



# DEVELOPING AND TESTING NURSE-FAMILY PARTNERSHIP: CHALLENGES AND OPPORTUNITIES FOR IMPROVING MATERNAL AND CHILD HEALTH

**David Olds, PhD**  
**Professor of Pediatrics**  
**University of Colorado**



## SEMINAR SERIES – UPCOMING DATES

**October 7, 2020 9:00am-10:30am MT**

**David Olds, PhD, University of Colorado**

“Developing and Testing Nurse-Family Partnership: Challenges and Opportunities for Improving Maternal and Child Health.”

**October 27, 2020 9:00am-10:30am MT**

**Jamila Mejdoubi, PhD, Atria, Institute on Gender Equality and Women’s History and Silvia van den Heijkant, MD, Amsterdam UMC, Amsterdam Public Health Institute, Section Youth & Health.**

“The Dutch NFP: VoorZorg and beyond.”

**December 9, 2020 9:00am-10:30am MT**

**Michael Robling, PhD, Cardiff University**

“The effectiveness and cost-consequences of the Family Nurse Partnership program for first-time mothers in England in reducing maltreatment and improving child health and development by age seven years: the BB:2-6 routine data-linkage study.”

**January 13, 2021 9:00am-10:30am MT**

**Nicole Catherine, PhD, and Charlotte Waddell, MD, Simon Fraser University, British Columbia, Canada**

“Prenatal Findings from the British Columbia Trial of Nurse Family Partnership, Healthy Connections.”

## SEMINAR SERIES – SCHEDULE TBD

### **Margaret McConnell, PhD, J-PAL, Harvard University**

"A randomized controlled evaluation of the impact of participation in the Nurse Family Partnership on Birth Outcomes in South Carolina."

### **Nancy Donelan-McCall, PhD, University of Colorado**

Will present results of cross-trial analyses of maternal and child mortality in the three original trials of Nurse-Family Partnership in the US with decades of follow-up beyond birth of the first child.

### **Gabriella Conti, PhD, University College London**

Will present results of an analysis of NFP effects on maternal and child obesity and hypertension among participants in the RCT conducted with a primarily African American sample living in very poor neighborhoods in Memphis, TN in the US.

### **Nicole Catherine, PhD , and Charlotte Waddell, MD, Simon Fraser University**

Will report results of the BC Healthy Connections trial on maternal and child health through child age two.

### **Andrea Gonzalez, PhD, McMaster University, Hamilton Ontario, Canada**

"The Impact of Nurse Family Partnership on Biomarkers in Mothers and their Infants: Preliminary Findings from the Healthy Foundations Study."

# SEMINAR SUPPORT

## **Moderators:**

### **Gregory Tung, PhD MPH**

Associate Professor

Department of Health Systems, Management & Policy

Colorado School of Public Health

### **Benjamin Jutson**

Coordinator

Prevention Research Center for Family and Child Health

University of Colorado Anschutz Medical Campus

## **Tech support:**

### **Michael Effler**

Video Conference Bridge Operator

Office of Information Technology

University of Colorado Denver | Anschutz Medical Campus

## SEMINAR SERIES

- **Participants won't be able to unmute, so please send questions using the Q&A function at bottom of screen**
- **Greg will assemble questions for me**
- **These webinars will be recorded but identity of those viewing won't be revealed in the recording**
- **The recordings will be posted to the NFP International website and a link sent to participants**

# DISCLOSURES

## **FINANCIAL DISCLOSURE:**

Dr Olds receives personal honoraria and travel expenses from philanthropies and organizations for speaking about Nurse-Family Partnership and early intervention.

## **FUNDING:**

Dr. Olds is currently supported by National Institutes of Health research grant 1R01HL148183-01A1, funded by the National Heart Lung and Blood Institute. Funded by the National Institutes of Health (NIH).

## **POTENTIAL CONFLICT OF INTEREST:**

The Prevention Research Center for Family and Child Health, directed by Dr Olds at the University of Colorado School of Medicine, has a contract with US Nurse-Family Partnership (NFP) to conduct research to improve NFP and its implementation; this contract covers part of Dr Olds' salary. Dr Olds is the founder of NFP and, with the University of Colorado, owns the NFP intellectual property. The University of Colorado receives royalties from governments and organizations outside of the United States that implement NFP and has contracts with those entities to guide implementation of NFP, but none of the royalties or fees go to Dr Olds personally; they are used to support Prevention Research Center for Family and Child Health research and NFP implementation.

## FUNDAMENTAL CONTRIBUTORS – ELMIRA NURSES

- ❖ Georgie McGrady
- ❖ Diane Farr
- ❖ Liz Chilson
- ❖ Lynn Scazafabo
- ❖ Jackie Roberts

## Harriet Kitzman, RN, Ph.D.

- **Crucial contributor to the scientific work of the Memphis trial**
- **Aligned program with nursing profession and education**
- **Led early work on developing visit-by-visit guidelines**





**Baltimore, 1970**



# HIGH-RISK NEIGHBORHOODS

- **No sources of healthy food**
- **Unemployment**
- **No decent housing**
- **Unsafe play areas**
- **Crime**



# GRADUATE SCHOOL AND BEYOND

- **Urie Bronfenbrenner at Cornell**
- **Hired by local non-profit – CIDS in Elmira, NY**
- **John Shannon, CIDS Administrator**

# LAYING GROUNDWORK FOR ELIMRA PROGRAM – ENSURING COMMUNITY OWNERSHIP

- **Community Advisory Group**
  - **Local pediatric groups**
  - **Chemung County Health Department**
  - **Department of Social Services**
  - **Head of County Mental Health Services**
  - **Low-income housing**

# DOUBTS ABOUT ELMIRA PROGRAM AND SCIENCE

- **OB Head of health department prenatal clinic**
- **Local child and family advocate**
- **National methodologist**

# NURSE FAMILY PARTNERSHIP

- Prenatal and infancy home visiting by nurses
- Low-income mothers with no previous live births
- Clarity in goals, objectives, and methods
- Activates and supports parents' instincts to protect
- Strengths-based
- Caring
- Respect



# **NURSE FAMILY PARTNERSHIP'S THREE GOALS**

- 1. Improve pregnancy outcomes**
- 2. Improve child health and development**
- 3. Improve parents' health and economic self-sufficiency**

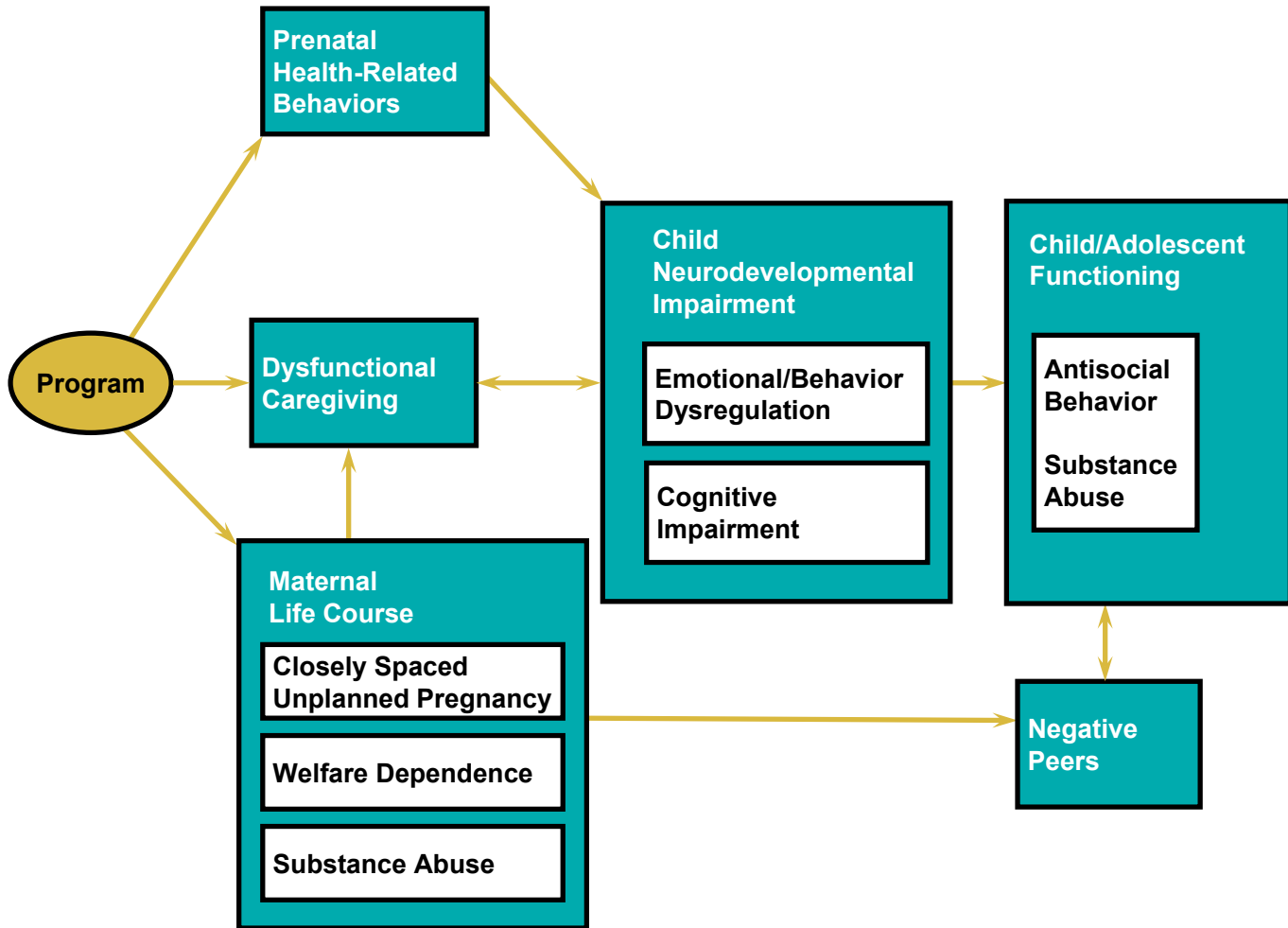


# PROGRAM FOUNDATIONS

- **Attachment Theory**
- **Human Ecology Theory**
- **Self-Efficacy Theory**
- **Developmental Epidemiology**







# NFP BUILT ON THREE FUNDAMENTAL PRINCIPLES

- **Clinical Excellence**
- **Scientific Integrity**
- **Accountability**

# TRIALS OF PROGRAM

## Elmira, NY 1977



**N = 400**

- **Low-income whites**
- **Semi-rural**

## Memphis, TN 1987



**N = 1,138 and N=742**

- **Low-income blacks**
- **Urban**

## Denver, CO 1994



**N = 735**

- **Large portion of Latino families**
- **Nurse versus paraprofessional visitors**

# CONSISTENT RESULTS ACROSS TRIALS

- Prenatal health
- Children's injuries
- Children's language and school readiness (low resource mothers)
- Children's behavioral problems
- Children's depression/anxiety
- Children's substance use
- Maternal Impairment due to substance use
- Short inter-birth intervals
- Maternal employment
- Welfare & food stamp use



## ELMIRA SAMPLE

**Sample: 400 pregnant women**

- **No previous live births**
- **Registered < 25 weeks gestation**
- **Poor, unmarried, teens**
  - **65% Low-SES**
  - **62% Unmarried**
  - **47% < 19 years of age**
- **89% White**
- **15% Higher SES, married, and non-adolescent**
- **48% smoked 5+cigs/day - intake**

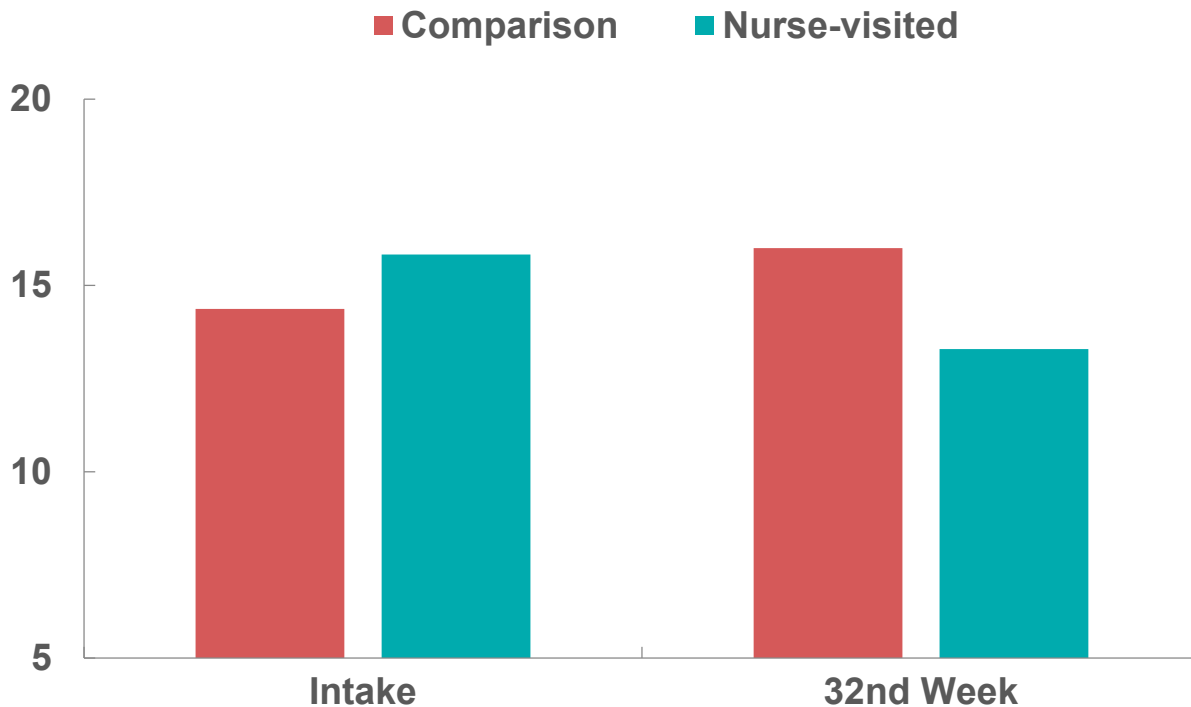
**Assessments on 83% of youth randomized and still alive at age 19 and 81% of the mothers still alive at age 15**



## TREATMENT CONDITIONS - ELMIRA

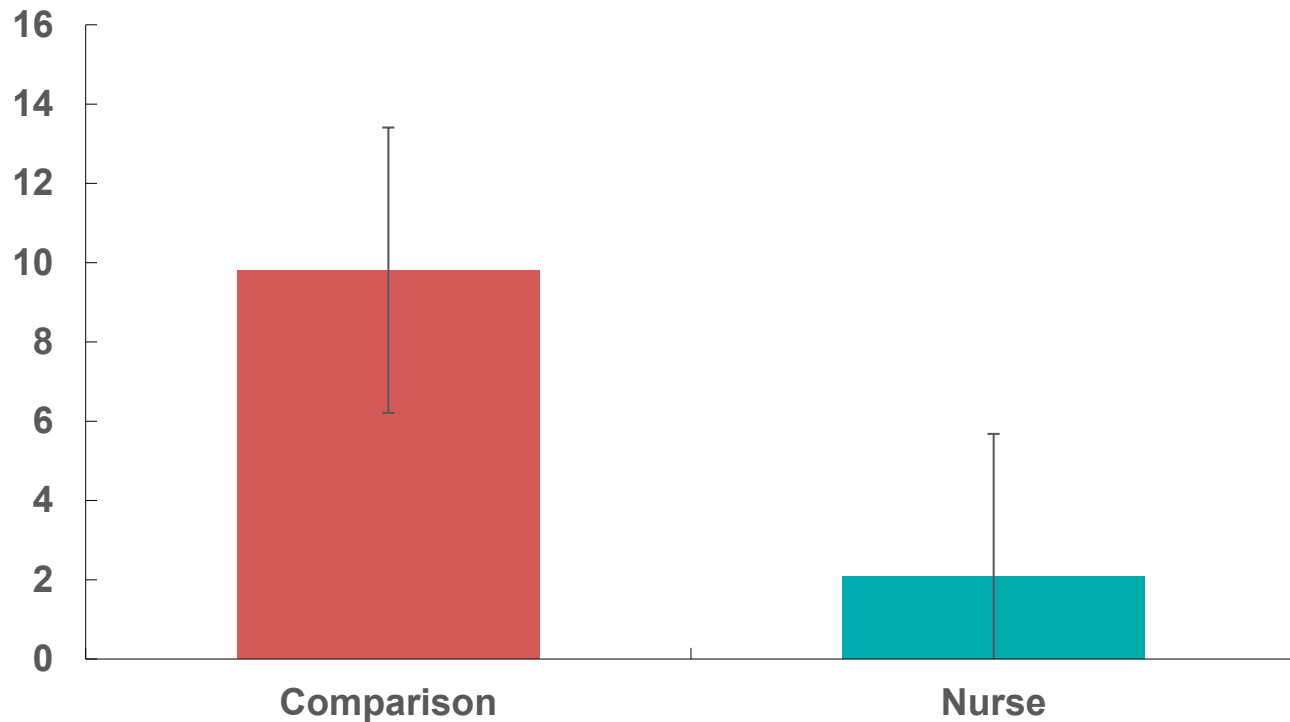
| Services  | Treatment 1<br>N=90 | Treatment 2<br>N=94 | Treatment 3<br>N=100 | Treatment 4<br>N=116 |
|---|---------------------|---------------------|----------------------|----------------------|
| Screening and referral for children               | X                   | X                   | X                    | X                    |
| Transportation for prenatal and well-child visits |                     | X                   | X                    | X                    |
| Prenatal home visiting                            |                     |                     | X                    | X                    |
| Infant and toddler home visiting                  |                     |                     |                      | X                    |

# NO. CIGARETTES SMOKED/DAY AT INTAKE AND AT 32 WKS PREG - THOSE WHO REPORTED SMOKING 5+



Mean difference of differences 4.17 +/- 1.11, p<.001

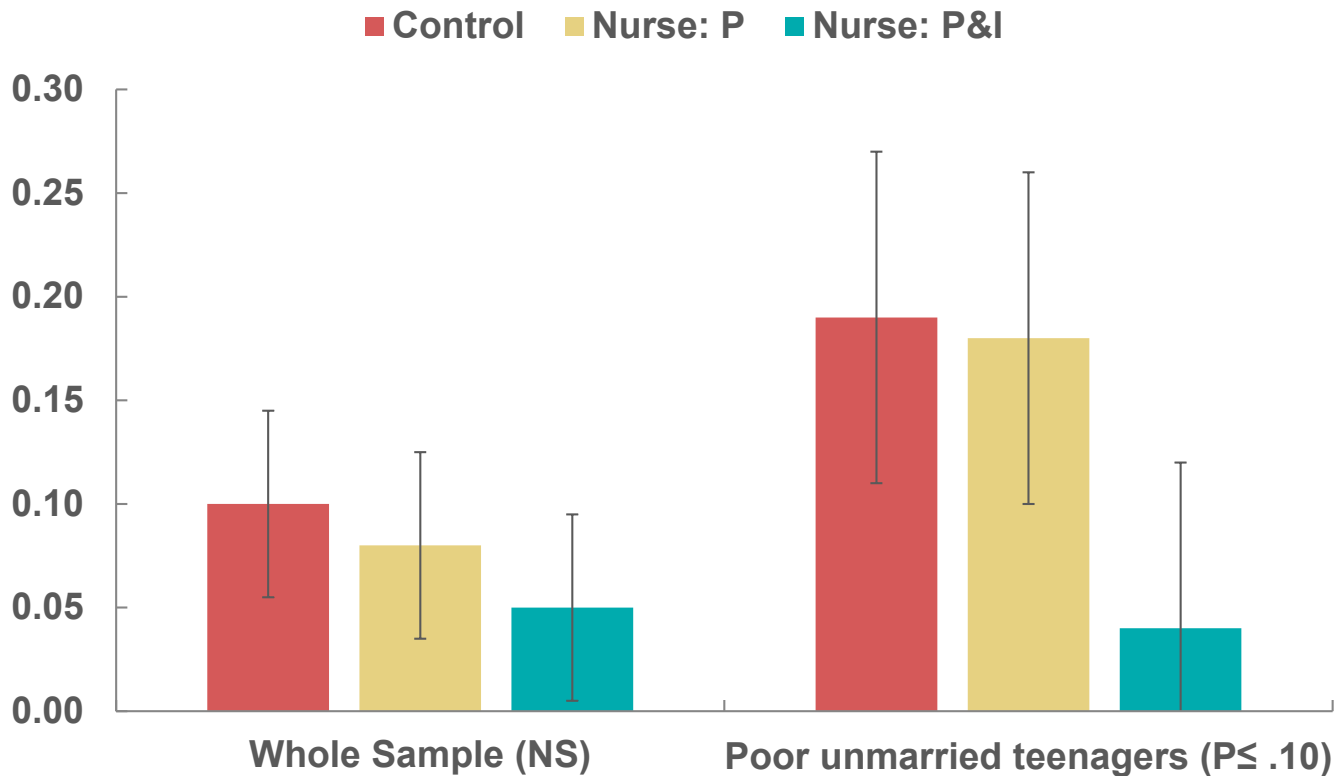
# % PRETERM DELIVERY (<37 WEEKS) AMONG SMOKERS (5+ CIGARETTES/DAY AT REGISTRATION) - ELMIRA



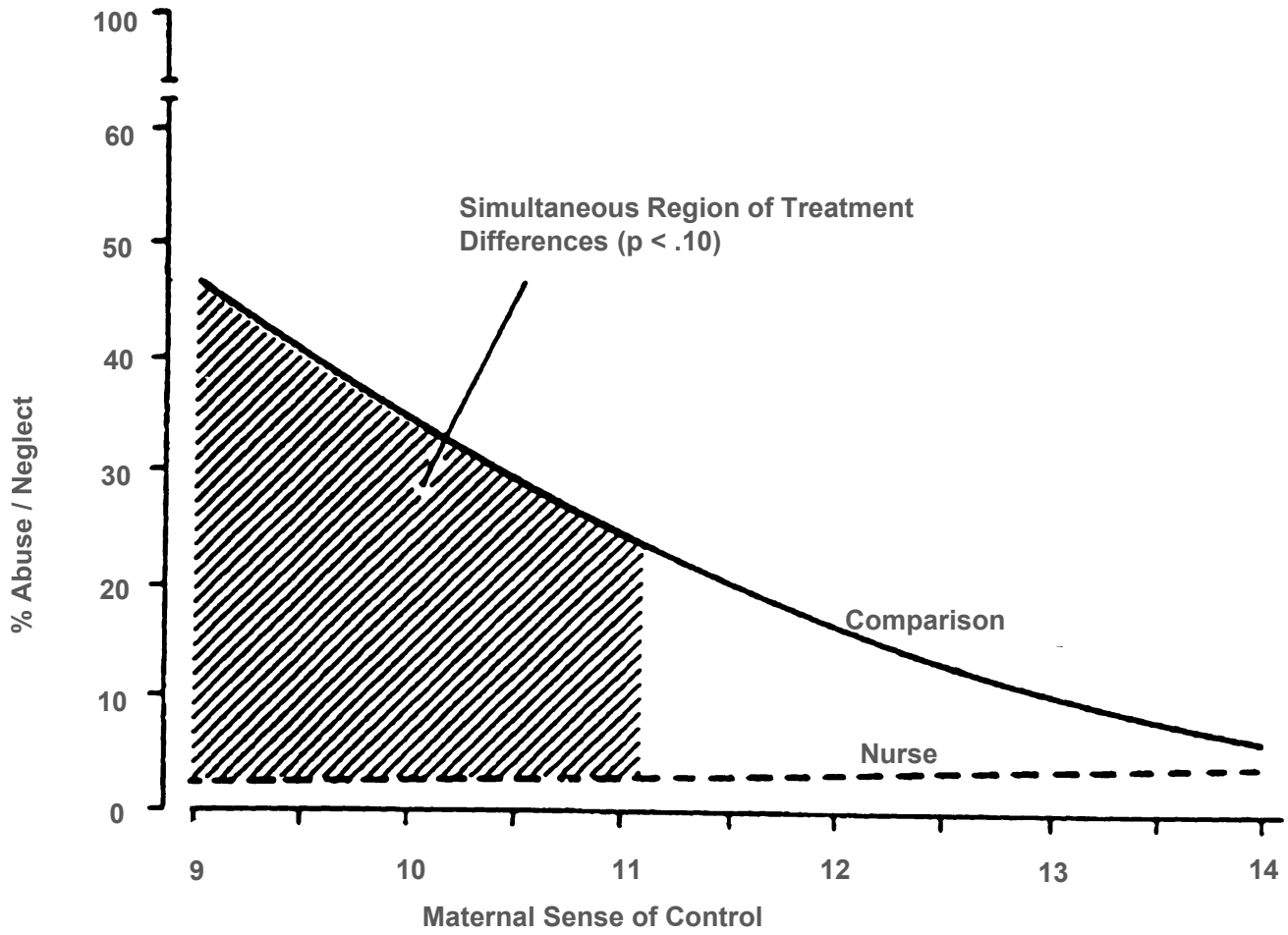
P < .01



# ELMIRA TRIAL: ABUSE/NEGLECT THROUGH CHILD AGE 2



Note: P-values for nurse P&I vs control comparison



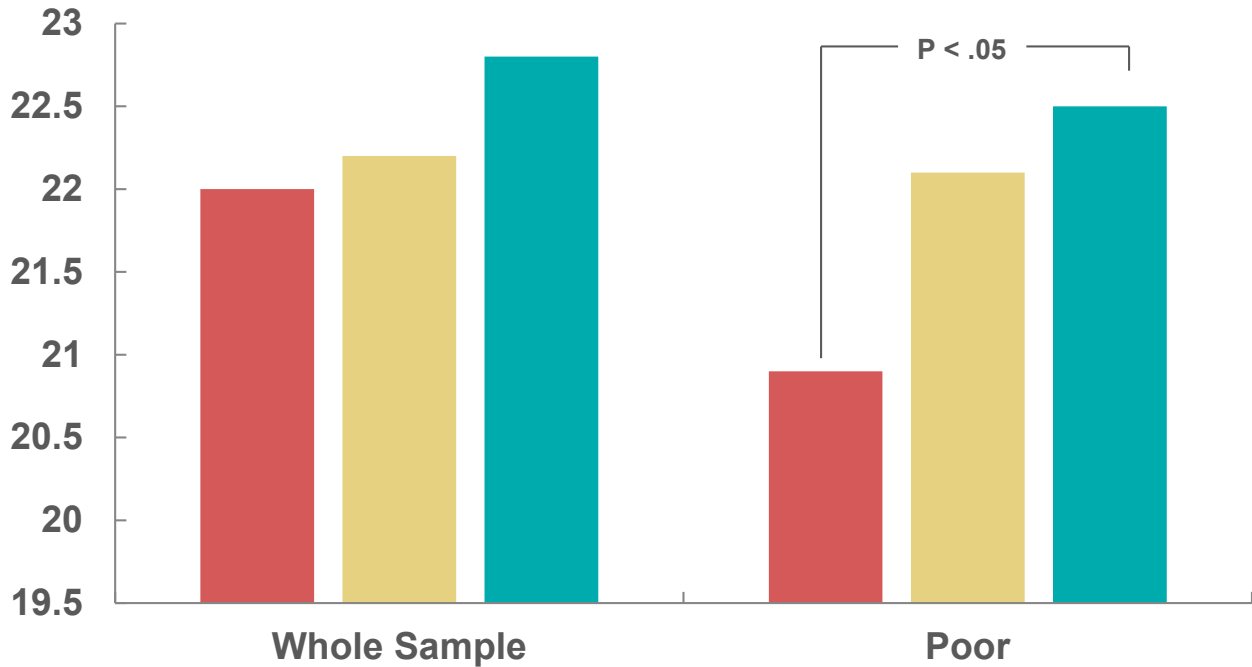
## TREATMENT DIFFERENCES BETWEEN MALTREATED CHILDREN IN CONTROL (N=28) AND NVI (N=13)- AGES 3 AND 4



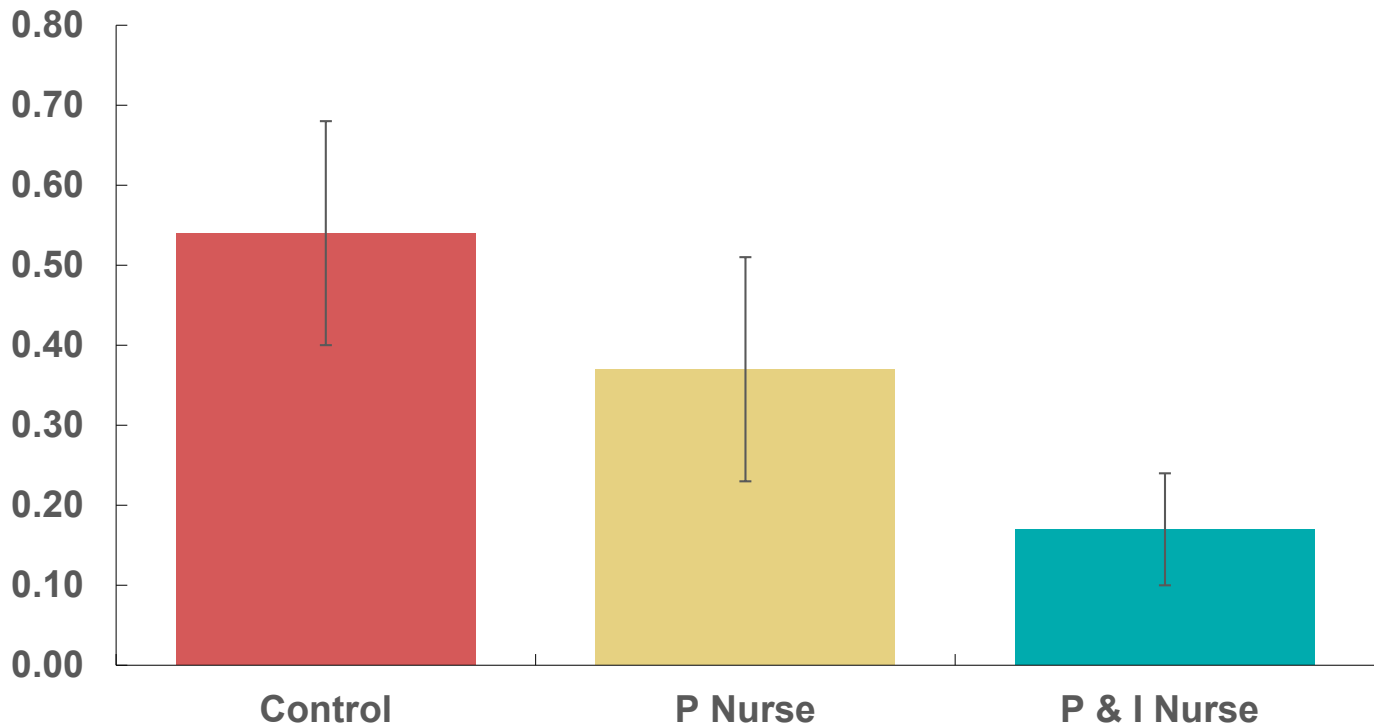
- **NV – fewer hazards observed – 46 months of age.**
- **NV – fewer injuries in physician record – 25-50 months of age**
- **NV – fewer emergency department visits – 25-50 mos.**
- **NV – trend for more stimulating home environments – 46 mos.**

# MATERNAL ACCURACY OF ESTIMATE - CHILD STANFORD-BINET IQ SCORE – AGE 3

■ Comp ■ NV-P ■ NV-I

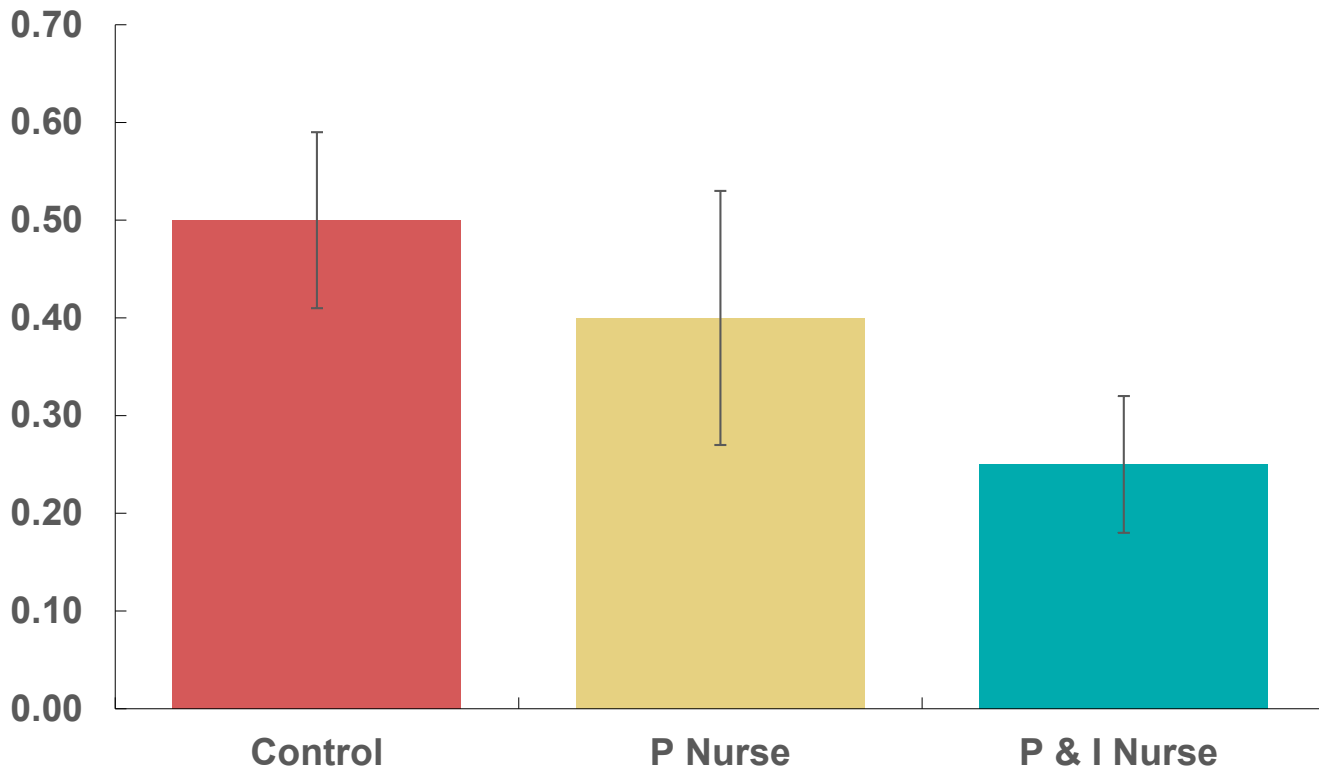


# SELF-REPORTED ARRESTS AMONG POOR UNMARRIED MOTHERS - 0 TO 15 YEARS - ELMIRA



\*P= .01

# INDICATED CASES OF CHILD ABUSE AND NEGLECT 0 TO 15 YEARS - ELMIRA

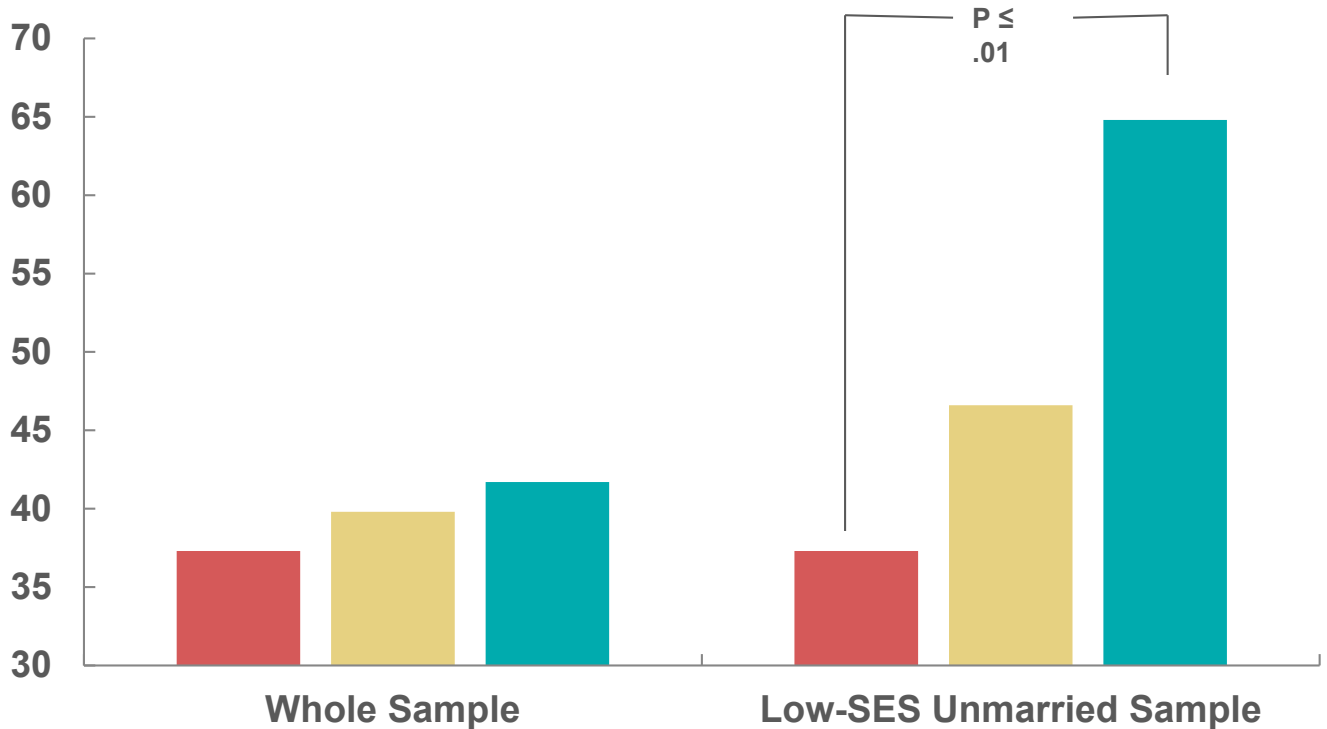


\*P= .03

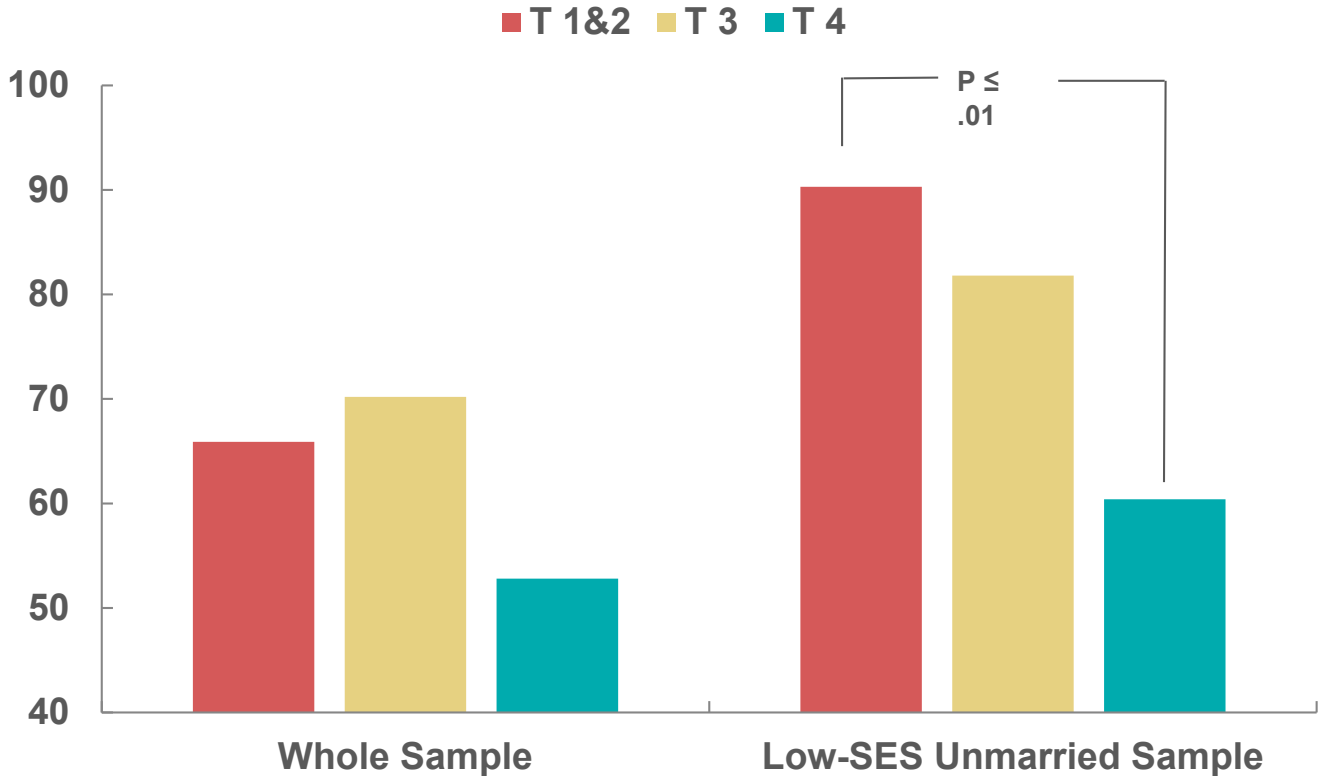
*JAMA*, 1997;278:637-643

# MONTHS BETWEEN BIRTH OF FIRST AND SECOND CHILD – BIRTH TO AGE 15 - ELMIRA

■ T 1&2 ■ T 3 ■ T 4



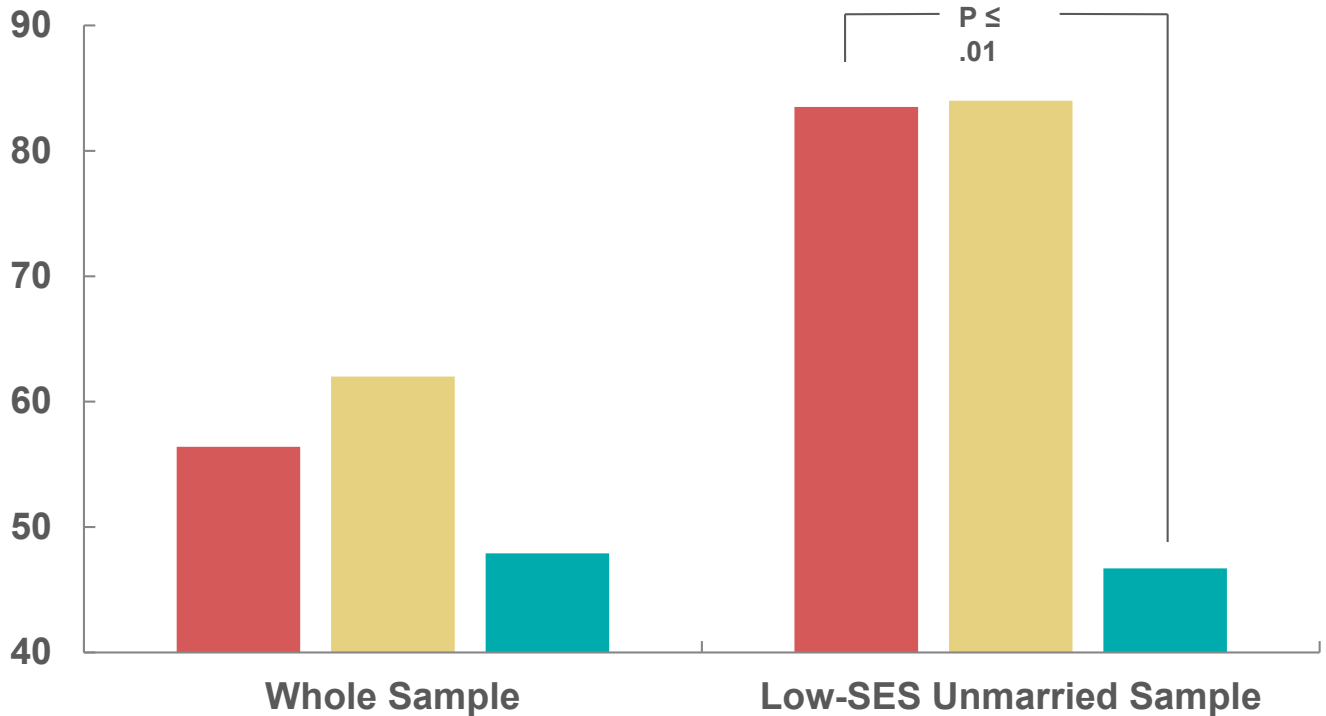
# MONTHS RECEIVING AFDC – BIRTH TO AGE 15 - ELMIRA





# MONTHS RECEIVING FOOD STAMPS – BIRTH TO AGE 15 - ELMIRA

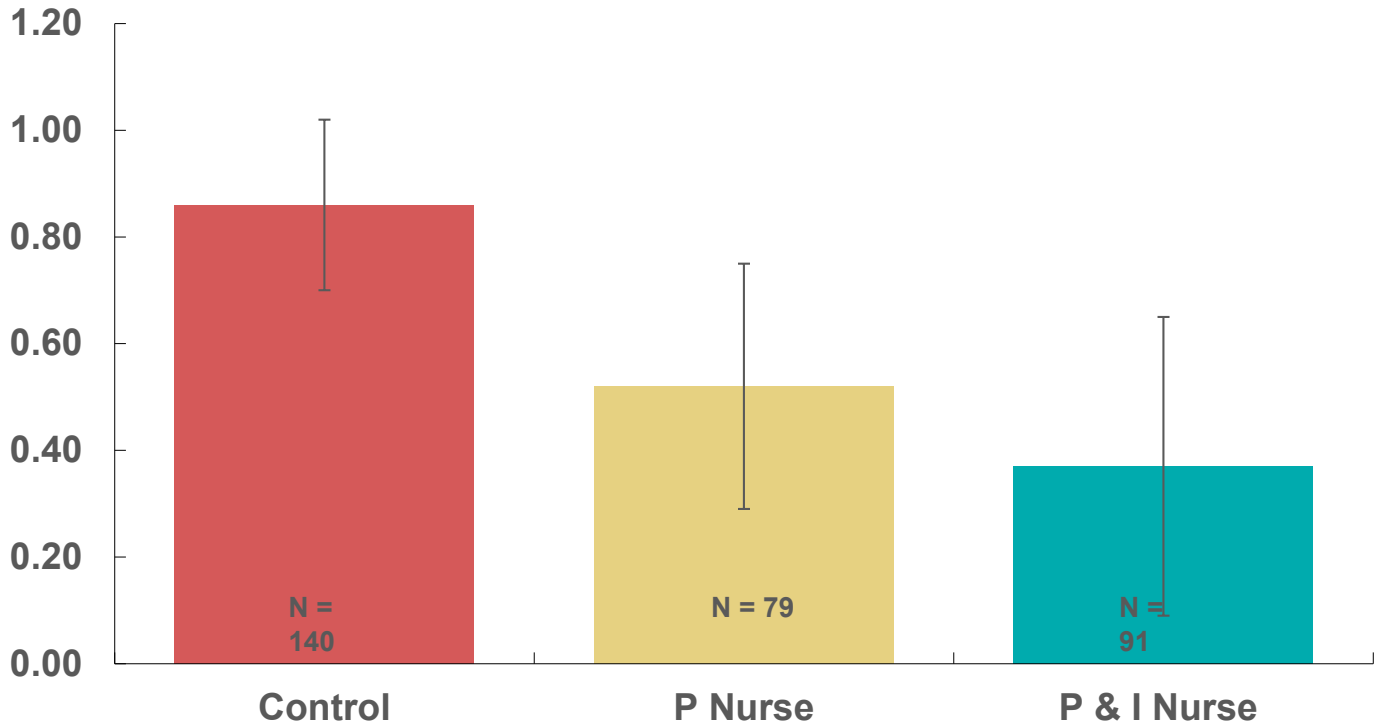
■ T 1&2 ■ T 3 ■ T 4



## **NO TREATMENT DIFFERENCES IN ELMIRA AT AGE 19 IN YOUTH:**

- **High School graduation**
- **Economic productivity**
- **Pregnancy/made pregnant**
- **Fathered or given birth**
- **Ever used welfare, food stamps, or Medicaid**
- **Number of sex partners**
- **Use of birth control**

# SELF-REPORTED LIFETIME ARRESTS ELMIRA YOUTH AGE 19



IRR = 0.43 CI = (0.23 – 0.80)

*Arch Pediatr Adolesc Med.* 2010; 164 (1): 9-15

## MEMPHIS SAMPLE

**Sample: 1138 pregnant women**

- **No previous live births**
- **89% African-American**
- **85% < federal poverty level**
- **2.4 SD above mean for US neighborhood adversity**

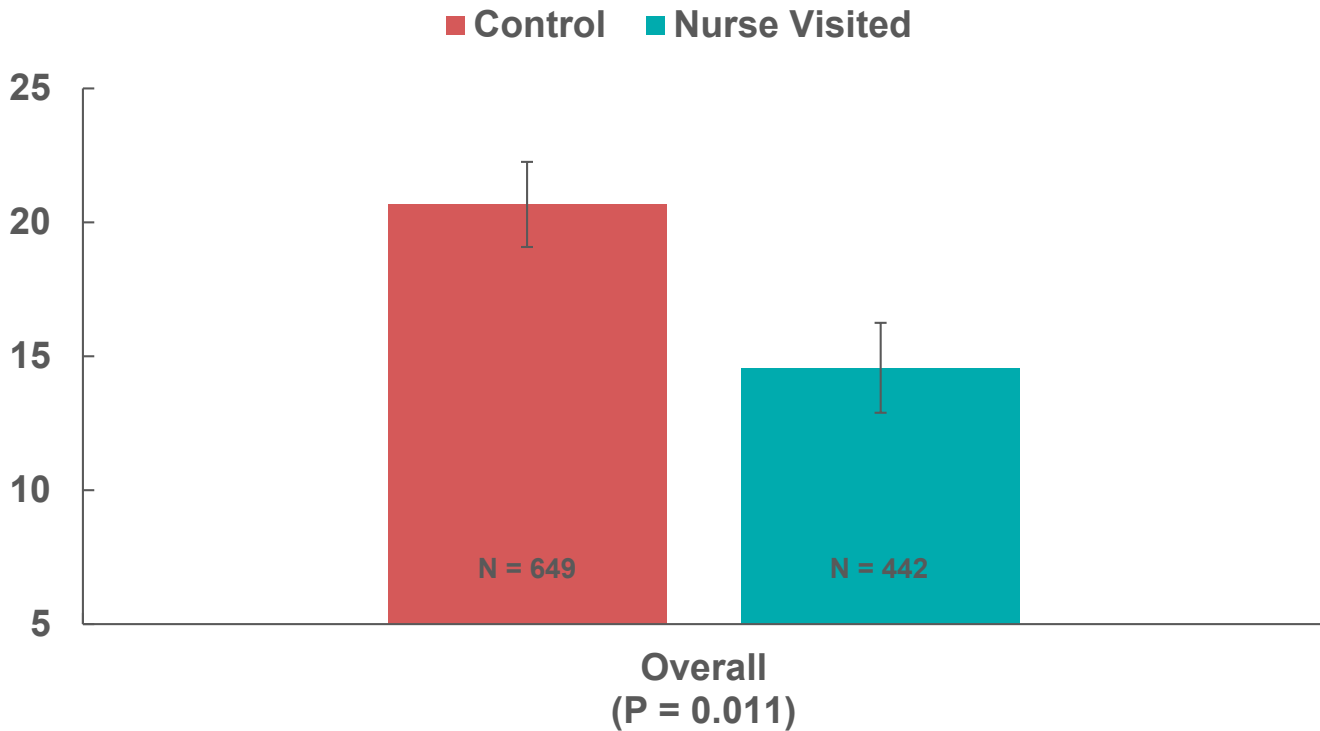
**Assessments on 90% of randomized youth alive at age 18 and 85% of the mothers still alive**



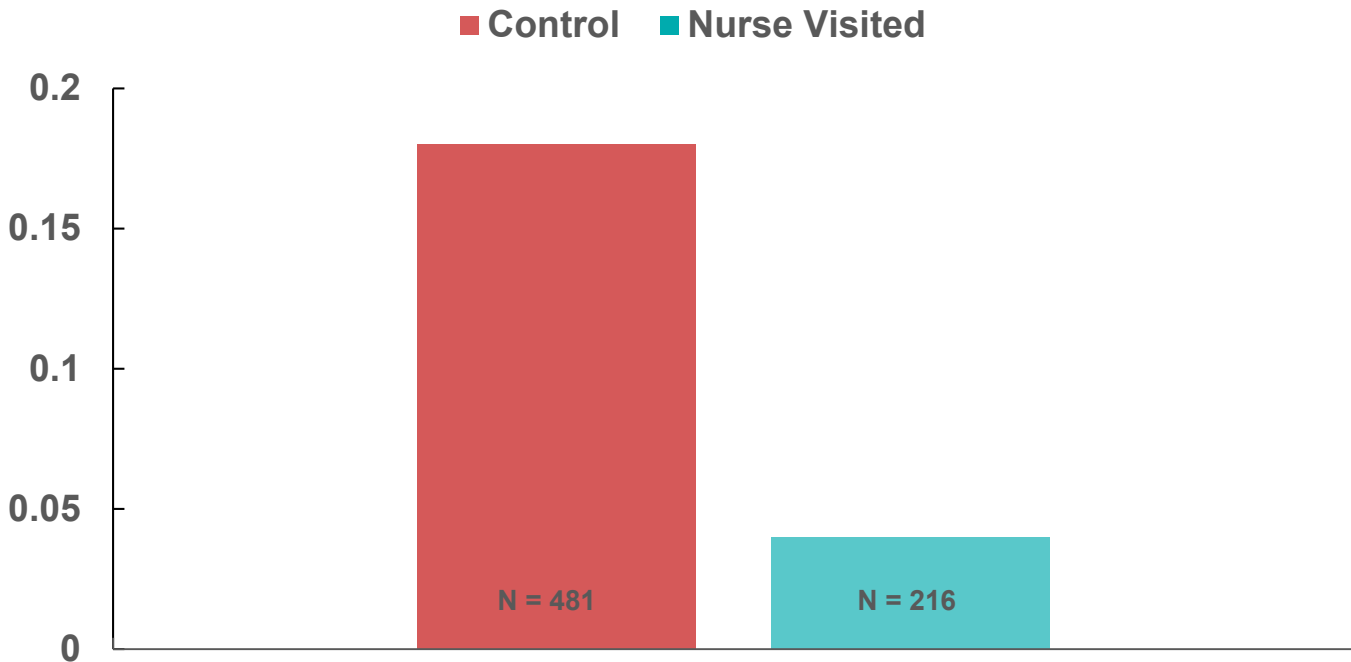
## TREATMENT CONDITIONS - MEMPHIS

| Services                            | Treatment 1<br>N=166 | Treatment 2<br>N=514 | Treatment 3<br>N=230 | Treatment 4<br>N=228 |
|-------------------------------------|----------------------|----------------------|----------------------|----------------------|
| Transportation for prenatal care    | X                    | X                    | X                    | X                    |
| Screening and referral for children |                      | X                    |                      | X                    |
| Prenatal/postpartum home visiting   |                      |                      | X                    | X                    |
| Infant and toddler home visiting    |                      |                      |                      | X                    |

# PREGNANCY-INDUCED HYPERTENSION - MOTHERS



# NUMBER OF DAYS HOSPITALIZED FOR INJURIES/INGESTIONS (0-24 MONTHS)



P<.01

JAMA 1997; 278: 644-652.

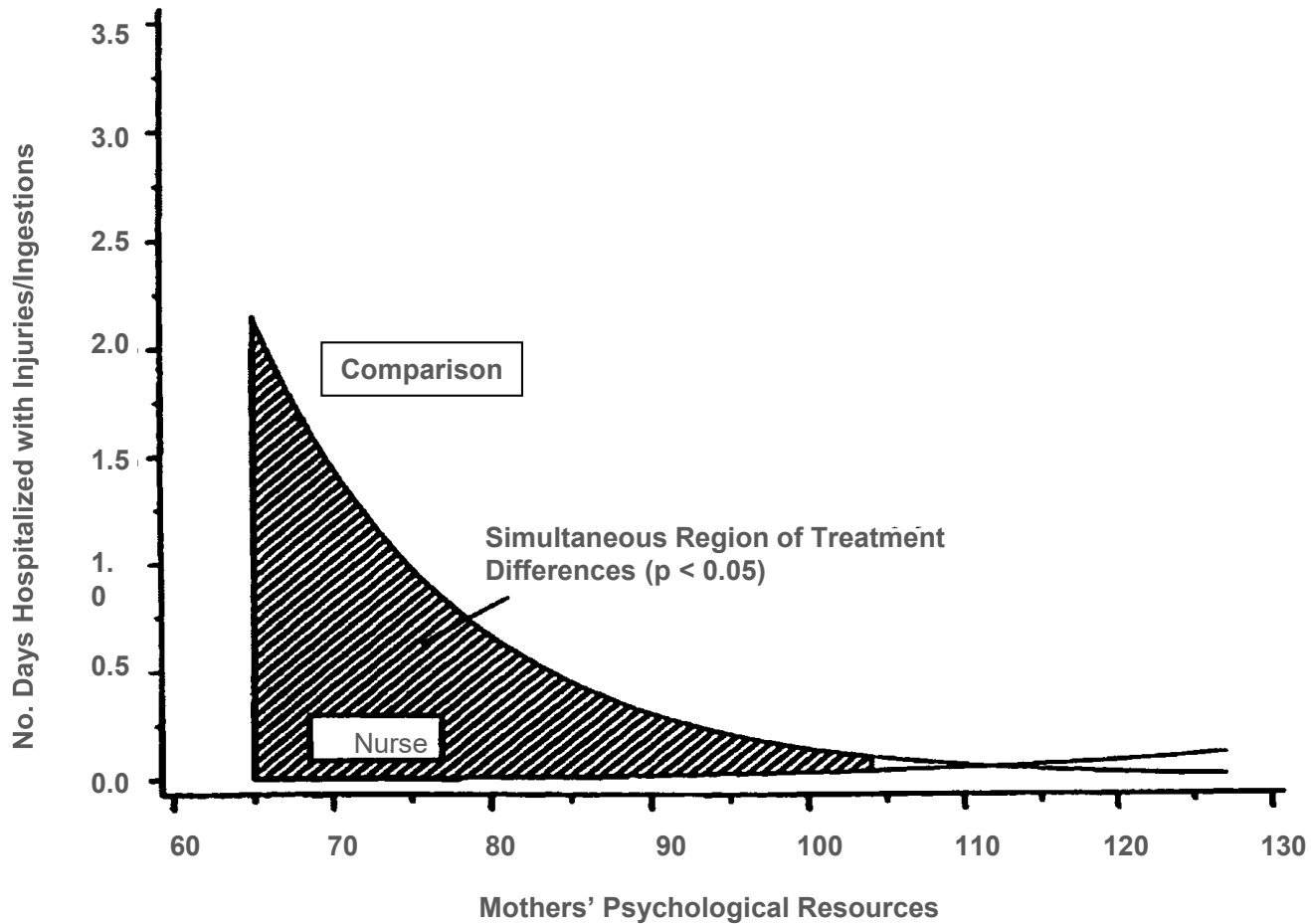
## DIAGNOSIS FOR HOSPITALIZATION IN WHICH INJURIES AND INGESTIONS WERE DETECTED – NURSE-VISITED (N=204)

|   | <b>Age<br/>(in months)</b> | <b>Length<br/>of Stay</b> |
|---|----------------------------|---------------------------|
| ▪ Burns (1 <sup>o</sup> & 2 <sup>o</sup> to face) | 12.0                       | 2                         |
| ▪ Coin Ingestion                                  | 12.1                       | 1                         |
| ▪ Ingestion of Iron Medication                    | 20.4                       | 4                         |

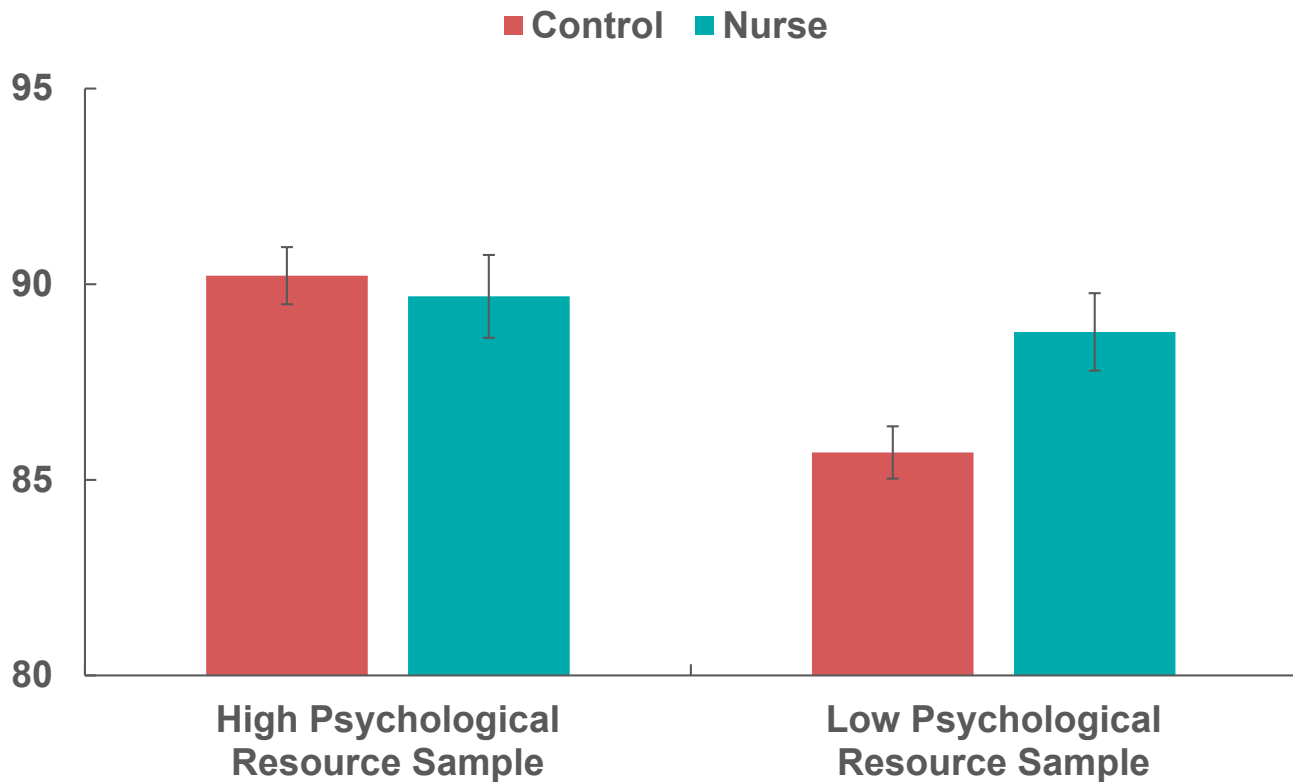


# DIAGNOSIS FOR HOSPITALIZATION IN WHICH INJURIES AND INGESTIONS WERE DETECTED - COMPARISON (N=453)

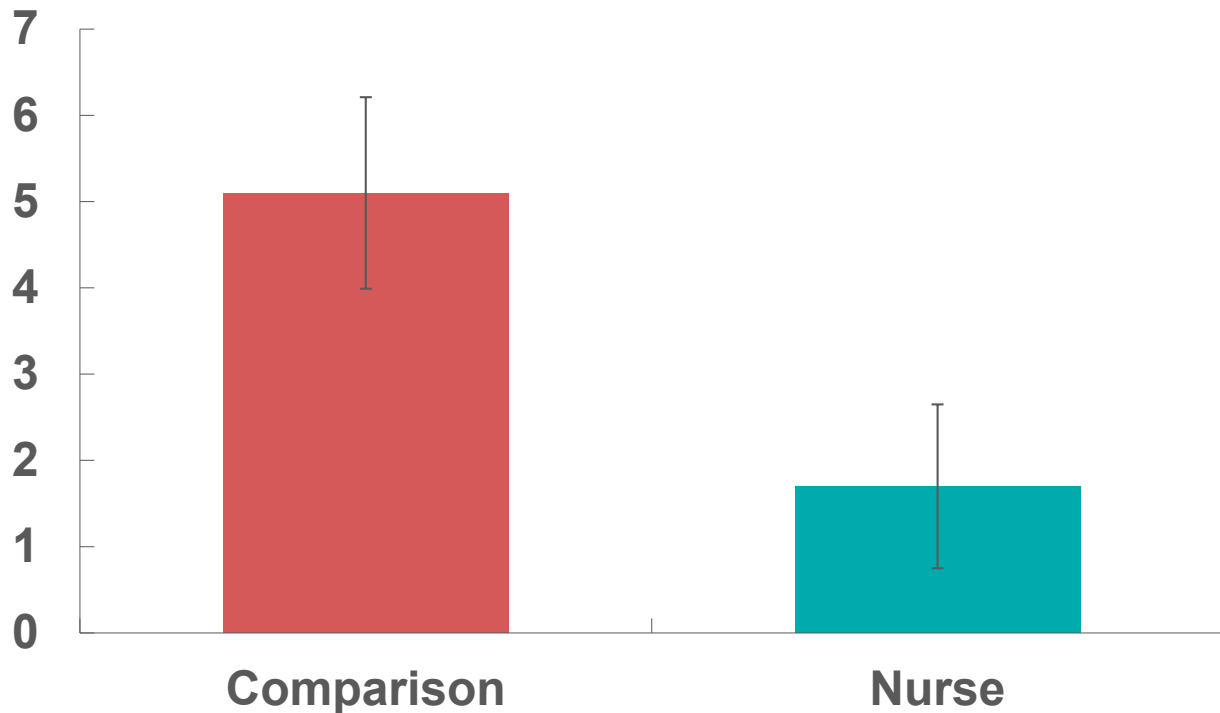
|   | <u>Age<br/>(in months)</u> | <u>Length<br/>of Stay</u> |    |
|---|----------------------------|---------------------------|----|
| ▪ Head Trauma   | 2.4                        | 1                         |    |
| ▪ Fractured Fibula/Congenital Syphilis  | 2.4                        | 12                        |    |
| ▪ Strangulated Hernia with Delay in Seeking<br>Care/ Burns (1 <sup>o</sup> to lips)     | 3.5                        |                           | 15 |
| ▪ Bilateral Subdural Hematoma   | 4.9                        | 19                        |    |
| ▪ Fractured Skull   | 5.2                        |                           | 5  |
| ▪ Bilateral Subdural Hematoma (Unresolved)/<br>Aseptic Meningitis - 2nd hospitalization | 5.3                        |                           | 4  |
| ▪ Fractured Skull   | 7.8                        |                           | 3  |
| ▪ Coin Ingestion  | 10.9                       | 2                         |    |
| ▪ Child Abuse Neglect Suspected   |                            | 14.6                      | 2  |
| ▪ Fractured Tibia   | 14.8                       | 2                         |    |
| ▪ Burns (2 <sup>o</sup> face/neck)  | 15.1                       | 5                         |    |
| ▪ Burns (2 <sup>o</sup> & 3 <sup>o</sup> bilateral leg)                                 | 19.6                       | 4                         |    |
| ▪ Gastroenteritis/Head Trauma   | 20.0                       | 3                         |    |
| ▪ Burns (splinting/grafting) - 2nd hospitalization                                      | 20.1                       | 6                         |    |
| ▪ Finger Injury/Osteomyelitis   | 23.0                       | 6                         |    |



# MEMPHIS TRIAL: MATH AND READING PIAT (AGE 12)



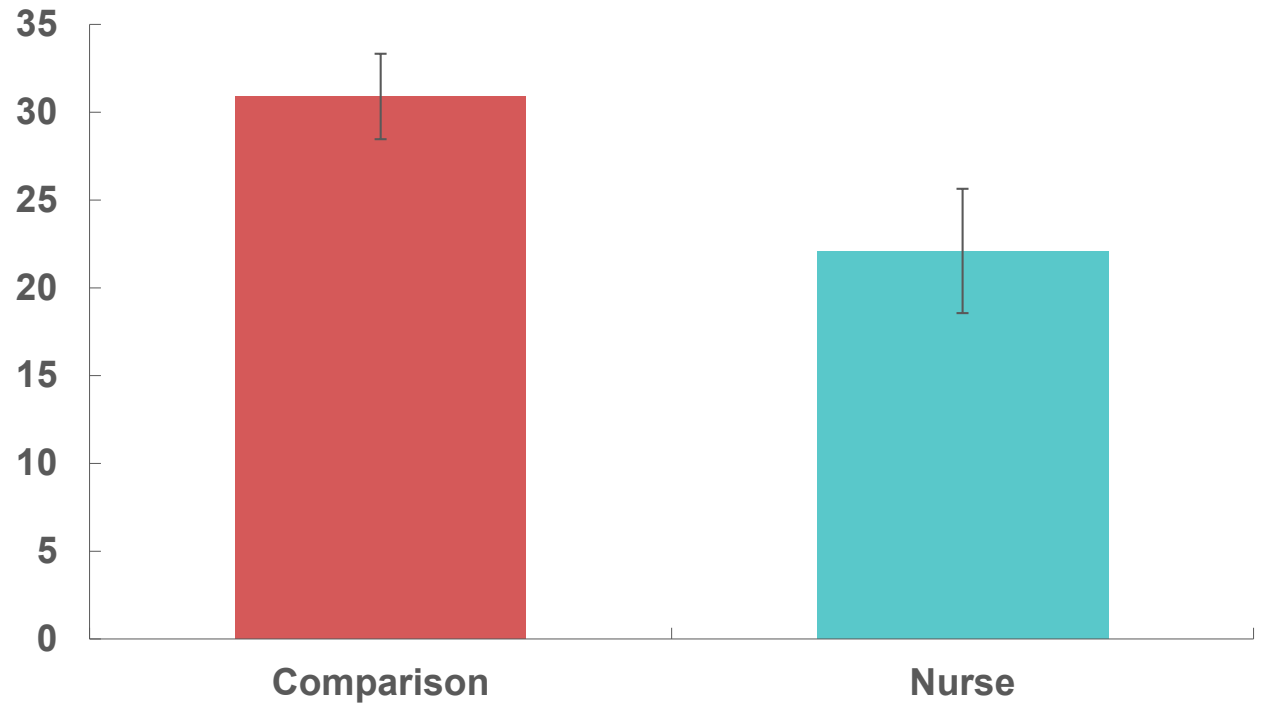
# % CHILDREN WHO USED TOBACCO, ALCOHOL, OR MARIJUANA (LAST 30 DAYS) - MEMPHIS – CHILD AGE 12



P = .04 OR = 0.31

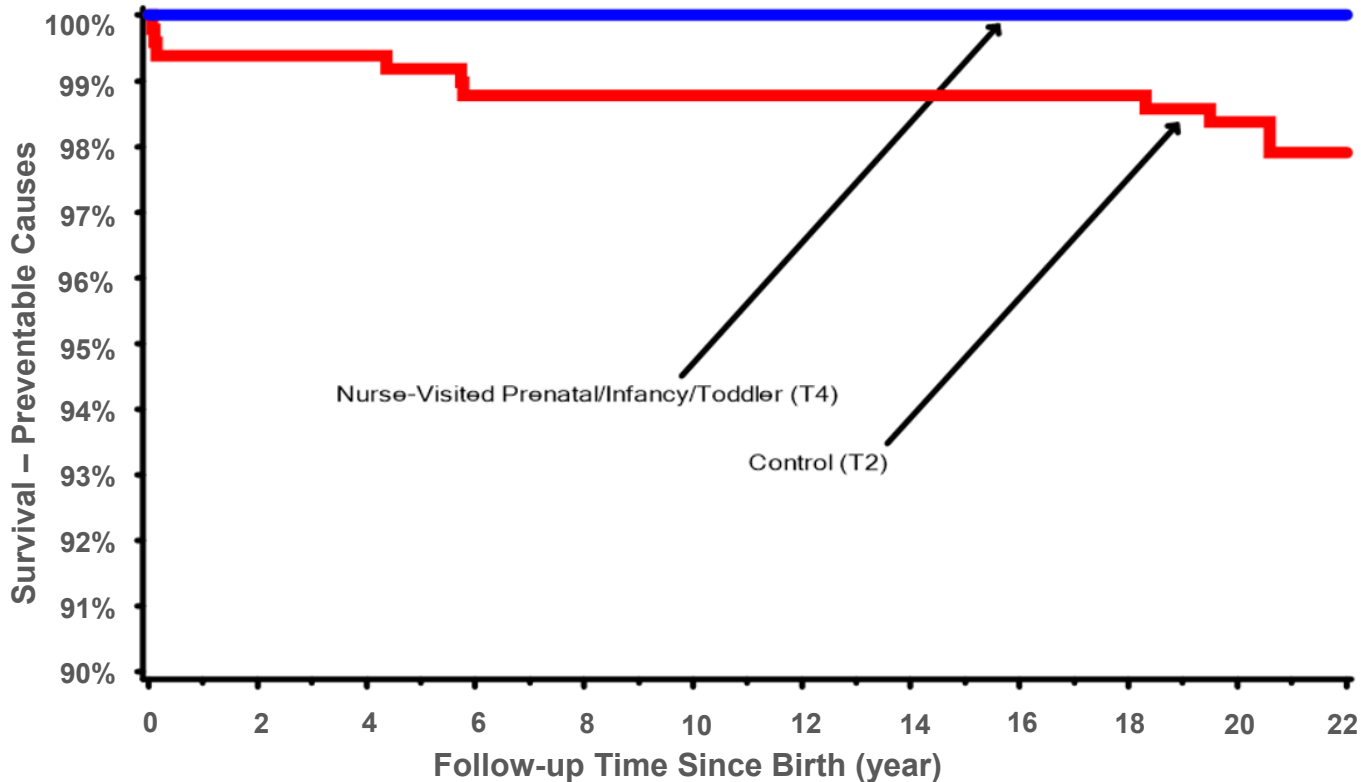
*Arch Pediatr Adoles Med, 164(5) 412-418*

# % CHILDREN WITH INTERNALIZING DISORDERS CHILD AGE 12 - MEMPHIS



P = .04 OR = 0.63

# SURVIVAL PLOTS FOR INTERVENTION AND CONTROL CHILDREN - PREVENTABLE CAUSES OF DEATH\*

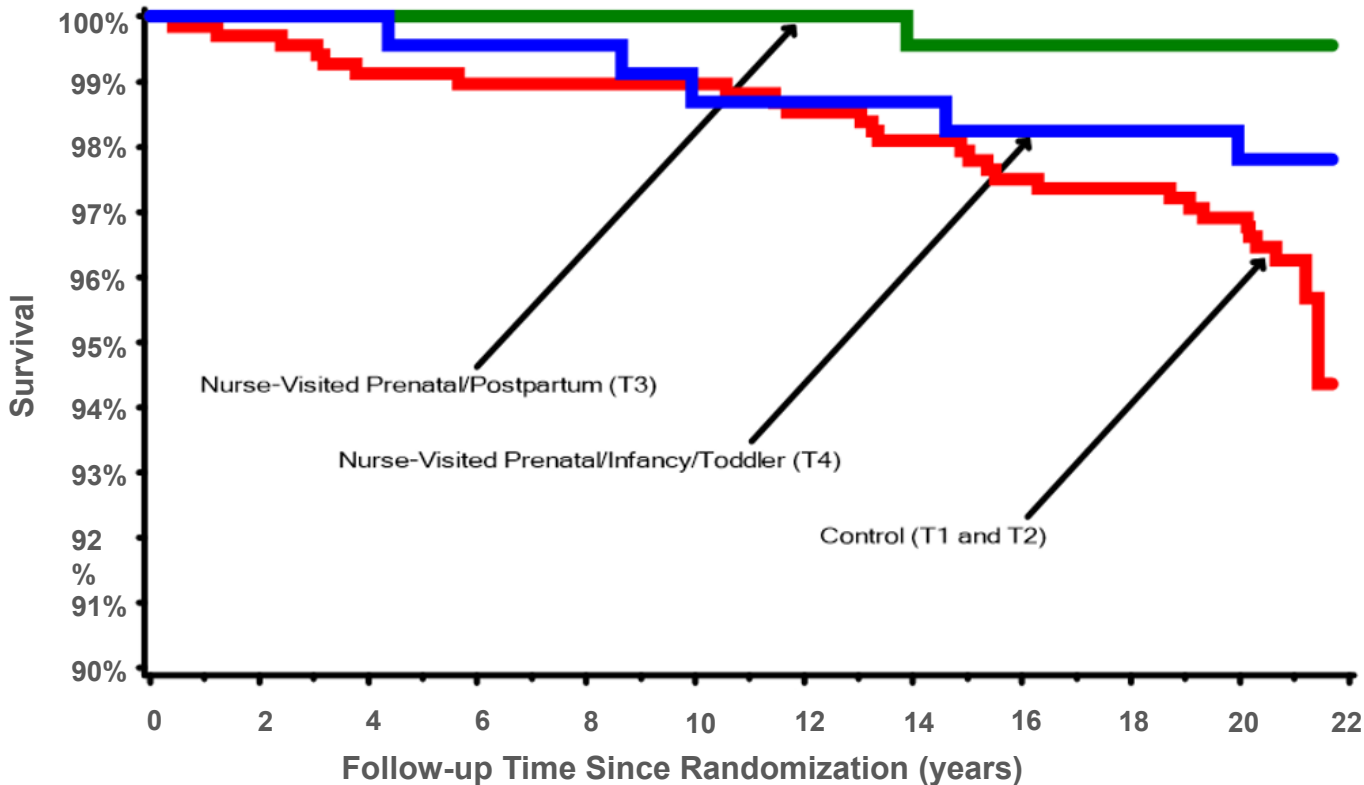


\* Sudden Infant Death Syndrome, injury, homicide

(T2 vs. T4 p=.02)

JAMAPEDIATRICS.2014.472.pages E1-E7.July 7, 2014

# SURVIVAL PLOTS FOR INTERVENTION AND CONTROL MOTHERS – ALL CAUSES OF DEATH



# MEMPHIS- NO OVERALL EFFECTS ON THESE BEHAVIORAL OUTCOMES – CHILD AGE 18

- **Behavioral problems**
- **Substance use & abuse**
- **STI's**
- **HIV risk**
- **Arrests**
- **Convictions**
- **Gang membership**

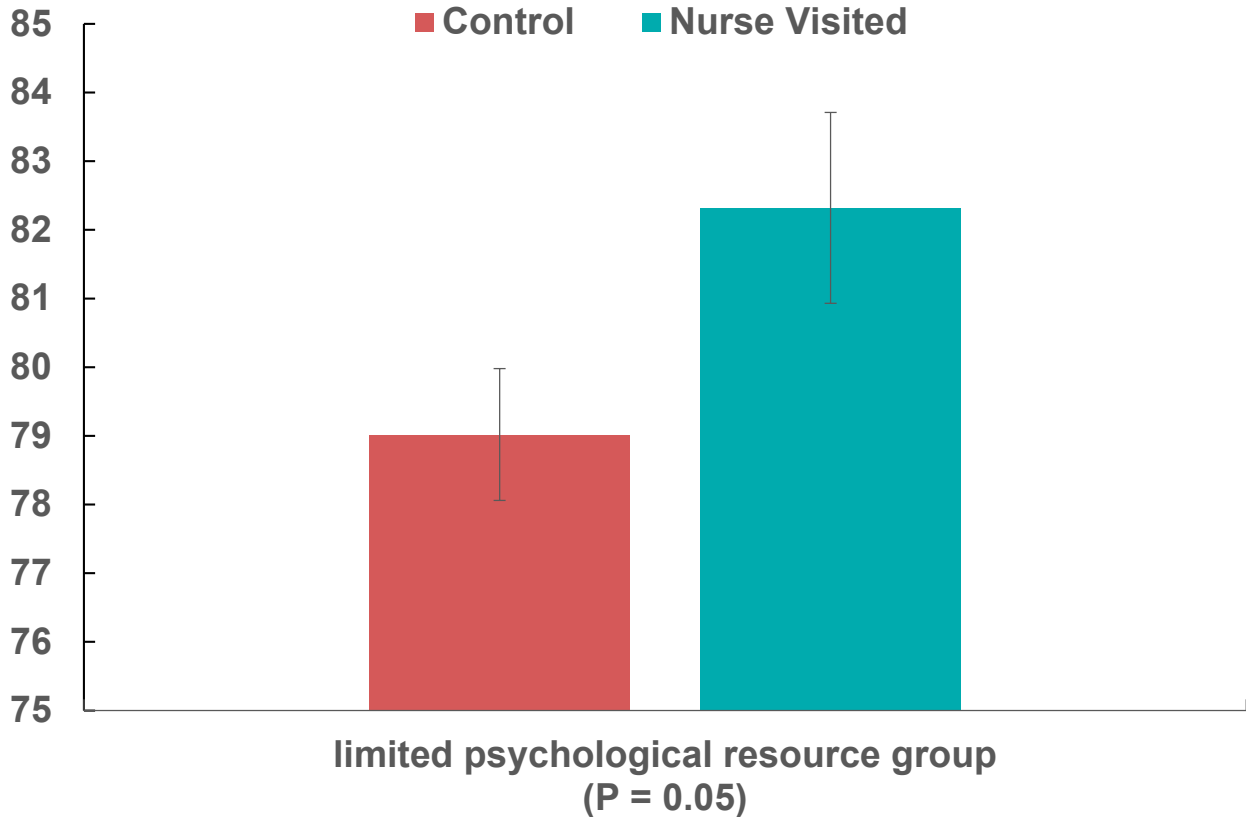




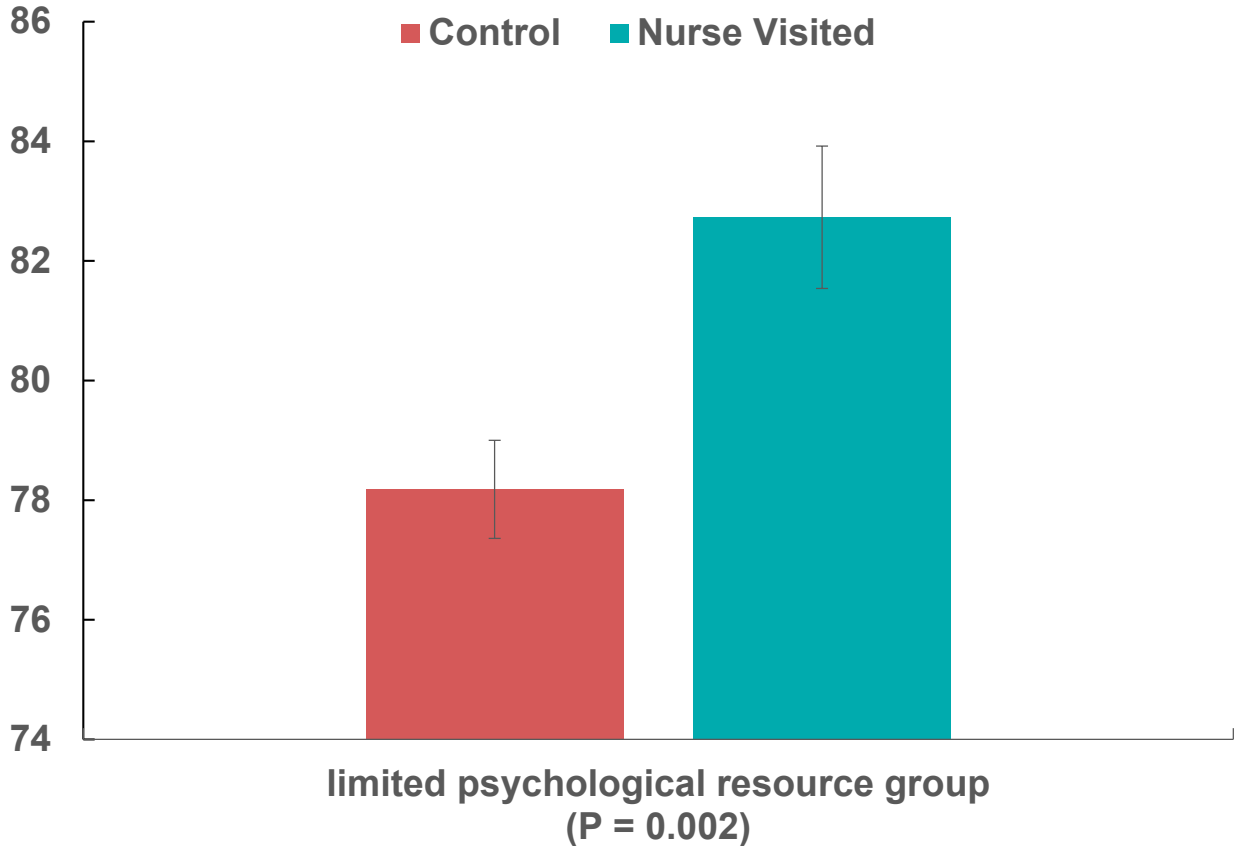
# INCREASED GRADUATION WITH HONORS – MEMPHIS AGE 18



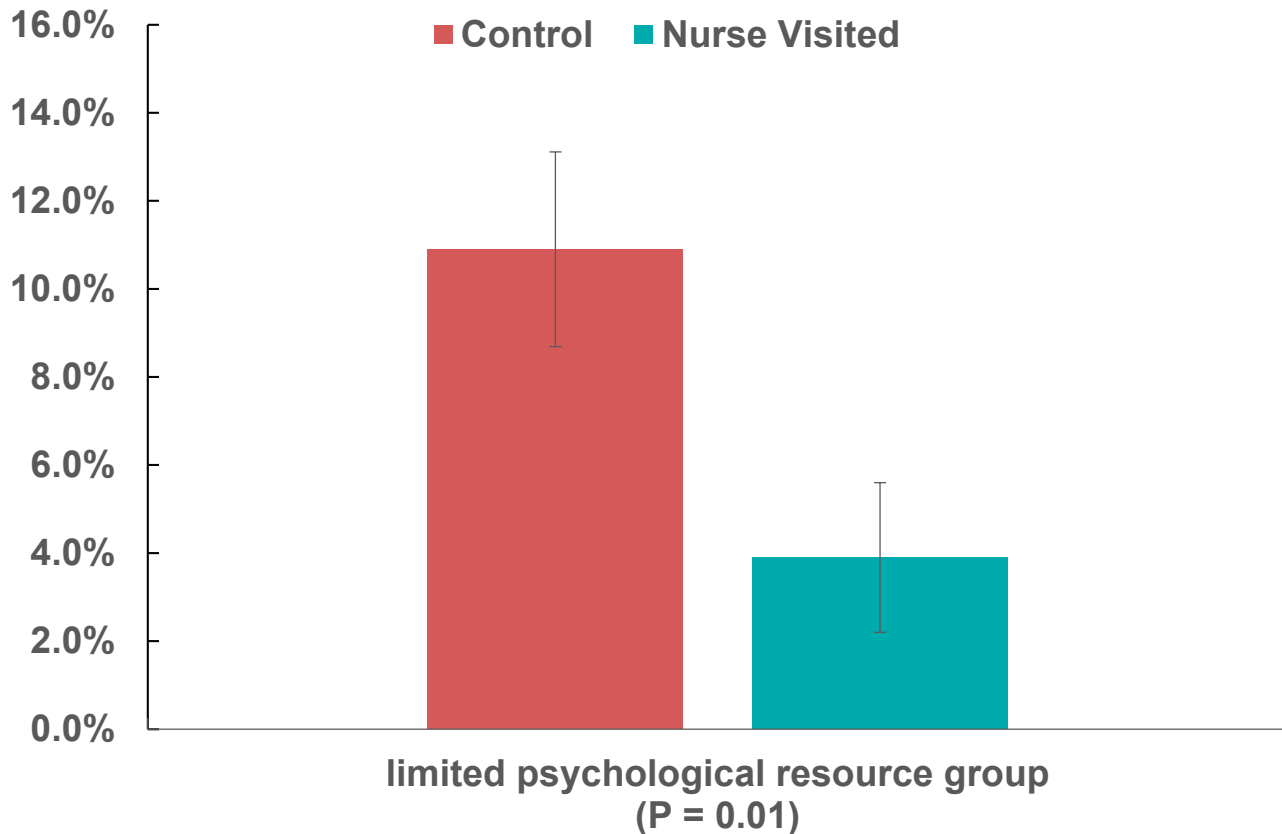
# IMPROVED RECEPTIVE LANGUAGE – MEMPHIS AGE 18



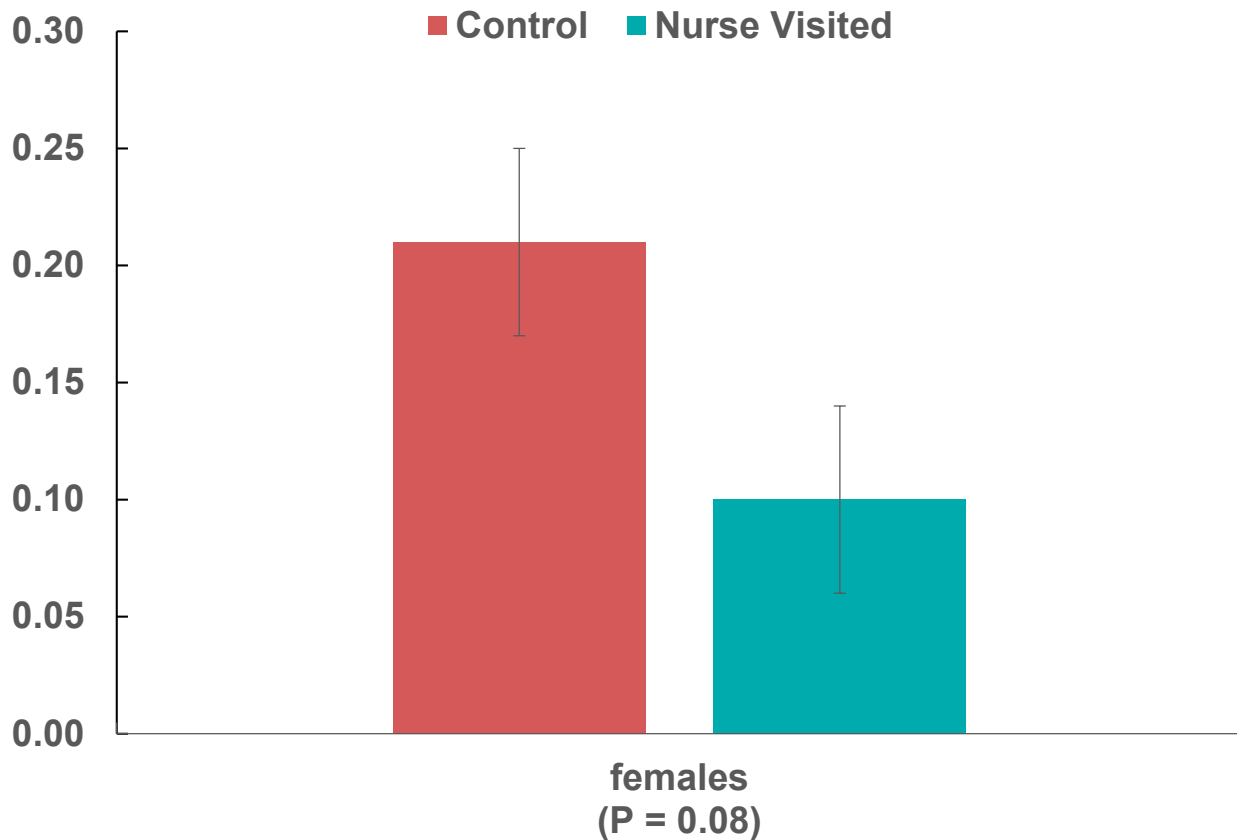
# IMPROVED MATH ACHIEVEMENT – MEMPHIS - AGE 18



# REDUCED CHILD SSI DISABILITY – MEMPHIS - AGE 18



# REDUCED NUMBER OF CONVICTIONS – MEMPHIS- AGE 18



## NO PROGRAM EFFECTS ON MOTHERS'

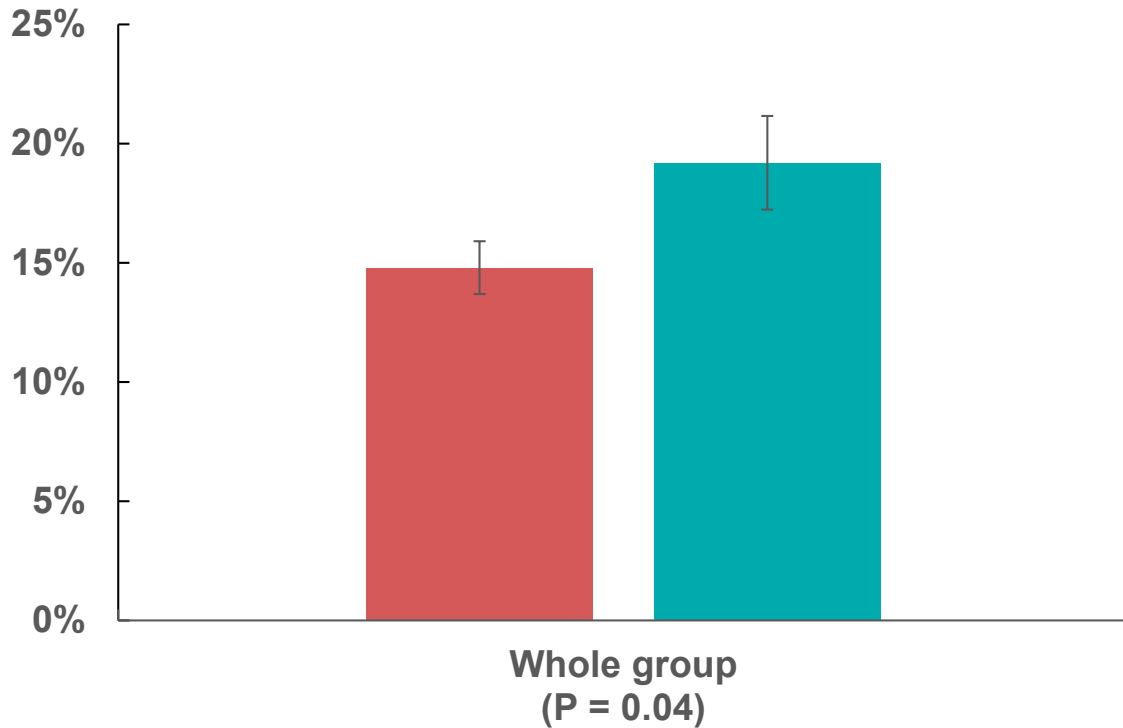
- Substance use or abuse
- Depression
- Anxiety
- Months worked
- Earnings



Photo by: Karen O'Hern

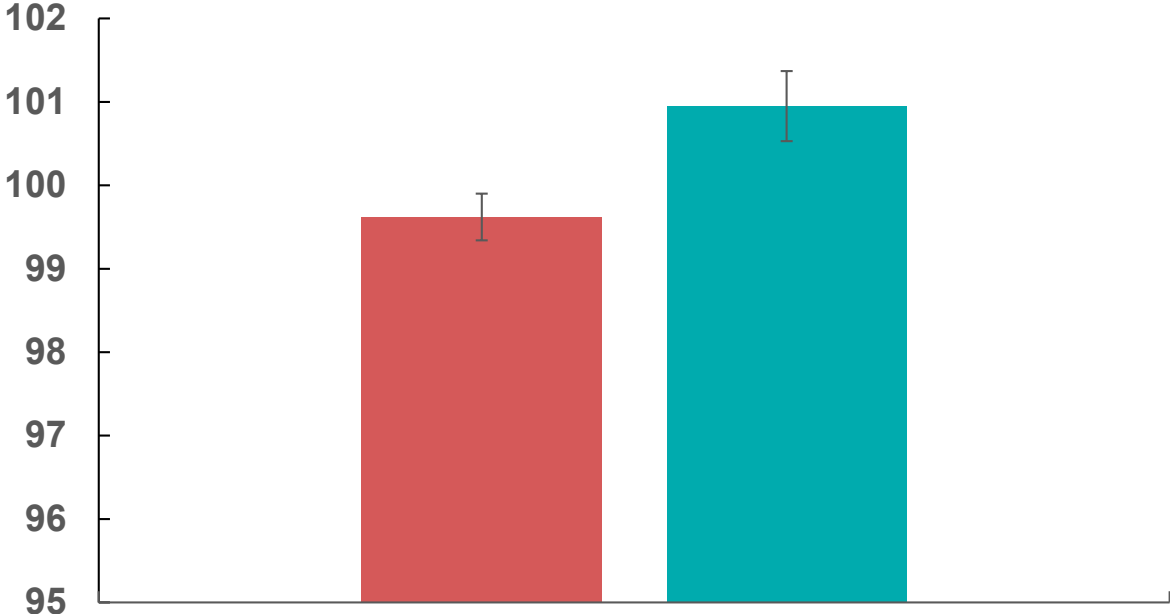
# % MARRIED - 2-18 YEARS

■ Control ■ Nurse Visited



# SENSE OF MASTERY – END OF PREGNANCY-18 YEARS

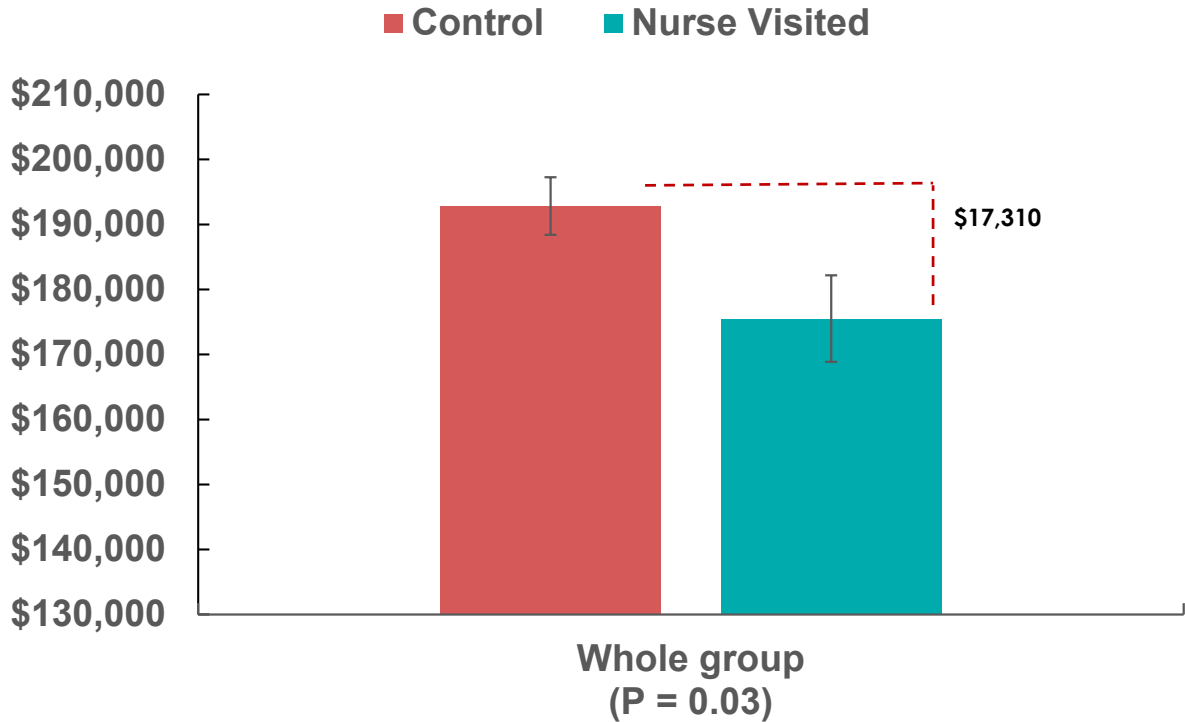
■ Control ■ Nurse Visited



Whole group  
(P = 0.009)



# TOTAL COSTS FOR PUBLIC BENEFITS PER FAMILY 0-18 YEARS – 2009 DOLLARS



**Memphis Program Costs**

**\$12,578 per Family**

**NFP Saved Government**

**\$4,732 per Family in 2009**

**Dollars**



# DENVER SAMPLE

**Sample: 735 pregnant women**

- **No previous live births**
- **45% Latina**
- **16% Black**
- **All < Medicaid eligible (133 % federal poverty) or no private health insurance**
- **23% reported cigarette smoking at registration**

**Assessments on 78% and 75% of the mothers randomized by child age 9. Higher when you exclude deaths and fetal demises.**

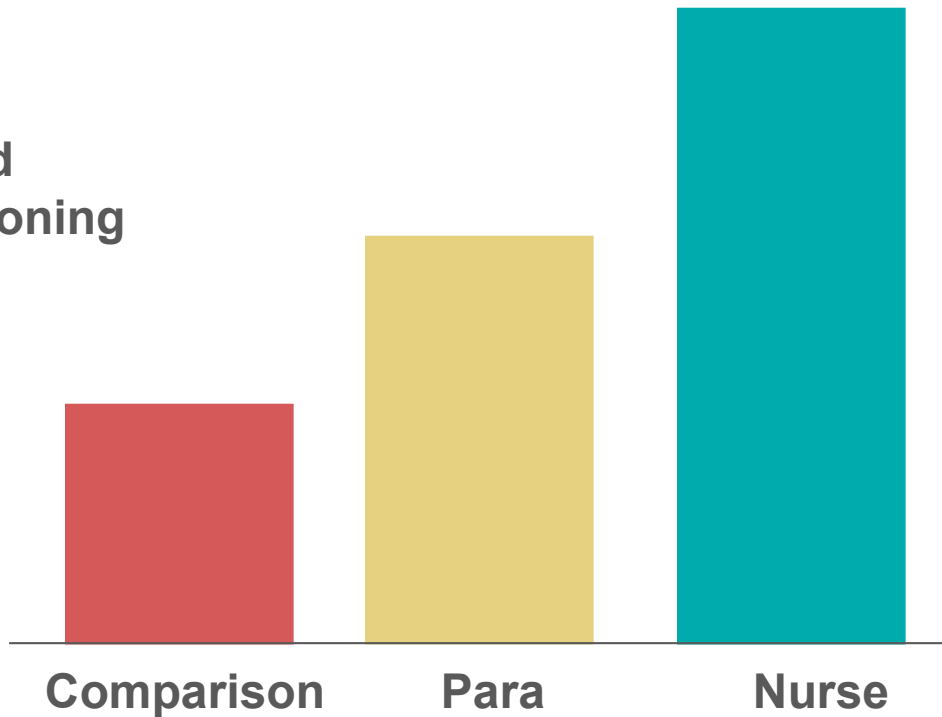


## TREATMENT CONDITIONS - DENVER

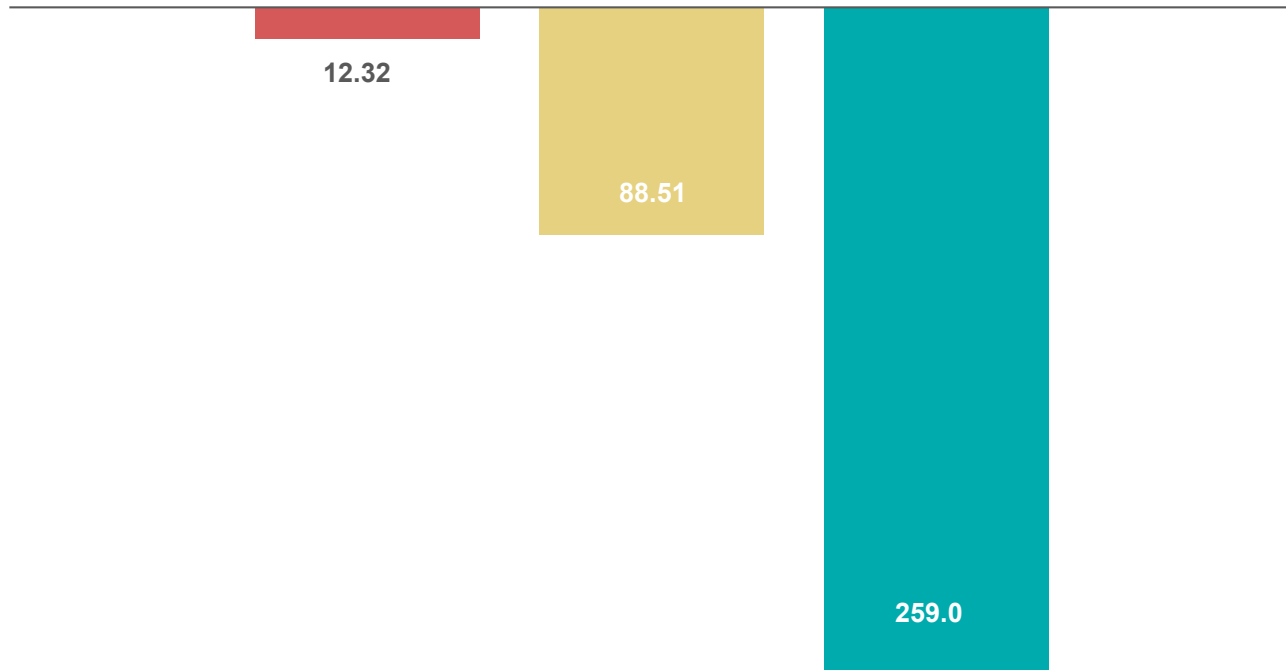
| <b>Services</b>   | <b>Treatment 1<br/>N=255</b> | <b>Treatment 2<br/>N=245</b> | <b>Treatment 3<br/>N=235</b> |
|---|------------------------------|------------------------------|------------------------------|
| <b>Screening and referral for children</b>                            | <b>X</b>                     | <b>X</b>                     | <b>X</b>                     |
| <b>Prenatal and Infant/Toddler Home Visiting by Paraprofessionals</b> |                              | <b>X</b>                     |                              |
| <b>Prenatal and Infant/Toddler Home Visiting by Nurses</b>            |                              |                              | <b>X</b>                     |

# PATTERN OF DENVER PROGRAM EFFECTS

**Maternal and  
Child Functioning**



# CHANGES IN URINE COTININE FROM BASELINE TO 36 WEEKS OF PREGNANCY (NG/ML) - DENVER



■ Control

■ Paraprofessional Visited

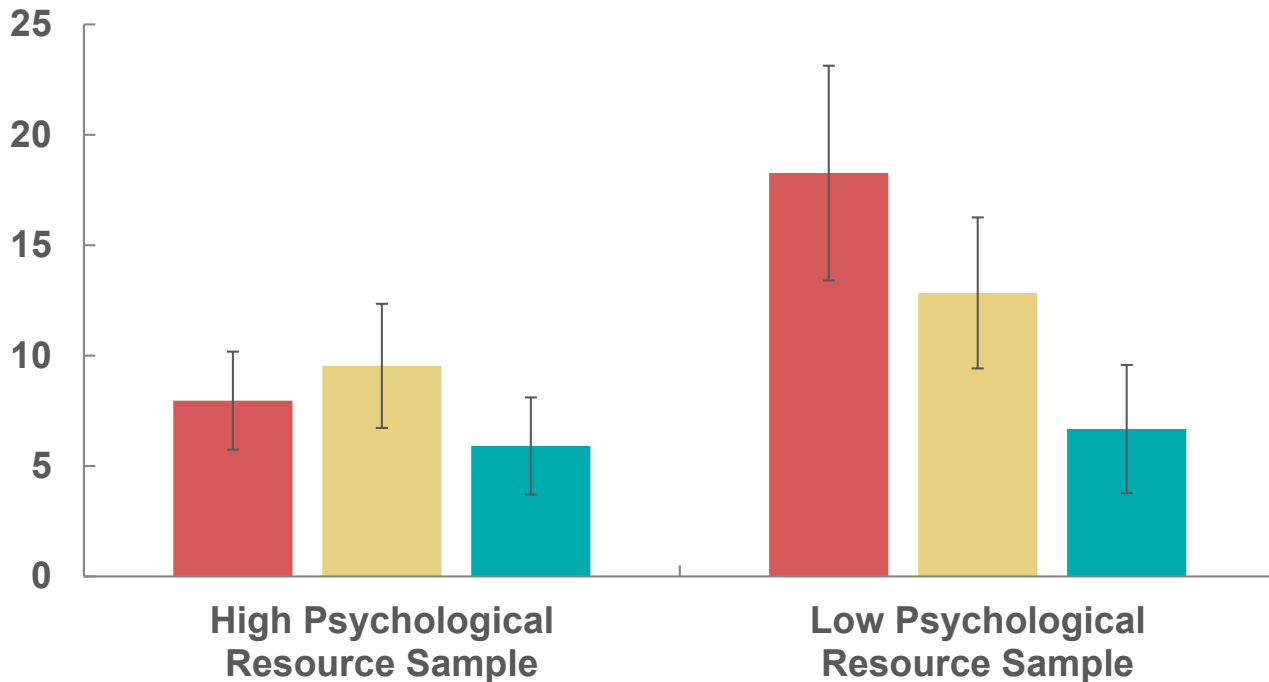
■ Nurse Visited

P-values: p vs c = NS

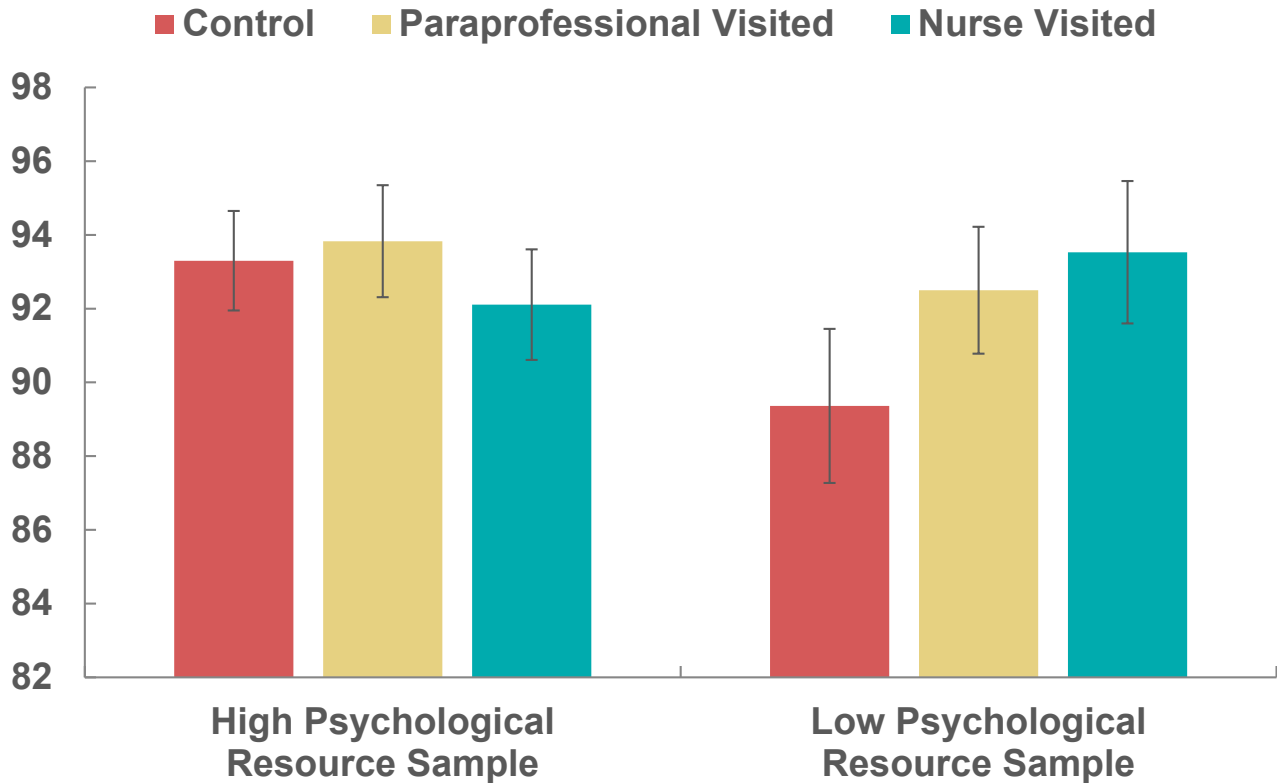
n vs c <.05

# DENVER TRIAL: LANGUAGE DELAY (21 MONTHS)

■ Control    ■ Paraprofessional Visited    ■ Nurse Visited

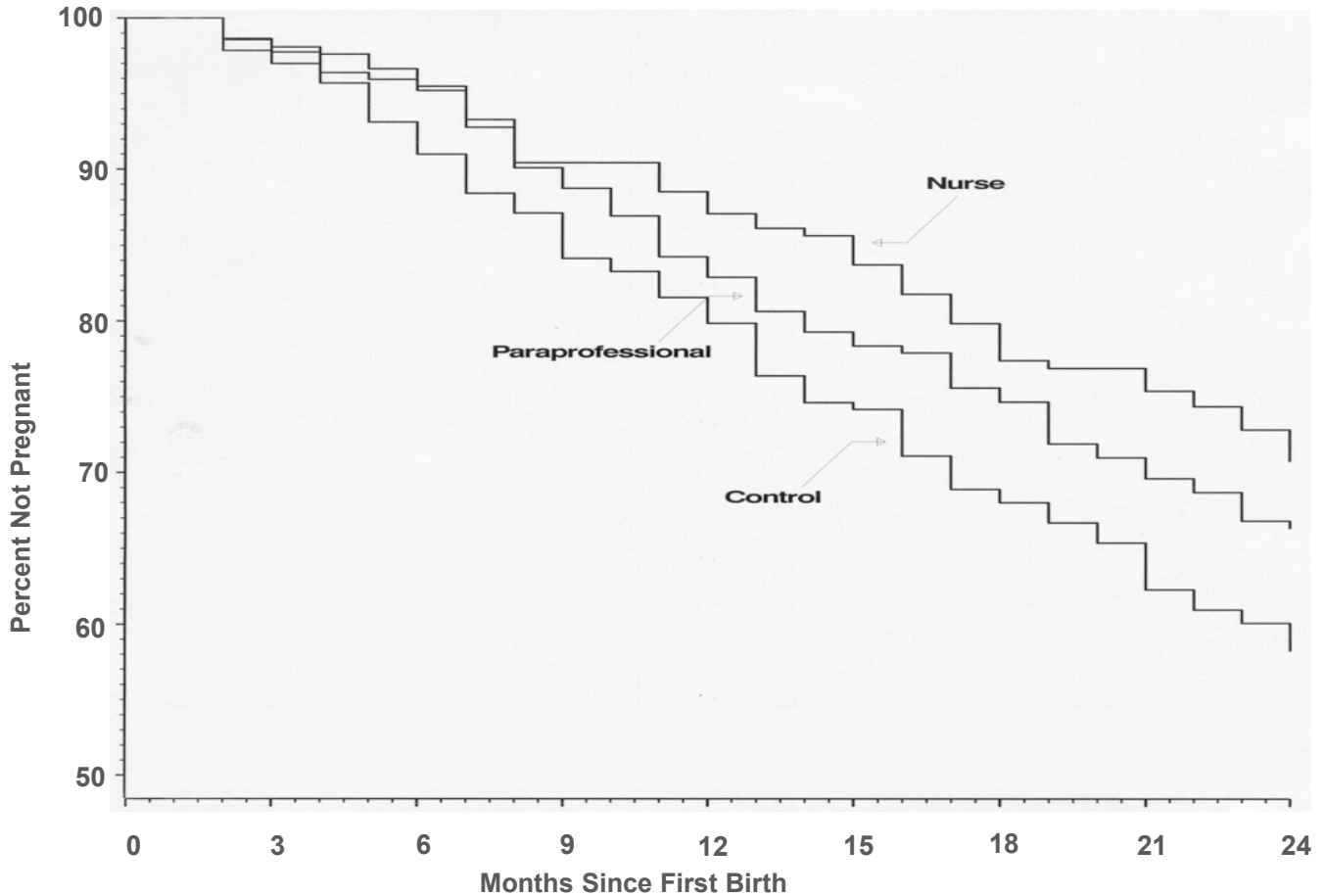


# DENVER TRIAL: TOTAL LANGUAGE SCORE – PLS (AGE 4)



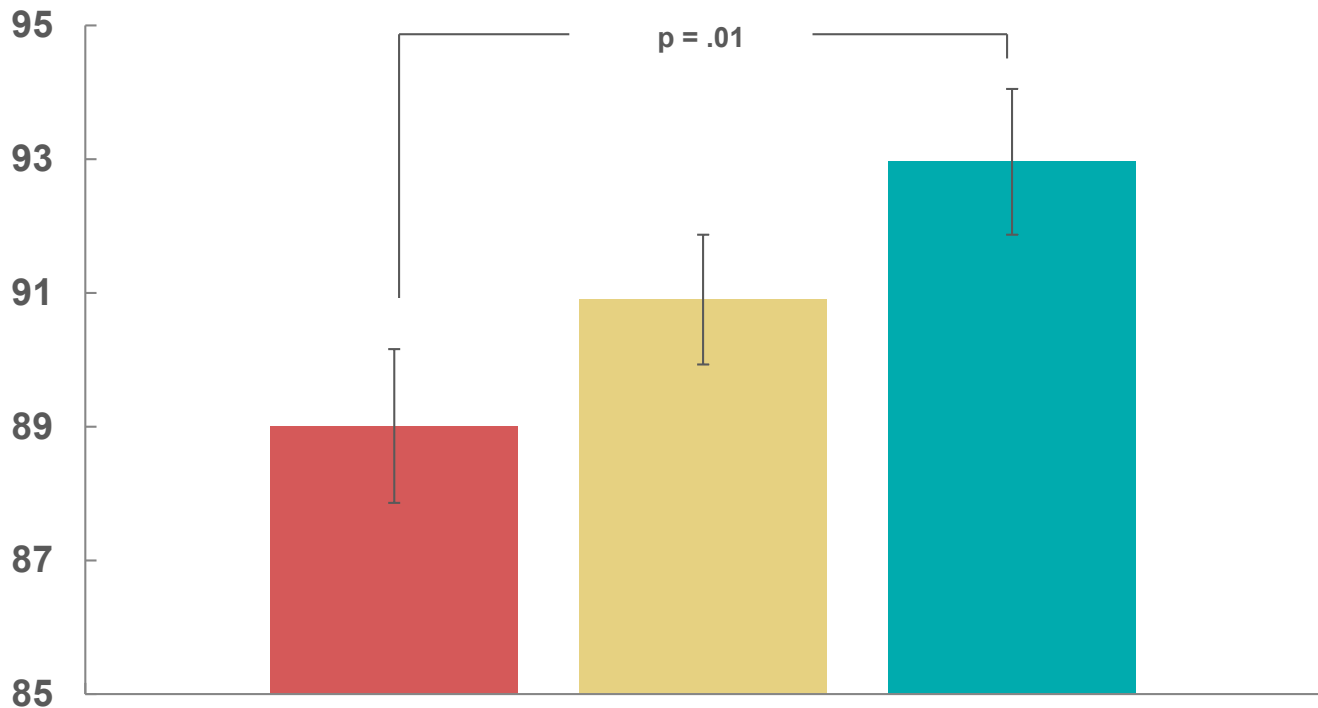


# TIME TO FIRST SUBSEQUENT PREGNANCY

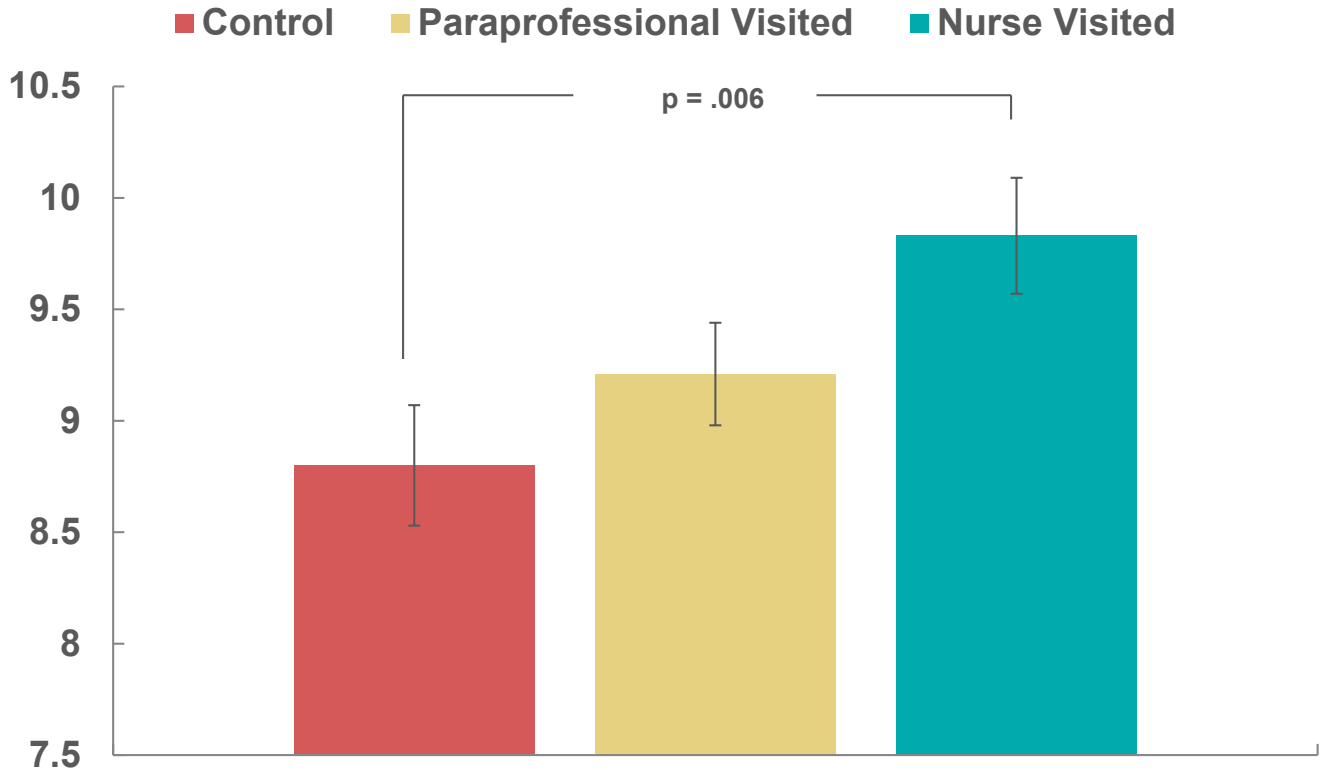


# RECEPTIVE LANGUAGE – 2, 4 & 6 YEARS OF AGE – LOW PSYCHOLOGICAL RESOURCE GROUP

■ Control    ■ Paraprofessional Visited    ■ Nurse Visited



# SUSTAINED ATTENTION – 4, 6 & 9 YEARS OF AGE – LOW PSYCHOLOGICAL RESOURCE GROUP

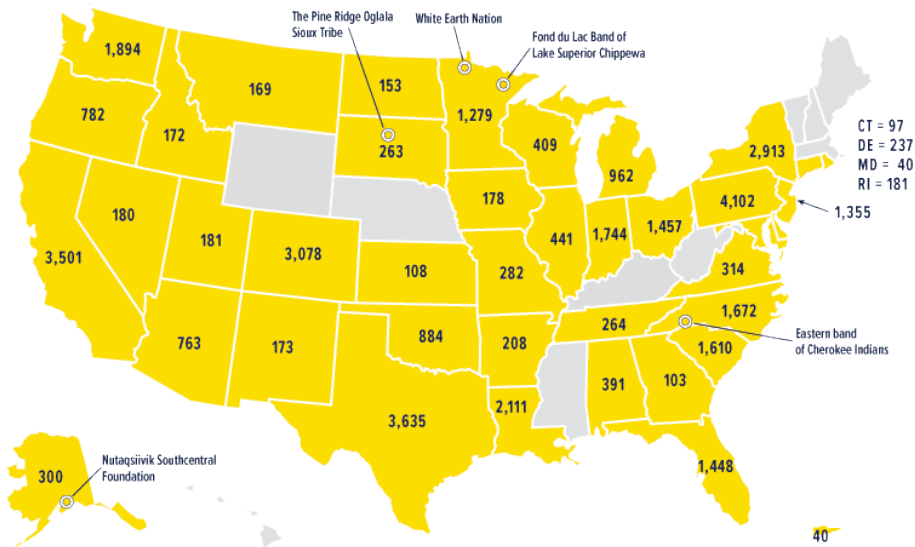




## FROM SCIENCE TO PRACTICE

- **Support Organizational and Community Capacity**
- **Education and Consultation**
- **Program Guidelines**
- **Information System**
- **Assessing Program Performance**
- **Continuous Improvement**

# NURSE-FAMILY PARTNERSHIP IS A GROWING, NATIONAL PROGRAM



Numbers on the map represent the number of families currently enrolled as of 5/31/2020.

**40** States that NFP serves + U.S. Virgin Islands

**722** Number of counties NFP is serving

Tribal agencies are denoted by Band

Map does not include program in U.S. Virgin Islands



# INTERNATIONAL REPLICATION

- **No presumptions**
- **Adaptation – feasibility & acceptability**
- **Pre-test and small-scale trial/evaluation**
- **Larger trial (if population sufficiently large and feasible)**
- **Faithful replication of adapted program**
- **International societies:**
  - **UK – England, Scotland, Northern Ireland**
  - **Australia – aboriginal families**
  - **Canada – ON and BC**
  - **Norway**
  - **Bulgaria – Roma families**
  - **American Indians & Alaskan Natives**

## TEST INNOVATIONS IN MODEL AND IMPLEMENTATION

- **Participant retention and completed home visits**
- **Intimate partner violence**
- **New method to observe & promote caregiver-child interaction – DANCE/DANCE STEPS**
- **Maternal depression and anxiety**
- **Development of STAR (Strength and Risk) framework to guide program implementation**
- **Modernize NFP with telehealth and electronic facilitators**
- **Goal Mama app – link mothers and nurses to support goals**
- **Improve NFP - child welfare & primary care collaboration**
- **Enhanced support for women with substance use disorders**
- **Formative development and testing of program for women with previous live births**

*Pediatrics 2013; 132; S110*

*If you want to go fast go alone.*

*If you want to go far go together.*

**African Proverb**



POLARIZATION

HOPE

