Child Development: Does Early Intervention Make a Difference?

Sandra L.W. Thornton

Broadwater Academy, Exmore, Virginia

In collaboration with Carla White, National Center on Birth Defects and Developmental Disabilities, Centers for Disease Control and Prevention

Child Development: Does Early Intervention Make A Difference?

Sandra L.W. Thornton
Broadwater Academy
Exmore, VA

Summary
Students will analyze and describe graphs relating to early childhood development programs and use this analysis to formulate conclusions and inferences based on the data. Students will investigate risk factors for early childhood development and use this information to prepare a calendar of activities to enhance early development.

Learning Outcomes

- Students will be able to analyze and describe various types of graphs.
- Students will be able to formulate conclusions about the effectiveness of early learning programs.
- Students will be able to identify risk factors for developmental delays during early childhood.
- Students will be able to describe activities that promote positive cognitive development in young children.

Materials

1. Markers, colored pencils, stencils, and other basic art supplies
2. Computers with Internet connections

Total Duration
3 hours

Procedures

Teacher Preparation
If necessary, familiarize yourself with early cognitive development before beginning this lesson. Some suggested resources are listed (see Web Resources and Supplemental Document). Also, be aware of some of the early intervention programs available in your community. You can find out about these programs from your local school system, health department, or pediatrician's office. Print and copy the graphs and supplemental student handouts. You might find it helpful to laminate the graphs for more durable student use.

Web Resources
Title: BrainWonders
URL: www.zerotothree.org/brainwonders/FAQ.html
Description: This interactive page is sponsored by the Boston University School of Medicine, the Erikson Institute, and Zero to Three. It offers information about brain and cognitive development. Topics covered range from "nature versus nurture" to the effects of nutrition on brain development.

Title: The Magic of Everyday Moments
URL: www.zerotothree.org/magic/

Description: This page, sponsored by Zero to Three and the Johnson and Johnson Pediatric Institute, offers age-group links to information about expected developmental progress and tips on how families can foster cognitive development.

Title: Welcome to Head Start
URL: www2.acf.dhhs.gov/programs/hsb/
Description: This site provides further information about the Head Start program, if needed.

Title: Early Literacy
URL: http://www.zerotothree.org/brainwonders/EarlyLiteracy/earlyliteracy.pdf
Description: This summary of early literacy and language development includes examples of age-appropriate behaviors and suggested activities. It is sponsored by the Boston University Medical Center, the Erikson Institute, and Zero to Three.

Step 1: Introduction **Duration: 20 minutes**

How do we learn?

This lesson will begin with student discussion and brainstorming. Ask students to name the skills they felt were important when they attended preschool or kindergarten. How did they learn those skills? Do any students have younger brothers or sisters, (cousins?)? What are some of the things their younger brothers and sisters are doing? Do they know their colors, shapes, etc.? Follow this with a discussion of resources in the students' community such as Head Start, preschool, and other programs. This exercise will be used to assess student knowledge. Because many children have or know someone who has different abilities and educational needs, it is important to treat the topic of this lesson plan in a sensitive manner.

Step 2 **Duration: 55 minutes**

Are Early Intervention Programs Effective?

In this step, students will examine graphs related to early intervention programs. The purpose of this step is to reinforce students' graphic interpretation and analysis skills to form conclusions. Students should be familiar with the terms "conclusion" and "inference" before completing this activity. Divide students into pairs or small groups. Give each group one graph from "Child Development Graphs and Charts," and have each student complete an individual "Interpretation and Analysis of Graphs—Student Data Sheet." Allow time at the end of the class period to regroup and discuss students' analyses and interpretations.

Supplemental Documents

Title: Child Development Graphs and Charts
File Name: Child Development Graphs and Charts.doc
Description: This is a collection of graphs representing data from early intervention programs. Students will use these graphs for the activity in Step 2.

Title: Interpretation and Analysis of Graphs—Student Data Sheet
File Name: Interpretation and Analysis of Graphs.doc
Description: The "Student Data Sheet" includes instructions for student work. Students will use this data sheet to summarize the analysis of their sample graphs.

Title: Interpretation and Analysis of Graphs—Answer Key
File Name: Interpretation and Analysis of Graphs Answer Key.doc
Description: This key provides expected answers for each sample graph.

Step 3 **Duration: 45 minutes**

What Are Risk Factors for Developmental Delays and Disabilities in Child Development?

In this step, students will use the Web resources listed below to research risk factors for developmental delays and disabilities in child development. Using the "Risk Factors for Developmental Delays and Disabilities in Early Child Development" handout, have students list eight risk factors and eight activities that might help minimize overall risk. It is important to understand that different factors determine a child's risk of developmental delay. They include genetics, behavior, and environment. There is no possible way to influence genetics.

Comment [MSOffice1]: This comment might be misleading to some reading the lesson plan. It implies that disabilities are predetermined, and there is no need for preventive measures.

Web Resources

Title: BrainWonders
URL: www.zerotothree.org/brainwonders/FAQ.html
Description: This interactive page is sponsored by the Boston University School of Medicine, the Erikson Institute, and Zero to Three. It offers information about brain development and cognitive development. Topics covered range from "nature vs. nurture" to the effects of nutrition on brain development.

Title: The Magic of Everyday Moments
URL: www.zerotothree.org/magic/
Description: This page, sponsored by Zero to Three and the Johnson and Johnson Pediatric Institute, offers age-group links to information about expected developmental progress and tips on how families can foster cognitive development.

Title: National Center on Birth Defects and Developmental Disabilities
URL: www.cdc.gov/ncbddd/child/
Description: This site provides information about child development and developmental milestones.

Title: How A Child Develops—Developmental Delay
URL: www.howkidsdevelop.com/developDevDelay.html#riskFactors
Description: This site provides risk factors and information about intervention programs related to early cognitive development.

Supplemental Documents

Title: Risk Factors for Developmental Delays and Disabilities in Early Child Development
File Name: Risk Factors Student Response.doc
Description: Students should use this handout to summarize developmental risk factors and activities that will counter these risk factors.

Title: Risk Factors for Developmental Delays and Disabilities in Early Child Development Answer Key
File Name: Risk Factors Answer Key.doc
Description: Use this handout as a key for the Risk Factors Student Response handout.

Conclusion **Duration: 1 hour**

How Might Families Foster Early Cognitive Development?

In the final step, students will use what they have learned to prepare a calendar of activities that promote early cognitive development. This calendar could be distributed to families through a clinic, library, or other community resource. There are two options for the calendar project: groups might be assigned a single month to design as part of a year-long calendar, or the whole class might design a generic thirty-day calendar. Use the "Student Calendar Scoring Rubric" to

assess student performance. Share the grading rubric and expectations with students before they complete the assignment. This activity will also serve as a posttest measure of student progress.

Supplemental Documents
Title: Student Calendar Scoring Rubric
File Name: Student Calendar Rubric.doc
Description: This rubric will be used to assess student performance for the calendar of activities assignment.

Title: Student Planning Tool for Calendar
File Name: Calendar Planning Tool.doc
Description: This tool will help students plan their calendar project.

Title: Template for Calendar
File Name: Monthly Calendar.doc
Description: This is a template of a one-month calendar that could be used for student calendars.

Title: Suggestions for Calendar
File Name: Calendar Suggestions.doc
Description: This document provides a sample of what to expect from student calendars. While this sample does not include artwork, students should be encouraged to include original artwork that is appealing to children and families.

Assessment

Student assessment will be based on skills evaluation in two areas: 1) ability to interpret and analyze graphs to form a conclusion and 2) demonstration of positive activities that might counteract risk factors for poor cognitive development. The two activities used for assessment are “Step 2—Interpretation and Analysis of Graphs—Student Data Sheet” and “Conclusion—Student Calendar.”

Modifications

Extensions
Teachers might wish to set up a cooperative arrangement with a Head Start, preschool, or kindergarten group where older students interact with younger children by reading stories, completing simple art projects, or teaching songs.

Technology Modifications
Teachers without classroom Internet access might wish to provide printed handouts from the available Web resources for student use.

Education Standards

National Science Education Standards
SCIENCE AS INQUIRY, CONTENT STANDARD A:

As a result of activities in grades 5–8, all students should develop

- **Abilities necessary to do scientific inquiry**
- **Understandings about scientific inquiry**

LIFE SCIENCE, CONTENT STANDARD C:
As a result of their activities in grades 5–8, all students should develop understanding of

- Structure and function in living systems
- Reproduction and heredity
- **Regulation and behavior**
- Populations and ecosystems
- Diversity and adaptations of organisms

SCIENCE IN PERSONAL AND SOCIAL PERSPECTIVES, CONTENT STANDARD F:
As a result of activities in grades 5–8, all students should develop understanding of

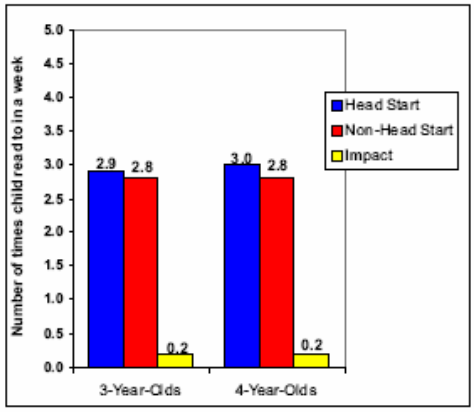
- **Personal health**
- **Populations, resources, and environments**
- Natural hazards
- **Risks and benefits**
- Science and technology in society

Child Development Graphs and Charts

Child Development: Does Early Intervention Make a Difference?
Sandra L.W. Thornton, CDC's 2005 Science Ambassador Program

Graph 1.

Exhibit 12: Impact of Head Start on the Number of Times Parent Reads to Child in a Week, 3- and 4-Year-Old Groups



*As a result of rounding, the figure in the "Impact" column may be slightly different than the difference of the figures listed for the "Head Start" and "Non-Head Start" columns.

Formatted: Font: (Default) Arial, 10 pt

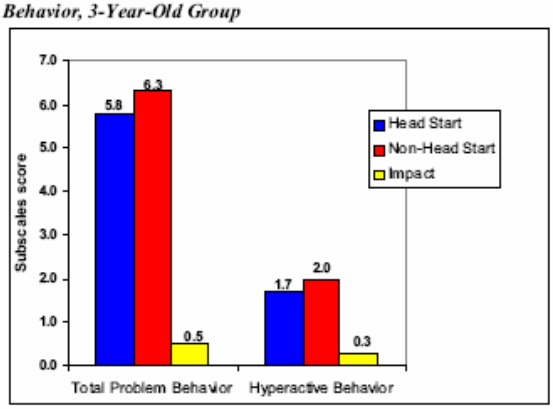
Head Start is a program that helps low-income children and their families get ready for school. Children participate in activities similar to a regular preschool, and their families learn about health, nutrition, and how they can help their children succeed in school.

Impact indicates how much of an effect one variable has on another variable.

Reference: U.S. Department of Health and Human Services. Head Start impact study first year findings. 2005 June. [cited DATE]. Available from URL: http://www.nhsa.org/download/press/ImpactStudy.pdf

Graph 2.

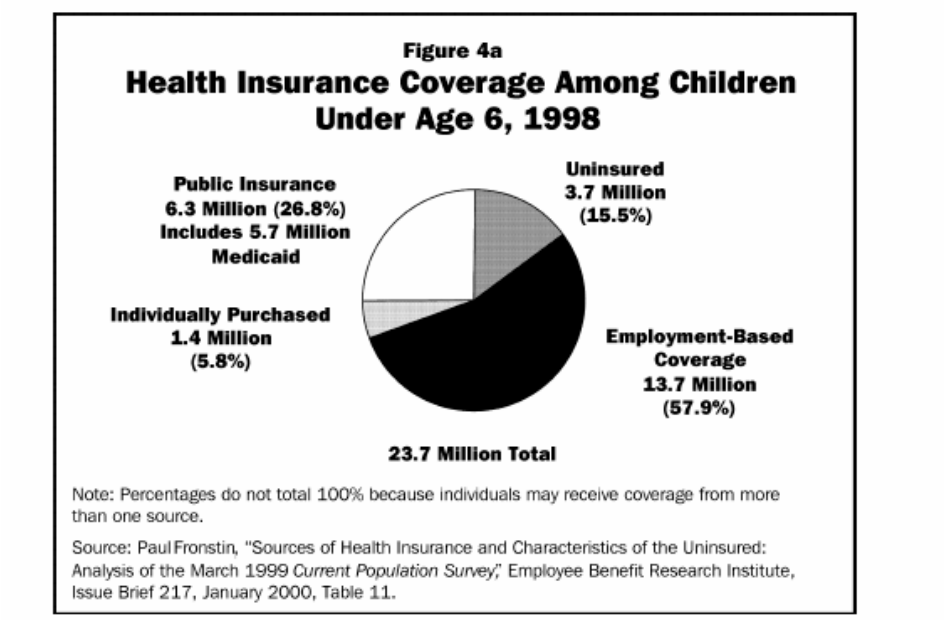
Exhibit 8: Impact of Head Start on Behavior Problems and Hyperactive Behavior, 3-Year-Old Group



- Head Start is a program that helps low-income children and their families get ready for school. Children participate in activities similar to a regular preschool, and their families learn about health, nutrition, and how they can help their children succeed in school.
- Impact indicates how much of an effect one variable has on another variable.
- The prefix “hyper” means “more than” or “over,” so a child who is hyperactive is more active than would be expected. Children with hyperactive behavior might have difficulty concentrating or sitting still at a desk during class.

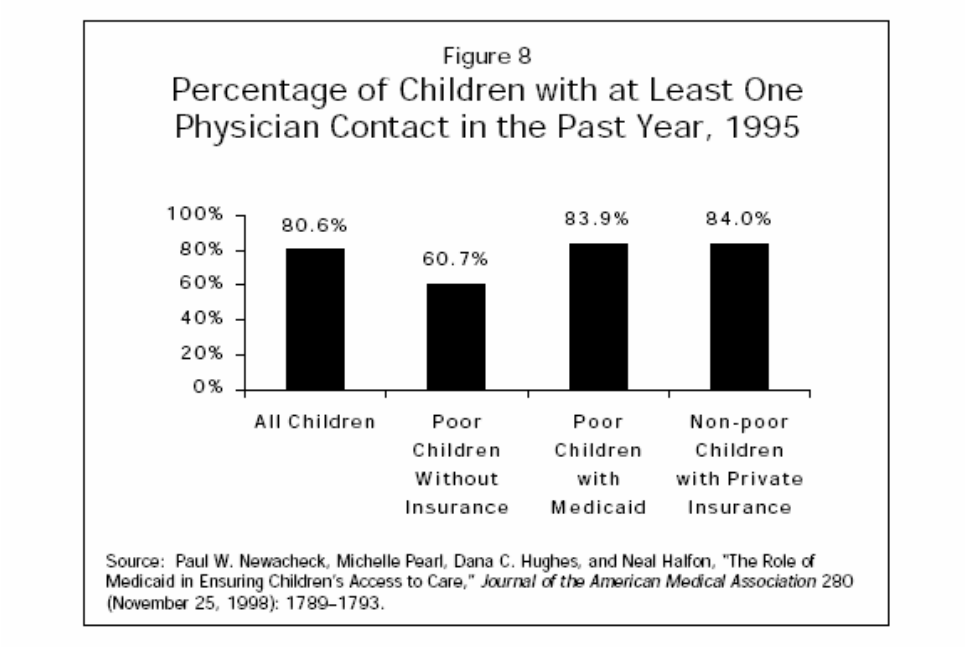
Reference: U.S. Department of Health and Human Services. Head Start impact study first year findings. 2005 June. [cited DATE]. Available from URL: http://www.nhsa.org/download/press/ImpactStudy.pdf

Graph 3.



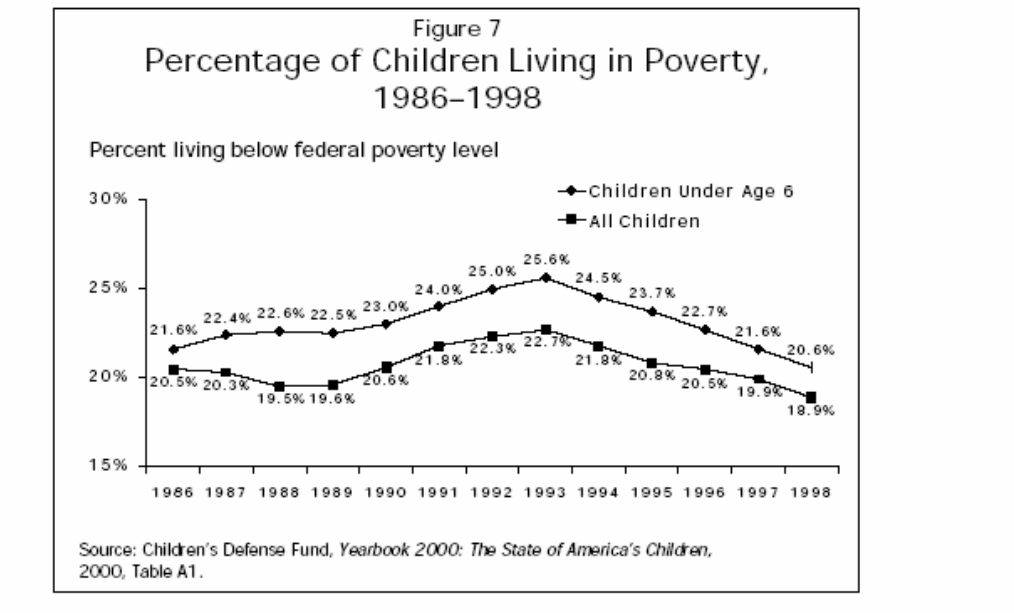
Reference: Rosenbaum S. Health policy and early child development an overview. The George Washington University Medical Center School of Public Health and Health Services Center for Health Services Research and Policy. 2001 July. [cited DATE]. Available from URL: http://www.cmwf.org/usr_doc/rosenbaum_early_450.pdf

Graph 4.



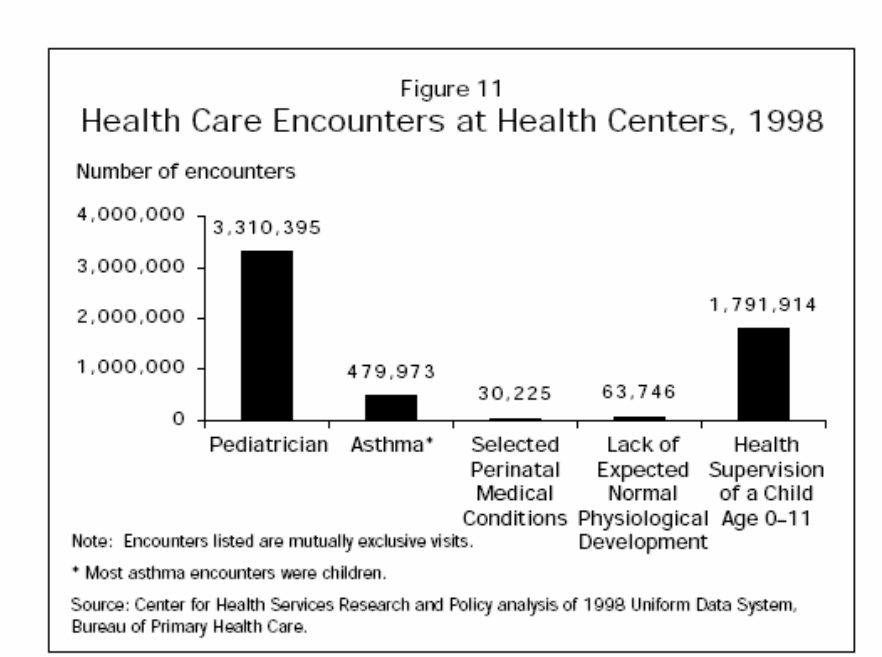
Reference: Rosenbaum S. Health policy and early child development an overview. The George Washington University Medical Center School of Public Health and Health Services Center for Health Services Research and Policy. 2001 July. [cited DATE]. Available from URL: http://www.cmwf.org/usr_doc/rosenbaum_early_450.pdf

Graph 5.



Reference: Rosenbaum S. Health policy and early child development an overview. The George Washington University Medical Center School of Public Health and Health Services Center for Health Services Research and Policy. 2001 July. [cited DATE]. Available from URL: http://www.cmwf.org/usr_doc/rosenbaum_early_450.pdf

Graph 6.



Reference: Rosenbaum S. Health policy and early child development an overview. The George Washington University Medical Center School of Public Health and Health Services Center for Health Services Research and Policy. 2001 July. [cited DATE]. Available from URL: http://www.cmwf.org/usr_doc/rosenbaum_early_450.pdf

Interpretation and Analysis of Graphs—Student Data Sheet

Child Development: Does Early Intervention Make a Difference?

Sandra L.W. Thornton, CDC's 2005 Science Ambassador Program

Name _____ Date _____ Section_____

Sample ID _____

Instructions: You have been given a copy of a graph, chart, or data table. Carefully analyze your sample, then answer the following questions. Be sure to use complete sentences when describing your graph and data.

1. Is your sample a graph, data table, or chart?
2. What is the title of your sample?
3. Describe the data shown in your sample. What variables are included?
4. What conclusions and/or trends are there in the data in your sample?
5. What inferences about early child development might be drawn from your sample?
6. Other Comments:

Interpretation and Analysis of Graphs—Answer Key

Child Development: Does Early Intervention Make a Difference?
Sandra L.W. Thornton, CDC's 2005 Science Ambassador Program
Total—75 points

Graph 1

1. Is your sample a graph, data table, or chart? **(10 points)**
   This is a bar graph.

2. What is the title of your sample? **(10 points)**
   Impact of Head Start on the Number of Times Parent Reads to Child in a Week, 3- and 4-Year-Old Groups

3. Describe the data shown by your sample. What variables are included? **(20 points)**
   Answers may vary. For example, the y-axis shows the number of times a child was read to in a week. The x-axis shows the ages of the children (3 and 4 years old).

4. What conclusions and/or trends are there in the data in your sample? **(25 points)**
   Answers may vary. For example, according to the graph, children attending Head Start are read to more often.

5. What inferences about early child development might be drawn from your sample? **(10 points)**
   Answers may vary. For example, Head Start might benefit early cognitive development in children because parents are reading to their children more often, and this might help brain development.

6. Other comments.
   Answers may vary.

Interpretation and Analysis of Graphics—Answer Key

Child Development: Does Early Intervention Make a Difference?
Sandra L.W. Thornton, CDC's 2005 Science Ambassador Program
Total—75 points

Graph 2

1. Is your sample a graph, data table, or chart? **(10 points)**
   This is a bar graph.

2. What is the title of your sample? **(10 points)**
   Impact of Head Start on Behavior Problems and Hyperactive Behavior, 3-Year-Old Group

3. Describe the data shown by your sample. What variables are included? **(20 points)**
   Answers may vary. For example, the y-axis shows subscale score while the x-axis indicates behavior. The total problem behavior for Head Start and non-Head Start children are compared. The hyperactive behavior for Head Start and non-Head Start children are compared.

4. What conclusions and/or trends are there in the data in your sample? **(25 points)**
   Answers may vary. Children who participate in Head Start have less problem behavior and less hyperactive behavior than children who do not participate in Head Start.

5. What inferences about early child development might be drawn from your sample? **(10 points)**
   Answers may vary. Head Start might benefit early child development because the children might be more able to direct their own behavior.

6. Other comments.
   Answers may vary.

Interpretation and Analysis of Graphics—Answer Key

Child Development: Does Early Intervention Make a Difference?
Sandra L.W. Thornton, CDC's 2005 Science Ambassador Program
Total—75 points

Graph 3

1. Is your sample a graph, data table, or chart? **(10 points)**
   My sample is a pie graph.

2. What is the title of your sample? **(10 points)**
   Health Insurance Coverage Among Children Under Age 6, 1998

3. Describe the data shown by your sample. What variables are included? **(20 points)**
   Answers may vary. For example, the graph shows what kinds of health insurance children have, and how many children have each type. The graph includes children with public insurance, individually purchased insurance, employment-based coverage, and no insurance.

4. What conclusions and/or trends are there in the data in your sample? **(25 points)**
   Answers may vary. For example, many children under age 6 do not have any health insurance. Most children in this sample have employment-based health insurance (57.9%). The next largest group of children has public insurance (26.8%). Many children do not have any health insurance (15.5%).

5. What inferences about early child development might be drawn from your sample? **(10 points)**
   Answers may vary. For example, because children do not have insurance, they might not be able to afford to go to a doctor when they are sick. They might not get the health services they need. They might have some problems that affect their development and how well they do in school. If children do not have health insurance, they might not grow into healthy adults.

6. Other comments.
   Answers may vary.

Interpretation and Analysis of Graphics—Answer Key

Child Development: Does Early Intervention Make a Difference?
Sandra L.W. Thornton, CDC's 2005 Science Ambassador Program
Total—75 points

Graph 4

1. Is your sample a graph, data table, or chart? **(10 points)**
   My sample is a bar graph.

2. What is the title of your sample? **(10 points)**
   Percentage of Children with at Least One Physician Contact in the Past Year, 1995

3. Describe the data shown by your sample. What variables are included? **(20 points)**
   Answers may vary. This graph shows the percentages on the y-axis and children by types of insurance on the x-axis.

4. What conclusions and/or trends are there in the data in your sample? **(25 points)**
   Answers may vary. For example, children with some type of insurance see a doctor at least once. The same percentage of poor children with Medicaid insurance and non-poor children with private insurance saw a doctor at least once in the past year. The percentage of poor children that saw a doctor at least once in the past year was the smallest.

5. What inferences about early child development might be drawn from your sample? **(10 points)**
   Answers may vary. For example, poor children might not get to see a doctor when they are sick. Because they do not get to see a doctor, they might have some developmental conditions that are missed. This might affect how well they develop and progress in school.

6. Other comments.
   Answers may vary.

Interpretation and Analysis of Graphics—Answer Key

Child Development: Does Early Intervention Make a Difference?
Sandra L.W. Thornton, CDC's 2005 Science Ambassador Program
Total—75 points

Graph 5

1. Is your sample a graph, data table, or chart? **(10 points)**
   My sample is a line graph.

2. What is the title of your sample? **(10 points)**
   Percentage of Children Living in Poverty, 1986–1998

3. Describe the data shown by your sample. What variables are included? **(20 points)**
   Answers may vary. For example, the y-axis shows percentages. The x-axis shows years. There is a line for all children and a line for children under age 6.

4. What conclusions and/or trends are there in the data in your sample? **(25 points)**
   Answers may vary. Many children live in poverty. Overall, children under age 6 are more likely to live in poverty than children over age 6. The highest number of children living in poverty was around 1993. In 1998, about 20% of children under 6 lived in poverty. Between 1986 and 1998, at least 19% of all children lived in poverty.

5. What inferences about early child development might be drawn from your sample? **(10 points)**
   Answers may vary. Children living in poverty go through many difficulties. This might affect their development.

6. Other comments.
   Answers may vary.

Interpretation and Analysis of Graphics—Answer Key

Child Development: Does Early Intervention Make a Difference?
Sandra L.W. Thornton, CDC's 2005 Science Ambassador Program
Total—75 points

Graph 6

1. Is your sample a graph, data table, or chart? **(10 points)**
   My sample is a bar graph.

2. What is the title of your sample? **(10 points)**
   Health Care Encounters at Health Centers, 1998

3. Describe the data shown by your sample. What variables are included? **(20 points)**
   Answers may vary. The y-axis shows the number of encounters. The x-axis shows the reasons why children went to a health center.

4. What conclusions and/or trends are there in the data in your sample? **(25 points)**
   Answers may vary. Most visits were to see a pediatrician. Almost 500,000 children visited a health center because of asthma. Not as many visits were to see if a child was developing normally. More visits occurred when a child was sick than when a child was well.

5. What inferences about early child development might be drawn from your sample? **(10 points)**
   Answers may vary. When children do not see a doctor on a regular basis, problems might not be caught early. This might affect a child's development.

6. Other comments.
   Answers may vary.

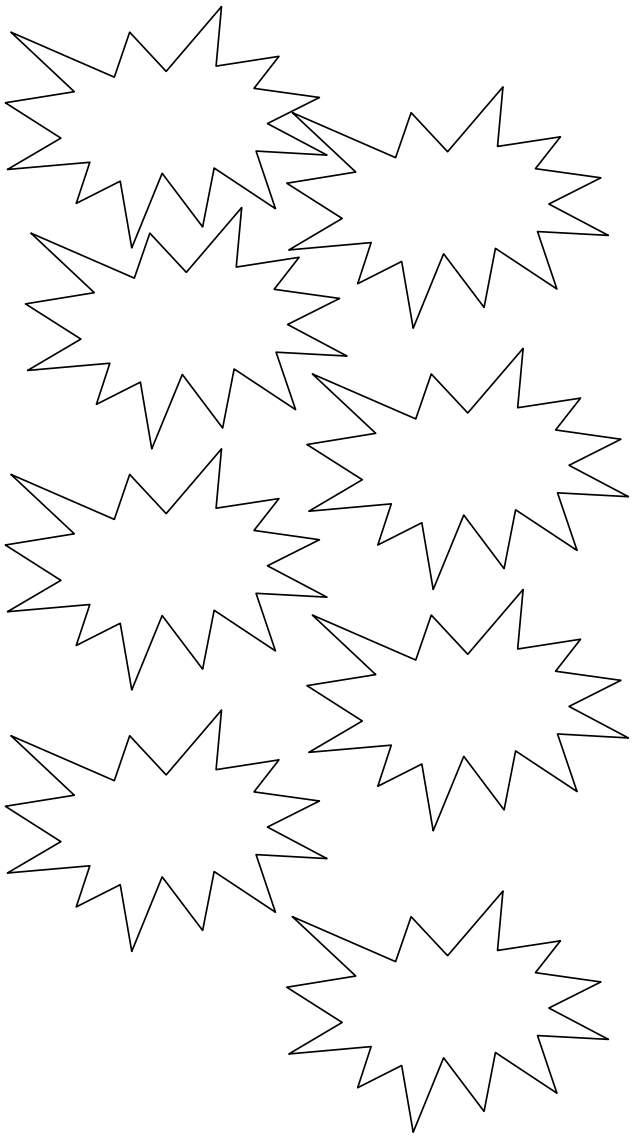
Risk Factors for Developmental Delays and Disabilities in Early Child Development

Child Development: Does Early Intervention Make a Difference?
Sandra L.W. Thornton, CDC's 2005 Science Ambassador Program

Instructions: Research risk factors for developmental delays and disabilities in child development using the Web resources provided by your teacher. List eight risk factors in the boxes below. Then use what you have learned to list eight activities that might help counteract these risk factors.

Risk Factors

Positive Activities



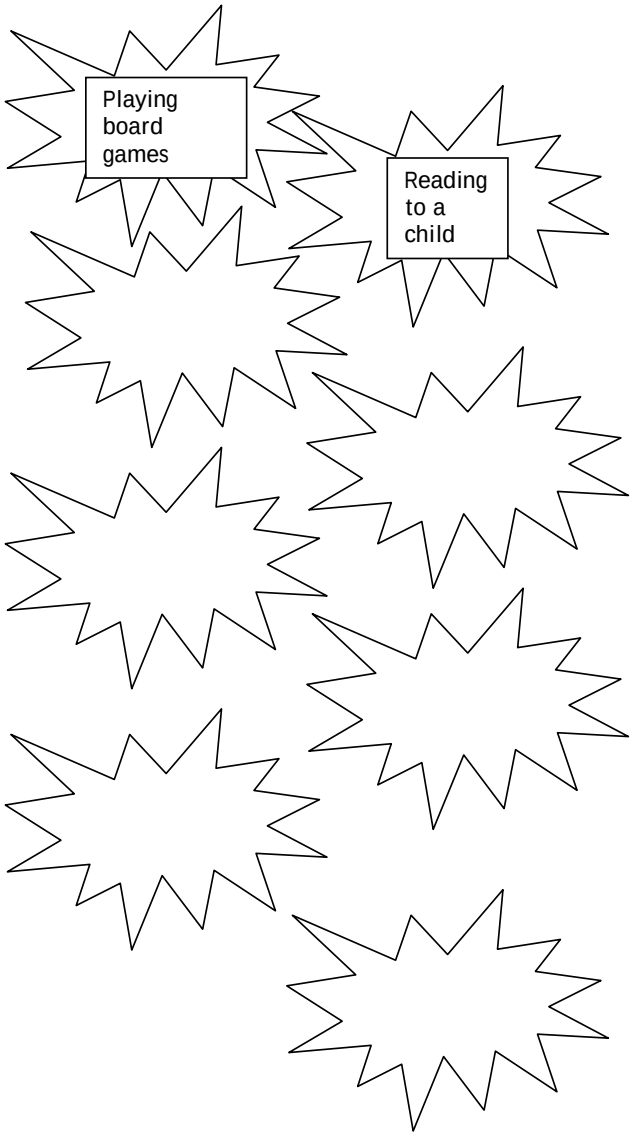
Risk Factors for Early Child Development—Answer Key

Child Development: Does Early Intervention Make a Difference?
Sandra L.W. Thornton, CDC's 2005 Science Ambassador Program

Instructions: Research risk factors for developmental delays and disabilities in child development using the Web resources provided by your teacher. List eight risk factors in the boxes below. Then use what you have learned to list eight activities that might help counteract these risk factors.

Answers will vary. Accept all reasonable responses.

Risk Factors	Positive Activities
Children living in poverty	Playing board games
Poor/inadequate nutrition	Reading to a child



Student Calendar Scoring Rubric

Child Development: Does Early Intervention Make a Difference?
Sandra L.W. Thornton, CDC's 2005 Science Ambassador Program

Date _____

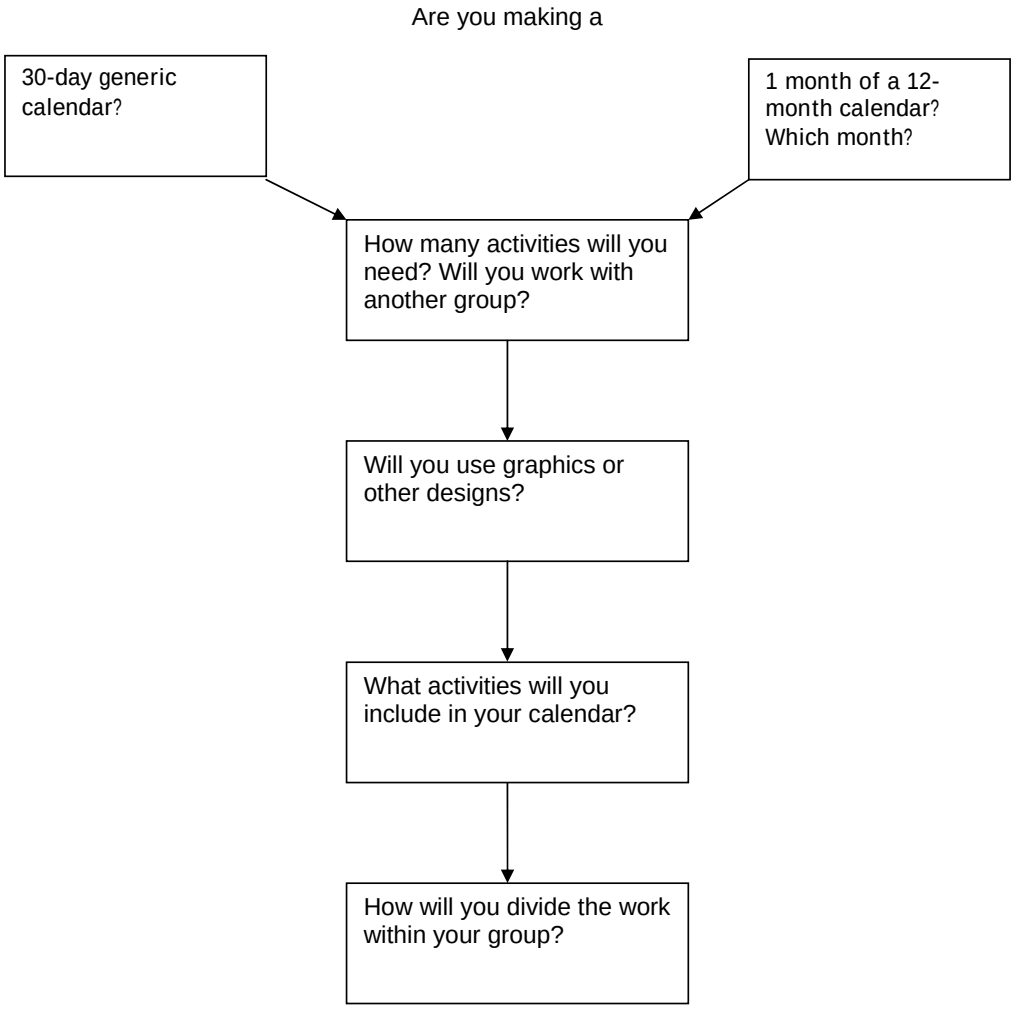
Group Members _____
_____

Descriptor	5 points	4 points	3 points	0 points	Total
Neatness and creativity	Calendar is neat with no mark-throughs. Creative design was used.	Calendar is neat with no mark-throughs.	Calendar is not neat.	No attempt.	
	10 points	**8 points**	**6 points**	**0 points**	
Accuracy of information	All information is accurate and complete.	Information is accurate, but incomplete.	Little information is included.	No attempt.	
	10 points	**8 points**	**6 points**	**0 points**	
Appropriateness	All activities are appropriate for the intended audience.	Some activities are appropriate for the intended audience.	It would be difficult for the intended audience to complete the activities.	No attempt.	
	5 points	**4 points**	**3 points**	**0 points**	
Group effort	Group worked well together. Work was completed in a timely manner.	Group had some difficulty completing the assignment but worked things out.	Group had difficulty reconciling their differences and had difficulty completing the assignment.	No attempt.	
				Total Score	

Student Planning Tool for Calendar

Child Development: Does Early Intervention Make a Difference?
Sandra L.W. Thornton, CDC's 2005 Science Ambassador Program

Use this chart and the instructions your teacher has given you to plan your calendar.



Template for Monthly Calendar

Child Development: Does Early Intervention Make A Difference?
Sandra L.W. Thornton, CDC's 2005 Science Ambassador Program

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday

Suggestions for Calendars

Child Development: Does Early Intervention Make A Difference?
Sandra L.W. Thornton, CDC's 2005 Science Ambassador Program

Encourage students to include artwork in the margins, and to use colorful designs when making their calendars.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Go for a walk. Look for something purple.	Read a story or look at a picture book together.	Pop popcorn and use measuring cups to put it into bowls. How many cups did the recipe make?	Use different utensils to blow bubbles. Are bubbles always round?	Make a necklace with round cereal. Use different colors to make a pattern.	Color a picture. Use a coloring book or draw your own picture.	Put different objects (blocks, fabric, etc.) in a bag. Reach into the bag and try to guess what you are touching.
Make a paper kite and fly it.	Go on a color scavenger hunt.	Sing silly songs.	Read a story or look at a picture book together.	Play "Guess Who?"	Put a puzzle together.	Prepare a simple recipe such as English muffin pizzas.