A systematic review and meta-analysis of the Brief Illness Perception Questionnaire

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Objective: This paper aims to systematically review the use and performance of the Brief Illness Perception Questionnaire (Brief IPQ).

Design: Electronic databases were searched for papers administering the Brief IPQ published in peer-reviewed journals. Data were extracted from the results for meta-analysis.

Main outcome measures: Use by illness population, country, language and study design. The questionnaire’s concurrent validity, predictive validity, sensitivity to change, discriminant validity and mean scores for different populations were summarised.

Results: The review included 188 papers. The Brief IPQ has been administered to patients from age 8 to over 80, with a wide range of illnesses, in 26 languages from 36 countries. Pooled correlations between illness perceptions and depression, anxiety, blood glucose levels and quality of life were consistent with previous research and theory (range .25 to .49 for consequences, identity and emotional representations; −.12 to −.27 for personal control). All items were able to predict some outcomes up to one-year follow-up. Each subscale demonstrated sensitivity to change after intervention in randomised controlled trials with the personal control and causal items showing most frequent change.

Conclusions: The Brief IPQ is widely used and has good psychometric properties. More studies should include and analyse the causal item.

Keywords: illness cognitions; validity; measurement; Brief Illness Perception Questionnaire; self-regulation model; illness perceptions

This paper provides a systematic review of the use of the Brief Illness Perception Questionnaire (Brief IPQ), a measure of illness perceptions (Broadbent, Petrie, Main, & Weinman, 2006). The aim is to synthesise data across a number of studies to add information about the scale’s use and psychometric properties. It is hoped that this will inform and guide researchers and clinicians in the use of the questionnaire and interpretation of scores.

The questionnaire assesses patients’ perceptions of illness, which were first examined in research on health threat communication in the 1960s. Subsequent research led
to the development of the Common-Sense Model (CSM) (Leventhal et al., 1997). The theory describes a parallel response model, in which people process emotional responses to illness and cognitive representations of illness relatively independently. These cognitions and emotional responses provide motivation for people to take specific behaviours to regulate their emotions and improve the outcome of their illness. Following adoption of these procedures, people appraise the effects on the illness and the self system, and this can then result in changes to their cognitive representations and emotional responses in a feedback loop. ‘Illness perceptions’ is a term used to refer to the mental representations and personal ideas that people have about an illness. Patients’ ideas tend to fall along at least five dimensions that include beliefs about the identity of the illness (its name and symptoms), the causes of the illness, its consequences (impact on life domains), the course or timeline of the illness and how the illness can be cured or controlled (Lau, Bernard, & Hartman, 1989; Petrie & Weinman, 2012).

Hundreds of studies have investigated associations between illness perceptions, coping and illness outcomes in many different patient populations. A meta-analytic review of 45 studies showed that worse consequence and identity beliefs were consistently associated with worse physical, role and social functioning, higher distress, lower well-being and vitality, with pooled correlations ranging between .18 and .67, while correlations with disease state were −.06 to .08 (Hagger & Orbell, 2003). Higher control beliefs were associated with better social functioning and well-being, lower distress, higher vitality and better disease state with correlations between .13 and .24, while correlations with physical and role functioning were .03–.04. Longer timeline beliefs were associated with higher distress, lower role and social functioning and lower vitality, with correlations from .11 to .20, and correlations with physical function, well-being and disease state ranged from −.03 to −.10. In addition to these associations with behavioural and quality-of-life outcomes, there is growing evidence that illness perceptions are associated with important physical health outcomes, including survival/mortality (e.g. Parfeni, Nistor, & Covic, 2013). Experimental studies provide the strongest evidence that illness perceptions can modify behaviours, and several studies have shown that interventions designed to change illness perceptions can improve health outcomes (Broadbent, Ellis, Thomas, Gamble, & Petrie, 2009a; Cunningham, Swanson, O’Carroll, & Holdsworth, 2012; Davies et al., 2008; Keogh et al., 2011; Petrie, Cameron, Ellis, Buick, & Weinman, 2002; Petrie, Perry, Broadbent, & Weinman, 2012).

Initial studies used interviews to assess patients’ perceptions but as the volume of research using the CSM has increased, scales have been developed to aid assessment. The original Illness Perception Questionnaire (Weinman, Petrie, Moss-Morris, & Horne, 1996) combined 38 items rated on Likert scales to form subscales that assess each illness perception dimension. The Illness Perception Questionnaire-Revised (IPQ-R) (Moss-Morris et al., 2002) added 48 more items and new subscales to assess illness coherence, emotional response, cyclical timeline perceptions, and divided the control/cure dimension into personal control and treatment control.

The Brief IPQ (Broadbent, Petrie, Main, & Weinman, 2006) was designed to provide simple and rapid assessment of illness perceptions. In contrast to the more traditional method of constructing dimensions by forming subscales from multiple statements rated on Likert scales, the Brief IPQ uses one single item on a scale from 0 to 10 to assess each dimension, where higher scores indicate stronger perceptions along that dimension. The items include perceived consequences, timeline (acute-chronic), amount of perceived
personal control, treatment control, identity (symptoms), concern about the illness, coherence of the illness and emotional representation. The last item assesses causal perceptions by asking patients to list the three most likely causes for their illness. This short scale has advantages in terms of brevity and lower participant burden, especially in clinical settings and where repeated follow-up assessments are needed. While internal reliability cannot be assessed for single-item measures, they can produce acceptable reliability based on convergent validation measures, and can be more robust than scale measures of an overall construct (Wanous, Reichers, & Hudy, 1997). The original evaluation of the Brief IPQ found that it demonstrated good psychometric properties, including concurrent, predictive and discriminant validity. It showed similar associations with medication beliefs, disease severity and quality of life as previous research with other illness perception measures (Broadbent et al., 2006). Since publication, the Brief IPQ has been widely used which has made more data available to assess its performance.

The aims of this paper were: (1) to systematically review the use of the Brief IPQ since its publication to indicate when, where and how it has been used, (2) to provide further information regarding its concurrent and predictive validity with illness outcomes, and its sensitivity to change (3) to aggregate data to provide mean scores and predominant causal perceptions across various illness populations. Whereas Hagger and Orbell were concerned with testing CSM theory, the present study focuses on tests derived from the use of a single measure, thereby controlling for one source of method variance. Based on theory, the results of that meta-analysis and other research with the longer versions of the IPQ, we hypothesised that:

(1) Greater perceived consequences, identity, emotional response and concern would be associated with worse psychological, social, and physical functioning, and worse illness outcomes.

(2) Greater perceived control would be associated with better psychological, social and physical functioning, and better illness outcomes.

(3) Longer perceived timeline would be associated with worse psychological outcomes and quality of life with smaller effect sizes.

Method

This review focuses on journal papers that have reported the administration of the Brief IPQ to participants, and have been published between June 2006 and the end of June 2013. This systematic review has been conducted in accordance with a defined set of criteria, consulting the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Moher, Liberati, Tetzlaff, & Altman, 2009).

Search strategy

A comprehensive search of the electronic database GoogleScholar was conducted to identify papers citing the original paper on the development and validation of the Brief IPQ, as of 30th June 2013. The databases Science Citation Index, Social Sciences Citation Index, PsycINFO, Embase (2006 onwards), and Medline (2006 onwards) were then searched using the search terms ‘Brief Illness Perception Questionnaire’; ‘Brief IPQ’; ‘BIPQ’; ‘Brief-IPQ’; ‘B-IPQ’; ‘IPQ-Brief’; and ‘IPQ-B’.
Inclusion and exclusion criteria
The inclusion criteria were papers in all languages that have reported administering the Brief IPQ or a modified version of the Brief IPQ, and were published in peer-reviewed journals. Exclusion criteria were papers not administering the Brief IPQ, duplicate papers, commentaries, book chapters, literature reviews, clinical guidelines, conference proceedings or abstracts, study protocols and university theses.

Review strategy and procedure
The search identified 579 publications. Once duplicates were removed, 474 publications were included. The titles and abstracts of the publications were inspected using the inclusion and exclusion criteria and 254 were excluded. A further 32 were excluded after accessing the full articles, leaving 188 papers in the review (see Table S1 and Figure S1).

A detailed procedure for extracting relevant information from the journal papers included: the name of the paper; author(s); year of publication; number of participants; language(s) that the study was conducted in; patient or condition population; participant ages; study design; language(s) of the abstract and paper; country the study was conducted in; text that referred to the results relating to the Brief IPQ; and Brief IPQ items administered. The abstraction included results that contained information that met criteria for predictive, construct validity and sensitivity to change. Foreign-language papers were included in the summaries of countries, languages and illnesses, although not in the construct validity, predictive validity, sensitivity to change or means tables, due to limited information. Where possible, they were translated in English to help with this process.

Statistical analysis
Random effects meta-analysis was conducted using the metan package in Stata (Harris et al., 2008). Where quality-of-life scales were scored such that higher scores indicated better quality of life (e.g. SF-36), the sign of the correlation coefficient was changed to ensure consistency with other measures of quality of life, and measures of psychological distress. Pooling was undertaken based on the Fisher’s $z$ transformation of the correlation coefficient, where the standard error was calculated as $1/\sqrt{(n - 3)}$ (Cox, 2008). Back transformed correlations are displayed. Where there were fewer than three samples reporting correlation coefficients no pooling of the correlations was undertaken.

Results
Illness populations, countries and languages
The results of this review show that the Brief IPQ is a versatile measure of illness perceptions. The scale has been used in many illness populations: cancer (23 studies); endocrine, nutritional and metabolic diseases (28); mental and behavioural disorders (22); diseases of the nervous system (14); eye diseases (4); diseases of the circulatory system (36); respiratory diseases (19); diseases of the digestive system (10); skin diseases (1) diseases of the musculoskeletal system and connective tissue (27); diseases of
the genitourinary system (8); infectious diseases (16); accidents, injuries and burns (6); organ transplantation (2); allergies and sensitivities (2); and factors affecting health status and contact with health services (2). The Brief IPQ has also been used in 36 countries across many continents: North America (19 studies); Central and South America (5); the UK (42); Rest of Europe (64); Australasia (38); and Asia (25). It has been used in 26 languages (Chinese, Croatian, Czechoslovakian, Danish, Dutch, English, French, German, Greek, Gujarati, Hebrew, Hindi, Indonesian, Italian, Japanese, Kannada, Norwegian, Persian–Farsi, Polish, Portuguese, Samoan, Slovene, Spanish, Telegu, Tongan and Urdu). The ages of the participants have ranged from eight to over 80 years. Its use has grown steadily over time (see Figure S2). While many researchers have used the full version (38 studies), most (101 studies) have omitted the causal item, and others (32 studies) have chosen a selection of items, most commonly the personal and treatment control and consequences items. Most studies (137) used items individually in analyses but 43 created composite scores by adding the scores of between 2 and 8 items together. The scale has been employed in a range of study designs, including 116 cross-sectional and 31 longitudinal studies as well as 24 interventions and a handful of vignette-based studies.

Validation studies of translated versions and new measures
Four papers validated translated versions of the Brief IPQ for the Dutch (de Raaij, Schröder, Maissan, Pool, & Wittink, 2012), Iranian (Farsi translation) (Bazzazian & Besharat, 2010), Spanish (Pacheco-Huergo et al., 2012) and Taiwanese (Chinese translation) populations (Lin, Chiu, & Wang, 2011). The results supported the validity of the translations. Six studies used the Brief IPQ for validating new measures, including the Beliefs about Depression Questionnaire (Lynch, Moore, Moss-Morris, & Kendrick, 2011), the Adult Eosinophilic Oesophagitis Quality of Life questionnaire (Taft et al., 2011), the Czech translation of the Beliefs about Medicines Questionnaire (Matoulková et al., 2013), the Norwegian Core Outcome Measures Index (Storheim, Brox, Lochting, Werner, & Grotle, 2012), the Satisfaction With Cancer Information Profile (Llewellyn, Horne, McGurk, & Weinman, 2006) and the Personal Perception Questionnaire and the Health Behaviour Questionnaire (Brehmer-Rinderer, Zigrovic, & Weber, 2013). In addition, the Brief IPQ was validated for use in assessing beliefs about mood swings in bipolar disorder (Lobban et al., 2013).

Concurrent validity
To examine concurrent validity, we concentrated on associations reported in cross-sectional studies between the Brief IPQ and anxiety, depression, HbA1c and quality of life. Table 1 and Figure 1 report the pooled correlation coefficients where a minimum of three samples was available for pooling. Heterogeneity as indicated by $I^2$ varied substantially across items and constructs.

As hypothesised, higher consequences, emotional representation and identity, were moderately to strongly associated with higher depression and anxiety, higher HbA1c (worse control) and lower quality-of-life dimensions according to Cohen’s criteria (Cohen, 1992). Concern perceptions had similar but slightly less consistent associations. Personal control and treatment control had small negative correlations with anxiety and
Table 1. Results of meta-analysis between items of the Brief IPQ and outcomes to examine concurrent validity.

<table>
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<th>$k$</th>
<th>$r$</th>
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<th>Upper</th>
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(Continued)
depression and small to moderate correlations with better quality of life. Personal control had moderate negative correlations with HbA1c (better control).

The studies that included the causal item typically categorised and described the most frequent responses, and some also investigated associations with diagnostic/demographic factors or outcomes. These associations largely support the validity of the causal item (see Table S2).

**Predictive validity**

Twenty longitudinal studies reported using the Brief IPQ at baseline to predict outcomes over time, and these are summarised in Table S3. More threatening composite scores were associated with worse adherence in sleep apnea patients, persistence of medically unexplained symptoms, anxiety after cardiac events and slower healing from burns. Perceptions of more negative consequences were one of the strongest predictors of outcomes, predicting disability in gout, lower reassurance following normal test results, higher depression after cardiac evaluation and in patients with bipolar disorder, post-concussion syndrome, slower return to work in cancer patients and in workers after sickness absence.

Higher identity beliefs were another strong predictor of outcomes, predicting lower quality of life in CHD, PTSD scores, post-concussion syndrome, lower chance of returning to work, lower reassurance, more depression and mood episodes. Similarly, longer timeline beliefs predicted reduced odds of preterm birth, slower recovery from surgery and from injury, slower return to work, post-concussion syndrome and lower reassurance.

Both higher personal and treatment control beliefs predicted lower disability in gout patients, and return to work following illness absence. In addition, higher treatment control predicted better recovery from surgery, more weight loss and higher reassurance, while higher personal control predicted less chance of post-concussion syndrome.
Stronger emotional representations predicted lower quality of life, lack of return to work and lower reassurance. The concern item was added to the Brief IPQ in an attempt to assess how worried people were about their illness, as part of emotional representations, and higher concern was found to predict higher post-traumatic stress scores, worse recovery from surgery, less chance of returning to work, lower reassurance, more frequent

![Figure 1. Results of meta-analysis showing pooled correlations between illness perception items and outcome measures. Note: Higher outcome scores indicate worse function.](image)

Stronger emotional representations predicted lower quality of life, lack of return to work and lower reassurance. The concern item was added to the Brief IPQ in an attempt to assess how worried people were about their illness, as part of emotional representations, and higher concern was found to predict higher post-traumatic stress scores, worse recovery from surgery, less chance of returning to work, lower reassurance, more frequent
depression and more relapses of mood episodes. Better coherence predicted the fewest outcomes: post-traumatic stress scores and caregiver gains.

**Discriminant validity**

An additional five longitudinal studies administered the Brief IPQ at baseline and examined differences between groups (Devcich, Ellis, Broadbent, Gamble, & Petrie, 2012; Dickson, Toft, & O’Carroll, 2009; Kaptein et al., 2011, 2013; Pacey et al., 2013). Compared to patients with autoimmune thyroid disease, individuals with chronic fatigue syndrome reported shorter timeline beliefs, greater illness concerns and lower treatment control perceptions (Dickson et al., 2009). Kaptein and colleagues conducted two studies to investigate quality of life and illness perceptions in Dutch and Japanese patients with non-small cell lung cancer (2011) and breast cancer (2013), respectively. Japanese and Dutch cancer patients shared similar illness perception beliefs; however, some differences were observed. Compared to Dutch patients with non-small cell lung cancer, Japanese patients scored higher on personal control and treatment control perceptions suggesting Japanese patients had stronger beliefs in the success of their cancer treatment. Also, compared to Dutch breast cancer patients, Japanese patients expressed higher concern about their breast cancer.

**Sensitivity to change**

Table S4 summarises the 13 randomised controlled trials that have measured change in illness perceptions. The results show that all of the items have demonstrated changes over time in at least one trial. The personal control item has shown change most frequently, and treatment control, concern and coherence have also shown change in a number of studies. Causal beliefs have shown change in all three studies they were measured in.

There have also been several longitudinal studies that have shown changes in illness perceptions over time including: intensive care patients (Aitken, Chaboyer, Schuetz, Joyce, & Macfarlane, 2014); cardiac rehabilitation (Janssen, De Gucht, van Exel, & Maes, 2013); young adults with cancer (de Castro, Kreling, Ponciano, Meneghetti, & Chem, 2012); dialysis (Jansen et al., 2012); and following coronary computed tomography angiography (Devcich et al., 2012).

**Means**

Table S5 provides a list of the means and standard deviations of the items and the causal categories. The most prevalent causal beliefs were psychological stress, genetics and illness behaviours.

**Discussion**

**Psychometric properties**

This review has demonstrated that the Brief IPQ has been widely used in diverse ages including children from the age of eight, illness types, countries and languages.
Meta-analysis showed the scale has good concurrent validity, as the associations shown were consistent with theory and with previous literature (Hagger & Orbell, 2003). A belief in serious consequences, a strong illness identity, stronger emotional representations and concern were moderately to strongly associated with depression, anxiety, low quality of life, and worse blood glucose levels (range .17–.49). Higher perceived personal control (and to a lesser extent treatment control and coherence) had small to moderate correlations with better quality of life, lower depression and anxiety, and better blood glucose control (range .12–.27). A longer perceived timeline showed weaker associations with these outcomes (range .05–.19) and this is likely due to differences in the adaptiveness of a chronic timeline perception between different illnesses.

Predictive validity was demonstrated in 19 of 20 longitudinal studies for a number of mental and physical health outcomes. The coherence item predicted the fewest outcomes. Illness coherence was not one of the original dimensions of illness perceptions described in early research, and was added by the authors of the IPQ-R as a metacognition to assess the extent to which patients’ illness perceptions provided a coherent understanding of the illness. This dimension was not included in the published meta-analysis by Hagge and Orbell (2003) and less data exist regarding the validity of this dimension in illness perception research. The dimension can be seen as a summary of how the other perceptions fit together to provide a coherent model rather than being an independent illness perception per se.

Randomised controlled trials have shown that all of the items can assess changes in illness perceptions after an intervention relative to a control group. Personal control and causal beliefs have been shown to change the most frequently in response to interventions. These are critical illness perceptions to modify for behaviour change to occur. Longitudinal studies have demonstrated the ability of the total Brief IPQ score as well as individual items to assess changes in illness perceptions over time. Other longitudinal studies have provided evidence that Brief IPQ scores are different between groups, including different illnesses, different cultures and between patients with diseased and non-diseased arteries. The Brief IPQ has been translated into 25 other languages and studies have largely supported the validity of the translations. Data from studies using the Brief IPQ for the validation of other questionnaires also support its validity.

The majority of studies have analysed the items as single-item scales, but 43 studies have combined various items in a range of ways to create composite scores or subscales. Such combinations have tended to either sum all of the items or to form subscales of the cognitive items and the emotion/concern items separately. Grouping the items this way is in line with the CSM’s separation of the cognitive and emotional representations. The CSM proposes that illness perception dimensions are not independent and yet they will be related in different ways depending on the characteristics of illness concerned, such as chronicity and treatment. Composite scores may be valid in certain illnesses, depending on how the dimensions are related. Caution must be applied when forming subscales because the items will not necessarily form a coherent cluster and this will vary greatly among diseases. Combining items should be considered only after carefully checking correlations between the items in the study population. In addition, summing items together loses information about which perceptions are most strongly linked to outcomes. It reduces the scale to a general measure of threat and is less useful for clinical applications. It can also make comparisons across studies difficult.
Limitations

Limitations of the work using the Brief IPQ to date include a predominance of cross-sectional studies over longitudinal studies. Cross-sectional studies are easier to perform but longitudinal studies are more valuable. Fewer studies included the causal item and this is likely because it is more time consuming to analyse. Studies that did assess causal attributions typically categorised and listed the most common responses, while a small number attempted to analyse how causal beliefs were associated with outcomes. While a number of translations have been published and successfully used, it is not clear that they are all semantically equivalent to the English version. There has been a lot of variation in the use of items and response scales across studies. This may be because the authors of the IPQ scales encourage researchers to modify wording to suit their illness populations. However, altering the instructions and using a confusing translation has drawn criticism, so taking care in wording is advised (Broadbent, Kaptein, & Petrie, 2011). The review does not include internal reliability because this is not applicable to single-item scales, which is a limitation of the Brief IPQ. Single items must capture the content of the dimension succinctly. One criticism of the original Brief IPQ was that it developed from the items of the IPQ-R rather than from patient interviews (van Oort, Schroder, & French, 2011). Intercorrelations between items were very rarely provided in publications and in each instance these were in foreign-language versions, so were not considered sufficient to include in this review. It is acknowledged that some of the correlations between Brief IPQ items and other self-reported variables might involve elements of common measurement. For example, the correlation between the consequences perception and quality-of-life measures are because both are asking people to rate how much the illness affects aspects of their lives – i.e. they are measuring something very similar, which is good as a form of construct validation but not as good for predictive validity. This same point can be made with regards to the concern item and measures of anxiety.

Future research

It is suggested that future research employs longitudinal rather than cross-sectional designs. This will allow stronger conclusions to be made regarding changes in illness perceptions and associations with outcomes over time. Future research should also include the causal dimension more often. Researchers are advised to code answers into causal categories, and use categorical analysis. Further validation studies with foreign-language translations are required. More research could investigate whether the coherence dimension adds anything to the other illness cognitions assessed and if it belongs in the CSM. Researchers are encouraged to use the original instructions and response scales, and to analyse the items individually in order to allow easy comparisons across studies. More research could be done into whether the illness perception items should be combined into composite scores to predict outcomes.

It is anticipated that the table of mean scores (Table S5) will provide a useful reference for researchers and clinicians interested in what constitutes a ‘normal’ illness perception for a particular group. However, care needs to be taken as different studies have used different response scales, items and languages, and have studied patients at different stages of disease. This needs to be kept in mind when considering the scores.
Conclusion
This review has shown the Brief IPQ is useful across many applications and has provided further evidence for its validity. The items most predictive of outcomes were consequences, identity, timeline and control, which is consistent with theory because they are the core cognitive dimensions in the CSM. The most modifiable perceptions were personal control and causal beliefs and these are central perceptions to assess and target to create behaviour change.

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