Lifestyle modification as an intervention for inner city women at high risk for preterm birth

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**Lifestyle modification as an intervention for inner city women at high risk
for preterm birth**
This study details a programme which emphasized nursing interventions for
women at high risk for preterm birth Preterm birth continues to be a major
health problem, with ongoing research being conducted both in the United
States and internationally in an effort to find causative factors Programmes
designed to prevent preterm birth have been described often in the literature,
with lifestyle factors being implicated in the incidence of preterm birth by many
researchers The purpose of this study was to determine the lifestyle factors most
often associated with preterm birth in a high risk population of inner city women,
and to examine the effect of change in lifestyle when change was possible
Women at high risk for preterm birth were interviewed extensively for
prevalence of 12 lifestyle factors most often cited in the literature as being

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associated with preterm birth Counselling and education were offered to each woman, with emphasis on symptom recognition and modification of lifestyle activities Comprehensive prenatal care was administered by programme personnel A profile of the women's reported lifestyle activities and stress factors is presented along with the relationship to outcome The data suggested that, when change in lifestyle activity or stress was possible, women who decreased the activity or stressor were more likely to deliver at term This study represents one of the first efforts in the United States to produce a prospective database to quantify risk and analyse the impact of change in activities associated with symptoms of preterm labour in high risk women This study is particularly relevant for nursing since assessment, intervention and evaluation of lifestyle changes in the high risk perinatal client are integral parts of perinatal nursing practice

INTRODUCTION

Preterm birth continues to be a major health problem, contributing 60–80% of the perinatal mortality in the United States International research is ongoing concerning causative factors, and programmes designed to prevent preterm birth have been described in the literature with conflicting results (Creasy *et al* 1980, Herron *et al* 1982, Papiernik 1984, Main 1985, Buescher *et al* 1988) Lifestyle factors have been implicated in the incidence of preterm birth by many researchers (Papiernik 1984, Mamelle *et al* 1984, Mamelle & Munoz 1987, Berkowitz & Kasl 1983, Nuckolls *et al* 1972, Boone 1985) Some of the lifestyle factors most often mentioned are work outside the home, commuting, exercise, sexual activity, stair climbing, standing for long periods of time, lifting heavy objects, and stress

The purpose of this study was to determine the lifestyle factors most often associated with preterm birth in a high risk population of inner city women, and to examine the effect of change in lifestyle when change was possible

METHODS

As a part of the Albert Einstein College of Medicine's Program to Reduce Obstetrical Problems and Prematurity (PROPP), the major borough-wide preterm birth prevention programme in the Bronx, New York, women at high risk for preterm birth were seen in a special clinic located in the Bronx Municipal Hospital Center These women were referred to the special clinic by their physicians or midwives because of their multiple risk factors for preterm birth such as

1 one or more previous preterm births,
2 one or more previous preterm labour(s),
3 diagnosed preterm labour in the index pregnancy, or
4 incompetent cervix

A total of 208 women were interviewed extensively by the two programme nurses (Dr Freda and Ms Poust) concerning prevalence of lifestyle factors thought to be associated with preterm birth Interviews took place at least once in the pregnancy, and at least twice (< 20 weeks and > 20 weeks) when possible Six women were not included in this analysis due to multiple gestation, leaving 202 in the sample Twelve different activities were addressed in the interviews, including work outside the home, commuting, exercise, housework, long trips, use of heavy or vibrating equipment, standing, lifting, sexual activity, and stair climbing Stressors such as finances, family conflict, substance abuse, inability to rest, inadequate housing and anxiety about the pregnancy were also assessed Table 1 presents a description of the data regarding lifestyle activity and stressors collected by the programme nurses

Nursing interventions included counselling and education offered to each women concerning symptoms of preterm labour and relationship to lifestyle, risk for preterm birth, and risk reduction Both a booklet and a videotape developed by Dr Freda were utilized for education in addition to counselling Women were encouraged to modify their lifestyle when any preterm symptoms developed which were associated with lifestyle activities Referral to Social Service was made for presence of stressors such as financial problems, inadequate housing, and family violence Care in the clinic included complete prenatal care with particular emphasis on risk reduction, especially when subtle preterm symptoms developed or cervical softening occurred Returning the client to her regular prenatal care provider for continuity of care was encouraged Education regarding symptom recognition and instructions for follow-up if symptoms occurred was ongoing Every effort was made to empower women with information concerning expedited access to the medical care system if preterm symptoms developed

Table 1 Type of lifestyle activity and stressor variables collected

Name of variable	Description of data
Work	No hours/day
	No days/week
Commuting	No hours/day
	No days/week
	Mode
Exercise	No hours/day
	No days/week
	Type
Travel/long trips	Plane
	Car
	Train
	Bus
	How often
Heavy housework	Type
	How often
Operates vibrating or	Type
heavy equipment	How often
Travel to prenatal	Amount of time
appointments	Car
	Bus
	Train
Standing	At work
	At home
	How long
Lifting	Grocery bags
	Laundry
	Children
	How often
Climbing stairs	No flights
	How often
Sexual activity	Frequency
	No partners
Stressors	Family
	Financial
	Pregnancy related
	drugs

Table 2 Distribution of lifestyle variables related to work outside of the home

Variable	Women	
	%	n
Work hours/week		
None	49 0	99
≤ 20 hours	2 0	4
21–30 hours	10 9	22
31–40 hours	30 2	61
≥ 40 hours	7 9	16
Commuting hours/week		
None	62 4	126
≤ 6	23 3	47
> 6	14 4	29
Commuter transfers/day		
0–1	78 7	159
≥ 2	21 3	43
Total women		202

Analyses were performed utilizing the POPRAS Prenatal and Intrapartum Database and the supplemental Lifestyle Assessment Database These databases were linked by the PROPP Perinatal Data Center The BMDP Statistical package was used to conduct the univariate, bivariate and regression analyses

RESULTS

Interview data from 202 patients enrolled in the PROPP Preterm Prevention Program from November 1985 through to June 1987 were available for analysis In 29 cases outcome data were not available Analysis was possible, therefore, on outcome data for 173 women

Table 2 is the distribution of lifestyle variables related to work outside the home For the 51% of women who reported working outside the home, 30 2% worked more than 30 hours/week, while 7 9% worked more than 41 hours/week. Approximately one-third of the women commuted weekly Overall 23 3% commuted less than 6 hours/week, and 14 4% commuted more than 6 hours, 21 3% of the women utilized two or more commuter transfers/day

Table 3 describes other physical activities and stressors The vast majority (82 2%) did not report heavy housework weekly, 11 4% of the women described heavy housework

Table 3 Other physical activities and stressors

Activity	Women	
	%	n
Housework frequency/week		
None	82 2	166
≤ 3 hours/week	11 4	23
> 3 hours/week	6 4	13
Standing hours/day		
None	46 0	93
≤ 3 hours/day	20 3	41
> 3 hours/day	33 7	68
Lifting total × /week		
None	47 5	96
≤ 3 × /week	29 7	60
> 3 × /week	22 8	46
Flights of stairs/day		
None	38 1	77
≤ 5 flights	17 8	36
> 5 flights	44 1	89
Stressors		
None	27 7	56
1–2	27 7	56
3–5	33 2	67
≥ 6	11 4	23
Total women		202

Table 4 Sexual activity, exercise and travel (not work related)

Activity	Women	
	%	n
Exercise hours/week		
None	75 3	152
≤ 3 hours	0 0	0
> 3 hours	24 7	50
Trips/year		
None	90 6	183
≤ 6/year	2 5	5
> 6/year	6 9	14
Travel to clinic/minutes		
Unknown	7 4	15
≤ 30 minutes	62 4	126
> 30 minutes	30 2	61
Sexual activity/month		
None	59 4	120
≤ 4 × /month	17 3	35
> 4 × /month	23 3	47
Total women		202

3 hours or less weekly, while 6 4% did heavy housework more than 3 hours weekly Thirty-four per cent stood for 3 hours or more each day, 22 8% lifted heavy objects (laundry, groceries, children) more than three times a week, and 44 1% had more than five flights of stairs to climb daily Almost three-fourths of these women reported at least 1 stressor, while 27 7% reported 1–2 stressors, 33 2% had 3–5 stressors and 11 4% had 6 or more stressors during the pregnancy

Table 4 describes sexual activity, exercise and travel Of the 24 7% women who exercised weekly, all exercised more than 3 hours weekly Less than 10% (6 9%) routinely took six or more trips/year Travel time to the clinic was determined to be 30 minutes or less for 62 4%, and more than 30 minutes for 30 2% More than one-half of these high risk women (59 4%) reported no sexual activity during the pregnancy, 17 3% reported sexual activity four times or less a month, and 23 3% more than four times a month

The 16 specific types of stressors reported by this population are presented in Table 5 The most common were anxiety about the pregnancy (19 3%), financial problems (15 4%), inability to rest when tired (11 4%), and family conflict (10 7%) Stressors of lowest frequency included suicide attempt, mate incarcerated, children in trouble and psychiatric history The 202 women reported a total of 523 stressors, which represents an average of 2 6 stressors for each pregnancy

Table 6 presents a description of the most common occupations of the 103 women working outside the home The five categories were clerk (30 1%), health aide (21 4%), student (21 4%), secretary (16 5%) and other (10 7%)

In Table 7 selected demographic characteristics of the women including mother's age, race, marital status and education are presented stratified by preterm and term outcome of delivery Fifty-four per cent of the women were between the ages of 20 and 29, and the numbers of preterm and term births were similar Nine per cent of the preterm births occurred in women over the age of 40 (n = 3) This represented all of the women over 40 years of age in the sample Nearly twice as many women in the sample were Hispanic as were Black, with 10% White There were no substantial differences in marital status between those

Table 5 Distribution of types of stressors for women (*n* = 202) at high risk for preterm birth

Type of stressor	%	*n*
Anxiety about pregnancy	19 3	101
Financial problems	15 4	81
Inability to rest when tired	11 4	60
Family conflict	10 7	56
Inadequate housing	9 9	52
Unemployment in household	8 9	47
Moving this pregnancy	8 7	46
Feels alone	7 2	38
Family violence	2 1	11
Family drug use	1 7	9
Caring for a sick relative	1 3	7
Patient drug use	1 0	5
Suicide attempt	0 5	3
Mate incarcerated	0 5	3
Children in trouble	0 5	3
Psychiatric history	0 2	1
Total stressors		523

Table 6 Work description for women at high risk for preterm birth

	Women	
Work description	%	*n*
Clerk	30 1	31
Health aide	21 4	22
Student	21 4	22
Secretary	16 5	17
Other	10 7	11
Total working	51 0	103

Table 7 Demographic characteristics by preterm and term birth outcome

	Preterm		Term		Total	
Characteristics	%	*n*	%	*n*	%	*n*
Mother's age						
15–17	2 9	1	10 1	14	8 7	15
18–19	11 4	4	10 9	15	11 0	19
20–24	31 4	11	29 7	41	30 1	52
25–29	25 7	9	23 9	33	24 3	42
30–34	17 1	6	16 7	23	16 8	29
35–39	2 9	1	8 7	12	7 5	13
≥ 40	8 6	3	0 0	0	1 7	3
Race						
White	11 4	4	10 8	15	10 9	19
Black	31 4	11	28 2	39	28 9	50
Hispanic	54 2	19	59 4	82	58 3	101
Other	2 9	1	1 4	2	1 8	3
Marital status						
Married	45 7	16	38 4	53	39 8	69
Single	45 7	16	52 8	73	51 4	89
Widow	0 0	0	0 7	1	0 6	1
Divorced	5 7	2	2 2	3	2 9	5
Separated	0 0	0	5 8	8	4 6	8
Unwed couple	2 9	1	0 0	0	0 6	1
Education						
0–8 years	37 1	13	31 2	43	32 4	56
9–11 years	31 4	11	27 5	38	28 3	49
High school grad	22 9	8	26 8	37	26 0	45
Some college	8 6	3	14 5	20	13 3	23
Total women	20 2	35	79 8	138	100 0	173

who delivered preterm and those who delivered term Educational level was not a factor in preterm and term outcomes

Table 8 presents the past obstetrical histories of these high risk women, and the relationship to preterm and term outcomes Thirty-four per cent of the women who delivered preterm were nulliparous, 17 1% primiparous and 48 5% multiparous Of the term deliveries, these percentages were 36 9%, 26 8% and 36 2% respectively Forty-six per cent of the women who delivered preterm had one or more previous preterm births, and 14 3% had two or more

previous preterms In contrast 31 9% of the women who delivered term had at least one previous preterm birth, while 8 0% had two or more previous preterm births Twenty-nine per cent of the preterm births occurred in women who had three or more abortions Forty-two per cent of the sample had no living children, reflecting 37 1% of the preterm deliveries and 43 5% of the term deliveries

Lifestyle factors

Table 9 presents the analyses of selected lifestyle factors for preterm and term deliveries Independent of outcome, one-half of these women worked during pregnancy, and the majority worked more than 30 hours/week More

Table 8 Past obstetrical history by preterm and term birth outcome

History	Preterm %	n	Term %	n	Total %	n
Parity						
Nulliparous	34 2	12	36 9	51	36 4	63
Primiparous	17 1	6	26 8	37	24 8	43
Multiparous	48 5	17	36 2	50	38 7	67
Term births						
0	48 6	17	50 7	70	50 3	87
1	31 4	11	25 4	35	26 6	46
≥ 2	20 0	7	23 9	33	23 2	40
Preterm births						
0	54 3	19	68 1	94	65 3	113
1	31 4	11	23 9	33	25 4	44
≥ 2	14 3	5	8 0	11	9 3	16
Abortions						
0	40 0	14	37 0	51	37 6	65
1	20 0	7	29 0	40	27 2	47
2	11 4	4	19 6	27	17 9	31
≥ 3	28 6	10	14 5	20	17 3	30
Living children						
0	37 1	13	43 5	60	42 2	73
1	25 7	9	26 8	37	26 6	46
2	22 9	8	18 1	25	19 1	33
≥ 3	14 3	5	11 6	16	12 1	21
Total women	20 2	35	79 8	138	100 0	173

Table 9 Selected lifestyle variables by preterm and term birth outcome

Lifestyle variables	Preterm %	n	Term %	n	Odds ratio
Work hours/week					
None	54 3	19	48 6	67	
> 40 hours	2 9	1	8 7	12	
31–40 hours	34 3	12	27 5	38	4 34
21–30 hours	5 7	2	13 0	18	
1–20 hours	2 9	1	2 2	3	
Stressors reported					
Yes	80 0	28	70 3	97	1 69
No	20 0	7	29 7	41	
Number of stressors					
≥ 6	10 7	3	17 5	17	1 42
3–5	57 1	16	42 3	41	
1–2	32 1	9	40 2	39	
Unemployment in household					
Yes	34 3	12	20 3	28	2 05
No	65 7	23	79 7	110	
Family drug use					
Yes	8 6	3	3 6	5	2 49
No	91 4	32	96 4	133	
Moving					
Yes	31 4	11	20 3	28	1 80
No	68 6	24	79 7	110	
Family conflict					
Yes	25 7	9	27 5	38	0 91
No	74 3	26	72 5	100	
Caring for sick relatives					
Yes	5 7	2	2 9	4	2 03
No	94 3	33	97 1	134	
Anxiety about pregnancy					
Yes	60 0	21	48 6	67	1 59
No	40 0	14	51 4	71	
Inability to rest					
Yes	34 3	12	27 5	38	1 37
No	65 7	23	72 5	100	
Lack of housing					
Yes	37 1	13	24 6	34	1 81
No	62 9	22	75 4	104	
Feels alone					
Yes	11 4	4	18 1	25	0 58
No	88 6	31	81 9	113	
Financial problems					
Yes	40·0	14	39 1	54	1 04
No	60 0	21	60 9	84	

women who delivered preterm reported stressors (80%) compared to women who delivered term (70%) Comparison of number of stressors by outcome showed that preterm outcomes were associated with a larger number of stressors Of the women who delivered preterm, 67 8% reported three or more stressors, compared to 59 8% of the women who delivered term Ten stressors were reviewed For seven of these stressors, women who delivered preterm were more likely to report the stressor as present than were women with term deliveries For only two stressors (family conflict and financial problems) was there little difference between preterm and term For the single stressor of feeling alone, women who delivered term reported this concern more often This stressor was not, however, an issue for the vast majority of both term (81 9%) and preterm (88 6%) women

Table 10 Changes in lifestyle activities during pregnancy by preterm and term birth outcome

Lifestyle variables	Preterm %	Preterm n	Term %	Term n	Odds ratio
Activities reported					
Work					
No change	62 5	5	23 7	9	5 37
Decreased	37 5	3	76 3	29	
Commuting days/week					
Increased	—	0	3 1	1	2 75
No change	55 6	5	28 1	9	
Decreased	44 4	4	68 8	22	
Commuting hours/week					
Increased	—	0	6 7	2	3 33
No change	62 5	5	26 7	8	
Decreased	37 5	3	66 7	20	
Commuter transfers					
No change	80 0	4	26 3	5	11 2
Decreased	20 0	1	73 7	14	
Exercise hours/week					
Increased	—	0	8 3	1	2 67
No change	50 0	4	25 0	3	
Decreased	50 0	4	66 7	8	
Standing hours at work					
No change	50 0	3	38 1	8	1 50
Decreased	50·0	3	61 9	13	
Standing hours at home					
No change	50 0	3	72 2	13	0 38
Decreased	50 0	3	21 8	5	
Lifting groceries					
No change	83 3	10	68 0	17	2 35
Decreased	16 7	2	32 0	8	
Lifting laundry					
No change	81 8	9	73 9	17	1 59
Decreased	18 2	2	26 1	6	
Flights of stairs daily					
No change	66 7	6	51 6	16	1 87
Decreased	33 3	3	48 4	15	
Sexual frequency					
Increased	—	0	8 3	2	4 29
No change	85 7	6	50 0	12	
Decreased	14 3	1	41 6	10	

Table 11 Changes in lifestyle stressors during pregnancy by preterm and term birth outcomes

Lifestyle variables	Preterm %	Preterm n	Term %	Term n	Odds ratio
Stressors reported					
Number of stressors					
Increased	7 1	1	14 6	6	3 87
No change	85 7	12	61 0	25	
Decreased	7 1	1	24 4	10	
Unemployment in household					
Increased	12 5	1	35 7	5	0 40
No change	75 0	6	50 0	7	
Decreased	12 5	1	14 3	2	
Moving					
Increased	—	0	17 6	3	3 33
No change	88 9	8	52 9	9	
Decreased	11 1	1	29 4	5	
Family conflict					
Increased	14 3	1	—	0	*
No change	83 7	6	94 1	16	
Decreased	—	0	5 9	1	
Anxiety about pregnancy					
Increased	—	0	3 1	1	*
No change	100 0	11	81 2	26	
Decreased	—	0	15 6	5	
Lack of housing					
Increased	—	0	15 0	3	*
No change	100 0	10	60 0	12	
Decreased	—	0	25 0	5	
Financial problems					
Increased	—	0	5 0	1	*
No change	100 0	9	85 0	17	
Decreased	—	0	10 0	2	
Inability to rest					
No change	100 0	7	70·6	12	*
Decreased	—	0	29 4	5	

*Odds ratio cannot be calculated due to zero value

Although the sample size was too small to calculate 95% confidence intervals, the calculated odds ratios showed that working more than 30 hours a week corresponded to the greatest excess risk of having a preterm birth The most

important stressors associated with having a preterm outcome were unemployment in the household, family drug use, and caring for sick relatives The absolute numbers in the sample reporting family drug use or caring for sick relatives, however, were small (3 and 2 respectively)

Tables 10 and 11 demonstrate changes in lifestyle activities and stressors during the index pregnancy for preterm and term deliveries For 17 of the 19 lifestyle variables analysed where change data are available, the data suggest that decreasing the activity or stressor was associated with a better outcome of pregnancy The exception was standing hours at home Sufficient data were available to calculate odds ratios for 14 of the 19 lifestyle variables With respect to change in reported activities a decrease in work, commuting, lifting groceries and sexual activity were associated with a term delivery in this population of high risk women (odds ratio of ≥ 2) With respect to stressors decreasing both the number of reported stressors and the stress of moving were associated with term delivery

DISCUSSION

Recent efforts to identify successful interventions for the prevention of preterm birth have focused on social and lifestyle factors in addition to medical risks This recent focus reflects the fact that despite years of research into medical risk factors, little alteration in risk of preterm birth for the women at the highest risk has resulted The results presented here on a cohort of very high risk women represent one of the first prospective efforts in the United States to address this important concern

Although the sample sizes are small and there is no control group, the preliminary results support the probable efficacy of strategies to modify selected lifestyle factors in the women studied It is believed, therefore, that a case has been established which justifies further work in this area The authors recognize that many stressors reported by the women in this sample could not realistically be modified Stressors such as drug use by family members and long standing financial difficulties require far more intervention than could be accomplished in a clinic setting during the index pregnancy

When women were able to modify activities and stressors, however, the results were evident When long work hours, heavy lifting and sexual activity were associated with symptoms of preterm labour, the women who decreased these activities were more likely to deliver at term

The issue of work outside the home is often mentioned in relationship to preterm birth In this study, one-half of the high risk women worked outside the home after 20 weeks

of gestation Of these women, 51 4% ($n = 71$) delivered at term, and 45 8% ($n = 16$) delivered preterm Of the 71 women who ultimately delivered at term from this group, 29 decreased their work hours or their high risk activities (long hours standing, heavy lifting, inability to rest, etc) in response to preterm symptoms associated with work It is important to note here that in the United States there is no national policy for work leave during a high risk pregnancy If a pregnant woman requires time off, she must rely on the kindness of her employer to guarantee that her job (or any job in that company) will be available when she is able to return to work Government disability pay (a percentage of regular pay) is available for a set number of weeks, and then pay ceases completely

Another problem concerns health insurance Since health insurance is usually obtained through employers in the United States, the loss of employment has far-reaching consequences for the pregnant woman and for society This lack of a national policy for guaranteed work leave has an obvious impact on working women's attitudes towards increased rest in pregnancy, even when that increased rest is prescribed for high risk factors For the woman at high risk for preterm birth, a work leave at 28 weeks might be deemed necessary by her health care providers, but might not be financially feasible for the woman and her family For the poor, possibly under-educated woman who is working at a low paying job, an unpaid work leave could mean the difference between maintaining her home and becoming homeless, or the difference between being self-supporting and relying on the welfare system for support Legislative action to correct this problem has been proposed in the United States Congress, but has yet to be approved

Problem areas for this study include the inability to test for significance due to the small sample size, the lack of a control group, and the inability to calculate confidence intervals (also due to small sample size) Of particular concern in this study was the absence of a substantial number of drug abusing women This was due to the existence of a separate drug abuse clinic Despite these limitations and difficulties, the study represents the first attempt to identify high risk lifestyles among inner city women in the United States who are known to be at high risk for preterm birth

The need to expand and replicate these findings is obvious and represents a high priority for obstetrical and nursing research, especially in the cohort of women with the most difficult social circumstances and highest of adverse perinatal outcomes The potential for nursing to enhance maternal and infant health with low technology nursing interventions such as education and counselling, therefore, is an exciting strategy in the management of the

high risk client The assessment, intervention and evaluation of lifestyle changes in the high risk perinatal client are an integral part of perinatal nursing practice, and could provide important areas for future nursing research

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