring irrational beliefs using Thai language. Accurate measurement of irrational performance beliefs is important for research and practice. Since REBT aims to reduce irrational beliefs to promote psychological functioning (Ellis & Dryden, 1997), being able to accurately assess irrational beliefs as part of a needs analysis, or as part of continual monitoring over the course of an intervention, has implications on how the effectiveness of REBT is determined. As such, accurate and language-appropriate measures of irrational beliefs in Eastern populations is a clear research need.

Since the iPBI reflects contemporary REBT theory, assesses beliefs only, is contextually specific to performance settings, and has been used in Eastern samples (Deen et al., 2017), the translation and cross-cultural validation of the iPBI in Eastern samples is warranted. The IBT has various limitations that preclude its use in contemporary REBT research (see Terjesen, Salhany, & Sciutto, 2009, for a review), especially research conducted in performance settings. For example, many of the IBT items capture emotions and behaviours rather than beliefs, and some of the items that are proposed to assess beliefs actually assess inferences or automatic thoughts. Therefore, in the current study, the iPBI is translated into Thai for the first time in research, and the Thai version of the iPBI is examined for its validity and reliability in a Thai sample. A Thai version of the iPBI can help to generate research on the mental health implications of irrational beliefs in Thai samples, and can also offer REBT practitioners working in Thailand a valid psychometric for applied work.

The current study has three main aims. First, the iPBI will be translated into Thai following procedures for cross-cultural psychometric adaptation (Wild et al., 2005). Second, the Thai translated iPBI (T-iPBI) will undergone validity and

reliability testing to assess its psychometric properties. As part of testing the T-iPBI, associations between irrational beliefs and psychological distress will be determined in a Thai sample for the first time in research. In line with past research, it is hypothesised that irrational beliefs as measured using the T-iPBI will be related to greater psychological distress. Finally, the test-retest reliability of the T-iPBI will be assessed to determine the consistency of the psychometric across three time points. In line with recent research (Turner et al., 2017), it is hypothesised that irrational beliefs as measured using the T-iPBI will remain stable across three time points.

Methods

Cross-cultural adaptation of the iPBI into Thai

The original iPBI was translated into Thai with permission from developers (Turner et al., 2018a). The translation process followed the Translation and Cultural Adaptation (TCA) – Principles of Good Practice, proposed by the TCA working group of the International Society for Pharmacoeconomics and Outcome Research's Quality of Life Special Interest Group (ISPOR's QOL-SIG; Wild et al., 2005). The TCA protocol comprises 10 stages:

Stage I: preparation. Together with original developers, the conceptual basis for the items in the questionnaire was discussed in order to be used by translators in the translation processes.

Stage II: forward translation. The original version of the iPBI was translated independently into Thai by the translation and languages institutes of two Thai universities. Translators were instructed to produce colloquial translations.

Stage III: reconciliation. Discrepancies between the two forward translations were identified and resolved by consensus. They were reconciled and merged into a single forward translation by the independent native Thai speaker.

Stage IV: back translation. The reconciled Thai-translated questionnaire was re-translated back into English by two additional translation and languages institutes of two independent Thai universities.

Stage V: back translation review. The differences between the two back-translated versions and the original version were identified. Only minimal problems in items were highlighted and refined following the revision of the back translated versions against the original English version.

Stage VI: harmonization. To ensure global consistency and conceptual equivalence between the Thai version and other translated versions, usually the newly translated version is compared to all translated versions in other languages. However, at the time of translation, the iPBI had not previously been translated into any other languages so we could not complete this phase.

Stage VII: cognitive debriefing. The newly Thai-translated iPBI was tested for cognitive equivalence on a small group of respondents (n = 5) in order to check understandability, interpretation, and cultural relevance. Participants included in this phase were randomly recruited from members of the Thai association in the UK. The interview was done by an experienced Thai consultant, who was familiar with carrying out cognitive debriefing interviews. Results from this cognitive debriefing interview showed adequate participant understanding of the translation.

Stage VIII: review of cognitive debriefing results and finalization. Researchers reviewed the results from the previous stage. Following an agreement between the researchers and the cognitive debriefing interviewer on minor changes, the translation was finalized.

Stage IX: proofreading. The finalized translation was proofread by checking and correcting any remaining spelling, grammatical, and/or other errors.

Stage X: final report. The final report including a full description of methodology used is presented in the current article.

Statistical analyses of the T-iPBI

Measures

Thai-translated irrational Performance Beliefs Inventory. Turner et al. (2018a) developed and validated the original iPBI as a 28-item psychometric of the four core irrational performance beliefs. Participants are asked to indicate their agreement on the 28-items on a 5-point Likert-scale from 1 (*strongly disagree*) to 5 (*strongly agree*). Higher scores reflect stronger irrational beliefs. The iPBI demonstrates good internal consistency (α = .90 - .96), and criterion validity (r = .47 - .81) within a professional working environment (Turner et al., 2018a), and good test-retest reliability in academy athlete and university student samples (Turner, Slater, Dixon, & Miller, 2018). In the present study, the iPBI was translated into Thai, and was used in all subsequent data collection and analyses.

Thai-translated Irrational Beliefs Test (IBT). The original Irrational Beliefs Test (IBT; Jones, 1968) is a 100-item self-report instrument comprising 10-items chosen to represent each of the 10 irrational belief facets (i.e. demand for social approval, high self-expectations, blame proneness, frustration reactivity, emotional irresponsibility, anxious overconcern, problem avoidance, dependency, helplessness, and the need for perfect solutions to problems). Participants are asked to indicate the frequency with which they experience each item on a 5-point Likert-scale from 1 (*almost never*) to 5 (*most of the time*). Higher scores demonstrate greater irrationality. Jones (1968) reported good internal consistency (ranging between .66-.80 for subscales and .74 for full-scale) and test-retest reliability (ranging between .68-.87 for subscale stabilities and .92 for full-scale stability). In the current study, the Thai-

translated version of the IBT (Ruangjun, 1996) is used, which includes 60-items (6-items per irrational belief facet). The Thai-translated version of the IBT demonstrated good internal consistency (Cronbachs alpha = .86) in a nursing student sample. To the current authors' knowledge, this scale is the first and only instrument measuring irrational beliefs using Thai language.

Hospital Anxiety and Depression Scale (HADS). In the original iPBI research conducted by Turner et al. (2018a), the State-Trait Personality Inventory (STPI; Spielberger, 1979) was employed to measure anxiety and depression in participants. Unfortunately, the STPI has not been Thai-translated, and therefore, an alternative measurement with similar constructs was administered in the current study. The Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983), contains two seven-item subscales, the HADS-A measuring anxiety such as "I feel restless as I have to be on the move" and "I get sudden feelings of panic", and the HADS-D measuring depressive symptoms such as "I feel as if I am slowed down" and "I feel cheerful", using a four-point Likert response scale. Previous studies using the original version of HADS report good validity and internal consistency for the subscales of anxiety and depression (α = .68 - .93 and α = .67 - .90, respectively; Bjelland, Dahl, Haug, & Neckelmann, 2002).

The Thai-translated version of the HADS (Nilchaikovit, Lotrakul, & Phisansuthideth, 1996), has good internal consistency (α = .89 for anxiety symptoms and α = .85 for depressive symptoms). In the current study, the mean score for anxiety subscale 6.69 (*SD* = 3.61; α = .79) and the mean score for depression was 4.11 (*SD* = 3.37; α = .81).

Participants

A sample of at least five participants per item (28 items x 5 = 140 participants) is recommended by DeVellis (2012) for statistical validation analyses and factor analysis. Therefore, one hundred and sixty-six participants (61 men, 104 women, 1 did not disclose) ranging in age from 18 to 71 (M = 31.08, SD = 7.25) were recruited. The sample consisted of 45 current members of the Samaggi association who temporary reside in the UK and 121 participants from alumni of the Samaggi association and acquaintances on social networking sites who are currently in Thailand. Participants, whose names appeared on the Samaggi association's social networking site, were randomly contacted if they were able to speak, read, and write the Thai language. The demographic information for the current sample is presented in Table 1.

INSERT TABLE 1 HERE.

The required sample size for three time-point test-retest, to an estimated typical planned value of 0.8 with a 95% CI width of 0.20, was 36 participants (Shoukri, Asyali, & Donner, 2004). Reminders on the Samaggi association's social networking site were sent out to all participants before each retest along with instructions on how to access and complete the Web-based T-iPBI assessments. In order to get an accurate result of test-retest reliability, participants had to complete the retest questionnaires within 24 hours after notification. In the current sample, 19.88% of respondents (N = 33) completed the questionnaires at three time points; time-point 1 (T1), time-point 2 (T2) 7-days after T1, and time-point 3 (T3) 21-days after T2. Therefore, thirty-three participants (16 men and 17 women) ranging in age from 20 to 40 (M = 28.00, SD = 6.03) consisted of 13 current members and 20 alumni of the Samaggi association.

Procedures

A link to the online questionnaire including the Thai-iPBI, the Thai-IBT, and the Thai-HADS, was sent to personal emails or preferred personal social networking site accounts. Potential participants were given detailed information about the research and that their participation would be anonymous and data would be kept confidential. After giving their informed consent, participants completed the questionnaire. Prior to all data collection, full ethical approval was granted by a U.K. university.

Data analyses

Factor analysis. The structure of the T-iPBI scale was analysed using structural equation modelling (SEM) software SPSS AMOS version 24.0. Confirmatory Factor Analysis (CFA) was used to assess the proposed measurement model in a SEM. CFA evaluated a priori hypothesis of the original four-factor measurement model structure proposed by Turner et al. (2018a).

Criterion-related validity. To determine scale criterion validity, both concurrent and predictive validity were determined. We examined criterion validity of the T-iPBI by assessing the Pearson product-moment correlation coefficients for the associations between the T-iPBI subscales and the Thai IBT and Thai HADS. In this phase, the performance of the T-iPBI was compared to a criterion standard, which presumably measure the same construct. Concurrent validity is also presented when the T-iPBI subscales can predict irrational beliefs from the Thai IBT in a multiple regression analysis. For predictive validity of the scale, we tested the relationships between T-iPBI subscales and the Thai HADS subscales (anxiety and depression).

Internal consistency reliability. Cronbach's Alpha coefficients, which refer to the general agreement between composite items of a given construct, were used to

indicate the internal consistency of the T-iPBI subscales. Cronbach's alpha above .70 indicates acceptable reliability (Nunnally & Bernstein, 1994).

Test-retest reliability. Test-retest reliability was measured to ensure the establishment of repeatability of the T-iPBI (Anthoine, Moret, Regnault, Sébille, & Hardouin, 2014). Results obtained from T-iPBI over three time-points should be representative, reproducible, and stable over time when administered to the same respondents. The original iPBI demonstrates good test-retest reliability in both athlete and university student samples (Turner et al., 2018b), and therefore it is expected that the T-iPBI should demonstrate good test-retest reliability as well. A subsample of 33 participants (from 166) completed the questionnaire at two follow-up time-points (7 days and 21 days), to evaluate interclass correlation coefficients (ICCs). The 28-day period was considered long enough to ensure that participants would not recall previous questionnaire responses. Participants were not able to print or save their previous answers and were not given the opportunity to view their previous responses. The ICC estimates and 95% confidence intervals were calculated using SPSS version 24.0 based on an absolute-agreement and 2-way mixed-effects model. A one-way repeated-measures MANOVA was also conducted to test differences in T-iPBI score across the three time-points.

Results

Descriptive statistics

There were some outliers in the data, as assessed by inspection of a boxplot. However, no cases were omitted prior the analyses in line with the minimal mean differences criteria proposed by Mat Roni (2014). All means, standard deviations, and Pearson product-moment correlation coefficients calculated among all variables are

shown in Table 2. The mean scores for total T-iPBI was 65.24 (*SD* = 12.48) with a range of 20 to 98. All intercorrelations were in the expected directions.

INSERT TABLE 2 HERE.

Factor Analysis and Construct Validity

The original iPBI scale has four components of irrational performance beliefs: primary irrational beliefs (PIB), low frustration tolerance (LFT), awfulizing (AWF), and depreciation (DEP). Factor analysis for the iPBI supported the 28-item four factor measurement structure with seven-items per subscale. The CFA in the original Turner et al. (2018a) study was replicated in the current study, comparing the proposed second-order four-factor construct model with a unidimensional construct model. The alternative unidimensional measurement model had all items loaded onto one factor.

The goodness-of-fit indices used to evaluate the overall fit of both proposed models were the comparative fit index (CFI), the standardized root mean square residual (SRMR), the root mean squared error of approximation (RMSEA) with confidence intervals, and the chi-square per degree of freedom (χ^2/df) ratio. A CFI value of .90 or above indicates a good model fit (Bentler, 1990; Hu & Bentler, 1999). A SRMR value of .08 or below indicates an acceptable model fit. A RMSEA values below .08 represents a model with an adequate fit (Hu & Bentler, 1999). Considering the computed value of CFI, SRMR, RMSEA, and the Chi-square of the Thai version of iPBI, results of the confirmatory factor analysis using AMOS software revealed a somewhat unacceptable model fit for the four-factor model structure. A χ^2 value of 798.98 was obtained ($df = 346$, $p < .001$, $\chi^2/df = 2.31$). Other goodness-of-fit indices were: CFI = .75, SRMR = .09, RMSEA = .09. The chi-square difference between the hypothesized and final model was statistically significant ($\Delta\chi^2 = 15.96$, $p < .001$). However, this four-factor 28-item measurement model still indicated a better fit for

the data than an alternative unidimensional model, $\chi^2(350) = 1087.09$, $p < .001$, $\chi^2/df = 3.11$, CFI = .59, SRMR = .12, and RMSEA = .11, according to the χ^2 difference test for nested models ($\Delta\chi^2 = 288.11$, $\Delta df = 4$, $p < .001$).

INSERT FIGURE 1 HERE.

In order to determine the most parsimonious model (Figure 1), the poorest loading items from each factor and items with poor factor loadings were removed from the model (< 0.5). As a result, eight items from the 28-item T-iPBI were removed. Specifically, three items from PIB factor ("4. I need my manager/coach to act respectfully towards me", "18. I must not be dismissed by my peers", and "22. Decisions that affect me must be justified"), three items from LFT factor ("1. I can't stand not reaching my goals", "12. I can't bear not getting better at what I do", and "15. I can't bear not being given chances"), an item from AWF factor ("28. It's awful if others think I do not make a valuable contribution"), and an item from DEP factor ("2. If I face setbacks it goes to show how stupid I am"), were omitted. The shortened model was re-modified by adjusting one covariance path at a time on the basis of modification indices and par changes. An investigation of model modification indices indicated adding a covariance path between e5 and e13, between e15 and e25, between e6 and e16, and between e16 and e17. The finalized model's goodness-of-fit was satisfactory, $\chi^2(162) = 297.02$, $p < .001$, $\chi^2/df = 1.83$, CFI = .90, SRMR = .07, RMSEA = .07. Standardized regression weights of the confirmatory factor analysis paths of the T-iPBI model were between .53 and .94 and error variances were between .07 and .92. In summary, the final 20-item T-iPBI demonstrated acceptable construct validity and was deemed acceptable to use as a four-factor measurement structure. The final 20-item four-factor T-iPBI is shown in Figure 2.

INSERT FIGURE 2 HERE.

Criterion-related Validity

Pearson product-moment correlation coefficients were calculated among subscales. As seen in Table 2, results revealed moderate correlations (r = .32 - .66, p < .001) among the T-iPBI subscales. Further, correlation coefficients between T-iPBI subscales and total T-iPBI score were computed. As a result, each subscale showed a significant, moderate-to-high, positive relationship (r = .48 - .68, p < .001) to the other subscales.

To examine the predictive validity of the T-iPBI, we next computed the correlation coefficients between the T-iPBI and the Thai HADS subscales (anxiety and depression symptoms). As a result, the total score on the T-iPBI significantly correlated with both anxiety (r = .35, p < .001) and depression (r = .35, p < .001). There were small to moderate significant correlation coefficients between subscales of the T-iPBI and anxiety (r = .17 - .33) and depression (r = .17 - .32).

To examine the concurrent validity of the 20-item T-iPBI, correlation coefficients were calculated between the T-iPBI and the Thai IBT. The total score on the T-iPBI correlated positively and significantly with the Thai IBT total score (r = .39, p < .001). Furthermore, a standard multiple regression analysis was conducted with IBT as the criterion variable and the scores on each T-iPBI subscale as criterion predictors. The multiple regression model of T-iPBI subscales significantly predicted irrational beliefs in Thai population, $F(4, 161) = 11.08$, p < .001, adj. R^2 = .20. However, it was found that only AWF predicted irrational beliefs and produced a significant R^2 change in the model (β = .37, p < .001), as did PIB (β = .17, p < .05). Table 3 reveals that various strengths of correlation between subscales of the T-iPBI and the Thai IBT subscales. The strongest correlation emerged between PIB and demand for approval (r = .42, p < .001). However, the frustration reactive subscale of

the Thai IBT did not significantly correlate with any of the T-iPBI subscales ($p > .05$).

INSERT TABLE 3 HERE.

Scale Reliability

Internal consistency reliability. The internal consistency of the T-iPBI scale was excellent with a Cronbach's Alpha of .90, as shown in Table 2. The Cronbach's Alpha values of each subscale were also high ($\alpha = .72$ - $.82$).

Test-retest reliability. Within the test-retest sample ($N = 33$), mean T-iPBI scores at T1 (Day 0), T2 (Day 7), and T3 (Day 28) were 67.45 ($SD = 11.52$), 66.85 ($SD = 12.27$), and 66.76 ($SD = 13.98$), respectively. As shown in Table 4, all T-iPBI subscale scores at T1 correlated significantly with the corresponding re-test scores at T2 and T3. Intraclass correlation coefficients (ICC) were calculated and showed an excellent degree of reliability index in test-retest. The average measure ICC of T-iPBI was .95 with a 95% confidence interval from .90 to .97, $F(32, 64) = 18.35$, $p < .001$. The ICC results of each subscale are shown in Table 4.

INSERT TABLE 4 HERE

A one-way repeated-measures MANOVA was conducted in order to further test the T-iPBI's repeatability. According to the Mauchly's test of sphericity, the assumption of sphericity was met, $\chi^2(2) = .64$, $p = .73$. The T-iPBI score did not significantly change across the three time points, $F(2, 64) = .20$, $p = .82$, partial $\eta^2 = .01$. In summary, results from ICC and one-way MANOVA indicated that overall mean scores of the T-iPBI remained stable over time.

Discussion

To our knowledge, this is the first published study reporting the successful translation of the iPBI into a non-English language. After a rigorous procedural translation exercise, the original English language iPBI was translated into Thai language,

forming the T-iPBI. After cross-cultural and linguistic adaptation, the psychometric reliability of the T-iPBI was examined. Following CFA, a 20-item T-iPBI emerged, confirming the four-factor structure of the scale in a Thai sample. The 20-item T-iPBI then underwent predictive, criterion-related, and test-retest reliability analyses. The finding that irrational beliefs are positively related to anxiety and depression symptomology is consistent with previous research findings using the iPBI (Turner et al., 2018a; Turner, Carrington, & Miller, 2017) and a vast amount of research using an array of alternate irrational beliefs measures (see Visla et al., 2016, for a review). Furthermore, the finding that T-iPBI scores remain stable over time, thus evidencing test-retest reliability, is consistent with recent research findings in U.K. athlete and student samples (Turner et al., 2018b) but extends research by sampling a general population.

The T-iPBI is a Thai-translated measure of *performance* beliefs, rather than a measure of *general* beliefs (e.g., SGABS; Lindner et al., 1999). This is important for two chief reasons. First, the research examining irrational beliefs and the use of REBT in performance environments has experienced a sharp incline in recent years, partially because performance is a part of everyday life for most people. Whether it is performing at work, in sport, in school, or at home, situations that involve disapproval, failure, unfairness, rejection, lack of respect, and danger to security arise on a daily basis. The items of the T-iPBI assess irrational beliefs that pertain to these situations, because the item-generation stage of the original iPBI included them in its early development (Turner et al., 2018a). As such, the T-iPBI, like the original iPBI, is highly applicable to a general population (Turner et al., 2018b), not just those performing in formalized and structured organizations such as elite sports clubs (e.g., Wood, Barker, Turner, & Sheffield, 2018) or blue-chip companies (e.g., Turner &

Barker, 2015). Therefore, the development of the T-iPBI allows for the accurate assessment of irrational beliefs in Thai-speaking populations for whom performance is an everyday occurrence.

Second, research suggests that cultural background is an important consideration for intervention effectiveness (Bernal & Saez-Santiago, 2006), and indeed findings of past research that were once thought to be universal may be culturally-bound (Hofstede, Hofstede, & Minkov, 2010). For example, REBT is used globally across a variety of cultures (e.g., Lega & Ellis, 2001), but it should be recognised that cultural influences can shape the expression of theory (e.g., Chang, Arkin, Leong, Chan, & Leung, 2004). Therefore, not only does the translation of the iPBI into Thai language provide a reliable measure for a Thai-speaking population, it also helps to further validate the theory of REBT through construct validity testing in this population. That is, the four core irrational beliefs that form the basis of the iPBI, and that provided good model fit in the current study for the T-iPBI, are in line with contemporary REBT theory.

A 20-item T-iPBI emerged from CFA analyses because the model fit for the 28-item T-iPBI was not satisfactory. It is possible that the full 28-item scale retained too many items and failed to sieve unnecessary translated items out. The number of instrument items being analyzed in CFA can negatively correlate with the model fit (Kenny & McCoach, 2003). In order to achieve the best model fit, the T-iPBI was shortened from 28-items to 20-items by removing items with low factor loadings from each factor. The model was re-specified to fit the revised scale and the CFA was re-run to evaluate the revised scale. Results confirmed that each of the four components was well defined by its items and all factor loadings exceeded .50. The shortening of the T-iPBI was necessary for psychometric validity, but collaterally is also beneficial

for the future use of the T-iPBI, because a shorter measure places less burden on respondents. The 20-item T-iPBI has the advantage that researchers can assess a large number of participants within a short testing time.

Concurrent validity was supported by the moderate-to-high correlations and regression model comprising the T-iPBI subscales and the total irrational beliefs measures using the IBT. Turner et al. (2018a) reported moderate to large correlations between the iPBI subscales and the subscales of another measurement of irrational beliefs, namely the Shortened General Attitudes and Beliefs Scale (SGABS; Lindner et al., 1999). Contrary to our hypothesis, only half of the relationships between the four subscales of the T-iPBI and ten subscales of the IBT were statistically significant in the current study. For instance, only demand for approval, high self-expectation, blame proneness, and helplessness for change subscales showed strong relationships with the T-iPBI subscales. Whilst it is important to demonstrate concurrent validity, it is possible that the IBT is outdated, contains too many subscales (DiGiuseppe, 1991; Smith, 1989), and includes items that are no longer considered to be irrational beliefs by contemporary theoretical standards (Dryden & Ellis, 1988). In particular, the preferential statements of the original IBT reflect only preferences, rather than core irrational processes and absolute thinking of irrationalities (Burgess, 1990). The ability of the original IBT scale to distinguish between irrationality and negative emotions has also been questioned since scores have been found to strongly correlate with measures of depression and anxiety symptomology (Haaga & Davison, 1993). Moreover, inadequate information was included in the study that produced the 60-item Thai-translated version of the IBT, and therefore the current authors are unsure about the validity of the item reduction process. This may in turn lead to unexpected results when using the Thai-IBT, which could be reflected in the present study. We

suggest researchers use contemporary and contextually specific measures of irrational beliefs in future research to ensure validity and reliability of measurement.

The predictive validity of the T-iPBI was supported through moderate positive correlations between the subscales of the T-iPBI and symptoms of anxiety and depression as measures using the Thai-HADS. These results are in line with the original iPBI validation study (Turner et al., 2018a), in which composite irrational beliefs measured using the iPBI was positively related to anxiety and depression measured using the STPI. The complimentary results found in the current paper indicate that the T-iPBI shows good predictive validity and is associated with symptoms of anxiety and depression consistent with variety of non-performance specific irrational beliefs measures (e.g., Terjesen, Salhany, & Sciutto, 2009).

As well as demonstrating concurrent and predictive validity, in the present study the T-iPBI also demonstrated test-retest reliability. Scores across three time-points remained stable as evidenced by ICC and MANOVA results, supporting recent research showing that the iPBI has good test-retest reliability in athlete and student populations (Turner et al., 2018b). The T-iPBI assesses trait constructs, rather than state or affective constructs, and therefore should exhibit high test-retest reliability (Widaman, Little, Preacher, & Sawalani, 2011). Indeed, the test-retest reliability shown for the T-iPBI is also consistent with alternate measures such as the SGABS (Lindner et al., 1999), which has demonstrated comparable test-retest reliability, and in a study using an athlete sample, remained stable over an eight-week period (Turner & Moore, 2016). Not only does test-retest reliability demonstrate good repeatability of measurement, it also suggests that irrational beliefs are indeed traits that do not change across relatively short periods of time. Research suggests that irrational beliefs are lower in older participants (Ndika, Olagbaiye, & Agiobu-Kemmer, 2012; Turner

et al., 2016), but researchers have yet to examine whether irrational beliefs reduce over long periods of time or whether generational differences can account for lower irrational beliefs in older participants. Also, growing research shows that irrational performance beliefs can be reduced using REBT, by engaging participants in structured and meaningful disputation of irrational beliefs (see Turner, 2016, for a review; Turner & Bennett, 2017). Future researchers should examine REBT interventions in Thai samples using the T-iPBI to measure changes in irrational beliefs over the intervention period using idiographic multiple-baseline across-participant designs (e.g., Deen et al., 2017; Turner, Ewen, & Barker, 2018).

Despite the promising linguistic adaptation and cross-cultural validity results presented in the current paper, it is important to consider the results as preliminary. There are several limitations in the present study that need to be considered in the interpretation of results. First, the number of participants did not allow for exploratory factor analysis (EFA) prior to CFA. To explain, we assumed the we had a known framework and we confirmed that the theoretical structure (four core irrational beliefs) by conducting CFA without prior EFA. A larger sample (N = 250; Anthoine et al., 2014) of Thai respondents would allow us to conduct EFA to ensure that the structure of the T-iPBI conforms to the original iPBI. Third, participants in this study were sampled among adult members and alumni of the Samaggi association, or were acquaintances of the researchers on social networking sites. Whilst this population sampling recruited a diverse sample, it was not a systematically randomized. The main aims of the present study were to translate the iPBI into Thai language and to test the validity and reliability of the T-iPBI in a Thai sample. Future researchers should extend these aims and recruit more specific samples to examine the validity

and reliability of the T-iPBI in groups such as athletes (Turner & Allen, 2018), occupational workers (Turner et al., 2018a), and students (Turner et al., 2018b).

The assessment of performance-related irrational beliefs has a major impact on both clinical practice and research in performance setting. In a clinical practice, an effective psychological intervention to increase individual's performance depends on an accurate identification of irrational cognitive processes and contents related to problems. Being able to identify problematic cognitive mechanisms correctly can help clients to adhere to the psychotherapeutic process. From a research perspective, distinguishing different types of thought content and processes can help researchers develop efficient intervention techniques and models of change in different settings. In an East Asian culture, rationality is also highly valued as the essence of human life. However, spectrums of rationality and irrationality are slightly different between the East Asian notion and the terms used in the Western style psychotherapy (Chen, 1995). Therefore, the applicability of iPBI to people with a Thai or East Asian cultural background will help implement mainstream Western psychotherapies into Eastern cultures. The potential for using the T-iPBI and future derivative translations in other Asian languages seems promising.

In summary, this study demonstrates that the Thai version of iPBI, the T-iPBI, is a linguistically and psychometrically valid instrument for the measurement of irrational performance beliefs. The assessment of irrational beliefs in Thai populations using the T-iPBI might help researchers and practitioners identify Thai people at risk of anxiety and depression. Moreover, the application of REBT within Thai samples is now bolstered with a contemporary Thai-language measure of irrational beliefs. As such, the authors encourage practitioners working with Thai clients to use the T-iPBI

to evaluate intervention effects and to report their findings to the wider academic community.

Conflict of Interest: Authors A and B declare that they have no conflict of interest.

Ethical approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent: Informed consent was obtained from all individual participants included in the study.

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Table 1. General characteristics of participants by gender

	Male *N=61* % (n)	Female *N=104* % (n)	Rather not say *N=1* % (n)	Total *N=166* % (n)
Age (years)	31.13 ± 6.33	31.09 ± 7.80	28.00 ± 0.00	31.08 ± 7.25
Education				
High school	4.91 (3)	6.73 (7)	0.00 (0)	6.02 (10)
Undergraduate	40.98 (25)	54.81 (57)	100.00 (1)	50.00 (83)
Postgraduate	54.10 (33)	38.46 (40)	0.00 (0)	43.98 (73)

Table 2. Means, Standard Deviations, and Intercorrelation of Variables

Factor	M	SD	T-iPBI	PIB	LFT	AWF	DEP	IBT	HADS-A	HADS-D
T-iPBI	65.24	12.48	(.90)							
PIB	15.90	2.81	.55[a]***	(.72)						
LFT	14.29	3.49	.68[a]***	.50***	(.81)					
AWF	20.75	4.58	.67[a]***	.56***	.66***	(.82)				
DEP	14.31	5.01	.48[a]***	.32***	.46***	.42***	(.82)			
IBT (Thai)	215.02	16.65	.39***	.36***	.30***	.44***	.15*	(.80)		
HADS-A (Thai)	6.69	3.61	.35***	.17*	.33***	.27**	.31***	.16*	(.81)	
HADS-D (Thai)	4.11	3.37	.35***	.17*	.32***	.25**	.31***	.13	.71***	(.79)

N = 166. [a] Correlation between T-iPBI subscales and total scores from 20 items were computed with the subscale removed from the total score. Cronbach's alphas are shown in the diagonal. T-iPBI = Thai version of Irrational Performance Beliefs Inventory; PIB = Personal Irrational Beliefs; LFT = Low Frustration Tolerance; AWF = Awfulizing; DEP = Depreciation; IBT = Irrational Beliefs Test; HADS-A = Hospital Anxiety and Depression Scale – Anxiety Subscale; HADS-D = Hospital and Depression Scale – Depression Subscale.

*** $p < .001$

** $p < .01$

* $p < .05$

Table 3. Correlations between the T-iPBI Subscales and the Thai Version of the IBT Subscales

Factor	M	SD	PIB	LFT	AWF	DEP	T-iPBI
IBT (Thai version)	215.02	16.65	.36***	.30***	.44***	.15	.39***
Demand for approval	19.86	2.69	.42***	.36***	.38***	.17*	.41***
High self expectation	22.07	2.48	.25**	.39***	.38***	.05	.33***
Blame proneness	22.45	3.15	.28***	.28***	.36***	.12	.32***
Frustration reactive	21.73	2.59	.06	-.09	.04	-.09	-.03
Emotional irresponsibility	23.87	3.04	.19*	.07	.11	-.16*	.04
Anxious over-concern	20.11	2.78	.17*	.17*	.19*	.21**	.24**
Problem avoidance	18.13	2.86	.11	.11	.22**	.12	.19*
Dependency	24.07	2.84	.27**	.16*	.36***	.07	.27**
Helplessness for change	20.13	2.98	.21**	.27**	.36***	.29***	.37***
Perfectionism	22.61	2.69	.17*	.07	.18*	.07	.15

N = 166. T-iPBI = Thai version of Irrational Performance Beliefs Inventory; PIB = Personal Irrational Beliefs; LFT = Low Frustration Tolerance; AWF = Awfulizing; DEP = Depreciation; IBT = Irrational Beliefs Test.

*** $p < .001$

** $p < .01$

* $p < .05$

Table 4. Correlations between T-iPBI (Time 1), (Time 2), and (Time 3), and ICC Results

	Time 2					Time 3					ICC		
Time 1	T-iPBI	PIB	LFT	AWF	DEP	T-iPBI	PIB	LFT	AWF	DEP	ICC	95% CI	*F*
T-iPBI	.82***	.50***	.67***	.73***	.85***	.85***	.71***	.65***	.76***	.73***	.95***	.90 - .97	18.35
PIB	.59***	.75***	.42*	.53**	.38*	.57***	.73***	.36*	.49**	.44**	.90***	.82 - .95	9.92
LFT	.61***	.27ns	.65***	.57***	.48**	.67***	.56**	.78***	.59***	.42*	.90***	.80 - .94	8.89
AWF	.74***	.44**	.64***	.70***	.63***	.74***	.65***	.57***	.82***	.49**	.93***	.87 - .96	13.51
DEP	.67***	.27ns	.46**	.54**	.79***	.73***	.45**	.43**	.56**	.84***	.93***	.87 - .96	13.71

N = 33. T-iPBI = Thai version of Irrational Performance Beliefs Inventory; PIB = Personal Irrational Beliefs; LFT = Low Frustration Tolerance; AWF = Awfulizing; DEP = Depreciation; ICC = Interclass Correlation Coefficients.
*** $p < .001$
** $p < .01$
* $p < .05$
ns $p > .05$

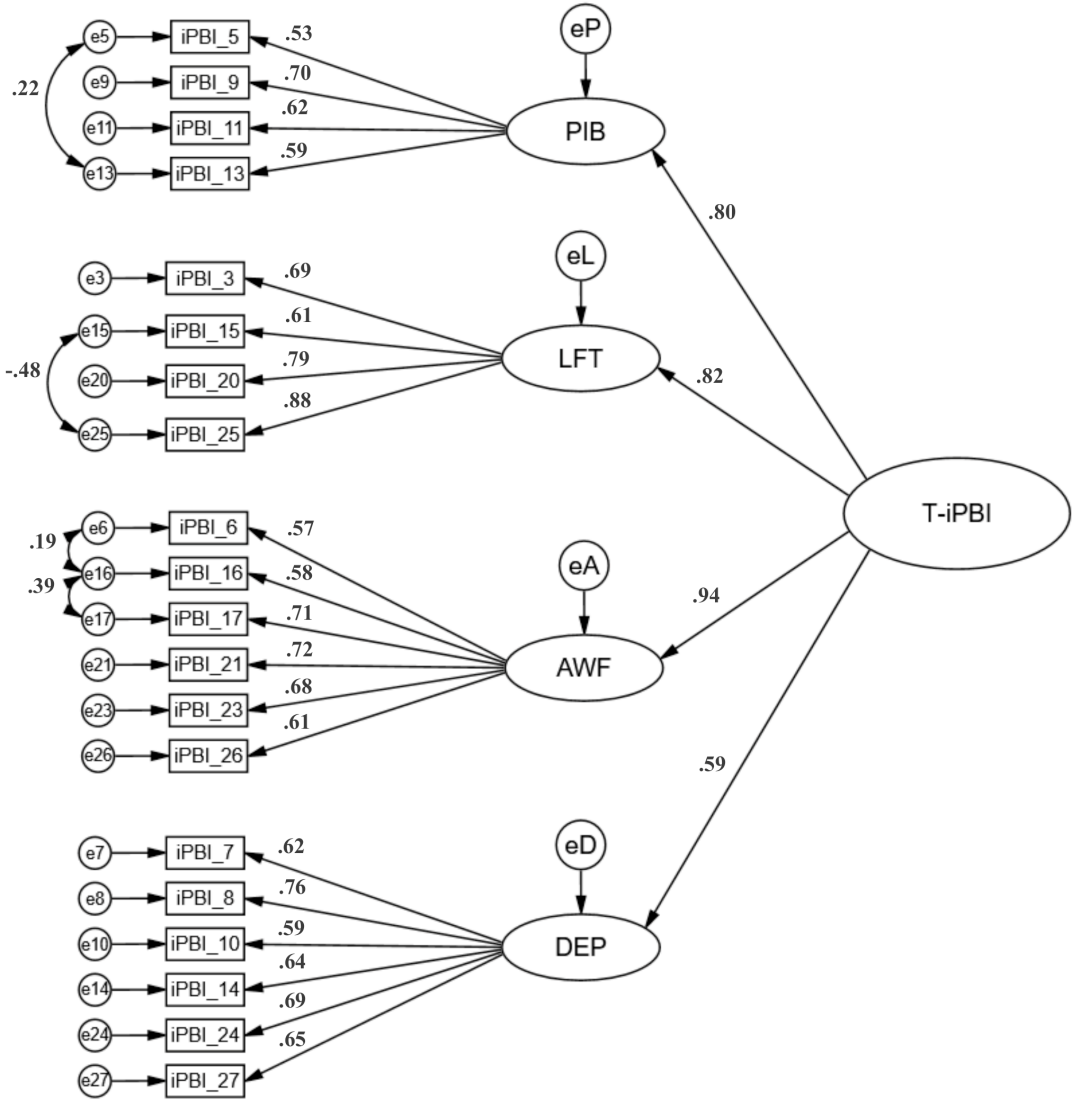

Figure 1. The Thai version of the Irrational Performance Beliefs Inventory second-order confirmatory factor analysis path diagram indicating the four first-order factors loading onto a single second-order T-iPBI factor. Standardized regression weights and covariances are shown on a diagram.

Figure 2. The final 20-item T-iPBI

แบบสำรวจความเชื่อของการกระทำที่ไร้เหตุผล ฉบับ 20 ข้อ

โปรดอ่านข้อความในแต่ละข้อ และพิจารณาเลือกคำตอบซึ่งตรงกับความรู้สึก และความเป็นจริงของท่านมากที่สุด

โดยเพียงเลือกเพียงคำตอบเดียวเท่านั้นต่อข้อ และกรุณาตอบทุกข้อ

(*ไม่เห็นด้วยอย่างมาก(1) - ไม่เห็นด้วยเล็กน้อย(2) - รู้สึกเป็นกลาง(3) - เห็นด้วยเล็กน้อย(4) - เห็นด้วยอย่างมาก(5)*)

1) ฉันทนไม่ได้ถ้าฉันต้องล้มเหลวในเรื่องที่สำคัญต่อฉันมาก

2) ฉันต้องการให้คนที่มีความสำคัญต่อฉัน มองฉันอย่างชื่นชม

3) การที่คนอื่นไม่ให้โอกาสฉัน มันเป็นเรื่องที่แย่มาก

4) หากการตัดสินใจที่มีผลกระทบต่อฉันไม่มีเหตุผลอันควร นั่นแสดงว่าฉันเป็นคนไร้ค่า

5) หากฉันไม่ได้รับโอกาส นั่นแสดงว่าฉันเป็นคนที่ไม่มีค่าพอ

6) ฉันต้องการให้คนอื่นคิดว่าฉันได้ทำสิ่งที่มีคุณค่า

7) ฉันเป็นคนขี้แพ้ หากฉันไม่ประสบความสำเร็จในสิ่งที่มีความสำคัญต่อฉัน

8) ฉันต้องได้รับความเคารพจากสมาชิกในทีมงานของฉัน

9) ฉันไม่ควรถูกดูหมิ่นดูแคลน จากคนที่ฉันให้ความสำคัญ

10) หากตำแหน่งของฉันในทีมไม่มั่นคง นั่นแสดงให้เห็นว่าฉันไร้ค่า

11) ฉันทนไม่ได้ที่จะไม่ได้รับโอกาส

12) การไม่ได้รับการปฏิบัติอย่างเป็นธรรมจากเพื่อนของฉัน นับเป็นเรื่องที่เลวร้าย

13) การที่สมาชิกในทีมไม่เคารพฉัน นับเป็นเรื่องที่เลวร้าย

14) ฉันทนไม่ได้หากล้มเหลวในสิ่งที่สำคัญต่อฉัน

15) การที่คนอื่นไม่ยอมรับฉัน นับเป็นเรื่องที่เลวร้าย

16) การที่เพื่อนๆของฉันทอดทิ้งฉัน นับเป็นเรื่องที่เลวร้าย

17) หากความสามารถของฉันไม่พัฒนาและถูกปรับปรุงให้ดีขึ้นอย่างต่อเนื่อง นั่นแสดงว่าฉันเป็นคนล้มเหลว

18) ฉันทนไม่ได้ หากไม่ประสบความสำเร็จในสิ่งที่มีความสำคัญต่อฉัน

19) การที่ตำแหน่งของฉันในทีมไม่มั่นคง นับเป็นเรื่องที่เลวร้าย

20) หากคนอื่นคิดว่าฉันไม่เก่งในสิ่งที่ฉันทำ นั่นแสดงให้เห็นว่าฉันเป็นคนที่ไม่มีค่า