RESEARCH

JCHC

Journal of Child Health Care

Vol 9(2) 92–107
DOI: 10.1177/1367493505051400

Evaluation of a developmental care training programme for neonatal nurses

ISABELLE H. MILETTE, RN, MScN
Nurse, Neonatal Intensive Care Unit, Montreal Children's Hospital, McGill University Health Center, Quebec, Canada

LUCIE RICHARD, PhD
Associate Professor, University of Montreal, Faculty of Nursing and Groupe de recherche interdisciplinaire en santé, Quebec, Canada

MARIE-JOSÉE MARTEL, RN, MScN
Associate Professor, Faculty of Nursing, University of Quebec in Trois-Rivières, Quebec, Canada

Abstract

Although the impact of developmental care on premature infants has been investigated at length, often the issue of professional development and training related to this type of care has not been examined. The aim of the present study was to evaluate the impact of a developmental care training programme on nurses' behaviours and cognitive attributes with regard to the prevention of overstimulation of premature infants. The Theory of Reasoned Action (TRA) was the framework underlying the study. This programme evaluation used a quasi-experimental one group pre-test/post-test design. Participants were nurses working in a neonatal intensive care unit. Data was collected by self-administered questionnaires. Significantly higher post-test scores were observed for knowledge and for a variety of theoretical constructs. The results of this study showed the potential of such training programs to help nurses implement developmental care.

Keywords developmental care • neonatal intensive care unit • nurse education • program evaluation • theory of reasoned action (TRA)

Introduction

It has been recognized for many years now that the neonatal intensive care unit (NICU) environment can have an important influence on the development of premature infants (Aita and Snyder, 2003; Als, 1986; Becker et al., 1991, 1993; Bondurant and Brinkman, 2003; Buehler et al., 1995; Gray et al., 1998; Peters, 1999; Symington and Pinelli, 2001; White-Traut et al., 1994). In line with research results in this area, developmental care (Als, 1986), a non-traditional kind of care which optimizes the NICU environment and care, has been proposed to ensure healthy outcomes for premature babies (Als, 1998; Bondurant and Brinkman, 2003; Byers, 2003; Kleberg et al., 2002; VandenBerg, 1993, 1997). Based on Als' Model of Synactive Organization of Behavioral Development (Als, 1986), the developmental care approach attempts to reproduce optimally the uterine environment to facilitate the development of premature infants. Developmental care interventions use the behavioural cues of premature infants to develop individualized patient-centred care. These interventions are part of a complete and complex programme developed by Als in the mid-1980s, the Newborn Individualized Developmental Care and Assessment Program (NIDCAP; Als, 1986). An important component of this developmental care approach is also aimed at reducing visual, auditory and tactile stimulation, to which premature infants would not be normally exposed in the uterus, by changing both nurses' behaviour and the NICU environment.

State of knowledge

Since its inception, the developmental care approach has generated numerous studies, focusing mainly on the impact of this approach on premature infants. In general, results have shown that developmental care has had a positive influence on a variety of outcomes such as weight, number of mechanical ventilation days, length of hospitalization, incidence of intracranial hemorrhage and an improvement in neonatal neurobehavioural organization (Als et al., 1986, 1994, 1996; Becker et al., 1991, 1993; Fleisher et al., 1995; Peters, 1999) as well as long-term improvement of behaviour and cognitive development (Kleberg et al., 2000, 2002; Symington and Pinelli, 2002). However, a review of this literature reveals a notable lack of research addressing the issue of professional development. Because the implementation of a developmental care approach demands that NICU staff acquire new knowledge and skills, it is surprising to note that very little has been published on training programmes and their evaluation (Aita and Snyder, 2003; Als and Gilkerson, 1995, 1997; Als et al., 1996).

Objective and context of the study

The objective of this study was to obtain preliminary evidence for the effectiveness of a developmental care training programme by examining its impact on the behaviours and cognitive attributes of nurses in relation to the prevention of visual, auditory and tactile overstimulation in the NICU. Three specific nursing behaviours were targeted, which correspond to three different sources of overstimulation:

1 placing a blanket over the infant's incubator;
2 decreasing the intensity of conversations around the incubator; and
3 correctly positioning the premature infant in the incubator.

A correct position was defined as one which promotes the physiological flexion of all limbs (fetal position), using various positioning tools such as rolled blankets (as described in Young, 1996). These three behaviours are the ones most frequently found in studies evaluating developmental care interventions related to overstimulation (Aita, 1996; Gray et al., 1998; Lotas and Walden, 1996; Stevens et al., 1996; White-Traut et al., 1994). Budgetary constraints precluded the inclusion of individualized behavioural components brought forward by the NIDCAP in the evaluation.

The programme implementation and its evaluation took place in a paediatric hospital in the province of Quebec, Canada. An advanced practice nurse in neonatology developed the training programme as part of her Master's thesis research (Martel, 2000). The ultimate goal of the programme was to increase the level of knowledge among nurses and the frequency of the three targeted behaviours. Intermediate goals were to improve certain cognitive attributes postulated as influencing the targeted behaviours: beliefs, attitudes and intentions (Fishbein and Ajzen, 1975). To this end, the programme emphasized the acquisition of knowledge about the following issues:

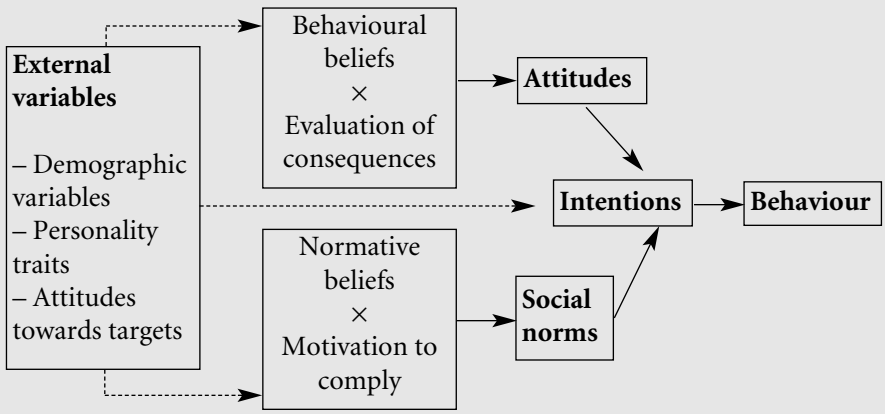
- neurosensorial foetal development from conception to birth;
- the behaviour and development of full-term versus pre-term infants;
- the NICU ecology;
- the impacts of traditional care on premature infants in the NICU;
- sources of environmental stimulation (visual, auditory and tactile) and their impact on premature infants and nurses;
- Als' Synactive Theory of Neonatal Development and the Developmental Care approach (Als, 1986), the basis for the NIDCAP;
- the essential role of the nurse in developmental care.

Participants were recruited on a voluntary basis from the three shifts of the NICU. They attended an eight-hour training session in small groups of five to

seven persons and received the equivalent of one day's salary in compensation for their time and expenses. The programme consisted of formal presentations on the above topics. Other elements of the programme included informational materials, videos, photograph quizzes and positioning practice periods supervised by a physiotherapist.

Evaluation

Fishbein and Ajzen's (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975) Theory of Reasoned Action (TRA, see Figure 1) guided the programme evaluation.



Source: Ajzen and Fishbein, 1980: 84.

Figure 1: The Theory of Reasoned Action

This psychosocial theory explains voluntary behaviours in terms of cognitive attributes: intentions, attitudes, social norms and beliefs. According to this theory, a person's intention is the immediate determinant of a given behaviour, defined as his or her motivation to perform that behaviour. An intention is influenced in turn both by the person's attitude towards the behaviour and by his/her perceptions about the social norm related to performing that behaviour. Attitude is conceptualized as the person's favourable or unfavourable evaluation of the targeted behaviour. This is a function of the person's set of behavioural beliefs about the consequences of performing the behaviour. Each such behavioural belief is weighted by another belief related to the value that the person attaches to the consequence. Attitude can be measured indirectly by computing the sum of the products of '(behavioural belief) x (evaluation of the consequence)'. The subjective norm is defined as a 'person's perception of the social pressures put on

him to perform or not perform the behaviour in question' (Ajzen and Fishbein, 1980: 6). Similar to the attitudinal component, the subjective norm is influenced by a set of weighted beliefs. (Because this study examined only the attitudinal component, these will not be described.) According to the theory, all beliefs are influenced by external variables such as knowledge, personality traits and demographic characteristics. This implies that, 'in order to influence behaviour, we have to expose people to information which will produce changes in their beliefs' (Ajzen and Fishbein, 1980: 83). Thus educational strategies are particularly important in this respect.

The TRA has been applied to the study of several health-related behaviours (Godin and Kok, 1996), mostly in the field of social psychology where the theory was developed initially (Azjen, 2001; Azjen and Fishbein, 1980; Blue, 1995; Salazar, 1991; Weinstein, 1993). The theory has been applied in other disciplines also, including nursing, where it has been used to investigate questions such as care for HIV-positive patients (Spence Laschinger and Goldenberg, 1993), infection control practices (Kretzer and Larson, 1998), care for patients receiving chemotherapy (Wallace et al., 1997) and attitudes toward dying patients (Waltman, 1990). To our knowledge, the TRA has not been used extensively in neonatology. A search of the literature revealed only two published studies: one related to the behaviours of parents of premature infants (Kurtz et al., 1992) and the second to nurses' attitudes towards premature infants (Richey, 1988).

Given the programme's emphasis on the modification of knowledge and attitudinal variables, this study sought to examine its impact on the attitudinal component of the TRA. No attempt was made to evaluate changes in the normative component. For the three targeted behaviours, we predicted that variables related to knowledge and the attitudinal component of the TRA (beliefs, attitudes, intention and behaviour) would improve following the nurses' exposure to the programme.

Method

Design and sample

This programme evaluation used a quasi-experimental one group pre-test/post-test design (Burns and Grove, 1997). Out of the 42 participants who attended the training programme, 31 responded to one or both questionnaires (see below). The final sample was composed of the 24 participants who responded to both pre-test and post-test questionnaires.

Participants

Nurses participated in the study on a voluntary basis, by responding to a posted announcement which invited them to sign up if they were interested in the

programme. Almost 100 out of the 158 nurses on the unit volunteered for the programme. This high demand could not be met for financial reasons, so priority was given to nurses with a permanent full-time or part-time position on the unit. Participant selection was based also on proportional representation from the different shifts. The intent was to maximize the exposure to developmental care for the greatest number of nurses on the unit, hoping for a contamination effect for non-participating nurses after the programme (Als, 1996). A total of 42 nurses were selected to receive the training programme. They constituted the convenience sample.

Data collection

Data was collected by two self-administered questionnaires. The first questionnaire (the TRA questionnaire) assessed the constructs taken from Fishbein and Ajzen's theory. It was distributed one week before the training session and participants were instructed to complete and return it before the beginning of the training session (pre-test administration). The same questionnaire was distributed one month after completion of the training session (post-test administration). Participants had one week to complete and return it. The second questionnaire (the Knowledge questionnaire) assessed nurses' knowledge about various aspects of developmental care. It was administered twice: at the beginning of the training session (pre-test) and at its end (post-test).

Measures

The Knowledge questionnaire assessed participants' knowledge regarding the various elements covered in the training programme (see above). Question formats included multiple-choice, true/false and association questions.

The TRA questionnaire was constructed using Ajzen and Fishbein's methodology (Ajzen and Fishbein, 1980; Milette, 2000). It consisted of 27 questions assessing behaviour, intention, attitude, behavioural beliefs and evaluations of the consequences in relation to the three targeted behaviours. All items were rated on a Likert scale. Four nurses specialized in neonatology and two research experts evaluated the content validity of the questionnaire. Pearson coefficients or Cronbach coefficients were computed for each scale; these ranged between 0.67 and 0.92.

The following is a description of the scales and items used for the behaviour of placing a blanket over the incubator. The format used for the two other behaviours was identical.

Behaviour: this was evaluated with a single item – 'During the last week of work, how often did you place a blanket over the incubator of patients under your care?' The five-point response scale ranged from 'never' to 'always'.

Intention: this was measured using a scale composed of two items – 'In the future, I intend to place a blanket on the incubator of the patients under my care'

and 'I am determined to place a blanket on the incubator of the patients under my care'. The seven-point response scale ranged from 'probable' to 'improbable' and 'true' to 'false', respectively. Pearson coefficients for the three scales assessing intentions (one for each behaviour) ranged from 0.71 to 0.83.

Attitude (direct measure): this was measured on a seven-item semantic differential scale. The question was: 'From my point of view, placing a blanket on the incubator of my patient is . . .' Adjectives used were 'good/bad', 'beneficial/harmful', 'wise/foolish', 'useful/useless', 'safe/unsafe', 'effective/ineffective' and 'important/unimportant'. Cronbach coefficients for the three attitudinal scales ranged from 0.84 to 0.91.

Beliefs (indirect measure of attitude): as suggested by Fishbein and Ajzen, a pilot study was conducted to identify neonatal nurses' salient beliefs about the consequences of performing the three targeted behaviours. The results of the pilot study were used in the construction of scales to measure beliefs. As for covering the incubator with a blanket, the pilot study identified five consequences: 'hinders seeing any change in colour of the premature infant', 'protects the eyes of the premature infant', 'diminishes the environmental noise perceived by the premature infant', 'promotes the physiological stability of the premature infant' and finally, 'facilitates the rest of the premature infant'. Two scales were designed using the consequences identified by the pilot study. The first scale consisted of five items assessing behavioural beliefs, that is, beliefs assessing the perceived consequences of the behaviour. An example of an item from this scale is: 'Do you believe that placing a blanket on the incubator of your patient facilitates its rest?' The seven-point response scale for this item ranged from 'probable' to 'improbable'. A second scale contained five items assessing participants' evaluation of each of these consequences. A sample item for this scale was: 'In your opinion, facilitating the rest of the premature infant is . . .' The seven-point response scale ranged from 'good' to 'bad'. An indirect measure of attitude was obtained by summing the products of '(behavioural beliefs) x (evaluation)' for each of the five consequences. Cronbach alpha coefficients for the three indirect measures of attitudes ranged from 0.69 to 0.80.

Questions on sociodemographic characteristics were included in the pre-test questionnaire. The post-test version included a section inviting nurses' comments.

Ethical considerations

The research protocol was approved by two ethics committees, one at the hospital site and the other at the University of Montreal.

Data analysis

To facilitate comparisons across constructs, the mean scores for each scale were calculated by adding all the item scores and then dividing the total by the

number of items. Descriptive analyses were performed to highlight response patterns. Comparisons were made between pre- and post-test scores for each scale using Student *t*-test for related samples. The Bonferroni procedure was used to control for the number of tests carried out. The *p* value used to consider results significant was $p \leq 0.004$.

Results

Participant characteristics

As detailed in Table 1, slightly less than half the participants had a part-time position and the rest worked full-time. The majority worked on the day shift and about a quarter worked on the night shift. A majority of respondents had a college diploma as their final degree. The mean age of the participants was 38 years, with the majority over 30 years of age. Their experience on the unit showed a U-shaped distribution, with most of the nurses reporting either less than 10 years or more than 20 years of experience. All nurses were women.

Table 1. Participant characteristics

Characteristics	Percentage (%)
Working status	
Full-time	54.2
Part-time	45.8
Work shift	
Day	43.5
Evening	30.4
Night	26.1
Education	
College	66.7
Bachelor	25.0
Master	8.3
Age	
25–30 years	15.7
31–35 years	31.7
41–45 years	20.9
45 years and over	31.7
Work experience	
10 years and under	43.5
11–20 years	13.0
21 years and over	43.5

Knowledge

Mean scores for the knowledge test at the pre-test and post-test were 81.9 percent and 92.9 percent respectively, which was a statistically significant difference ($p < 0.05$).

TRA variables

Table 2 presents the results for the TRA variables.

Table 2. Pre- and post-test results for the TRA variables

Variable	Pre-test Mean	Pre-test *S.D.*	Post-test Mean	Post-test *S.D.*	*t*-test	*p*-value
Attitudes (indirect measure)						
(1) Use of blanket over the incubator	4.33	1.57	6.26	1.57	4.58*	0.00
(2) Decrease in conversational intensity	4.59	1.74	5.53	2.04	2.23	0.04
(3) Optimal positioning of the baby with blanket rolls	4.36	.89	5.00	.844	3.56*	0.00
Attitudes (direct measure)						
(1) Use of blanket over the incubator	5.61	.61	6.53	.45	6.73*	0.00
(2) Decrease in conversational intensity	6.01	.47	6.54	.56	5.87*	0.00
(3) Optimal positioning of the baby with blanket rolls	6.28	.48	6.76	.34	4.75*	0.00
Intentions						
(1) Use of blanket over the incubator	6.27	.57	6.85	.35	4.75*	0.00
(2) Decrease in conversational intensity	6.40	.55	6.73	.42	2.50	0.02
(3) Optimal positioning of the baby with blanket rolls	6.75	.42	6.80	.39	0.44	0.66
Behaviors						
(1) Use of blanket over the incubator	3.44	1.38	4.26	1.32	2.50	0.02
(2) Decrease in conversational intensity	3.63	.97	4.17	.70	3.41*	0.00
(3) Optimal positioning of the baby with blanket rolls	4.50	.72	4.75	.44	1.81	0.08

* $p \leq 0.004$; df : 23

The first finding of interest is that all measures for study constructs increased at the post-test. However, taking the Bonferroni correction into account, the pre-test/post-test difference reached significance ($p \leq 0.004$) for only seven variables.

Constructs related to the use of a blanket over the incubator were found to be the most amenable to change, with a significant increase in the direct and indirect measures of attitude and the intention measure. However, no significant difference was found in the behavioural measure for this behaviour. A second interesting result was the post-test increase in both the direct and indirect measures of attitude for the construct related to the positioning of the baby with rolled blankets. No other differences were observed for this behaviour. Finally, there were significant differences in the direct measure of attitude and behaviour for the constructs related to decreasing the intensity of the conversations near the incubator. In general, the attitudinal variables (direct and indirect measures) emerged as the most amenable to change.

Results of the qualitative analysis of participants' comments

Ten participants provided comments in the final section of the post-test questionnaire. The content analysis revealed that all the comments were positive (see Table 3), with most of them relating to nurses' satisfaction with the programme.

Table 3. Themes identified by the content analysis of nurses' comments

Themes	Frequency
All nurses should be offered the programme	5
The programme had a positive impact on my care	3
All health care professionals as well as families should be offered the programme	3
The programme had a positive impact on my patients	2
Need for more training activities	1

Some participants reported a difference in their care behaviours after being exposed to the programme. Others emphasized the positive consequences of developmental care for infants. Many suggested offering the programme to all the nurses in the unit, other health care professionals interacting with premature infants and family members.

Discussion

Developmental care has garnered much interest among clinicians and researchers in recent years. A review of the literature shows that most research efforts have been concerned with the impact of such care on the health and development of

premature infants (Als, 1998; Lotas and Walden, 1996; Peters, 1999; Stevens et al., 1996; Symington and Pinelli, 2002). To our knowledge, the issue of professional development and training in developmental care has been studied very little. Because professional practices are such a key component of developmental care, it is crucial to design and offer attractive and effective training programmes (Robinson, 2003). The present study is important in how it may help to fill this gap in knowledge and demonstrate the potential benefits of an innovative developmental care training programme for neonatal nurses.

The first important finding was the favourable reception that the nurses gave to the training programme. Nearly two-thirds of the invited professionals volunteered to participate in the programme. Of the selected participants, a sizeable proportion expressed their satisfaction with the activities. Clearly, developmental care is raising a lot of interest among nurses and there is a need to offer adapted educational opportunities that will facilitate the implementation of innovative practices in this field. A second interesting result was a demonstrated capacity for change in numerous constructs of interest. Seven out of the 12 TRA variables showed a significant increase between the pre-test and the post-test. Variables related to the direct and indirect measures of attitudes emerged as particularly amenable to change, with five out of six variables increasing significantly after exposure to the programme. Such a result is particularly interesting, considering the significantly higher levels of knowledge also observed at the end of the training session.

Of course, the absence of a control group precludes making a definitive conclusion about the impact of the programme. However, a detailed documentation of the NICU situation during the study period led us to conclude that no relevant external events could reasonably be at the source of the improvement in these variables. Future studies should include a control group to establish firmly that other potential sources of bias, such as the repetition of the measure (Campbell and Stanley, 1966), do not contribute to the observed effects and that the training activities are the sole causal agent. Furthermore, we need to highlight that some of the non-significant variables showed very high levels at the pre-test, particularly those related to intention and behaviours, suggesting a possible ceiling effect for certain variables. Perhaps the exposure of some participants to a short training activity offered five years earlier in the NICU could explain such high baseline levels. Future studies should document in detail participants' previous experiences with developmental care and should control for such characteristics when evaluating the impact of training activities.

The behavioural component was assessed by self-report. As Ajzen and Fishbein (1980) have mentioned, there could be a difference between declared and actual behaviours. If feasible, future studies should include an observational measure of these behaviours.

Another relevant issue is related to the social norm component of the TRA. The educational programme emphasized the transmission of knowledge and the

modification of attitudes. No formal activities targeted social norm. While our results showed the potential of the programme to change the attitudinal component, Fishbein and Ajzen's theory reminds us that activities aimed at modifying the normative component (social norm and normative beliefs) also might be indicated, to maximize the impact of the programme on the nurses' intentions and behaviours. For example, implementing institutional policies that encourage developmental care could help to raise nurses' perceptions that they are expected to perform the recommended behaviours. In turn, such perceptions should influence their intentions and behaviours positively. Future research should definitely consider such hypotheses.

A further issue limits the interpretation of these findings. As this study was conducted on a convenience sample of nurses, many of whom had been sensitized already to the developmental care topic, certainly we are not in a position to generalize our findings to other groups of nurses. Future evaluative studies should consider larger samples and a variety of practice contexts.

Despite these limitations, the present study has several noteworthy features. First, our experience, as well as that of others in the field (Aita and Snyder, 2003; Robinson, 2003) shows that developmental care elicits a high level of interest among NICU nurses and that a programme of the type implemented here is an attractive vehicle to help them better implement this care. Second, the findings clearly show that the key variables (attitude, intention, behavioural variables) postulated to influence nurses' developmental care practices are amenable to change. Furthermore, the findings show that the programme is likely to be at the root of the observed changes. More research is needed to draw a more definitive conclusion about the impact of such programmes and to refine our knowledge of their mechanisms of action (Robinson, 2003). Up until now, the issue of professional training in developmental care has not been the subject of many studies. We hope that this first effort will encourage the pursuit of research in this important sector of neonatal care. Ultimately, we think that such small-scale evaluations as well as more ambitious evaluation projects will help to convince nurses, planners and decision-makers of the potential that developmental care offers for the health and development of premature infants.

Acknowledgements

This study fulfilled part of the requirement for Isabelle Milette's and Marie-Josée Martel's Masters' programmes. Lucie Richard is a Quebec Health Research Fund Scholar (#23187–2192). The authors gratefully acknowledge the contribution of the hospital and nurses who participated in this study. They also thank Franco Carnevale for his helpful comments on an earlier draft.

References

Aita, M. (1996) 'Comportements, intentions, attitudes et normes subjectives d'infirmières face à la prévention de la surstimulation du prématuré', Master's thesis, Faculty of Nursing, University of Montréal.

Aita, M. and Snyder, L. (2003) 'The Art of Developmental Care in the NICU: a Concept Analysis', *Journal of Advanced Nursing* 41(3): 223–32.

Ajzen, I. (2001) 'Nature and Operation of Attitudes', *Annual Review of Psychology* 52: 27–58.

Ajzen, I. and Fishbein, M. (1980) *Understanding Attitudes and Predicting Social Behavior*. Englewood Cliffs, NJ: Prentice-Hall.

Als, H. (1986) 'A Synactive Model of Neonatal Behavioral Organization: Framework for the Assessment of Neurobehavioral Development in the Premature Infant and for Support of Infants and Parents in the NICU', *Physical and Occupational Therapy in Paediatrics* 6(3–4): 3–55.

Als, H. (1996) 'Earliest Interventions for Preterm Infants in the Newborn Intensive Care Unit', in M.J. Guralnick (ed.) *The Effectiveness of Early Intervention*, pp. 47–76. Baltimore, MD: Brookes Publishing.

Als, H. (1998) 'Developmental Care in the Newborn Intensive Care Unit', *Current Opinion in Paediatrics* 10(1): 138–42.

Als, H. and Gilkerson, L. (1995) 'Developmentally Supportive Care in the Neonatal Intensive Care Unit', *Zero to Three: National Center for Clinical Infant Programs* 15(6): 104–12.

Als, H. and Gilkerson, L. (1997) 'The Role of Relationship-based Developmentally Supportive Newborn Intensive Care in Strengthening Outcome of Preterm Infants', *Seminars in Perinatalogy* 21(3): 178–89.

Als, H., Duffy, F.H. and McAnulty, G.B. (1996) 'Effectiveness of Individualized Neurodevelopmental Care in the Newborn Intensive Care Unit (NICU)', *Acta Paediatrica* (Supp.) 416: 21–30.

Als, H., Lawhon, G., Brown, E., Gibes, R., Duffy, F.H., McAnulty, G. and Blickman, J.G. (1986) 'Individualized Behavioral and Environmental Care of the Very Low Birth Weight Preterm Infant at High Risk of Bronchopulmonary Dysplasia: Neonatal Intensive Care Unit and Developmental Outcome', *Paediatrics* 78(6): 1123–32.

Als, H., Lawhon, G., Duffy, F.H., McAnulty, G.B., Gibes-Grossman, R. and Blickman, J.G. (1994) 'Individualized Developmental Care for the Very Low Birth-weight Preterm Infant. Medical and Neurofonctional Effects', *Journal of the American Medical Association* 272(11): 853–8.

Becker, P.T., Grunwald, P.C., Moorman, J. and Stuhr, S. (1991) 'Outcomes of Developmentally Supportive Nursing Care for Very Low Birth Weight Infants', *Nursing Research* 40(3): 150–5.

Becker, P.T., Grunwald, P.C., Moorman, J. and Stuhr, S. (1993) 'Effects of Developmental Care on Behavioral Organisation in Very Low Birth-weight Infants', *Nursing Research* 42(4): 214–20.

Blue, C.L. (1995) 'The Predictive Capacity of the Theory of Reasoned Action and the Theory of Planned Behavior in Exercise Research: an Integrated Literature Review', *Research in Nursing Health* 18(2): 105–21.

Bondurant, P.G. and Brinkman, K.S. (2003) 'Developmentally Supportive Care in the Newborn Intensive Care Unit: Early Intervention in the Community', *Nursing Clinics of North America* 38(2): 253–69.

Buelher, D.M., Als, H., Duffy, F.H., McAnulty, G.B. and Liederman, J. (1995) 'Effectiveness of Individualized Developmental Care for Low-risk Preterm Infants: Behavioral and Electrophysiologic Evidence', *Paediatrics* 96(5): 923–32.

Burns, N. and Grove, S.K. (1997) *The Practice of Nursing Research: Conduct, Critique and Utilization* (3rd edn). Montreal: W.B. Saunders.

Byers, J.F. (2003) 'Components of Developmental Care and the Evidence for Their Use in the NICU', *MCN Journal of Maternal Child Nursing* 28(3): 174–80.

Campbell, D.T. and Stanley, J.C. (1966) *Experimental and Quasi-experimental Designs for Research.* Chicago, IL: Rand-McNally.

Fishbein, M. and Ajzen, I. (1975) *Beliefs, Attitudes, Intentions and Behavior: an Introduction to Theory and Research.* Menlo Park, CA: Addison-Wesley.

Fleisher, B.E., VandenBerg, K., Constantinou, J., Heller, C., Benitz, W.E., Johnson, A., Rosenthal, A. and Stevenson, D.K. (1995) 'Individualized Developmental Care for Very Low Birth-weight Premature Infants', *Clinical Paediatrics* 34(10): 523–9.

Godin, G. and Kok, G. (1996) 'The Theory of Planned Behavior: a Review of its Applications to Health-related Behaviors', *American Journal of Health Promotion* 11(2): 87–98.

Gray, K., Dostal, S., Ternullo-Retta, C. and Armstrong, M.A. (1998) 'Developmentally Supportive Care in a Neonatal Intensive Care Unit: a Research Utilization Project', *Neonatal Network* 17(2): 33–7.

Kleberg, A., Westrup, B. and Stjernqvist, K. (2000) 'Developmental Outcome, Child Behavior and Mother–Child Interaction at 3 Years of Age Following NIDCAP Intervention', *Early Human Development* 60(2): 123–35.

Kleberg, A., Westrup, B., Stjernqvist, K. and Lagercrantz, H. (2002) 'Indications of Improved Cognitive Development at One Year of Age Among Infants Born Prematurely Who Received Care Based on the NIDCAP', *Early Human Development* 68(2): 83–91.

Kretzer, E.K. and Larson, E.L. (1998) 'Behavioral Interventions to Improve Infection Control Practices', *American Journal of Infection Control* 26(3): 245–53.

Kurtz, M.M., Perez-Woods, R.C., Tse, A.M. and Snyder, D.J. (1992) 'Antecedents of Behavior: Parents of High-risk Newborns', *Children's Health Care* 21(4): 213–23.

Lotas, M.J. and Walden, M. (1996) 'Individualized Developmental Care for Very Low Birth-weight Infants: a Critical Review', *Journal of Obstetric, Gynecologic and Neonatal Nursing* 25(8): 681–7.

Martel, M.-J. (2000) 'Programme de formation destiné aux infirmières en regard des soins du développement chez l'enfant né prématurément', Master's thesis, Faulty of Nursing, University of Montreal.

Milette, I. (2000) 'Évaluation d'un programme de formation sur les soins du développement chez des infirmières en néonatalogie', Master's thesis, Faulty of Nursing, University of Montreal.

Peters, K.L. (1999) 'Infant Handling in the NICU: Does Developmental Care Make a Difference?' *Journal of Perinatal and Neonatal Nursing* 13(3): 83–109.

Richey, D.A. (1988) 'Neonatal Nurses' Attitudes, Beliefs and Feelings Toward the Care and Management of Fetal Infants', *Journal of Perinatology* 8(2): 145–53.

Robinson, L.D. (2003) 'An Organizational Guide for an Effective Developmental Program in the NICU', *Journal of Obstetric, Gynecologic and Neonatal Nursing* 3(3): 379–86.

Salazar, M.K. (1991) 'Comparison of Four Behavioral Theories. A Literature Review', *American Association of Health Nurses Journal* 39(3): 128–35.

Spence Laschinger, H.K. and Goldenberg, D. (1993) 'Attitudes of Practising Nurses as Predictors of Intended Care Behavior with Persons Who Are HIV Positive: Testing the Ajzen & Fishbein Theory of Reasoned Action', *Research in Nursing and Health* 16(6): 441–50.

Stevens, B., Petryhen, P., Hawkins, J., Smith, B. and Taylor, P. (1996) 'Developmental Versus Conventional Care: a Comparison of Clinical Outcomes for Very Low Birth-weight Infants', *Canadian Journal of Nursing Research* 28(4): 97–113.

Symington, A. and Pinelli, J.M. (2001) 'Developmental Care for Promoting Development and Preventing Morbidity in Preterm Infants', The Cochrane Library, 1: CD001814.

Symington, A. and Pinelli, J.M. (2002) 'Distilling the Evidence on Developmental Care: a Systematic Review', *Advances in Neonatal Care* 2(4): 198–221.

VandenBerg, K.A. (1993) 'Basic Competencies to Begin Developmental Care in the Intensive Care Nursery', *Infants and Young Children* 6(2): 52–9.

VandenBerg, K.A. (1997) 'Basic Principles of Developmental Caregiving', *Neonatal Network* 16(7): 69–71.

Wallace, K.G., Koeppel, K., Senko, A., Stawiaz, K., Thomas, C. and Kosar, K. (1997) 'Effect of Attitudes and Subjective Norms on Intention to Provide Oral Care to Patients Receiving Antineoplastic Chemotherapy', *Cancer Nursing* 20(1): 34–41.

Waltman, N.L. (1990) 'Attitudes, Subjective Norms and Behavioral Intentions of Nurses Toward Dying Patients and Their Families', *Oncology Nursing Forum* 17(3) (Supp.): 55–62.

Weinstein, N.D. (1993) 'Testing Four Competing Theories of Health-protective Behavior', *Health Psychology* 12(4): 324–33.

White-Traut, R.C., Nelson, M.N., Burns, K. and Cunningham, N. (1994) 'Environmental Influences on the Developing Premature Infant: Theoretical Issues and Applications to Practice', *Journal of Obstetrics, Gynecologic and Neonatal Nursing* 23(5): 393–401.

Young, J. (1996) *Developmental Care of the Premature Baby*. London: Ballière Tindall.

ISABELLE MILETTE is a registered nurse at the NICU of the Montreal Children's Hospital. Her clinical areas of specialization included NICUs, ground and flight transport, delivery rooms and post-operative cardiac neonatal patients. She is a member of the executive committee of the council of nurses at the McGill University Health Centre and chapter representative for the Montreal Children's Hospital. Her main areas of research include developmental care of premature newborns, auditory (noise) and visual overstimulation at the intensive care unit and intensive care unit psychosis.

LUCIE RICHARD is an associate professor in the Faculty of Nursing, University of Montreal. Her research interests lie in health promotion and disease prevention. She has conducted many projects pertaining to programme planning and evaluation as well as the study of professional practice in public health and health promotion, across a wide range of health issues and populations. She is the author and co-author of numerous publications and communications. The results of her work have been published in peer-reviewed journals including *American Journal of Health Promotion, Health Education Practice, Evaluation and Program Planning, and Health Education Journal.*

MARIE-JOSÉE MARTEL is Professor of the Department of Nursing at the University of Quebec Trois-Rivieres (Canada). She will begin doctoral studies in Autumn 2005 and her research interests include the parent–child attachment surrounding a premature birth. From 1993–2002, she was a perinatal and pediatric nurse at St Justine hospital. The last five years of her career have focused on neonatalogy, in a pilot project for neonatal nurse practitioners, a newly-developed profession in Quebec. Her professorial specialty is related to family health and care as well as nursing practice in perinatality and pediatrics.

Correspondence to:

Isabelle Milette, Neonatal Intensive Care Unit, Montreal Children Hospital, McGill University Health Center, 2300 Tupper Street, Room C-925, Montreal, Quebec H3H 1P3, Canada.
[Email: Isabelle.milette@muhc.mcgill.ca]