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The compensatory health beliefs scale: psychometric properties of a cross-culturally adapted scale for use in The Netherlands

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Abstract

This study assesses the psychometric properties of a measuring scale for compensatory health beliefs (CHBs), culturally adapted for use in the Dutch context. CHBs refer to the idea that people can compensate for unhealthy (mostly pleasant) behaviours with healthy behaviours, e.g. 'It is OK to eat a chocolate bar, because I am going to the gym tonight'. We are critical towards such beliefs as they may also be an excuse to justify unhealthy behaviours. Before such effects can be studied, an appropriate tool to measure CHBs must be developed. We adapted a Canadian scale, consisting of four factors relating to beliefs about substance use, eating/sleeping habits, stress and weight regulation, translating it according to guidelines for cross-cultural adaptation and testing it among 145 Dutch students. Factor analysis showed that the structure was not entirely identical in the Dutch context, and the internal consistency of the four subscales was also low. The overall scale showed a high internal consistency ($\alpha = 0.78$), indicating the existence of an underlying construct, and a high Pearson correlation between the first and second measurements ($r = 0.82$), showing good stability. We recommend using the overall scale and further studying its reliability among other subgroups as well as its validity.

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Introduction

The present paper describes the psychometric properties of a Canadian scale that was culturally adapted to assess compensatory health beliefs (CHBs) [1] in the Dutch context. CHBs are beliefs relating to the idea that people can compensate for unhealthy behaviours (mostly pleasurable) with healthy behaviours [1, 2]. For example, 'It is OK to eat a chocolate bar, because I am going to the gym tonight'.

Many people recognize such beliefs in their daily lives (unpublished qualitative interviews with young Dutch adults). In this respect, the fact that people hold CHBs about unhealthy behaviour followed by healthy compensatory behaviours may be relevant to the prevention of behaviour-related chronic diseases such as cardiovascular diseases and obesity [3]. However, people holding such beliefs are more likely to engage in health risk behaviours and have a higher body mass index (BMI) [1]. Moreover, I. Kronick and B. Knäuper ('Compensatory beliefs in dieters', unpublished paper) showed that dieters who were tempted by high-calorie cookies were more likely to hold CHBs than dieters not confronted with such cookies.

A theoretical model to explain why people hold CHBs, the CHBs model, has been developed by Rabiau *et al.* [2]. This model states that a motivational conflict (or cognitive dissonance) occurs between affective states (e.g. desires) and motivation (i.e. health goals). This conflict can be handled using different strategies: (i) deciding to resist the desire; (ii) adjusting the perception of risk and/or re-evaluating outcome expectancies or (iii) creating or activating CHBs. The first of these strategies is a behavioural response to the motivational conflict,

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while the other two are cognitive strategies. The second strategy involves changing beliefs to match the behaviour. The third strategy implies that one can give in to the temptation and then compensate for the harm caused by one's behaviour. The desired behaviour then takes place without the accompanying negative affect, like guilt. As such, individuals may use CHBs to justify their unhealthy choices because they are planning healthy ones. All too often, however, good intentions do not result in actual performance of the behaviour (see [4]). Thus, having CHBs is dangerous if actual compensation does not occur, so that the expected health effects also fail to materialize. This has recently been shown for glucose control in adolescent diabetics in whom holding more CHBs was related to poorer glucose control and less self-care [5].

The notion of compensating for unhealthy behaviours has been incorporated in a national campaign in The Netherlands which promotes caloric compensation to maintain a neutral energy balance (i.e. a situation of equal energy intake and energy expenditure). This campaign encourages CHBs as it recommends moderating food intake and/or increasing physical activity in response to occasions of overeating earlier on the same day or over 2 days [6]. The core message was the introduction of the 'balance day', which is based on the notion that episodes of overeating are part of our nutritional habits and that this could be compensated for within a short time span by moderating food intake or increasing physical activity. Although the campaign targets adults aged 20–40 years, and focuses on maintaining a neutral energy balance, it is likely that other subgroups of the Dutch population are also exposed to this message since it is promoted through radio advertisements, printed information, electronic newsletters, etc. We question whether encouraging compensatory behaviours is the right strategy to control weight gain among the general public since detrimental effects of holding CHBs are also likely to occur; for instance, if one is already planning to compensate for today's overeating tomorrow, is that not the perfect excuse to eat fatty snacks today?

An examination of such processes should start by developing a tool to assess CHBs, and a scale for this assessment was developed in English by Knäuper *et al.* [1]. They first generated an initial item pool by asking people worldwide to submit ideas about CHBs via a website. From this list of 523 items, the Canadian research group selected 237 that fitted their definition of CHB and further reduced the item pool to 67 items, based on redundancy and broadness. These items were edited to simplify the wording and were sent to an expert panel, which had to assess whether the items reflected CHBs, whether they used clear wording, whether an item should be deleted from the pool and whether the response format was clear and feasible. Forty items remained, which were examined by means of factor analysis and a test–retest reliability study among 381 undergraduate students. The remaining scale consists of 17 items, which ask respondents to indicate in a five-point Likert response format to what degree they hold certain beliefs: 'not at all' (0), 'a little' (1), 'somewhat' (2), 'quite a bit' (3) or 'very much' (4).

In the pre-selection phase, Knäuper *et al.* categorized the items into various domains, and the four subscales of the remaining scale, which were identified from the results of factor analysis, reflect this initial domain categorization. The first subscale is named 'substance use' and consists of six items about behaviours that could compensate for alcohol and coffee consumption and smoking (Cronbach's α 0.74) (see Table I for the items). The second subscale is named 'eating/sleeping', and the four items in this subscale reflect beliefs about behaviours that can compensate for lack of sleep, breakfast skipping and eating whatever one likes in the evening (Cronbach's α 0.66). The four items in the third subscale, named 'stress', relate to behaviours that could compensate for periods of stress (Cronbach's α 0.63). The fourth subscale is named 'weight regulation', and the three items in this subscale relate to behaviours that can make up for high-calorie intake (Cronbach's α 0.57). Cronbach's α for the overall CHB scale was 0.80. Test–retest reliability ($n = 141$) of the total score on the CHB scale was 0.75 using a 4.5- to 5-month test–retest interval, indicating high stability over a longer period.

Table I. *Compensatory health beliefs: item wording (original Canadian version) and factor loadings*

Factor and item	1	2	3	4
Factor I				
1. The effects of regularly drinking alcohol can be made up for by eating healthy	0.406		**0.435**	
2. It is alright to drink a lot of alcohol as long as one drinks lots of water to flush it	0.219	**0.578**		
3. Smoking from time to time is OK if one eats healthy	**0.654**			
4. The effects of drinking coffee can be balanced by drinking equal amounts of water	<0.4			
5. The effects of drinking too much alcohol during the weekend can be made up for by not drinking during the week	**0.561**			
6. Smoking can be compensated for by exercising	**0.794**			
Factor II				
1. Too little sleep during the week can be compensated for by sleeping in on the weekends		**0.683**		
2. It is OK to go to bed late if one can sleep longer the next morning (only the number of hours counts)		**0.557**		
3. It is OK to skip breakfast if one eats more during lunch or dinner	**0.492**	0.377		
4. Eating whatever one wants in the evening is OK if one did not eat during the entire day		**0.547**		
Factor III				
1. Stress during the week can be made up for by relaxing on the weekend			**0.608**	
2. A stressful day can be compensated for by relaxing in front of the TV			**0.626**	
3. The bad effects of stress can be made up for by exercising			**0.658**	
4. Sleep compensates for stress			**0.560**	
Factor IV				
1. Eating dessert can be made up for by skipping the main dish				**0.695**
2. Using artificial sweeteners compensates for extra calories				**0.654**
3. Breaking a diet today may be compensated for by starting a new diet tomorrow		**0.481**		0.416

Note. If items loaded on different factors in the Dutch context are compared to the Canadian context, the highest factor loadings of items on the 'Dutch factors' are printed in bold, while factor loadings on the 'Canadian factors' are printed using a regular font.

A high score on the Canadian CHB scale indicates that the respondent is inclined to think that he or she can compensate for unhealthy behaviours. However, before the scale could be used in the Dutch context, it had to be translated and its psychometric properties (factor analysis, internal consistency and stability) had to be assessed. This was the aim of the present study.

Methods

Cross-cultural adaptation of the Canadian scale to the Dutch context

We followed the guidelines for the adaptation of health-related measures to other languages and/or cultures proposed by Guillemin *et al.* [7] and Beaton *et al.* [8], except for a back-translation procedure. We started by having the scale translated by two independent translators, a lay person and an informed person. Following this, an expert committee consisting of eight Dutch academics and three master students from various disciplines (health promotion, nutrition, psychology and methodology) combined the translations into a version that was used for field testing. In an open discussion, the committee compared the original and the translated items to check whether the words meant the same thing (semantic equivalence), whether expressions or terms were difficult to translate (idiomatic equivalence), whether translations were feasible for the target situation

(experiential equivalence) and whether there were differences in meaning between concepts (conceptual equivalence). For example, one of the words that was discussed was the English word 'diet'. The Dutch translation is 'dieet', which in the Dutch language and culture refers to a period of low-calorie intake to lose weight, but also to people's dietary pattern in general. The translated items were adopted by consensus. Although the translators were unable to attend the committee meetings, the developers could contact them by e-mail during this period to discuss or clarify the wording and the correct interpretation of the items. This pre-final version of the scale was tested for comprehensiveness, correct interpretation and length among 10 members of the target group who completed the questionnaire individually and were interviewed afterwards. Small adjustments were then made. The results of this adjustment process were reported to the developers and the committee, to verify that all steps in the adaptation process had been followed correctly (process audit).

Participants and procedures

Undergraduate students at two Dutch universities were recruited to participate in the study. Students were mainly enrolled in health science, psychology, law, business, languages and culture. They were informed about the study at the start of lectures or in the university canteens. Directly after this, students were asked to write down their e-mail address if they were willing to participate. They then received an e-mail with a link to an electronic questionnaire. To enable test–retest analysis, students were invited to complete the same questionnaire again after 2 weeks.

Measurements

The CHB scale we used consisted of 17 items (see Table I for the wording of the items), to which participants had to respond on a five-point Likert scale ranging from totally agree (+2) to totally disagree (−2). In addition, they were asked about their age, sex, whether they belonged to an ethnic minority, height, weight, what they were studying and in what year of the curriculum they were in. BMI was calculated by dividing body weight (in kilogram) by the square of the height (in metre). Ethnicity was assessed by asking respondents to indicate the country of birth of both their parents. If both parents had been born in The Netherlands, respondents were classified as 'of Dutch origin', according to the definition used by Statistics Netherlands [9].

Data analysis

A sum score of the 17 items of the CHB scale was calculated (range −34 to 34), with a higher score indicating that a person is more inclined to think that he or she can compensate for unhealthy behaviours.

To investigate whether the four factors found in the Canadian CHB scale had been preserved in the Dutch version, we conducted a principal component analysis with Varimax rotation to improve the interpretability.

Internal consistency was assessed for the 17-item CHB scale and the subscales. The stability of the total scale was tested by examining its test–retest reliability using Pearson correlations between the two CHB measurements. All analyses were done with SPSS 13.0.

Results

Respondents

E-mail addresses were submitted by 244 students, 145 (59%) of whom completed both questionnaires. They were predominantly female (85%), on average 20.4 (SD 1.84, range 18–26) years old, and 86% were of Dutch origin. Most respondents were first-year (43%) or second-year students (30%). The majority was studying health sciences (55%), languages (11%) or psychology (9%). Of the participants, 76.7% had a BMI between 18.5 and 25, representing normal weight, while 15.9% were overweight (BMI > 25) and 7.6% were underweight. Participants had an average sum score of 23.91 (SD 7.61) on the CHB scale.

Principal component analysis

Preliminary analysis showed no items that did not correlate with any other item or items having a correlation coefficient of >0.9. Furthermore, the

Kaiser-Meyer-Olkin statistic was >0.5 (0.738), and Barlett's test of sphericity was significant ($P <$ 0.000), indicating that the data were appropriate for principal component analysis [10].

Table I shows the highest factor loadings (printed in bold) of items on the 'Dutch factors' while using a regular font for factor loadings on the 'Canadian factors' in cases where our items loaded on different factors than the Canadian items. Only factor loadings >0.4 are shown. The structure of the Dutch version proved comparable, though not identical, to that of the Canadian scale. Four of the 17 items differed from the Canadian factor structure. First, the item 'The effects of regularly drinking alcohol can be made up for by eating healthy' clustered in factor III instead of Factor I. Second, the item 'It is alright to drink a lot of alcohol as long as one drinks lots of water to flush it' loaded on Factor II instead of Factor I. Third, the item 'It is OK to skip breakfast if one eats more during lunch or dinner' had a factor loading >0.4 on Factor I, but factor loadings <0.4 on Factor II. Fourth, the item 'Breaking a diet today may be compensated for by starting a new diet tomorrow' had the highest loading on Factor II, and a lower loading, although >0.4, on Factor IV.

The item 'The effects of drinking coffee can be balanced by drinking equal amounts of water' had no value >0.4.

Internal consistency

The overall α of the 17-item CHB scale was 0.78. Using the same subscales as in the Canadian study resulted in slightly lower Cronbach's α values than the original. All alpha values were low, although >0.5 (Table II).

Test–retest analyses

Pearson correlation between the first and second measurements of the total score on the CHB was 0.82 ($P < 0.01$, $n = 145$).

Discussion

The present study assessed a version of the Canadian CHB scale adapted to the Dutch context, using

Table II. *Internal consistency: comparison of the Canadian and Dutch subscales*

Canadian compensatory health beliefs

Subscales and items	Cronbach's α	
	Original[a]	Dutch version
Substance use: six items	0.74	0.66
Eating/sleeping: four items	0.66	0.53
Stress: four items	0.63	0.58
Weight regulation: three items	0.57	0.52

[a]Published in Knäuper *et al.* [1].

factor analysis, internal consistency assessment and test–retest analyses.

The analysis to compare the factor structures of the two versions showed that the Dutch version did to some extent have the same structure as the original, but four items showed different results. The most deviant factor was Factor I. One item, about balancing the effects of drinking coffee by drinking equal amounts of water, had a factor loading <0.40, indicating that this item did not share the theme of any of the factors. Since Dutch people drink an average of 3.2 cups of coffee a day [9], they may not regard caffeine as hazardous to their health, and beliefs that compensate for the negative effects of unhealthy behaviours may therefore not be salient. We cannot explain why the belief 'It is OK to skip breakfast if one eats more during lunch or dinner': had a higher loading on Factor I (items related to substance use), while the content of the item would suggest that it should rather correlate with the items on the second factor (items related to eating/sleeping habits). Our findings for the item 'Breaking a diet today may be compensated for by starting a new diet tomorrow' also differed from the Canadian results; however, in view of its content, this item may correlate with items related to eating/sleeping habits (our result) as well as with items related to weight regulation (Canadian result). Such differences in factor structure may be explained by subtle cultural differences [8]. However, since the initial item pool was collected from suggestions by people from all over the world (including 36.3%

Europeans), our data largely confirm that the CHBs also represent 'our' beliefs.

The internal consistency of our CHB scale as a whole was comparable to that of the original scale, representing acceptable reliability [10]. However, the analysis of the subscales of the Dutch version yielded lower Cronbach's α values than those of the Canadian scale, indicating less reliable underlying constructs. Nevertheless, both versions of the overall scale had sufficient internal consistency. This means that all items represent one central idea, which we assume to be the inclination to think that unhealthy behaviours can be compensated for.

Based on both the mixed results of the factor analysis and the low internal consistency of the subscales, we recommend using the overall CHB scale, not the subscales. We do not consider this as a problem because the developers of the scale explicitly state that the tendency to hold CHBs represents a more general health behaviour-regulating tendency. The different areas of behaviour are 'just' specific manifestations of the more general construct of CHBs [1].

A high Pearson correlation was found between the first and second measurement ($r = 0.82$). This may indicate that the instrument is very stable in terms of assessing CHBs. We found a slightly higher test–retest correlation for our CHB scale than for the original, probably since our test–retest interval was shorter.

A limitation of the present study could be that the guidelines for cultural adaptation were not fully followed due to practical constraints. For instance, back translation is recommended, but was not performed, although this is important to identify unclear wording in the translation. However, a great deal of time was spent with the expert committee, and close contact with the original developers during this process and the pretests ensured clarity of wording. Furthermore, our sample was small for performing factor analysis on a 17-item scale. Also, we only tested the CHB scale among students, so we cannot be sure that these results are also valid for other segments of the population.

Is the CHB applicable in the Dutch context? In view of the internal consistency of the total CHB scale and the test–retest correlation, we think that the scale is sufficiently reliable and can be applied in the Dutch context, at least among Dutch students. Nevertheless, the overall CHB scale should be further tested for its reliability in other subgroups using larger samples, for instance adults and people who are overweight or restrained eaters. Its validity should also be tested. If the scale proves sufficiently reliable and valid for use in the general population, the next step would be to investigate the relationship between CHBs and different health behaviours for certain subgroups.

To conclude, if the results of the recommended further reliability and validity testing are also positive, the CHB scale will be an instrument that enables us to study whether the strategy of encouraging CHBs is appropriate in Dutch health behaviour-promoting campaigns, such as the campaign aimed at weight gain prevention.

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Conflict of interest statement

None declared.

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