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Research Article

Validating the revised Health Belief Model for young families: Implications for nurses' health promotion practice

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Abstract By modifying the Health Belief Model (HBM) nurses can provide health promotion guidance for families through the revised HBM for young families. The constructs 'perceived behavioral control' and 'behavioral intention' from Ajzen's Theory of Planned Behavior were added to the HBM to provide a health orientation. An initial qualitative study informed the second quantitative study through thematic data obtained by interviewing parents about family health. The second comparative study of low and high socioeconomic status families of preschool-aged children living in western Sydney, Australia, measured family health through the Parental Health Behavior Questionnaire (PHBQ). After a small pilot study, the researcher distributed 150 questionnaires to center directors from preschools, kindergartens and long day care, who then handed out questionnaires to interested parents. Data collection occurred in 1998 with consenting parents returning the questionnaires for collection by the researchers. A convenience sample of 103 was obtained with a 69% return rate. Analysis was undertaken through MANCOVA. Justification for validity occurred through logical analysis and hypothesis testing, based on the literature, while reliability was acknowledged by undertaking Cronbach coefficient alphas on small variable clusters. Results support the constructs 'perceived behavioral control' and 'behavioral intention' in the revised model, suggesting that for families of different socioeconomic background, differences emerge in terms of their perceived control over their child's health and the initiation of health behaviors for their child. Recommendations for further research are for refinement of the PHBQ, new research with different families, and further testing of all the model constructs.

Key words health promotion, nurses, revised Health Belief Model for young families, validating.

INTRODUCTION

Nurses have an important role in health promotion by taking a health promotion stance to assist families with young children (McMurray, 2003). Palmer and Short (1989) acknowledge that health promotion involves strategies for improving health and engages people to nourish their own health (Milo, 1988), unlike illness prevention which is undertaken by nurses and other health care workers on behalf of their clients.

This illness prevention or preventive health focus has been a useful one for nurses using the Health Belief Model (HBM) (Hochbaum, 1958; Rosenstock, 1960; 1966; 1974; Strecher & Rosenstock, 1996). It has assisted women who are undertaking screening through mammography (Holm *et al.*, 1999) and has also provided educational programs for clients ranging from those with osteoporosis (Sedlak *et al.*, 2000) to children with diabetes and their families (Marshall *et al.*, 2002). In a complementary way, a revised HBM for young families would assist nurses to develop educational programs for promoting family exercise or for promoting family nutrition. In addition, such a model could assist nurses in understanding families and their decision-making behavior when it comes to health

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promotion. A revised HBM for young families could be a way forward for nurses' health promotion practice.

Reconceptualizing the Health Belief Model

If nurses are to be able to understand their clients' health motivation then there needs to be improvement in the health orientation of the HBM (Rosenstock, 1990). The connection between 'perceived control' and 'positive' health definitions (Ardell, 1977; Downie *et al*., 1990) associated with health promotion needs to be considered as a more appropriate way for the HBM to be oriented. It is argued that it is important to develop a health promotion model which identifies 'at risk' families. This can be achieved through the incorporation of a construct like locus of control or 'behavioral control', considered important for families who are trying to develop healthy behaviors in their young children. Justification for the modification of the HBM using the constructs 'perceived behavioral control' (PBC) and 'behavioral intention' (BI) from Ajzen's (1985) Theory of Planned Behavior comes from its wide health research application, its classification as an expectancy-value theory with the same philosophical approach as the HBM, and it being ideally placed through the use of the constructs PBC and BI to reflect the notion of health promotion, considered necessary for nurses to empower the health of families with young children (McMurray, 2003). To reconceptualize the HBM as one embracing health promotion there are five problem areas, two of which are most important, that need to be addressed to enable development of the revised HBM for young families (Fig. 1).

Of the two main concerns, the first is the need to add Ajzen's (1985) construct PBC to improve the decision-making ability of the HBM when economic and environmental factors prevent the family undertaking health behaviors (Janz & Becker, 1984). The second concern is about overcoming the lack of logical explanation, clarity and accuracy of the HBM and improving the prediction of health promoting behavior by including the construct BI, also from the Theory of Planned Behavior (Ajzen, 1985).

In addition to these two concerns there are three further problems which involve the need to redevelop constructs to reflect a wellness health orientation. First, it is proposed that 'perceived notion of health' be the significant, overriding construct under which 'perceived threat of disease' is subsumed. In support of a health focus, immunization is an example of a health behavior regarded as an important health promoting behavior (Murray & Zentner, 1997). However, immunization is also an example of a subsumed illness prevention behavior or a screening behavior (Lawson, 1991), which corresponds to the perceived threat of disease. Other constructs to be reoriented to emphasize a health promotion perspective are 'perceived

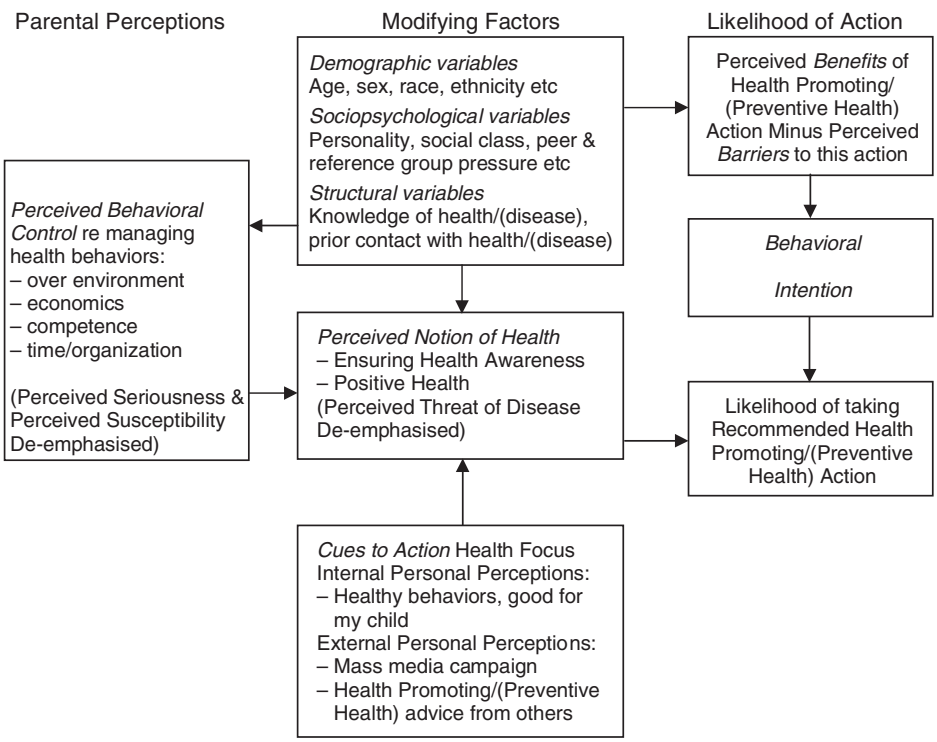

Figure 1. Revised Health Belief Model for young families.

seriousness of disease' and 'perceived susceptibility'. As the major focus is to be a healthy one there is a need to de-emphasize and subsume these constructs under the construct PBC. That is, if a parent is confident in terms of the control they have over their child's health then they will want to undertake health promoting behaviors if other elements such as financial, social and environmental are in harmony.

The final issue to be addressed relates to reorienting the construct 'cues to action'. Rosenstock (1974) describes cues to action, which is linked to perceived threat of disease. However, if a health focus is needed, cues to action needs to be linked to perceived notion of health so that, for example, receiving health promotion advice from the media (through cues to action) will help further develop health promotion behaviors in families (perceived notion of health). PBC and BI (the predictor of health promoting behavior) are important constructs associated with perceived notion of health and cues to action and they clarify the likelihood of health promotion action. Important constructs of the revised HBM for young families have been identified in this section as PBC, 'modifying factors' (influenced by the addition of PBC), BI, perceived notion of health and cues to action.

Justification for research approach

There are minimal research studies about young families and their health behaviors (Pratt, 1976; Loveland-Cherry, 1986; Ford-Gilboe, 1997). The first step in the process of validation for the revised HBM for young families is to undertake exploratory research which measures the influence of PBC and BI to a range of health behaviors that different kinds of families undertake for their preschool-aged children. The preferred research option is to explore the health behavior data to obtain an understanding about the constructs and their possible linkages in terms of their health focus before testing the modified HBM as a combination of constructs (Strecher *et al*., 1997).

The two important constructs, PBC and BI, considered the cornerstones of the revised HBM for young families (Fig. 1), and the other constructs perceived notion of health, cues to action and modifying factors, were represented by varying numbers of health variables in a multivariate analysis. The Parental Health Behavior Questionnaire (PHBQ) was constructed through a qualitative, preliminary study (Roden, 2003). Consenting parents aged from 27 to 44 years, with educational backgrounds ranging from 5 years in primary school to completion of a postgraduate degree, were given in-depth interviews. The 14 volunteer parents (11 parent sets and three single parents in total), from each of two, different socioeconomic areas of Mt Druitt and Baukham Hills, western Sydney, were recruited by the researcher at preschool, kindergarten and long day care venues. They were asked about their family's health and the health behaviors they undertook for their preschool-aged children. The important thematic material generated by using a modified grounded theory (Glaser & Strauss, 1967) approach in this comparative, exploratory study informed the questionnaire construction.

Process of the formation of clusters and domains

Questionnaire construction commenced on the basis of significant themes from the qualitative study. Questions were developed from the thematic material. For example, one theme was about most parents focusing on an illness prevention approach when teaching their children about health, with a small minority more focused on teaching their children health concepts based on a health promotion perspective (Roden, 2003). Questions and variables chosen were part of the health related concepts or clusters associated with the themes and their relevant literature. An example of a question tapping a health promotion perspective was: 'My child goes to the supermarket to help select food for the family' (with a five-point Likert scale response rate ranging from 'all the time' to 'none of the time').

Questions generated became part of clusters and clusters became part of the domains of wellness, health promotion and illness prevention. 'Dimensions of high level wellness' (Ardell, 1977) was chosen as a framework for the formation of clusters making up the wellness domain because of its similarity with that data. It was determined that the seven clusters of the wellness domain would be initiation (parents initiating activities associated with their child's health), cohesion (families sharing decisions and tasks), mental health (getting on well with the family and family stress), well-being (family happiness), healthy practices (family health practices), resourceful (families getting assistance, their ability to juggle activities and their environmental sensitivity) and being well adapted (families learning new tasks and problem-solving) (Fig. 2). Each cluster was developed by building up a related concept. For example, families were asked to address how household tasks were shared within the cohesion cluster. The related concept 'sharing family tasks' included bathing your child, cooking dinner, housework, dressing your child, cleaning your child's teeth and doing the laundry. These six variables were combined to form additive scales and Cronbach's coefficient alphas were reported for each, derived on the total number of respondents.

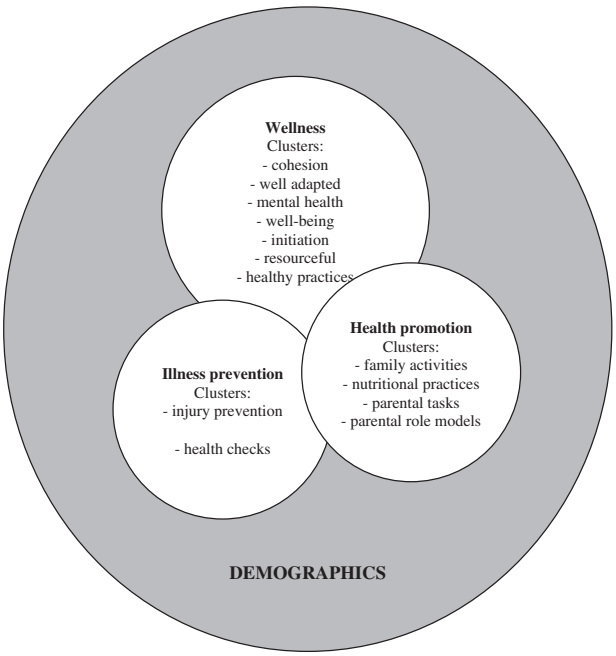

Figure 2. Representation of the wellness, health promotion and illness prevention domain and their clusters.

The development of the wellness domain measures reflected more general health behaviors (e.g. equal family decision-making) within its clusters, more so than the smaller, more specialised domains of health promotion and illness prevention. Like the wellness domain, the health promotion domain and its data were guided by the appropriate literature (Pender, 1996; Murray & Zentner, 1997) and included four clusters: parental role models (parents being good role models for exercise and nutrition); nutritional practices (family's eating habits); family activities (parental involvement in family outings); and parental tasks (parents learning new tasks including providing a safe and stimulating environment and finding sources of child health information). The illness prevention domain and its data reflected in the 'prevention' literature as responses to threats to health (Pender, 1996; Harris & Guten, 1979) included the two clusters injury prevention (safety practices and avoiding environmental hazards) and health checks (personal health practices). This brief reference to the process of questionnaire construction is reflected in the main aims of the quantitative study.

Aims

Examine the measured concepts of wellness, health promotion and illness prevention for western Sydney families of preschool-aged children for a range of demographic and family variables. Investigate the control families from western Sydney perceive they have over undertaking health behaviors for their preschool-aged child. Investigate the intention of families from western Sydney to undertake health behaviors for their preschool-aged children.

METHOD

Research design and rationale

A triangulated research approach was adopted so that the credibility of the qualitative method and the validity of the quantitative method could be improved (Lincoln & Guba, 1985). The concept of family health needed exploration in the qualitative tradition through the technique of interview. The questions about family health prediction could best be answered by adopting a quantitative research approach (Bauman & Greenberg Adair, 1992; Steckler *et al*., 1992), such as a questionnaire format, based on the qualitative study.

Sample

A purposive sample of 75 volunteer, consenting carer mothers was obtained from five to seven long day care centers and two preschool/kindergartens in Mt Druitt (from the Blacktown local government area) and Baulkham Hills (from the Baulkham Hills local government area), making a total of 150 parents from both areas in western Sydney. This provided an adequate sampling fraction of 0.06 (Nieswiadomy, 1998; Burns & Grove, 2001). A convenience sample was considered necessary because the PBHQ was a 26 page questionnaire and carers had to be interested to complete it. The questionnaire was returned by 103 parents (Mt Druitt, $n = 50$; Baulkham Hills, $n = 53$) over the period from March 1998 through to June 1998. This gave a response rate of 69% deemed reasonable for health related research. The socioeconomically different nature of these two samples was supported by the data about employment and educational status, income, family composition and social services for both these areas from the 1996 Census figures (Australian Bureau of Statistics, 1996). There was congruence with the 1996 Census figures for employment and educational status and family composition data from the PHBQ. Statistical analyses were only undertaken for partnered, female carers ($n = 91$), although there were 11 single female carers ($n = 11$).

Inclusion and exclusion criteria

As family diversity was considered important, a mix of different carer mothers was included such as those

from two parent families, single female partner families, families of ethnic origin, itinerant families and those of different ages. The only two criteria for exclusion were for families of non-English speaking backgrounds, due to the expense of translations and time constraints in obtaining consensus from cultural reference groups. The second criteria related to those families who had poor command of English at sixth grade primary school level and would find the long questionnaire too hard to undertake.

Participants

Of the 103 carer mothers with preschool-aged children living in western Sydney, most families were of the nuclear structure with a small number being single or extended families. The number of children per family ranged from two to 10 with half the sample having four children, and parents' ages ranged from 25 to 51 years, with the mean age being 34.13 years (SD 5.05 years). Women were chosen as the main carers on the basis that Australian statistics support women's extensive time commitment with family responsibilities (Australian Bureau of Statistics, 1995). Table 1 demonstrates that in educational terms most carers were at the level of completion of upper secondary education. Interestingly, carers (33%) and partners (31.1%) were almost equal in their participation in, or completion of, a degree. However, more partners (31.1%) had undertaken trade certificates than carers (17.4%). Only 25.7% of carers were undertaking full-time work, whereas nearly all men (partners) were involved in full-time work (92.2%). However, similar numbers of carers were either undertaking part-time work (35.9%) or busy with home duties (33.9%).

Although Table 2 alerts the reader to the need for caution when considering the sample sizes between carers and single carers, there are considerable socioeconomic differences for these two carer groups for renting and number of times moved. Compared to carers, the 11 single carers (identified in Table 2) were more compromised because 45.5% were not born in Australia (compared to 35.2% carers); 81.8% were renting (compared to 14.4% carers); whilst 54.5% had moved 2–6 times in the last 5 years (compared to 14.3% carers). It should be noted that data was unable to be obtained for one carer due to incomplete responses.

Procedure

When ethics approval had been granted for the quantitative study (as had been the case for the qualitative study) by the University of Western Sydney, initial contact was made with the care centers by letter, followed by a visit for those interested centers (there was only one center in Baulkham Hills that declined to participate). After initial questionnaire construction the

Table 1. Education and work information for carers ($n = 103$) and partners ($n = 91$)

	Carers		Partners	
	n	%	*n*	%
University degree (completed or in process)	34	33.0	28	31.1
Completion of trade certificate	18	17.4	28	31.1
Completion of upper secondary school	45	43.6	26	28.8
Completion of lower secondary and primary school	6	5.8	8	8.8
Working full-time in paid employment	26	25.2	83	91.2
Working part-time/casual in paid employment	37	35.9	1	1.0
Working in the family home with home duties	35	33.9	3	3.2
Retired, unemployed and/or full-time student	5	4.8	4	4.3

Table 2. Characteristics of single carer and carer families

	Single carers			Carers		
	n	%	Total	*n*	%	Total
Not born in Australia	5	45.5	11	32	35.2	91
Renting	9	81.8	11	14	14.4	91
Moved 2–6 times in last 5 years	6	54.5	11	13	14.3	91

PHBQ was reviewed by a panel of child and family health nursing experts and minor modifications were made. Then a small pilot survey of 10 questionnaires in both regions was conducted and other modifications were made to the draft questionnaire. In total, 150 questionnaires and the researcher's introductory letter to parents were distributed to all center directors over a 2-week period. As the directors had a knowledge of the parents they were considered by the researcher as appropriate for handing these surveys to mothers with acceptable literacy levels, and with an interest in filling in the questionnaires. The researcher returned to collect the completed questionnaires at each center after allowing a further 3 weeks. A lottery ticket was left for each participant as a sign of appreciation for taking part in the questionnaire.

Instrument

The 44 question PHBQ primarily consisted of Likert scale responses ranging from four to five, within three sections: demographic variables; variables about how the family manages its activities; and how the family manages its health (Roden, 2000, unpubl. data). The 15 demographic variables were carer and partner background (family size, carer and partner age, accommodation [house or other]; number of times moved [in last 5 years]; carer and partner educational status; carer and partner country of birth; carer's marital status; carer's and partner's occupational status; and carer's and partner's employment status). The second and third sections contained 27 questions or 183 variables. The second section was about how the family managed its activities. It included 15 questions about how the family managed their time between their own and their child's preschool activities; the sharing of household tasks; outings families enjoy; obtaining help from your preschool-aged child; spending time with your child doing relevant activities; supervising your child; family decision-making; family sharing; including your child's view; family problem-solving scenarios, for example, managing your child's behavior; assistance the family gets; and obtaining sources of information about your child's health. Section three addressed how the family managed its health and consisted of 12 questions about family stress; how well the family gets on together; the adjustment of your child at the center; the health of your family compared to others; views about your control over your child's health; family food eating habits; documentation of your child's food intake for 24 h; families role modeling healthy food habits; recycling habits of family; general family health habits; immunization status of preschooler and family exercise habits.

For the present article, the initiation cluster for the wellness domain is described with some examples, because it reflects the constructs PBC and BI. Following this, an attempt to represent the construct perceived notion of health is undertaken. Finally, the construct cues to action (with a health focus) is explained. Relevant aspects of the initiation cluster for the wellness domain are now addressed, and all variables are identified in italics.

Initiation cluster

The focus of the current paper was on the revised HBM for young families. PBC and BI were identified as potentially important constructs. In line with this approach, the second and third aims addressed the control western Sydney families perceive they have over their child's health as well as the perceived intention of these families to undertake health behaviors for their child. The initiation cluster concerned parents initiating activities for their child's health (Tinsley & Holtgrave, 1989; De Vellis, 1991). Within the PHBQ the two constructs PBC and BI were represented by the modified instruments of the Parent Health Locus of Control (PHLOC) scales (De Vellis *et al.*, 1993) (reflecting perceived behavioral control) and the Perceived Health Competence Scale (PHCS) (Shelton Smith *et al.*, 1995) (measuring behavioral intentions), respectively. The PHLOC was chosen because it had a health promotion focus in determining parents' beliefs about their control over their child's health. Three scales out of six were chosen (making 14 variables) as they reflected most accurately the health control aspects of parents and others. These scales were *media influence on child health* with a variable example being 'what my child sees on television commercials can affect my child's health'; *health professionals' influence on child health* and a related variable being 'health professionals control my child's well-being'; and *parental influence on child health* whose example variable was 'I can do a lot to help my child stay well'. Cronbach's coefficient alphas for *media influence on child health, health professionals influence on child health* and *parental influence on child health* were 0.91, 0.85 and 0.79, respectively.

Unlike the modified PHLOC, which had at least five validation studies undertaken, the second modified instrument PHCS (Shelton Smith *et al*., 1995) had sound internal consistency reliability coefficients but needed more reliability and validity studies due to small sample sizes. However, the PHCS was important because it could predict health behavior intentions and actual health promoting behaviors planned and enacted, as well as being able to measure self efficacy

or health competence. Although self efficacy was not considered necessary to measure in the planning stages of this work, it was expedient to use the PHCS and measure self efficacy as well as BI. This was an extra precaution to combat the difficulty of assessing parents' valuing of health. Although it was important to ascertain parents' value of health (when measuring health) this was problematic, due to the social desirability issue associated with questions about the importance of health.

The modified PHCS was able to measure the intentions of parents to initiate health behavior for their children. The seven variables comprising the PHCS were about the degree to which parents feel capable of managing their child's health. Some examples of the variables were 'handling myself well with respect to my child's health'; 'success in projects I undertake to improve my child's health'; and 'generally able to achieve my goals with respect to my child's health'. These had a coefficient alpha of 0.72.

Having just addressed the two constructs, the PHLOC (perceived parental control) and the PHCS (parental behavioral intentions), examples of variables representing the other constructs of the revised HBM for young families were located in various clusters of the questionnaire. Demographic factors such as socioeconomic background were identified as an important aspect of the construct modifying factors. These were reflected in the research sample through the choice of families from two different socioeconomic regions. Next, the construct perceived notion of health (addressing a desire for good family health) was represented by variable examples from the two clusters; parent role models and nutritional practices, for the health promotion domain, as well as part of the healthy practices cluster for the wellness domain.

The first parental role models cluster focused on maintaining health by exercise and nutritional awareness. For example, the subconstruct 'family members: nutritional awareness' was measured by one four variable scale *parents educating their children nutritionally,* with a coefficient alpha of 0.60. It included questions such as explaining to a child why she/he needs to eat healthy food, asking families about eating healthy food and discussing television advertising with a child when asked to buy a new brand of food advertised on television. High scores on this scale meant that parents were appropriate role models for their children's food choices because they were actively discussing and explaining food choices to their children.

The second cluster, nutritional practices, examined the nutritional practices that parents use when preparing and eating food. The subconstruct 'family members: nutritional knowledge' was measured by six variables. All these variables required carers to document their eating habits but they also identified their knowledge and commitment to healthy eating. *Parents healthy eating knowledge* ($r = 0.59$; $P < 0.000$) contained two variables: (i) How often does your family cook with oil? and (ii) How often does your family cook with salt? Responses for these variables ranged from 'every day' to 'hardly ever', while high scores meant that families hardly ever cooked with oil or salt. Examples of the five other single variables were how often the family eats take away food; how often the family eats fatty, fried food; and how often the family eats biscuits or cakes, with responses ranging from 'every day' to 'hardly ever'.

Finally, question 36 from the healthy practices cluster for the wellness domain contained a three variable scale *family resistance to illness*, which consisted of variable statements asking families about their health and, for example, whether they developed more than one bout of flu a year. Coefficient alpha for this scale was 0.74. Another single, global variable *how healthy is your family compared to others* asking about when you compare your family with others, how healthy are you, with responses ranging from 'very healthy' to 'very unhealthy', was also part of this subconstruct 'our resistance to illness is good'. Having described the construct perceived notion of health and its measurement, the construct cues to action (with a health focus) follows.

Question 29, part of the parental tasks cluster, health promotion domain, was measured by a nine variable scale *an important source of your child health information,* and this scale represented cues to action that might be triggered through parents wanting their family to be healthy (perceived notion of health). In this scale parents were asked to rate how important the sources of books, medical dictionaries, health and women's magazines, newspapers, mother, father, doctor, chemist, early childhood health nurse, 'from my own experience' and friends are in helping them look after their child's health. Parent responses ranged from 'very important' to 'not very important' and the coefficient alpha for this scale was 0.77.

Data analysis

Both logical (building up related concepts from data and comparing the relevant literature) and statistical criteria were used to select variables. First, logical selection meant that each cluster within each domain needed to be examined to determine what variables were logically required for the cluster to retain face validity. For example, the stress levels that families perceived they had when undertaking certain activities were an important part of the mental health cluster for

the wellness health domain. Then child health nursing experts commented on the final draft questionnaire. The second criteria of statistical selection by multivariate analysis of covariance (MANCOVA) was undertaken to eliminate from each cluster those variables which did not appear to maximize the differences between regions, and to achieve statistical matching between regions.

A multivariate analysis was undertaken using SPSS (SPSS Inc., Chicago, IL, USA). The demographic cluster was explored to identify the covariates to be used in subsequent analyses undertaken on the clusters of the wellness, health promotion and illness prevention domains. Then the dependent variables comprising the clusters making up the three domains were examined using the technique of MANCOVA (Norusis, 1990; Tabachnick & Fidell, 1996). Due to the relatively large number of variables which made up each domain, an a priori decision rule was used when interpreting the results. Multivariate significance was set at $P < 0.1$ as evidence of a significant linear combination of dependent variable means. When there was a significant multivariate effect the procedure for reducing the dependent variables involved the examination of the univariate findings of all variables and they were included in the reduced model if the observed F-value led to rejection of the null hypothesis at alpha 0.05. Following this, an examination of the size of the discriminant function coefficients and the structure coefficients was undertaken to select dependent variables as covariates for inclusion in the subset. A reduced model for each cluster was determined and the adequacy of this model was tested along with the influence of the specific demographic variables, introduced as covariates.

RESULTS

Socioeconomic difference

The results of the present research found that socioeconomic background was an important determining factor in the measurement of wellness, health promotion and illness prevention behaviors of families with preschool-aged children in western Sydney. The construct modifying factors was identified as important through its association with the demographic factors for families living in two regions of western Sydney. MANOVA analysis of the demographic cluster indicated that there was a significant multivariate relationship $F(15,72) = 7.45$, $P < 0.000$, that can be seen in Table 3.

Wellness model

Model reduction of the wellness domain, observed in Table 4, revealed that sharing family tasks; including the child's view, family members' health habits and

Table 3. Multivariate and univariate results for 15 demographic variables carers ($n = 88$)[†]

	Value		$P < 0.000$	
	0.39	F (15, 72)	Std	
Multivariate test	Univariate F value	7.45	discrim	Structure
Wilks Lambda	(d.f. = 1, 86)	$P <$	func.	coefficient
Family size	0.00	0.971	–0.02	–0.00
Accommodation (house or other)	0.58	0.447	–0.03	–0.06
Home ownership (owning or renting)	0.90	0.344	–0.30	0.08
No. times moved in past 5 years	0.06	0.798	–0.06	0.02
Financial adequacy	6.27	0.014	–0.08	–0.21
Carer age (years)	15.97	0.000	0.64	0.34
Partner age (years)	8.98	0.004	0.07	–0.26
Carer country of birth (Australia or other)	13.08	0.001	0.63	0.31
Partner country of birth (Australia or other)	4.08	0.046	0.26	0.17
Carer education status (secondary, technical or tertiary)	11.67	0.001	–0.36	–0.29
Partner education status (secondary, technical or tertiary)	14.11	0.000	–0.17	–0.32
Carer occupational status (high, medium or low)	19.96	0.000	–0.43	–0.38
Partner occupational status (high, medium or low)	39.84	0.000	–0.31	–0.54
Carer employment status (working or not working)	0.19	0.663	–0.29	–0.03
Partner employment status (working or not working)	2.07	0.154	0.42	0.12

[†] After missing data was accounted for by the variables carer age, partner age, carer country of birth and partner country of birth the sample size dropped from $n = 91$ to $n = 88$. Std discrim. func., standard discriminant function.

Table 4. Reduced subset of four dependent variables for the wellness health domain by region. carers (n = 91)

Multivariate Test Wilks Lambda	Value 0.72 Univariate F value (d.f. = 1, 86)	F (4, 86) 8.23 $P <$	$P < 0.000$ Std discrim func.	Structure coefficient
Sharing family tasks	6.68	0.011	–0.35	–0.44
Including the child's view	5.07	0.027	–0.46	–0.38
Family members' health habits	17.13	0.000	0.70	0.70
Getting assistance from other people	6.20	0.015	–0.40	–0.43

Std discrim. func., standard discriminant function.

Table 5. Reduced subset of two dependent variables for the illness prevention domain by region, carers (n = 91)

Multivariate Test Wilks Lambda	Value 0.81 Univariate F value (d.f. = 1, 86)	F (2, 88) 9.89 $P <$	$P < 0.000$ Std discrim func.	Structure coefficient
Assistance received from other resource personsfor concerns about your child's health	9.53	0.003	–0.80	–0.69
Family members' health checks	7.53	0.007	0.73	0.61

Std discrim. func., standard discriminant function.

getting assistance from other people, formed a highly significant multivariate subset F (4, 86) = 8.23, $P < 0.000$, suggesting a strong association between regional group variability (two regional groups of Mt Druitt and Baulkham Hills) and the wellness domain ($\omega = 0.27$).

Lower socioeconomic status Mt Druitt families performed better on the clusters of cohesion considered part of a family wellness orientation, because their partners were relatively more cohesive in sharing family tasks ($\overline{X} = 9.31$) than higher socioeconomic status Baulkham Hills family partners ($\overline{X} = 8.36$) F (1, 89) = 6.68, $P < 0.011$. Similarly, Mt Druitt family carers were relatively more likely to include their child's views in certain kinds of decision-making situations ($\overline{X} = 13.23$) than those family carers in Baulkham Hills ($\overline{X} = 11.84$) F (2, 89) = 5.08, $P < 0.028$. Mt Druitt carers also believed they had a relatively greater capacity to access resource people for a problem in their life or when they needed someone to look after their child when they were ill ($\overline{X} = 5.00$) than those carers living in Baulkham Hills ($\overline{X} = 4.22$) F (1, 89) = 6.20, $P < 0.015$. Conversely, higher socioeconomic status Baulkham Hills families engaged in slightly less smoking ($\overline{X} = 3.66$) than the lower socioeconomic status family members from Mt Druitt ($\overline{X} = 2.75$) t (89) = 3.81, $P < 0.000$. This was also the case for the somewhat reduced daily caffeine drinking behavior of Baulkham Hills family members ($\overline{X} = 3.58$) compared with family members from Mt Druitt ($\overline{X} = 3.08$) t (89) = 2.66, $P < 0.009$.

Health promotion and illness prevention models

A reasonable association with group variability and the other health models was also seen. The second model accepted for the health promotion domain was a highly significant, one variable model 'How much time would you spend watching TV with your child?' F (1, 89) = 14.91, $P < 0.000$, which accounted for a moderate association between the two regional groups and the health promotion domain ($\omega = 0.14$). Mt Druitt carers watched slightly more television with their children ($\overline{X} = 3.18$) than carers in Baulkham Hills ($\overline{X} = 2.58$) F (1, 82) = 14.52, $P < 0.000$. The third model accepted for the illness prevention domain was a two variable model; 'Family members' health checks and 'The assistance you can get from other resource people for concerns about your child's health' (Table 5), which formed a highly significant multivariate subset F (2, 88) = 9.89, $P < 0.000$) and resulted in a moderate to strong association between regional group variability and the illness prevention domain ($\omega = 0.18$). Evident from these results, and supportive descriptive research

evidence from the questionnaire relevant to healthy child eating and drinking practices, the Baulkham Hills families were somewhat more health conscious in terms of having health and dental checks and cleaning their teeth twice a day ($\overline{X} = 12.38$) than Mt Druitt families ($\overline{X} = 11.10$) $F(1, 89) = 7.54$, $P < 0.007$. In contrast, Mt Druitt families perceived that they had more assistance from a variety of resource persons for a problem with their child's health ($\overline{X} = 2.88$) compared to Baulkham Hills carers who said they had a moderate number of persons to assist them with their child health concerns ($\overline{X} = 2.38$) $F(1, 89) = 9.53$, $P < 0.003$.

Constructs perceived behavioral control and behavioral intention

The trend of explaining reasonable amounts of variability between regions continued for the construct PBC, along with BI in the initiation cluster. As the measurement of the two constructs, PBC (parents' control over their child's health) and BI (parents' intent to undertake health behaviors) were central to the initial validation process of the revised HBM for young families, it was interesting to find that higher socioeconomic background families were relatively more likely to take control of their child's health rather than allowing health professionals to do so ($\overline{X} = 21.84$), compared with lower socioeconomic background families ($\overline{X} = 19.49$) $F(1, 89) = 6.43$, $P < 0.013$. This result for PBC was important because it explained 7% of the variability within the two regions. The construct BI also produced a promising secondary result. It was noted that the variable 'parental initiation of child health activities' representing BI, was approaching significance in differentiating the regions at the univariate level $F(1, 89) = 3.64$, $P < 0.060$. On this basis, higher socioeconomic background parents were relatively more likely to agree they initiated health behaviors for their preschool-aged child ($\overline{X} = 32.89$) than lower socioeconomic background parents ($\overline{X} = 31.16$).

Construct perceived notion of health

Some parts of the constructs perceived notion of health and cues to action were also supported through secondary results or their ability to univariately differentiate the two regions. There was one convincing result that occurred for the construct perceived notion of health. For the nutritional practices cluster (health promotion domain) there was support in that families in Baulkham Hills would eat a little less fat or fatty food like chips in their diet ($\overline{X} = 3.18$) than families in Mt Druitt ($\overline{X} = 2.88$) $F(1, 89) = 5.75$, $P < 0.019$. The other components of perceived notion of health demonstrated through secondary result support (for question 36 or family members' resistance to illness) that higher socioeconomic status families (from Baulkham Hills) rated themselves as somewhat more resistant to illness ($\overline{X} = 9.26$) than lower socioeconomic status families (from Mt Druitt) ($\overline{X} = 8.36$) $F(1, 89) = 6.25$, $P < 0.014$. Resistance to illness was determined as being better able to remain well and more likely to contract only one bout of flu. Conversely, the findings for the parental role models cluster suggested there were no differences for parents educating their child nutritionally $F(1, 89) = 0.05$, $P < 0.816$ or for the family taking part in exercise $F(1, 89) = 2.14$, $P < 0.147$.

Construct cues to action

The construct cues to action did not fare as well as perceived notion of health. Secondary results for cues to action (represented by question 29, part of the parental tasks cluster–health promotion domain—the nine variable scale an important source of your child health information) found that Mt Druitt carers used the early childhood health nurses, the chemist, their fathers and health magazines as sources of child health information ($\overline{X} = 30.92$), unlike Baulkham Hills carers ($\overline{X} = 28.00$) $F(1, 82) = 5.85$, $p < 0.018$, but no further information of importance was forthcoming.

DISCUSSION

The constructs BC and BI have been supported in the current study. The results concerning higher socioeconomic parents believing they have more control over child health matters as well as perceiving they are more able to initiate child health promoting activities indicated that the constructs behavioral control and intention were important in influencing parents' health behaviors towards their children. Behavioral control was measured by the modified PHLOC (De Vellis *et al*., 1993) and intention by the modified PHCS (Shelton Smith *et al*., 1995), which also measured health self-efficacy. Although measuring self-efficacy was originally not considered, Rosenstock *et al.* (1988) conceded that locus of control and self-efficacy were constructs which should go together. This position is not rejected by the present research and needs to be further investigated.

The constructs PBC and BI demonstrated that they could differentiate health behaviors for the two socioeconomic regions. This has implications for the validation process of the revised HBM for young families and the need to undertake another larger study to determine if the effects of PBC and BI are still present and if the contributions of self-efficacy and BI together

make the difference. Significant multivariate results for the construct PBC corresponds with the findings of less well-educated families relinquishing their child health control to health professionals (Kraft & Loeb, 1996). In contrast, a multivariate result would have been more convincing for the construct BI and the initiation of health promoting behaviors by Baulkham Hills carers. However, these higher socioeconomic status families were more likely to initiate health behaviors such as undertaking dental checks and cleaning their teeth twice daily, as Green (1979), Harris (1993) and Pratt (1976) had found. A factor that might account for smaller differences between socioeconomic groups is the measurement of reasonably advantaged families from both socioeconomic groups, because these families' children were attending preschool, unlike the disadvantaged families whose children were unable to attend preschools.

Like the constructs PBC and BI, support is also apparent for the construct modifying factors. Rosenstock (1974) previously stated that sociopsychological variables (e.g. demographic variables) which are a part of modifying factors, were not considered an important construct for the HBM. In this present analysis associated with the revised HBM for young families, the demographic aspect of region has been determined to be an important one in differentiating health behaviors for families with young preschool-aged children.

The direction of some of the results was unexpected for the two different socioeconomic groups of families from western Sydney. It was exciting to see the lower socioeconomic background Mt Druitt families perform better on wellness behavior associated with sharing, being inclusive of their children and obtaining resource people for their problems. This trend for the wellness domain was supported by the health promotion and illness prevention domains in that lower socioeconomic families perceived they had more assistance for a problem with their child's health. However, it was the higher socioeconomic background Baulkham Hills families who engaged in less smoking and caffeine drinking behavior, experienced less stress, had more health and dental checks, and more frequently cleaned their teeth twice a day than lower socioeconomic background Mt Druitt families. These results agree with the literature that supports lower socioeconomic background parents' placing a low priority on activities associated with improving health habits (Koos, 1954; Harris, 1993).

That lower socioeconomic status families were more cohesive in sharing family tasks, allowing children more decision-making opportunities and perceiving they had more resources for their problems was an interesting result. First, with regard to task sharing, the higher socioeconomic status Baulkham Hills partners were working longer hours than Mt Druitt partners, which could have made sharing of tasks more difficult. Increased task sharing for Mt Druitt partners was supported by correlation evidence of sharing more household decisions and corroborated by their univariately higher idealised scores for sharing some family decisions. Second, that lower socioeconomic status families were more autonomous in allowing their children to decide what to have for dinner and their own bed time could be perceived as another positive family behavior, like family sharing. Koos's (1954) opinion is that lower socioeconomic status is associated with a lack of concern about child nutrition and child sleeping behaviors. Unlike the lower socioeconomic status Mt Druitt parents, the higher socioeconomic status Baulkham Hills parents provided descriptive evidence of being more aware of controlling their child's food intake to include healthy food. There might be a possible conflict between healthy child food outcomes and wellness behavior associated with autonomy. Higher socioeconomic status parents may regard these 'training' child behaviors (involving nutrition and sleep patterns) as being inappropriate to be controlled by young children, unlike lower socioeconomic status parents.

Although there was some support for the constructs perceived notion of health and cues to action indicated in the results, it was not apparent that there was a link between the two constructs. As has previously been noted, lower socioeconomic carers found such child health sources as early childhood health nurses, their father, the chemist and health magazines as being more important sources of child health information than did higher socioeconomic carers. Although higher socioeconomic carers appeared to have access to more sophisticated child health resources like computers, there were no questions about sources of child health information for television and computers. The addition of extra questions about the use of television or computers might have explained unknown elements and perhaps then enabled support for links between cues to action (as health instigator) and perceived notion of health.

Limitations and recommendations

The present study had many strengths, such as the questionnaire having justifiable face and content validity (through the rich data generated by parent 'experts' and the examination of the PHBQ by child and family health nursing experts), some attempts to satisfy reliability through undertaking Cronbach alphas on small variable clusters, and support for instrument validity

through logical analysis and testing of hypotheses from the data on the basis of theoretical considerations which have evolved from the literature (Polit & Hungler, 2001). However, some limitations should be acknowledged. There is the need for further refinement of the PHBQ; new research should be undertaken with different families (e.g. single parents whose health has been identified as more compromised than two parent families, and those of different cultural backgrounds) and the revised HBM for young families; and further testing of the constructs—health locus of control (PBC), modifying factors, BI, self-efficacy, perceived notion of health and cues to action. Although these results are supportive of the constructs modifying factors, PBC and BI, more development of the constructs perceived notion of health and cues to action as well as further reliability and validity studies are needed, especially in relation to the PHCS.

Implications for practice

This research has commenced the validation process for the revised HBM for young families. The results indicate that there is initial support for the model, but it will need further validation studies before community nurses can use it in their health promotion practice. The research also suggests that community nurses have significant health promotion roles in families with preschool-aged children, especially those disadvantaged, low socioeconomic background families, living in western Sydney. That these families allow health professionals more control over their child's health and initiate fewer health promoting behaviors for their children than higher socioeconomic families is of concern. These results appear to reflect lower socioeconomic families' disinterest in health promotion and their interest in helping their child when she/he is ill. On the basis of their disinterest in health promotion, community nurses, such as early childhood health nurses, need to assist low socioeconomic background families to develop a health promotion commitment, being mindful of the important health transmission role of the previous generation. Although there is a need to acknowledge the superior family sharing and resource perceptions of low socioeconomic families, community nurses also need to collaborate with child care centres in low socioeconomic areas so that they can assist the health of families by empowering them to develop and run family health management projects. Finally, child and family health professionals need to be active in lobbying for changes to healthy public policy, especially involving television and the commitment of this media to the development of family health programs.

CONCLUSION

The present research study is important for young families and their health behaviors. The first step in the validation process for the revised HBM for young families has been undertaken. The constructs of PBC and BI demonstrated that they could differentiate health behaviors for the two socioeconomic regions in western Sydney, suggesting that socioeconomic difference influences families in terms of control over their child's health and the initiation of health behaviors for their child. This has implications for the validation process of the revised HBM for young families and the need to undertake another larger study with different types of families (e.g. single parent families) to determine the exact nature and the relationship of PBC, BI, self-efficacy and the other relevant revised model constructs in a different context. There are implications for nurses and their health promotion practice and the need to assist the health promotion efforts of western Sydney families of lower socioeconomic background.

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