Published in final edited form as:
MCN Am J Matern Child Nurs. 2013 ; 38(3): 144–149. doi:10.1097/NMC.0b013e318286140c.

Reducing Anxiety among Children Born Preterm and their Young Mothers

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Abstract

Purpose—In 2009, over 10% of premature infants in the United States were born to younger mothers (≤ 21 years old). Negative outcomes are associated with both prematurity and younger parents.

Study Design and Methods—Secondary data analysis was conducted on data obtained from a larger randomized controlled trial with 253 mothers of low birth weight premature infants to examine the efficacy of the Creating Opportunities for Parent Empowerment (COPE) program, an educational-behavioral parent intervention in the Neonatal Intensive Care Unit (NICU), on maternal and child anxiety based on maternal age. For these analyses, child and maternal anxiety were assessed using the Child Behavior Checklist for Ages 2–3 and the State-Trait Anxiety Inventory collected at 24 months and 2–4 days post intervention, respectively. To test study

Conflict of Interest: For the remaining authors, none were declared.

Callouts:
Participation in the COPE program significantly predicted lower levels of mothers' anxiety at 2–4 days post-intervention for younger mothers, but not for mothers over 21 years old.
Participation in the COPE program predicted lower levels of child anxiety at 24 months for children of younger mothers, but not for children of mothers over 21 years old.
The COPE program was successful at influencing long term maternal and child outcomes as demonstrated by a sustained intervention effect over 2 years after the initial intervention session.
Participation in the COPE program may help close the health disparities gap by improving behaviors in infants of younger mothers to rates similar to those of infants of mothers over 21 years old.
The pairing of prematurity along with parenting by a young mother can result in substantial risk for both maternal and child anxiety.

Pertinent World Wide Web Addresses:
www.copeforhope.com
www.nidcap.org
www.p2pusa.org
www.shareyourstory.org
www.marchofdimes.com/baby/inthenicu_program

hypotheses, we conducted multiple regression models using the structural equation modeling approach to path analysis.

Results—Multiple regression results for the full model indicated that there was a significant COPE × mothers' age interaction effect on both mothers' anxiety and child anxiety. Participation in the COPE program significantly predicted lower levels of mothers' anxiety at post-intervention as well as lower levels of child anxiety at 24 months for younger mothers (18–21 years old), but not for mothers over 21 years old.

Clinical Implications—Participating in COPE was associated with more favorable mental health outcomes for younger mothers and their children than mothers over 21 years old. Participation in the COPE program may help close the health disparities gap by improving behaviors in infants of younger mothers to rates similar to those of children of mothers over 21 years old.

Keywords

Infant; Premature; Maternal Age; Anxiety

Introduction

Outcomes Associated with Younger Mothers

Negative maternal and child outcomes are associated with younger mothers even after adjusting for the role of socioeconomic status (Jutte, Roos, Brownell, Briggs, MacWilliam, & Roos, 2010; Ruedinger & Cox, 2012; Devereux, Weigel, Ballard-Reisch, Leigh, & Cahoon, 2009; Lanzi, Bert, Jacobs, & the Centers for the Prevention of Child Neglect, 2009; Whitson, Martinez, Ayala, & Kaufman, 2011). For the purposes of this review and research study, younger mothers are defined as ≤ 21 years of age. The stress of motherhood along with the added turmoil commonly associated with early adulthood makes parenting particularly challenging for younger mothers who also report a lack of knowledge in infant care which may have an impact on maternal anxiety levels (Bornstein, Cole, Haynes, Huan, & Park, 2010; Morawska, 2009). There is an ongoing debate over the magnitude of the problems associated with pregnancy among younger mothers due to the high comorbidity with poverty and low maternal education. However, after controlling for socioeconomic and/or familial factors, maternal age does in fact play a role in some maternal and child outcomes (de Vienne, Creveuil, & Dreyfus, 2009).

Maternal Age and Prematurity

Although younger mothers are at high risk for delivering a low birth weight (LBW) or preterm infant (Martin, Osterman, & Sutton, 2010), there is a paucity of research on this population. One study indicated that 28.7% of pregnancies by younger mothers resulted in premature birth (Sandal, Erdeve, Oguz, Uras, Akar, & Dilmen, 2011). Younger mothers in the Neonatal Intensive Care Unit (NICU) have also reported significantly higher stress than older mothers (Turan, Basbakkal & Ozbek, 2008). In general, mothers of preterm infants experience heightened arousal indicated by overprotective behaviors, persistent fears of child illness or death, sleep issues, and generalized anxiety. Maternal behaviors associated with increased arousal may exacerbate physical and mental problems frequently observed in preterm children in addition to increasing parental stress (Zelkowitz, Na, Wang, Bardin, & Papagergiou, 2011). The risks associated with younger mothers and their premature infants require further investigation and development of interventions that may minimize or eliminate risks for poor maternal and child outcomes.

Theoretical Framework for Intervention

Creating Opportunities for Parent Empowerment (COPE) (Melnyk, Feinstein, Alpert-Gillis, Fairbanks, Crean, Sinkin, . . ., Gross, 2006), a successful program for parents of premature infants is based on self-regulation (Johnson, Fieler, Jones, Wlasowicz, & Mitchell, 1997; Leventhal & Johnson, 1983) and control theories (Carver, 1979; Carver & Scheier, 1982). A major assumption of this theory-based program is that due to heightened stress, uncertainty regarding their parent role and decreased confidence in how to parent their children, mothers of premature infants find it difficult to initiate behaviors to reduce the discrepancy between the current state and a pre-existing standard/goal (control theory) (Bouet, Claudio, Ramirez, & Garcia-Fragoso, 2012; Carver, 1979; Carver & Scheier, 1982). However, this obstacle can be overcome through the provision of concrete descriptive objective information about their infants' physical and behavioral characteristics, which facilitates the development of a cognitive plan about what to expect in the future (self-regulation theory) (Johnson et al., 1997). This information is essential because the appearance and behaviors of premature infants are especially anxiety-producing for younger mothers (Holditch-Davis, Miles, Weaver, Black, Beeber, Thoyre & Engelke, 2009), who often have misconceptions about typical infant development and behaviors (Cox, Buman, Valenzuela, Joseph, Mitchell & Woods, 2008).

Results from a larger randomized controlled trial (RCT) suggest mothers of preterm infants who received COPE had less stress, depression, and anxiety, and more positive parent-infant interactions than the attention control group (Melnyk et al., 2006; Melnyk, Crean, Feinstein, & Fairbanks, 2008). In addition, infants of parents who received COPE were discharged an average of four days earlier than children of parents in the attention control group, eight days earlier for infants under 32 weeks gestation (Melnyk et al., 2006). This decrease in length of stay in COPE infants resulted in substantially less healthcare costs (Melnyk & Feinstein, 2009).

In this secondary analysis of a RCT (Melnyk et al., 2006) on the effects of COPE, we examine the efficacy of COPE on maternal and child anxiety associated with younger mothers of premature infants. The COPE program provides instruction and practice in parenting behaviors specific to the NICU, in combination with information that reduces ambiguity about their infant's appearance and behaviors. Because the mothers in the COPE program should be better prepared to meet their infant's needs, it is hypothesized that these mothers and their infants would have better mental health outcomes than mothers who do not receive COPE regardless of maternal age.

Study Design and Methods

Participants

Demographics—Two-hundred fifty eight mothers were enrolled in the original RCT. Due to missing maternal age data from 5 participants, two-hundred fifty three mothers were used for these secondary analyses. Sixty one mothers were 21 years of age or younger (i.e., younger mothers) and 192 mothers were older than 21 (i.e., mothers over 21 years old). Independent samples t-tests indicated that infants of younger mothers weighed significantly less at birth than infants of mothers over 21 years old, (see Table 1). Chi-square tests suggested that more mothers over 21 years old were White, college educated, multiparous, and reported a family income greater than $30,000 than younger mothers.

Recruitment—Parents were recruited from two NICUs in Upstate New York from September 2001 through June 2004. Mothers and fathers, aged 18 years of age and older, who could read and speak English, who never had another infant admitted to NICU, and

whose infants met the following criteria were eligible for participation: (a) gestational age of 26 to 34 weeks; (b) birth weight of less than 2500 grams; (c) anticipated survival; (d) singleton birth; (e) no severe handicapping conditions; (f) not small for gestational age; (g) no Grade III or IV intraventricular hemorrhage (IVH); and (h) born at the study sites. Parents were excluded from the study if they made a personal decision to withdraw from the study or if their infant had positive drug testing.

Design and Intervention

A comparative descriptive design was used on data obtained from a larger randomized controlled trial with mothers of LBW premature infants. For the larger study, a randomized block design with repeated measures was used. Participants were randomly assigned to the COPE or comparison group by 4-week periods of time in order to decrease the chance of cross contamination.

Experimental Group—The experimental program (COPE) consisted of 7 phases that occurred between 2 to 4 days after the infant's admission to NICU and 18-month corrected age (see Supplemental Digital Content for a comprehensive description of all phases of the COPE program). COPE provided parents with: (a) information on the appearance and behavioral characteristics of premature infants (infant behavior information) and how parents can participate in their infant's care, meet their infant's needs, enhance the quality of interaction with their infant, and facilitate their infant's development (parent role information); and (b) activities that assist parents in implementing the information. This information was delivered via audiotape along with a written copy for parents to read along and to keep. Parenting activities were also provided in the written materials. No additional support or information related to the intervention was provided in order to examine the impact of an intervention that was completely based on parental self-participation and could easily be instituted in any NICU without additional personnel.

Control Group—The comparison program consisted of audiotapes and written information delivered at the same times as the COPE phases. Phases 1 and 2 contained information about hospital services. Phase 3 contained discharge information that is given to all parents. Phase 4 contained information regarding immunizations. Phases 5 to 7 focused on age appropriate child safety and nutrition (see Supplemental Digital Content).

Procedure

Potential participants were identified by screening all new admissions daily. A research assistant met with potential participants to explain the study, determine eligibility, and review the informed consent within 2 to 4 days of their infant's admission to the NICU. Participants completed self-report measures (i.e., maternal depression and anxiety, parenting stress and quality, parental beliefs, mother-infant interaction, child cognitive development and behavior, and parental perception of child vulnerability) throughout the study prior to being given the intervention materials for that phase. Data were collected by a member of the research team at each intervention phase as well as 24 months corrected age.

Measures

Demographics—A self-report demographic questionnaire was completed by participants at 2–4 days after NICU admission. Information such as race/ethnicity, maternal age, child gender, parity, maternal education, household income, mental health history was reported by the mothers. Additional data (e.g. gestational age, birth weight, diagnoses, date of discharge) were collected from the children’s medical charts.

Maternal Anxiety—Mothers' current anxiety levels were measured at 2–4 days post-intervention for these analyses with the State Anxiety (A-State) subscale of the State Trait Anxiety Inventory (STAI) with established construct validity. Internal consistency reliability for the A-State Scale has ranged from .83 to .92 (Speilberger, Gorsuch, & Lushene, 1977).

Child Anxiety—The Child Behavior Checklist for Ages 2–3 (CBCL/2–3) (Achenbach, 1992), a 99-item scale, with established construct validity as well as excellent internal consistency reliability have been reported (Achenbach, Edelbrock, & Howell, 1987). For the current analyses, maternal rating on the anxious/depressed subscale was used to assess child anxiety at 2-years corrected age. Higher scores indicate more anxiety/depression.

Covariates—Socioeconomic status (SES), as well as parity, is often correlated with maternal age (de Vienne et al., 2009; Figueiredo, 2011; Levine, Emery, & Pollack, 2007). This relationship may create difficulty in assessing the impact of maternal age on maternal and child anxiety. Therefore, we controlled for socioeconomic status along with parity in the study analyses. SES was measured with a composite score we created by aggregating the standardized scores for family income and mother's education that were self-reported by participants. The correlation between family income and mothers' education was .61, $p < .001$ in the current study. Parity (number of births) of participants was gathered by self-report on the demographic questionnaire.

Results

We used PASW statistics 17 to estimate the correlations, means and standard deviations for the study variables (see Table 2). Mothers' age had a significant, positive correlation with SES and parity suggesting that younger mothers reported lower levels of income and education and fewer children. SES had a significant, negative correlation with child's anxiety while parity was positively correlated with child's anxiety indicating that mothers' with lower levels of income and education and more children reported higher levels of child anxiety. Parity had a significant, negative correlation with SES, which suggests that mothers with fewer children have higher levels of income and education.

We used Mplus 6.0 (Muthén & Muthén, 2010) to conduct multiple regression models using the structural equation modeling approach to path analysis in order to test the study hypotheses. All models were just identified with 0 degrees of freedom, thus the fit indices were not reported. The full models examined the effects of participating in COPE (0 = Control group; 1 = Experimental group), mothers' age, and the interaction between COPE and mothers' age on maternal and child anxiety, while controlling for SES and parity. Separate models were conducted for each outcome variable. To interpret significant COPE × mothers' age interactions, we conducted multiple group models by mothers' age to examine the effect of participating in COPE on maternal and child anxiety, while controlling for SES and parity. Missing data were accounted for using the full information maximum likelihood estimator, which provides more unbiased parameter estimates and standard errors than listwise deletion (Enders & Bandalos, 2001).

Mothers' Anxiety Models

Multiple regression results for the full model indicated that there was a significant COPE × mothers' age interaction effect on mothers' anxiety at 2–4 days post-intervention ($\beta = .20$, $p = .04$). The main effects of COPE ($\beta = -.07$, $p = .29$), mothers' age ($\beta = -.17$, $p = .10$), and parity ($\beta = .07$, $p = .30$) were not significant. The main effect of SES was significant ($\beta = .13$, $p = .04$). The multiple group model results suggested that participation in COPE

significantly predicted lower levels of mothers' anxiety at 2–4 days post-intervention for younger mothers only (see Table 3).

Child's Anxiety Models

The multiple regression results for the full model suggested that there was a significant COPE × mothers' age interaction predicting child's anxiety at 24 months (β = .19, p = .05). The main effects of COPE (β = .01, p = .82), mothers' age (β = −.14, p = .18), SES (β = −.10, p = .12), and parity (β = .03, p = .65) were not significant in the full model. To follow up the significant interaction effect, we conducted a multiple group model by mothers' age. The results indicated that participation in COPE predicted lower levels of child anxiety at 24 months for younger mothers only (see Table 3).

Clinical Implications

In partial support of our hypothesis, this brief parent self-participative program was successful at influencing outcomes long-term as demonstrated by a sustained intervention effect over 2 years for the children of COPE participants. Previous work with the COPE program indicates that the intervention effects may be mediated through a reduction in parent negative mood and enhanced parental functioning, which in turn facilitates parental coping and subsequently child behavioral outcomes (Melnyk et al., 2006; Melnyk et al., 2008). It is through this process that COPE has previously positively influenced maternal depression, stress, and mother-infant interaction in the NICU for mothers of all ages (Melnyk et al., 2008). The results of this study also support this explanation, at least for younger mothers and their children in the area of anxiety. These results indicate that the COPE program may help close the health disparities gap associated with maternal age among mothers in the NICU and their children by reducing anxiety in children of younger mothers to rates similar to those of children of mothers over 21 years old. It is believed that the increased risk for maternal and child mental health problems associated with inclusion in multiple at risk groups (i.e., premature infant and young maternal age) (Jutte et al., 2010) provided ample opportunity to influence anxiety.

Although the study provided a great opportunity to investigate longitudinal outcomes associated with an educational skills building intervention, some limitations do exist, particular for secondary data analyses. Additional variables that were not assessed may also have an impact on maternal and child outcomes. In future studies, the inclusion of a measure to evaluate family support may be a helpful addition in explaining intervention outcomes.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

The third author has received honoraria/consulting fees from various healthcare facilities as a result of her role as co-owner of a company called COPE for HOPE that markets the COPE NICU program. The third author is a speaker on evidence-based practice and intervention research and receives honoraria and travel expenses for speaking engagements, and is also a co-author of four books for which she receives honoraria. The third author is currently receiving a grant (#R01NR012171-04) from NIH/NINR.

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Suggested Clinical Nursing Implications

- Provide evidence based interventions to mothers in the NICU and after discharge to reduce maternal and child anxiety.
- Encourage parents in the NICU, particularly younger mothers and those with high stress levels, to participate.
- Provide infant behavior and parent role information in the NICU.
- Educate NICU staff members to recognize parents with characteristics of multiple at risk groups and understand the importance of providing these families with appropriate resources to reduce potential health disparities.

Table 1

Demographics

Demographics	Younger Mothers (n = 61)	Mothers over 21 years old (n = 192)
Child Gender: *n* (%)		
Male	30 (49.2%)	93 (48.4%)
Female	31 (50.8%)	99 (51.6%)
Parity: *n* (%)		
Primapara	33 (56.9%)	60 (31.7%) *
Multipara	25 (43.1%)	129 (68.3%)
Child Gestational Age in months: *M(SD)*; range	30.83 (2.42); 25.86–34.71	31.25 (2.46); 26.0–35.71
Child Birth Weight in grams: *M(SD)*; range	1526.97 (465.65); 710–2360	1695.09 (473.24) *; 795–2570
CRIB Score: *M(SD)*; range	1.48 (2.31); 0–9	1.82 (2.55); 0–12
Length of Stay in NICU: *M(SD)*; range	41.47 (26.11); 9–106	38.02 (29.58); 5–219
Child Ethnicity: *n* (%)		
White	25 (41%)	145 (75.5%) *
Black	27 (44.3%)	34 (17.7%)
Asian	2 (3.3%)	6 (3.1%)
Other	7 (11.5%)	7 (3.6%)
Mothers' Age: *M(SD)*	19.43 (1.07); 18–21	30.51 (5.32) *; 22–43
Mothers' Ethnicity: *n* (%)		
White	26 (42.6%)	146 (76%) *
Black	26 (42.6%)	32 (16.7%)
Asian	2 (3.3%)	6 (3.1%)
Other	6 (9.9%)	8 (4.2%)
Mothers' Education: *n* (%)		
High school degree or less	46 (88%)	42 (22.1%) *
At least some college	13 (22%)	148 (77.9%)
Maternal Mental Health Diagnosis: *n* (%)		
Yes	5 (8.6%)	16 (8.5%)
No	53 (91.4%)	173 (91.5%)
Family Income: *n* (%)		
Less than or equal to $30,000	42 (85.7%)	67 (35.6%) *
Greater than $30,000	7 (14.3%)	121 (64.4%)

Note.

* $p<0.05$ for chi-square and t-tests comparing demographics for younger mothers and mothers over 21 years old.

Table 2

Correlations Between Measures and Key Variables

	Cope Program	Mothers' Age	SES	Mothers' Anxiety	Child's Anxiety	Parity
COPE Program	--					
Mothers' Age	−.01	--				
SES	.08	.17**	--			
Mothers' Anxiety	−.03	.01	.09	--		
Child's Anxiety	.04	−.11	−.19**	.06	--	
Parity	.01	.24***	−.21***	.05	.15*	–
Mean	.57	27.84	−.08	42.81	1.78	2.46
SD	.50	6.66	1.50	13.07	1.90	1.91

Note.

* p<.05;

** p<.01;

*** p<.001.

Table 3

Standardized Regression Coefficients for Multiple Group Models by Mothers' Age

	Younger Mothers		Mothers over 21 years old	
	Mothers' Anxiety	**Child's Anxiety**	**Mothers' Anxiety**	**Child's Anxiety**
COPE Program	−.28*	−.26*	.01	.09
SES	.15	.06	.14	−.13
Parity	−.03	−.03	.08	.05

Note.

* p<.05.