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## Predicting Australian Health Behaviour from Health Beliefs

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### Abstract

The current study utilised two measures of health beliefs to predict health behaviour. Christensen, Moran and Wiebe (1999) developed the Irrational Health Belief Scale (IHBS) as an alternative to the more traditionally and widely used scales from the Health Belief Model (HBM). The IHBS has not previously been compared with a scale from the HBM in a non-clinical population. Furthermore, unlike the HBM, the IHBS has not been tested on a population outside North America. In the present study, 157 Australian university students (131 females and 26 males, mean age 21.9 years) completed both scales along with other scales measuring control variables of personality, locus of control and affect. The Personal Lifestyle Questionnaire (PLQ) measured health behaviour. Hierarchical multiple regression revealed that the IHBS could not significantly ( $p > .05$ ) predict health behaviour while the HBM significantly accounted for 8% of variance in the PLQ. Neuroticism and positive affect were the best predictors of health behaviour, accounting for 19% of variance. Close examination of IHBS items raised doubts regarding construct validity, suggesting the scale requires further development before cross-cultural application.

**Keywords:** *Health belief model; irrational health belief scale; lifestyle*

### Introduction

Health psychology has made important contributions to health promotion and disease prevention. From roles including assessment, consultation, intervention and research, health psychology has become integral to multidisciplinary efforts confronting the prevalence of such chronic disorders as asthma, Alzheimer's disease, AIDS, cancer, cardiovascular disease, diabetes and many stress related illnesses. Public health campaigns designed to create awareness and proactive strategies rely heavily on such efforts (Brannon & Feist, 2007). The area of women's health, for example, has benefited from a greater awareness of breast cancer and strategies including screening and educated self-examination. Health psychology plays an important role evaluating individual health beliefs and attitudes and in predicting

who is likely to utilise health services and display specific health behaviours.

Health behaviour prediction has been actively researched for over 50 years, developing numerous models and theories. The Health Belief Model (HBM) was foundational in this area but other researchers have since extended and incorporated aspects of this model to further enhance health behaviour predictability. The Theory of Reasoned Action (Ajzen & Fishbein, 1980) and its alternative, Theory of Planned Behavior (Ajzen, 1988), and Weinstein's Precaution Adoption Process Model (Weinstein, Rothman, & Sutton, 1998) are but a few. Nevertheless, it is the HBM, and particularly the version of Becker & Rosenstock (1984) that has generated the most extensive research.

The HBM is multidimensional, generally comprising five constructs of general health value/motivation, perceived susceptibility, severity, benefits and barriers, which are presumed to underlie health related cognition. However, individuals vary widely in the valence they attach to subjective experience and according to Rosenstock (1974), people only take action to avoid disease if they believe (1) they are personally susceptible to it, (2) the occurrence of the disease would have at least moderate severity on some component of their life, (3) that taking particular actions would in fact be beneficial in reducing the susceptibility to the condition or its severity if it occurred, and (4) such action would not entail overcoming important psychological barriers such as cost, convenience, pain or embarrassment.

Numerous scales have been developed to measure the constructs of the HBM. However, criticisms of the model have focussed on these constructs being context specific and inconsistent in their predictive ability (Ogden, 2003; Weinstein, 1993). Further criticisms have been raised concerning the overlap between many of the health belief theories as they all weigh benefit against cost, they all depend on beliefs and likelihood of consequences and they all assume that anticipation of negative health outcomes and the desire to avoid or reduce their impact, creates motivation for self protection. Also, none predict the amount of

precautionary behaviour that will occur, only its likelihood.

Furthermore, Christensen, Moran, and Wiebe (1999) argued that conventional health behaviour prediction models, such as the HBM, were also limited due to assumptions that health related decisions were always made rationally. None have considered the potential influence of distorted cognitions and irrational health beliefs. If an individual is prone to appraising a situation in a distorted manner, conventional definitions of rational health beliefs are not likely to predict health behaviour. To this end, Christensen et al. constructed the Irrational Health Belief Scale (IHBS) to predict health behaviours associated with irrational beliefs and distorted cognitions. The IHBS provides 20 vignettes describing appraisals of specific health situations and experiences. For example, one vignette reads:

*Several of your co-workers have come down with the flu. You hear on the news that there is a flu outbreak and that people who are in contact with infected individuals should get immunisations to reduce their chances of getting ill. You find yourself thinking, "I had a flu vaccination last year and got sick anyway, immunisations never do me any good."*

Christensen et al. (1999) conducted two studies when developing the IHBS which asked respondents to rate how similar such rationalisations were to how they would think in that situation, from 1 (*not at all like I would think*) to 5 (*almost exactly like I would think*). The first study sampled 235 female and 157 male psychology students with a mean age of 19.1 years, and the second a clinical population suffering Type 1 diabetes mellitus ( $N = 107$ ).

The criterion measure of health behaviour for the non-clinical population was the Personal Lifestyle Questionnaire (PLQ; Brown, Muhlenkamp, Fox, & Osborn, 1983). This measure evaluates six areas of health practices related to nutrition, exercise, relaxation, safety, substance use, and health promotion. Additionally, to control for individual differences that may confound the results, other variables were included in the analysis. These were neuroticism and conscientiousness as measured by the Big Five Inventory (BFI; John, Donahue, & Kentle, 1999), mood as assessed by the Positive and Negative Affect Scale (PANAS; Watson, Clark, & Tellegen, 1988) and the internal, powerful others and chance locus of control subscales from Multidimensional Health Locus of Control Scale (MHLC; Wallston, Wallston, & DeVellis, 1978). Christensen et al. (1999) provides a review on the relationship between these variables and health beliefs and behaviour.

Christensen et al. (1999) found the IHBS uni-dimensional through principal-components analysis

with adequate internal consistency but weak construct validity was reported through correlations with the PLQ ( $r = .35$ ), negative affect ( $r = .28$ ) and conscientiousness ( $r = .27$ ). For the non-clinical sample, the hierarchical regression model included all significant control measures from prior correlation analysis (only the MHLC Powerful-Others subscale was excluded) and explained 23% of variance in the PLQ. When the IHBS was entered at step two, it added a significant unique contribution of 5% for an overall 28% of variance accounted for in the criterion. However, in the regression model both internal and chance locus of control, and neuroticism were no longer significant. Only positive and negative affect, conscientiousness and the IHBS remained significant predictors. Results indicated greater cognitive distortion as defined by the IHBS and higher negative affect uniquely and significantly associated with less positive health practices. Greater conscientiousness and positive affect associated with more positive health practices.

For the clinical sample with Type 1 diabetes, health behaviour was operationalised as medical regimen adherence, measured both by self-report and objectively through glycosylated haemoglobin levels. Predictors included neuroticism, conscientiousness, the IHBS and a medical comorbidity index created by the researchers. The regression analysis indicated that the predictors were able to account for a total of 25% of the variance in the self-report measure, with 10% uniquely attributed to the IHBS. Furthermore, 14% of the variance in the objective measure (haemoglobin levels) was accounted for by the predictors, with 5% of this uniquely attributed to the IHBS. Christensen et al. (1999) concluded that their IHBS represented an alternative conceptualisation of health related cognitions to traditional measures (such as those assessing the HBM) and that their results had provided initial evidence of the IHBS's reliability and validity.

A review of the extant literature revealed that some subsequent research has further tested the instrument with non-clinical samples. Interestingly however, a different measure of neuroticism produced a different result. Bartz and Olson (2002) replicated the IHBS study of Christensen et al. (1999) but used the 48-item Neuroticism scale as measured by the Revised NEO Personality Inventory (NEO-PI-R; McCrae & Costa, 2003) instead of the eight-item neuroticism scale from the BFI. Bartz and Olson found Neuroticism significantly predicted health behaviour, but the IHBS no longer contributed uniquely or significantly. This is the opposite of what Christensen et al. found and suggested the IHBS might only predict health behaviours depending on how closely its items related to specific neuroticism domains.

In the only other study utilising the IHBS, Knauper, Rabiau, Cohen, and Patriciu (2004) developed the 17-item Compensatory Health Beliefs (CHB) scale and compared it with the IHBS. According to these

researchers, compensatory health beliefs identify cognitive dissonance. People often neutralise negative behaviour with healthy behaviour; for example, "I can eat this cake now because I will exercise this evening". This study found both scales correlated moderately but clear differences existed in their patterns of association with other constructs to suggest both scales assess different types of cognitions. Hierarchical regression analysis found, with risk behaviour as the criterion, that the IHBS did not account for variance even when entered before the CHB scale. However, using illness symptoms as the criterion, the IHBS significantly and uniquely accounted for 16% of variance before the CHB entered at the last step to contribute an additional 3% to the total explained variance of 27%.

The role of the IHBS in health psychology remains unclear. The scale has a theoretical background emerging from the HBM and the criticisms that not all health-relevant information is appraised rationally. However, empirically, the IHBS shows only moderate reliability and validity whereas the HBM has generated numerous scales adapted to specific conditions and continues to be utilised broadly in health psychology research. These include men's health (Samar, Donovan, Johnson, & Egger, 2002), breast self-examination (Ashton, Kamilowicz & Fooks, 2001; Savage & Clark, 1996), general compliance with medical advice (Becker & Rosenstock, 1984), attendance at health screening (Norman & Fitter, 1991); exercising (Saklofske, Austin, Rohr, & Andrews, 2007) and osteoporosis prevention (Sedlak, Doheny, Estok, Zeller, & Winchell, 2007).

However, other than a non-clinical replication questioning its independence from neuroticism (Bartz & Olson, 2002) and a study comparing it with the newly developed CHB scale (Knauper et al. 2004), no further research has investigated the predictive ability of the IHBS. For example, no comparisons have been made in non-clinical populations of the IHBS with more traditional measures of health belief drawn from the HBM. This would be an appropriate assessment of the IHBS given the widespread use of HBM scales in health psychology research.

Similarly, no other research has tested the external validity of the IHBS on a sample outside North America. Australian testing could facilitate this, however, although Australia and the USA share many similarities as Western societies, significant differences in public health exist between the two countries that may influence individual cognitions related to health and therefore the predictive ability of the IHBS.

By replicating and extending the research of Christensen et al. (1999) the current study aimed to compare the IHBS with a scale derived from the HBM whilst statistically controlling affect, locus of control and personality variables. As the first study to compare the two health scales non-clinically and also test the predictive ability of the IHBS outside North America, it sought to address two major research questions. First,

does the IHBS predict health-promoting behaviour in an Australian population? Second, does the IHBS predict health-promoting behaviour independent of a more conventional measure of health beliefs based on the HBM?

## Method

### Participants

The sample consisted of 157 undergraduate psychology students from the University of Western Sydney. Approval was obtained from the university's Human Research Ethics Committee prior to recruitment. Participation was voluntary and earned credit towards fulfilment of course requirements. A minimum age requirement of 18 years was the only exclusionary criteria. There were 131 women ( $M = 22.1$  years,  $SD = 8.0$  years) and 26 men ( $M = 19.8$  years,  $SD = 2.6$  years). Sample size was optimal based on initial power computations employing a conventional moderate effect size of .30, power of .80, and an alpha of .05 (Cohen & Cohen, 1983; Howell, 2007) and the ratio of cases to independent variables met assumptions for multiple regression (Tabachnick & Fidell, 2007).

### Materials

A questionnaire was constructed based on the original Christensen et al. (1999) study but with the inclusion of a measure from the HBM. Thus, the questionnaire comprised the following six scales along with demographic questions regarding age and gender.

**Personal Lifestyle Questionnaire (PLQ;** Brown, et al., 1983). The summated 24-item PLQ, as the criterion, measured six areas of health practices: nutrition, exercise, relaxation, safety, substance use and health promotion. The extent to which each activity applied was rated along a 4-point scale from 1 (*never*) to 4 (*almost always*) with four items reverse scored. Higher total PLQ scores indicated more positive and less negative health behaviours. Internal consistency ( $\alpha = .74-.76$ ), test-retest stability ( $rs = .72-.83$ ) and construct validity were demonstrated for this measure (Brown et al., 1983). Item 22 of this measure was specific to females; therefore, the female mean score on this item of 1.59 was substituted for missing male data to avoid losing cases when testing internal consistency reliability in the present study. Cronbach's alpha with the present sample was .63.

**Health Belief Model (HBM).** A 33-item scale measuring five dimensions was extracted from existing measures (Norman & Fitter, 1991; Weissfeld et al., 1987). Four items assessing general health value/motivation, six assessing perceived susceptibility, six assessing perceived severity, nine assessing perceived benefits and eight items assessing perceived

barriers were all scored along 4-point scales from 1 (*very little/not at all*) to 4 (*very much*) or their variants. The five subscales did not form a composite measure. Higher subscale scores indicated stronger perception of that dimension. Adequate internal consistencies for the five dimensions ( $\alpha = .69-.90$ ) were demonstrated (Norman & Fitter, 1991; Weissfeld et al., 1987). Internal consistency with the present sample yielded Cronbach's alphas of .66 for general health value/motivation, .75 for perceived benefits, and .74 for perceived barriers, .75 for perceived susceptibility and .64 for perceived severity.

**Irrational Health Belief Scale (IHBS;** Christensen et al., 1999). The IHBS summates 20 vignettes describing appraisals of specific health situations and experiences. Respondents rated how similar the cognition was to how they would think in that situation along a 5-point scale from 1 (*not at all like I would think*) to 5 (*almost exactly as I would think*). Higher total IHBS scores indicated greater irrational thinking. Good internal consistency ( $\alpha = .84$ ) and test-retest over 18 months ( $r = .57, p < .0001$ ) was demonstrated with a sample of 392 college students (Christensen et al., 1999). Cronbach's alpha with the present sample was .84.

**Big Five Inventory (BFI;** John et al., 1999). The BFI is a 54-item measure of the five-factor model of personality. Each item completes a standard sentence opening of "I see myself as someone who...." Responses were rated along a 5-point scale from 1 (*disagree strongly*) to 5 (*agree strongly*). Only the neuroticism and conscientiousness scales were used. The 8-item neuroticism scale reverse scores three items and the 9-item conscientiousness scale reverse scores four items so that a summated high score on each scale indicated greater strength of that construct. Good internal consistency ( $\alpha = .83$ ) was demonstrated for the composite BFI and for individual subscales ( $\alpha = .75-.90$ ) (John et al., 1999). Cronbach's alpha with the present sample was .83 for conscientiousness and .80 for neuroticism.

**Positive and Negative Affect Scale (PANAS;** Watson et al., 1988). The PANAS is a randomly distributed 20-item inventory containing 10 positive and 10 negative affect single-word items. Responses are specific to one of six timeframes ranging from "right now" through "the past year" to "in general". The present study applied the timeframe "during the past few days". Responses were rated along a 5-point scale from 1 (*very slightly or not at all*) to 5 (*extremely*). Higher summated scores on both scales indicated greater positive or negative affect. Good internal consistency ( $\alpha = .88$  and  $\alpha = .85$ ) for positive and negative affect was demonstrated for the "during the past few days" timeframe (Watson et al., 1988).

Cronbach's alpha for the present sample was .84 positive affect and .80 negative affect.

**Multidimensional Health Locus of Control Scale-Form A (MHLC;** Wallston et al., 1978). The randomly distributed 18-item MHLC assesses three dimensions of internal, chance and powerful others with six summated items for each. Responses reflected participant beliefs regarding control over their health outcomes and were rated along a 6-point scale from 1 (*strongly disagree*) to 6 (*strongly agree*). Higher subscale scores indicated greater locus of control along that dimension. Both parallel forms of the measure demonstrated adequate internal consistencies ( $\alpha = .67-.77$ ) for each subscale (Wallston et al., 1978). Cronbach's alpha with the present sample was .66 for internal, .65 for chance and .67 for powerful others.

### Procedure

Participants were tested in two groups of approximately 80 students per group. Each participant was given a questionnaire booklet containing all measures and an information sheet. In an effort to reduce possible order effects, there were two different placements of measures within the battery. The second ordering presented questionnaires from the front half of the booklet last. Booklets were then distributed randomly.

### Results

Data screening revealed eight univariate outliers with standardised residuals  $> 3.29$  and these were deleted from the analysis. Univariate assumptions of normality were satisfactory. With a sample size of 149, power was still acceptable to detect a moderate effect size, relative to the number of predictors (Tabachnick & Fidell, 2007). With the use of a  $p < .001$  criterion for Mahalanobis distance, no multivariate outliers among the predictors were identified. A scatterplot of residuals at each step indicated the multivariate assumptions of normality, linearity and homoscedasticity were met. Table 1 shows descriptive statistics and variable intercorrelations. All variables except the HBM subscale "perceived benefits", and MHLC subscales "chance" and "powerful others" correlated significantly with the PLQ and were the only variables entered into the subsequent regression equations. Only those variables that significantly correlated were entered as this is an assumption of multiple regression (Tabachnick & Fidell, 2007) and follows the procedure used by Christensen et al. (1999).

Table 1  
*Descriptive Statistics and Correlations among Variables.*

| Variables | PLQ     | IHBS    | HBM-  | HBM-   | HBM-  | HBM-   | HBM-   | BFI-C   | BFI-N   | MHLC  | MHLC  | MHLC  | PANAS  | PANAS |
|-----------|---------|---------|-------|--------|-------|--------|--------|---------|---------|-------|-------|-------|--------|-------|
|           |         |         | Gen   | Sus    | Sev   | Ben    | Barr   |         |         |       | Int   | Ch    | P      | N     |
| IHBS      | -.23**  |         |       |        |       |        |        |         |         |       |       |       |        |       |
| HBM-Gen   | .19**   | -.03    |       |        |       |        |        |         |         |       |       |       |        |       |
| HBM-Sus   | -.30*** | .11     | -.17* |        |       |        |        |         |         |       |       |       |        |       |
| HBM-Sev   | .14*    | -.07    | .17*  | -.03   |       |        |        |         |         |       |       |       |        |       |
| HBM-Ben   | .06     | -.04    | .22** | -.20** | .18*  |        |        |         |         |       |       |       |        |       |
| HBM-Barr  | -.21**  | .39***  | -.13  | .09    | -.08  | -.06   |        |         |         |       |       |       |        |       |
| BFI-C     | .24**   | -.36*** | .12   | -.24** | .06   | .18*   | -.26** |         |         |       |       |       |        |       |
| BFI-N     | -.36*** | .28***  | .02   | .24**  | .13   | .14*   | .10    | -.31*** |         |       |       |       |        |       |
| MHLC-Int  | .17*    | -.02    | .11   | -.14*  | .08   | .17*   | -.08   | .14*    | -.06    |       |       |       |        |       |
| MHLC-Ch   | -.08    | .22**   | -.03  | .16*   | -.03  | -.22** | .20**  | -.30*** | .11     | -.14* |       |       |        |       |
| MHLC-PO   | .00     | .13     | .17*  | .11    | .07   | .03    | .06    | -.06    | .02     | .05   | .22** |       |        |       |
| PANAS-P   | .34***  | -.11    | .16*  | -.15*  | .02   | .10    | -.04   | .28***  | -.44*** | .17*  | -.04  | -.01  |        |       |
| PANAS-N   | -.21**  | .24**   | .06   | .18*   | .02   | .05    | .12    | -.37*** | .54***  | -.08  | .16*  | .18*  | -.22** |       |
| <i>M</i>  | 68.61   | 39.17   | 12.33 | 12.58  | 21.65 | 28.93  | 14.97  | 31.75   | 24.23   | 25.40 | 16.14 | 16.50 | 29.87  | 22.77 |
| <i>SD</i> | 7.10    | 10.77   | 2.14  | 3.19   | 1.88  | 4.02   | 4.41   | 5.93    | 5.92    | 4.41  | 4.68  | 4.60  | 6.94   | 7.14  |

Note. PLQ = Personal Lifestyle Questionnaire; IHBS = Irrational Health Belief Scale; PANAS = Positive and Negative Affect Scale where P = Positive and N = Negative; BFI = Big Five Inventory where C = conscientiousness and N = Neuroticism; MHLC = Multidimensional Health Locus of Control where Int = Internal, Ch = Chance and PO = Powerful Others; HBM = Health Belief Model where Gen = General Health Value, Sus = Susceptibility, Sev = Severity, Ben = Benefits and Barr = Barriers.  
 \*\*\* $p < .001$ . \*\* $p < .01$ . \* $p < .05$ .

With alpha set at .05, two hierarchical multiple regression analyses were performed between total PLQ scores as the criterion, and the ten predictor variables with significant bivariate correlations to the criterion. With regard to the first research question about the IHBS's predictive ability of health behaviour in an Australian sample, Table 2 displays the unstandardised regression coefficients (B), the standardised regression coefficients ( $\beta$ ), and  $R^2$  change for the predictors at their step of entry, together with the final B and  $\beta$ . After step 1, with positive and negative affect, neuroticism, conscientiousness and internal locus of control in the equation,  $R = .44$ ,  $R^2 = .19$ ,  $F(5,143) = 6.84$ ,  $p < .001$ . Adding the IHBS to the equation at step 2 did not improve  $R^2$ , only contributing .01. Completing the full model by adding HBM variables of perceived benefits, barriers, severity, susceptibility and general health value at step 3, significantly improved the coefficient of determination with the final  $R = .53$ ,  $R^2 = .28$ , adjusted  $R^2 = .23$ ,  $F(10,138) = 5.39$ ,  $p < .001$ .

To test the second research question regarding the ability of the IHBS to predict PLQ scores independently of the HBM, required another hierarchical regression entering the same variables at the first step, HBM variables at the second step, and the IHBS now at the third step. However, given the IHBS was not a significant predictor when entered second, before the HBM, it was not surprising to find the IHBS performing worse when entered at step 3. The  $R^2$  change for the IHBS was .004 ( $p > .05$ ), whilst the control variables and HBM variables achieved similar effect sizes as the first regression (i.e. .19 and .08 respectively).

## Discussion

The results of the current study found that health belief irrationality, as operationalised and measured by the IHBS, did not uniquely predict health behaviour in an Australian sample. After controlling individual difference variables of positive and negative affect, neuroticism, conscientiousness and locus of control, the IHBS accounted for only about 1% of variance in self-reported health behaviour. Not unexpectedly, after then controlling more conventional or rational type health beliefs as operationalised by the HBM scale, the IHBS accounted for even less variance in the criterion.

Results from the regression analyses indicated that 19% of total variance in health behaviour was accounted for by the individual difference variables and a further 8% explained uniquely by HBM variables. The significant predictors in the final model were neuroticism, positive affect and the perceived susceptibility subscale of the HBM. Specifically, higher neuroticism scores related to less positive health practices, greater positive affect related to more positive health practices and higher perceived susceptibility related to less positive health practices.

Table 2  
*Hierarchical Multiple Regression of Individual Difference and Belief Variables on Self-Reported Health Practices (PLQ Scores) – IHBS Entered Second*

| Step   | Variable                 | B<br>at Step | $\beta$<br>at Step | $R^2$ change<br>at Step | Final B | Final $\beta$ |
|--------|--------------------------|--------------|--------------------|-------------------------|---------|---------------|
| Step 1 |                          |              |                    | .19***                  |         |               |
|        | MHLC Internal            | .18          | .11                |                         | .12     | .08           |
|        | BFI Neuroticism          | -.30         | -.25               |                         | -.28    | -.24*         |
|        | BFI Conscientiousness    | .11          | .10                |                         | -.01    | -.01          |
|        | PANAS Positive Affect    | .19          | .19                |                         | .18     | .17*          |
|        | PANAS Negative Affect    | .01          | .01                |                         | .02     | .02           |
| Step 2 |                          |              |                    | .01                     |         |               |
|        | IHBS                     | -.08         | -.13               |                         | -.05    | -.07          |
| Step 3 |                          |              |                    | .08**                   |         |               |
|        | HBM Severity             | .49          | .13                |                         | .49     | .13           |
|        | HBM General Health Value | .31          | .10                |                         | .31     | .10           |
|        | HBM Susceptibility       | -.39         | -.17               |                         | -.39    | -.17*         |
|        | HBM Barriers             | -.17         | -.11               |                         | -.17    | -.11          |
|        | Constant                 |              |                    |                         | 61.66   |               |

Note. PLQ = Personal Lifestyle Questionnaire; MHLC = Multidimensional Health Locus of Control Scale; BFI = Big Five Inventory; PANAS = Positive and Negative Affect Scale; HBM = Health Belief Model; IHBS = Irrational Health Belief Scale.  
 \*\*\*  $p < .001$ . \*\*  $p < .01$ . \*  $p < .05$ .

The result for perceived susceptibility is not commensurate with the HBM, which suggests that the higher the perceived susceptibility to health problems the greater the engagement in positive health practice (Becker, 1974; Becker & Rosenstock, 1984; Janz & Becker, 1984). One explanation for this counterintuitive finding may be related to the age of the cohort being examined and a general improvement in health practices, as measured by the PLQ. The present sample's mean age (around 21 years) was considerably less than the 30-50 year age group for which the perceived susceptibility subscale was designed (Norman & Fitter, 1991). Some of the items measuring perceived susceptibility were related to quite serious health conditions such as cancer, stroke and heart disease, and a relatively young sample might have considered their future susceptibility to these conditions as minimal.

Furthermore, the participants in the current study appeared to be more frequently engaged in positive lifestyle practices as suggested by their higher mean PLQ score of 68.61, especially when compared to the PLQ mean of 48.48 reported by the student sample in the Christensen, et al. (1999) study (with a similar mean age of 19 years). This higher PLQ score in the Australian sample may be due to a heightened awareness of positive lifestyle practices through recent lifestyle educational campaigns (nutrition, exercise, safe sex) and also more directly through strong harm minimisation strategies targeting smoking, excessive alcohol consumption and dangerous driving.

Although, Christensen et al. (1999) only reported reliability coefficients for the IHBS, the present study found a number of scales had less than satisfactory

internal consistency figures, including the criterion variable, the PLQ. Whilst all of these were above .60, there needs to be some caution taken when interpreting these results. However, the present results do confirm the value of HBM constructs in predicting health behaviour independently of other predictors and, indeed, the greater predictive ability of a scale from this model over the IHBS.

Furthermore, the rather weak predictive ability of the IHBS casts doubt on its construct validity. Only six of thirteen variables correlated significantly with the IHBS of which the only HBM variable was barriers. By contrast, perceived susceptibility from the HBM correlated significantly with nine of thirteen variables and, indeed, four of the five HBM variables correlated significantly with each other. Health beliefs, whether considered rational or irrational, could reasonably be expected to show some interrelatedness.

Compared to the health system in the United States, which has been criticised for excluding citizens based on their capacity to pay (Becker, 2001; Brannon, & Feist, 2007; Washington, 2001), Australia's health system is universally accessible and relatively egalitarian. It could have been expected that the IHBS would better predict Australian health behaviour because greater population homogeneity may make financial concerns less likely to act as a confound when making health decisions. This was not supported by the current results. However, closer examination of the IHBS reveals 18 of 20 vignettes refer directly to the actions or instructions of a doctor. It is also possible, especially within a highly discriminative health system, that the IHBS is measuring reactance to doctors and the medical system. This would seem more relevant in the

US than Australia and may partly explain the different results between the present study and the Christensen et al. (1999) findings. Correlating the IHBS with other instruments measuring such attitudes, for example, the Attitudes Towards Doctors and Medicine Scale (Marteau, 1990), or including such a measure in a broader battery administered to both insured and uninsured participants in the US, may better test the construct validity of the IHBS. Similarly, any subsequent cross-cultural IHBS research may need to clarify its structure with a larger sample and principal components analyses first.

Despite concerns regarding the validity of the IHBS, the present results were also inconsistent with those of Christensen, et al. (1999) relative to the variance explained by the control variables. For example, Christensen et al. found conscientiousness and positive and negative affect significant control variables accounting for the largest share of variance in the criterion with the IHBS explaining the remainder. However, neuroticism and locus of control were not significant. Yet, the present study could not find any significant contribution by the IHBS and found neuroticism, positive affect and perceived susceptibility predictive of health behaviour.

The results from Bartz and Olson (2002) were similarly equivocal when they found neuroticism, but not the IHBS, predictive of the PLQ as criterion. In using the 48-item neuroticism scale of the NEO-PI-R they explained the discrepancy between their results and those of Christensen, et al. (1999) by suggesting the utility of the IHBS was dependent on the neuroticism scale used. However, the results of the present study did not fully support their suggestion either because although the IHBS was found to be non-predictive, neuroticism as measured by the BFI, was still significant. Both neuroticism scales are dimensions of the Five Factor conceptualisation of personality and, whilst they are different measures of the same construct, they could be expected to overlap.

There were, however, noted sampling differences relative to gender, between this study and that of Christensen et al. (1999). Specifically, gender was biased in the present study with 83% women, but only 60% in the original IHBS study and research has identified women of all ages scoring consistently higher on dimensions of neuroticism in comparison to males (Chapman, Duberstein, Sorensen, & Lyness, 2007). Neuroticism means between the two studies were very similar, but a highly female dominated sample in the present study may have contributed to the significance of this personality domain predicting health behaviour. It would, therefore, be prudent for future research with the IHBS to control this variable.

Consistent with the results of Christensen et al. (1999), affect was a significant predictor of health behaviour and emphasises the importance of controlling this variable when investigating health beliefs,

especially when other research has suggested affect is causally prior to belief (Finucane, Alhakami, Slovic, & Johnson, 2000; Kiviniemi, Voss-Humke, & Seifert, 2007). Results indicated positive affect was a significant contributor in predicting the criterion and, when entered in regression first with other controls, accounted for the majority of explained variance. Positive affect remained significant at the final step of the regression model after both health belief scales had been entered. However, the present study did not specifically test this claimed antecedence by also controlling the IHBS before entering affect.

Also consistent with past research, locus of control contributed negligibly to health behaviour prediction. With only the internal dimension entering the regression model, it provided no significant contribution to explained variance beyond that of the other control variables. The present results paralleled those of Christensen et al. (1999) who found both internal and chance dimensions non-predictive in their model.

The claim of Christensen et al. (1999) that irrational health beliefs may predict health-related behaviour better than rational models was not supported, at least in relation to the HBM. The results suggest the IHBS is perhaps in need of greater development in terms of its psychometric properties. Nonetheless, any measure that may increase the confidence in health behaviour prediction is worthy of further investigation and development.

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