



Testing Thresholds of Quality on Child Outcomes Globally and in Subgroups

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Overview: Previous Research

- Empirical evidence indicating associations between quality of ECE and children's development
- Effect sizes tend to be modest
- Findings generally do not provide guidance for quality improvement or quality rating systems



Aims

- Identify thresholds of ECE quality necessary to positively and optimally influence children's development
 - Early Head Start Research & Evaluation Project (EHSREP)
 - Quality Interventions for Early Care and Education (QUINCE)
- Examine whether thresholds differ for vulnerable subgroups:
 - Low income or family risk index
 - Child ethnicity, primary language, or teacher-child ethnic match



Potential types of “Thesholds”

1. No significant association between quality & development until a minimum score
2. Significant association between quality and development up to a point of diminishing returns
3. Combination of 1 & 2, with a “sensitive range” identified between the “floor” and “ceiling”



Approaches to Identifying Thresholds: Previous Research

- Spline models based on assessments of quality with benchmarks for low/moderate/high quality
- Spline models based on programs scoring above or below the mean on quality



Approaches to Identifying Thresholds: Previous Research

- General Additive Model (GAM) analysis
 - Linear or non-linear function
 - Empirical identification of “thresholds”



Current Study: Combined Approaches

1. GAM Analysis: linear/non-linear?
2. If non-linear, spline analyses based on:
 1. Established benchmarks when available
 2. Empirically identified thresholds
3. Test significance of spline model overall and each segment of the model



Samples

- QUINCE (FCC n = 650 children; Center-based n = children 652)
 - Children ages 20 months – 5 years
 - Assessed fall and spring; T2 focus of this analysis
- EHSREP
 - Children assessed at 14, 24, 36, and 60 months

	Family Child Care	Center Care
14	151	372
24	159	416
36	134	500
60	80	1043



Quality Measures

- ITERS (EHSREP only)
- ECERS-R
- FDCRS
- CIS (in both family and center-based programs)



Child Outcomes: QUINCE

- Social-Emotional Development:
 - Social Competence
 - Conduct Problems
 - Anxiety/Depression
- Cognitive Development:
 - Bracken Basic Concepts Scale
 - Preschool Language Scale - IV



Child Outcomes: EHSREP Social-Emotional Measures

Orientation/Engagement (BBRS)	Emotional tone with Teacher (Howes)
Emotion Regulation (BBRS)	Conflict with Teacher (Howes)
Emotionality (EASI)	Prosocial with Peer (Howes)
Sociability (EASI)	Pretend Play (Howes)
Child Engagement of Parent (3-bag)	Cooperative & Complex Play (Howes)
Sustained Attention w/Objects (3-bag)	Anxious Composite (Howes)
Negativity toward Parent (3-bag)	Aggressive Composite (Howes)
ASEBA Scale Score (Achenbach TRF)	Social Skills/Approaches to Lrng (FACES)
Aggressive Behavior (CBCL)	Aggression (FACES)
Emotion Regulation (Leiter-R)	Total Problem Behavior (FACES)
Attention (Leiter-R)	



EHSREP Cognitive Measures

Mental Development Index	Bayley
Vocabulary Comprehension	Macarthur CDI
Vocabulary Production	Macarthur CDI
PPVT-III Standard Score	
TVIP Standard Score	
Letter-Word Identification	Woodcock-Johnson
Applied Problems Standard Score	Woodcock-Johnson



GAM Results: Linear & Non-Linear Models

Early Head Start – 14 Months

Social-Emotional Measure	FDCRS	ITERS	CIS
Child Engagement of Parent (3-bag)	L		
Sustained Attention with Objects (3-bag)	L	N	N
Negativity toward Parent (3-bag)			N
BBRS: Emotion Regulation			N
EASI: Emotionality	N		
EASI: Sociability		N	
Cognitive Measures	FDCRS	ITERS	CIS
Macarthur CDI Vocabulary Comprehension		L	N
Macarthur CDI Vocabulary Production	N		



EHS 14 Months ITERs & Sustained Attention to Objects Spline Analysis

- The association between ITERs quality and sustained attention becomes positive at an ITERs score of 5.0

Line Segment	Estimate (slope)	Std Err	P-value
[0.0, 3.3]	0.35 (0.35)	0.219	0.111
[3.3, 5.0]	-0.767 (-0.417)	0.316	0.016*
[5.0, 7.0]	0.712 (0.295)	0.238	0.003**



GAM Results: Linear & Non-Linear Models

Early Head Start – 24 Months

Social-Emotional Measure	FDCRS	ITERS	CIS
Child Engagement of Parent (3-bag)	L		
Sustained Attention with Objects (3-bag)	N		
Negativity toward Parent (3-bag)			N
BBRS: Orientation/Engagement	L	N	
BBRS: Emotion Regulation	L	N	
Cognitive Measures	FDCRS	ITERS	CIS
Macarthur CDI Vocabulary Production	N		N
Macarthur CDI Sentence Completion	N	L	L
Bayley: BSID-II Mental Dev. Index Score			L



GAM Results: Linear & Non-Linear Models

Early Head Start – 36 Months

Social-Emotional Measures	FDCRS	ECERSR	CIS
Child Negativity toward Parent		N	
BBRS Orientation/Engagement	N		
Achenbach ASEBA	N	N	

Cognitive Measures	FDCRS	ECERSR	CIS
Bayley Mental Dev. Index			N
PPVT-III Standard Score	L		



GAM Results: EHS 60 Months

Social-Emotional Measures	FDCRS	ECERSR	CIS
Emotion Regulation (Leiter-R)	N		N
Attention (Leiter-R examiner rating)	N		N
Intimate with Teacher (Howes)	N		L
Emotional Tone with Teacher (Howes)			N
Conflict with Teacher (Howes)		N	N
Prosocial with Peer (Howes)		N	L
Pretend Play (Howes)	N	N	
Cooperative & Complex Play (Howes)	N	N	
Anxious Composite (Howes)		N	N
Aggressive Composite		N	N
Social Skills/Positive Approaches to Learning (FACES)	L		
Aggression (FACES)		N	
Problem Behavior (FACES)		N	
Cognitive Measures	FDCRS	ECERSR	CIS
Cognitive Social Standard Score (Leiter-R)	N		N
PPVT-III Standard Score		L	
Applied Problems (W-J Standard)	N	L	
Letter-Word Identification (W-J)	N	N	L



GAM Results: QUINCE

Cognitive Measures	FDCRS	ECERSR	CIS
Bracken Basic Concepts Scale	N	N	N
Preschool Language Scale - IV			N

Social-Emotional Measures	FDCRS	ECERSR	CIS
Social Competence	N	N	L, N
Conduct Problems	N		N
Anxiety/Depression		L	

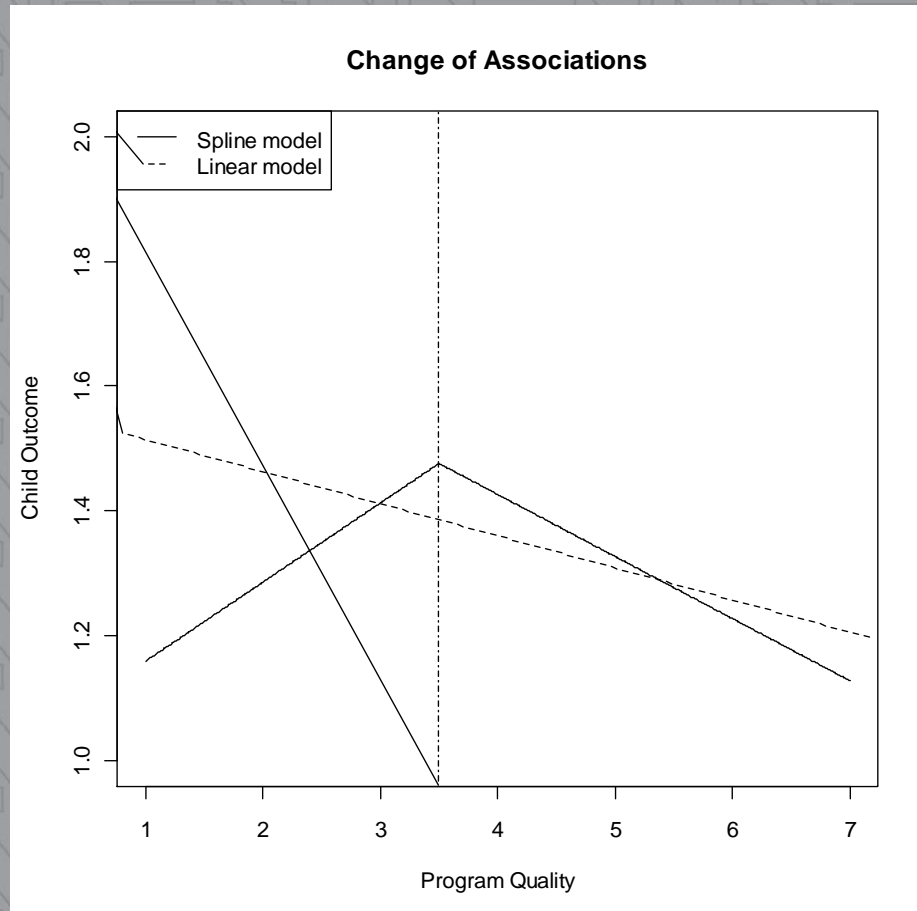


Quality Measures (ERS) and Social-Emotional Development

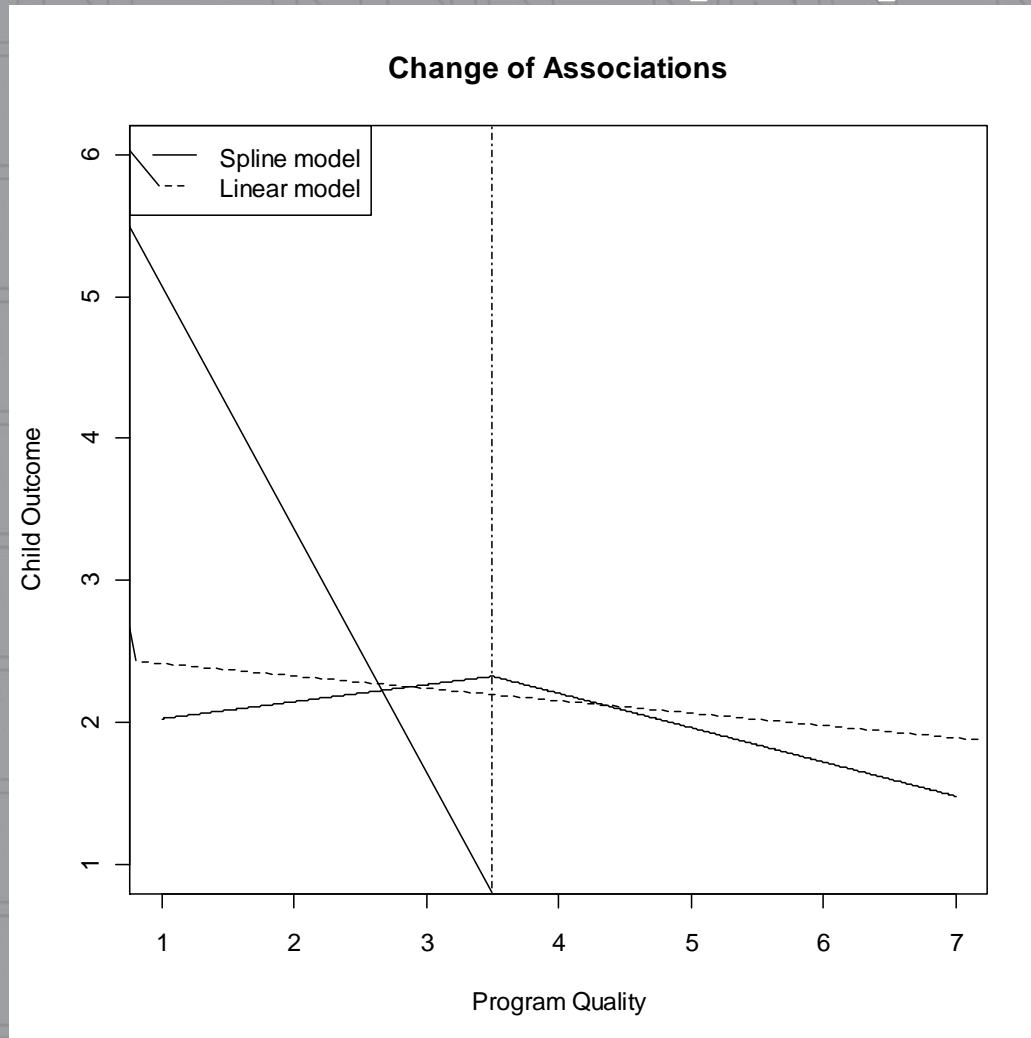
- EHS (36 months): Child's negativity toward parent begins to decrease at an ECERS-R threshold of 3.5
- QUINCE: Child's conduct problems begin to decline at a FDCRS threshold of 3.5



EHS 36 Months ECERS-R & Negativity with Parent Spline Analysis



QUINCE Spline Analysis: FDCRS & Conduct Problems (3.5)

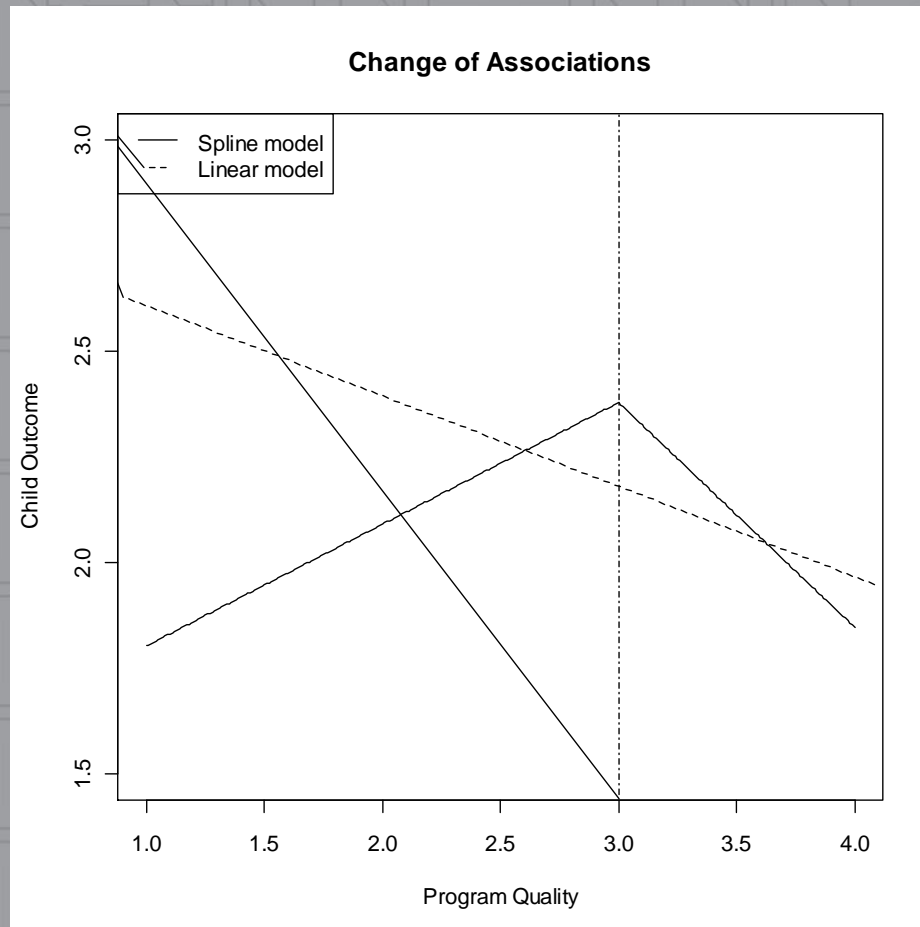


Quality (CIS) and Social-Emotional Development: EHS 60 Months

- Child's aggressive behavior begins to decline at a CIS threshold of 3.0
- Howes emotional tone with teacher begins to improve at a CIS threshold of 3.0
- Howes anxious composite begins to decline at a CIS threshold of 3.5



EHS 60 Months CIS & Aggressive Composite Spline Analysis

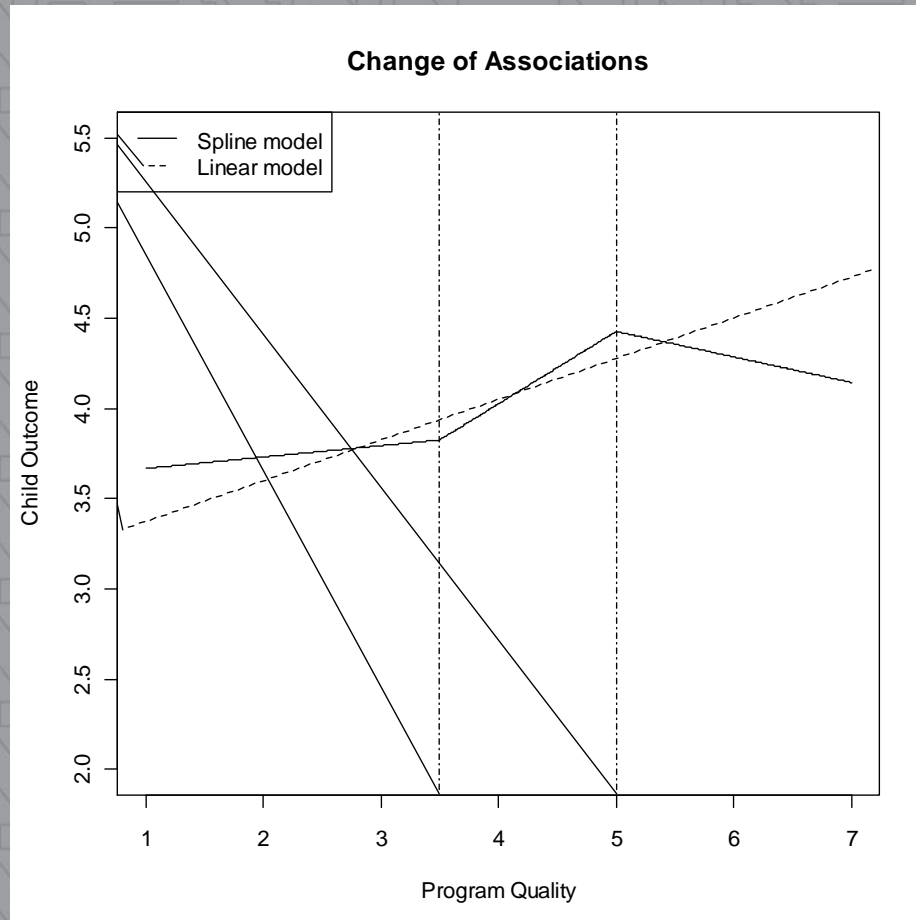


Quality Measures and Social Competence: QUINCE

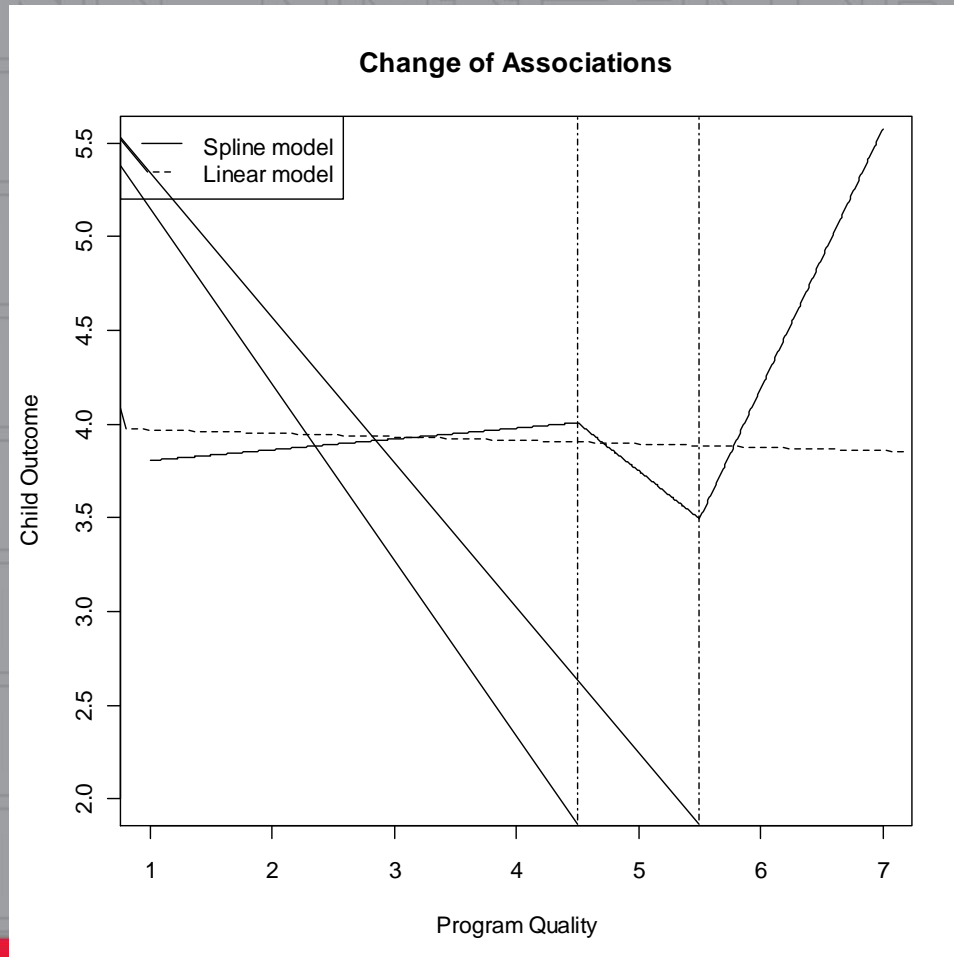
- Social Competence was most sensitive to change in the FDCRS range of 3.5 – 5.0
- Social Competence does not begin to benefit until a threshold of 5.5 is reached on the ECERS-R



QUINCE Spline Analysis: FDCRS and Social Competence (3.5 & 5)



QUINCE Spline Analysis: ECERS-R and Social Competence (4.5 and 5.5)

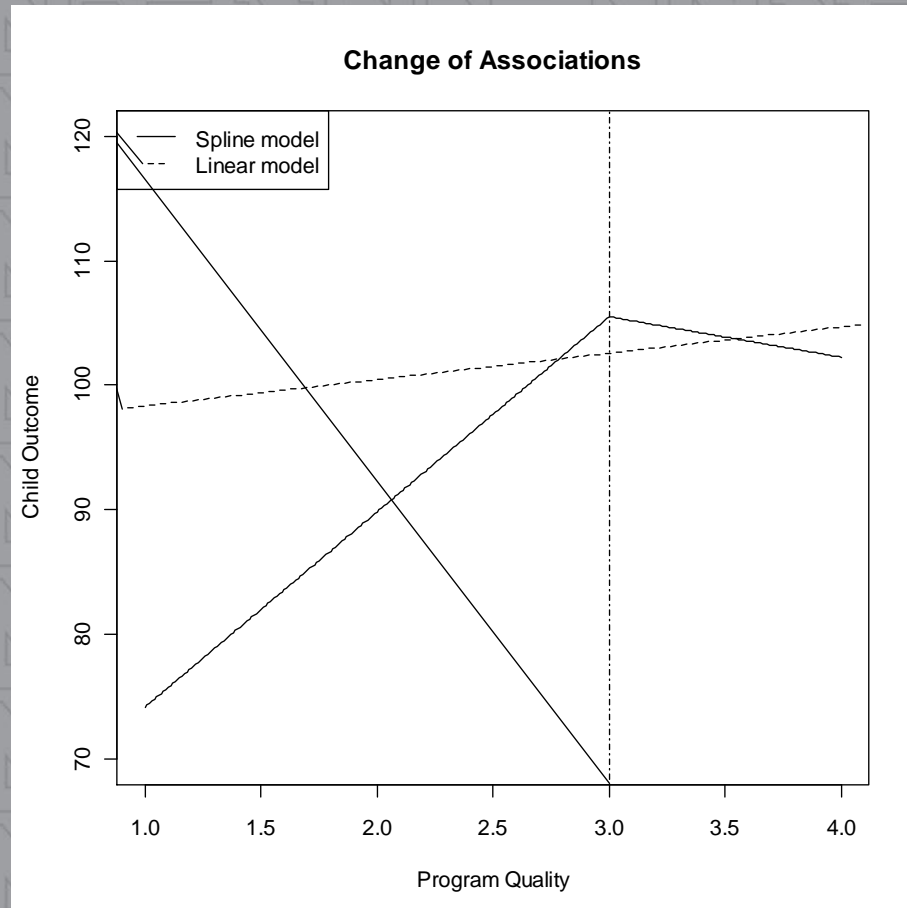


Quality Measures and Cognitive Development

- Bracken Basic Concepts Scale was most sensitive to change in the ECERS-R range of 3.5-4.5 (QUINCE)
- Bayley Mental Development Index benefitted in the CIS range of 2.5-4.0 (EHS)



QUINCE Spline: Arnett CIS & PLS-IV (3.0)



Conclusions

- Many associations between quality measures and children's developmental outcomes are non-linear
- GAM analysis is a useful tool for identifying associations that are best represented by non-linear models
- Important to keep in mind that the identified thresholds represent the beginning of a sensitive range, so it's important to improve quality within the sensitive range



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