

Early Identification Of Problem Youth Using Teacher Rated Aggression



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A Public Health Perspective On Identifying And Intervening With Multi-problem Youth

- Efficient method for early identification for those youth most at-risk
- School setting as context for identification and intervention
- Nested approach for identification and intervention



Baltimore Prevention Program: Design For First Stage Trials

- 19 elementary schools, 43 first grade classrooms
- Two cohorts of first grade children, about 1000 each
- Five urban areas, varied in ethnicity and SES from low to low - middle
- 3 to 4 matched schools in each urban area
- Random assignment within each urban area of schools, teachers, and children



Overview Of Presentation

- Ultimate goal: Efficient method for early identification of youth most at-risk for later problems
- Series of studies:
 - Utility of single time point teacher ratings of aggression in predicting multiple problems
 - Gender differences
 - Utility of multiple time points
 - Gender differences



References

Petras, H., Chilcoat, H., Leaf, P., Ialongo, N. & Kellam, S. (2004). The utility of teacher ratings of aggression during the elementary school years in identifying later violence in adolescent males. Journal of the American Academy of Child and Adolescent Psychiatry,1, 88-96.

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Schaeffer, C., **Petras, H.**, Ialongo, N., Kellam, S., & Poduska, J. (2003). Modeling growth in aggressive behavior across elementary school: Early identification of boys with later criminal involvement, conduct disorder, and antisocial personality disorder. Developmental Psychology, 6, pp. 1020-1035.

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Aggression: Risk Factor Vs. Screening Approach

- Risk Factor Approach:
 - using aggression as an antecedent of later violence
- Screening Approach:
 - using aggression to identify individuals at risk for later violence
- While an accurate screening indicator is also most likely to be a strong risk factor for the outcome or at least strongly correlated with the outcome, the opposite is not necessarily true.

Aggression And Later Violent Arrest

	Male		Female	
	OR	95% CI	OR	95% CI
Fall 1st	1.37	1.12-1.68	1.63	1.20-2.21
Spring 1 st	1.49	1.18-1.89	1.57	1.16-2.12
Spring 2 nd	1.57	1.25-1.98	1.56	1.05-2.32
Spring 3rd	2.05	1.61-2.60	1.98	1.50-2.59
Spring 4 th	1.89	1.47-2.43	1.64	1.21-2.23
Spring 5th	1.88	1.49-2.37	2.48	1.85-3.32



Clinical/Policy Significance Of Risk Factors

(Kraemer et al. 1999, 2002)

- How much difference does it make to those who have the outcome to be correctly classified? → **false negatives**
- How much difference does it make to those who do not have the outcome to be correctly classified? → **false positives**

Potency Of Risk Factors

	Test (+)	Test (-)
Outcome (+)	A	B
Outcome (-)	C	D

$$Q=A+C$$

$$Q'=1-Q=B+D$$

$$P=A+B \rightarrow \text{Base Rate}$$

$$P'=1-P=C+D$$

$$\text{Sensitivity (Se)}=A/A+B$$

$$\text{Specificity (Sp)}=D/1-P$$

■ $\kappa(r)=(AD - BC)/(PQ'r + P'Qr') \rightarrow$ Cohen's weighted Kappa

$$- \kappa(0)=(AD - BC)/(P'Q) = (\text{Sp} - Q')/Q$$

$$- \kappa(0.5)=2(AD - BC)/(PQ' + P'Q) \rightarrow \text{default for regular ROC}$$

$$- \kappa(1)=(AD - BC)/(PQ') = (\text{Se} - Q)/Q'$$



Three Intervention Scenarios

Scenario 1 (Kappa weight $r=1.0$): Optimal Sensitivity

- Emphasis is on reducing false negatives
- Recommended if the costs of the intervention are high and /or iatrogenic effects are possible

Scenario 2 (Kappa weight $r=0.0$): Optimal Specificity

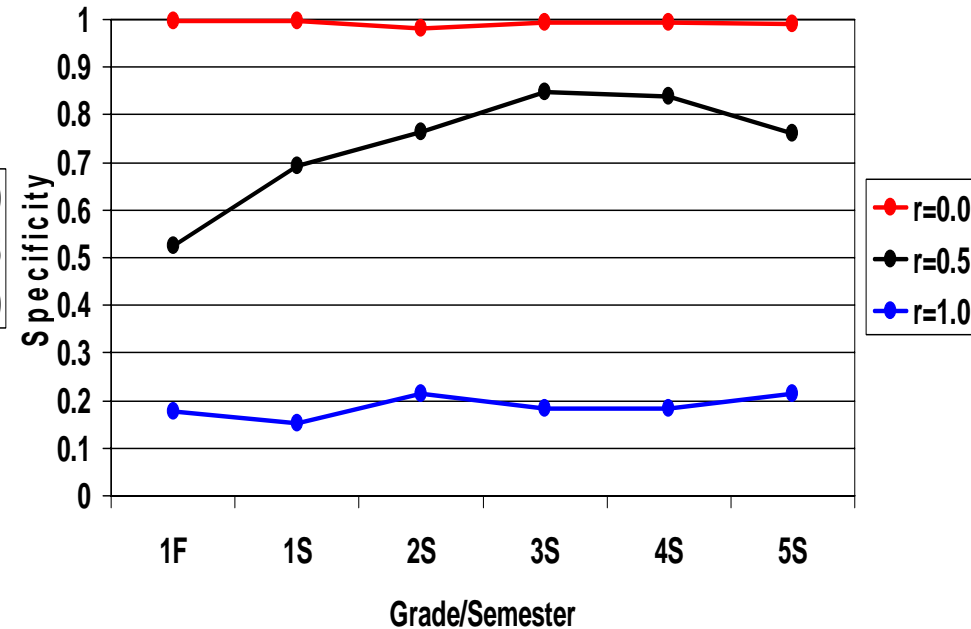
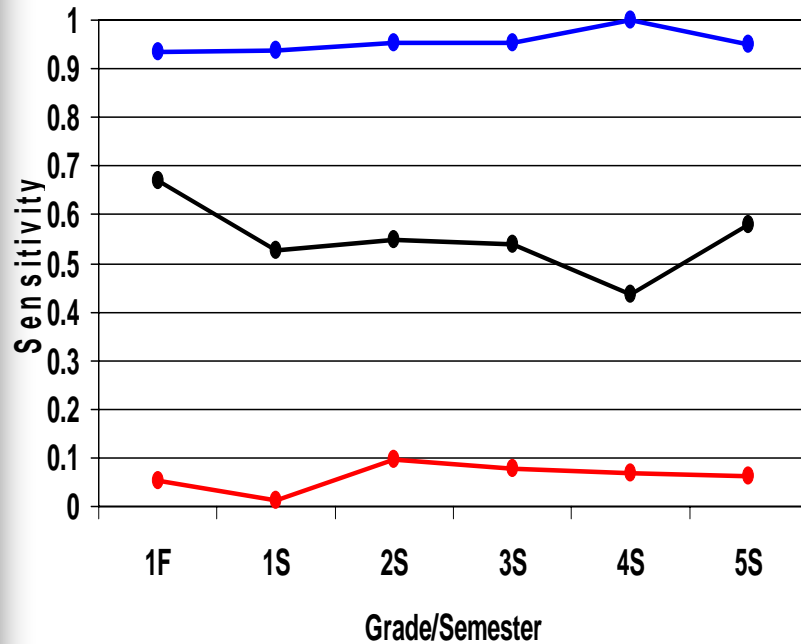
- Emphasis is on reducing false positives
- Recommended for noninvasive screening or as a “rule out” test and for interventions of very low cost and risk

Scenario 3 (Kappa weight $r=0.5$): Optimal Efficiency

- places equal emphasis on reducing both false positives and false negatives

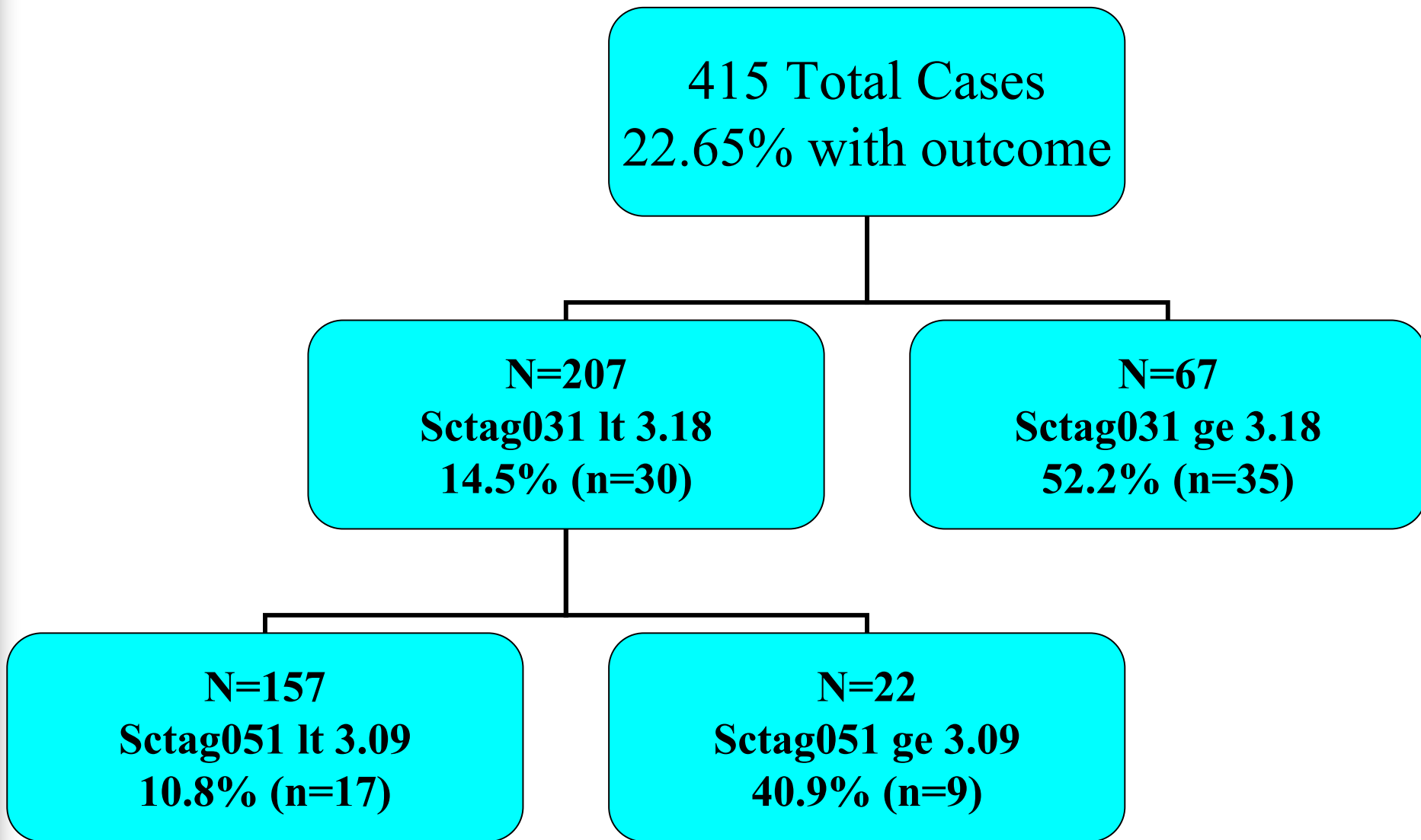
More generally, the kappa weight can be set to exactly match the particular screening goal: For example if a false negative outcome were considered 4 times worse than a false positive outcome then $r=4/4+1=0.8$.

Sensitivity / Specificity - Boys

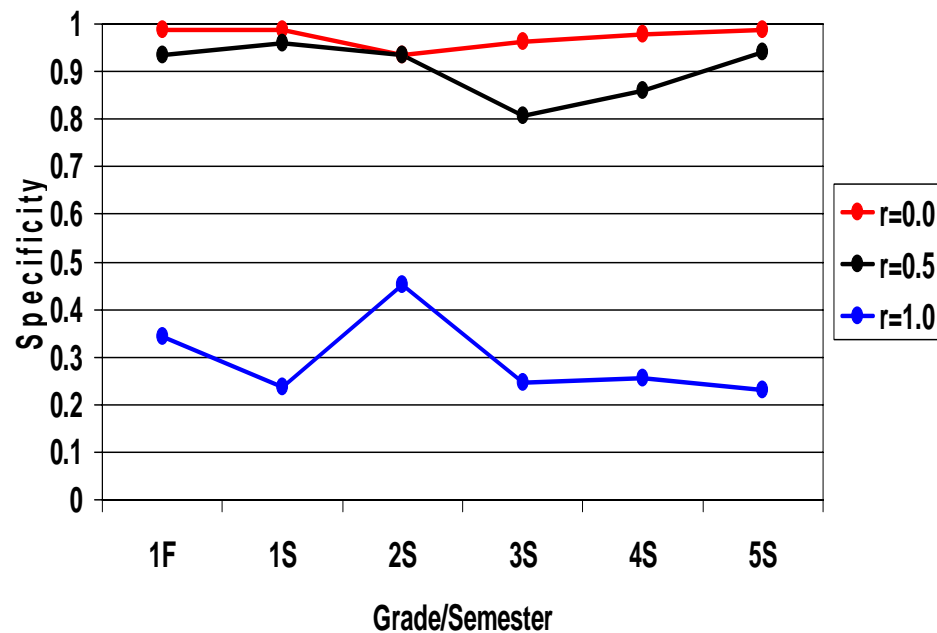
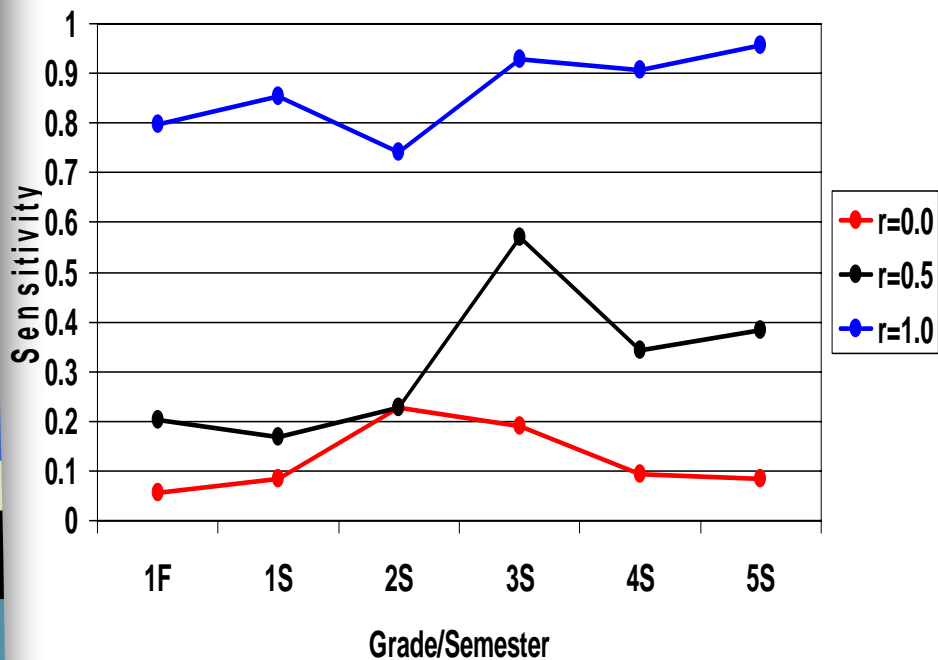


Kappa	1F	1S	2S	3S	4S	5S
R=0.0 (OSP)	0.785	0.360	0.487	0.782	0.775	0.611
R=0.5 (OE)	0.135	0.177	0.273	0.381	0.283	0.319
R=1.0 (OS)	0.580	0.525	0.728	0.692	1.000	0.711

Decision Tree for Boys (Kappa weight $r=0.5$)

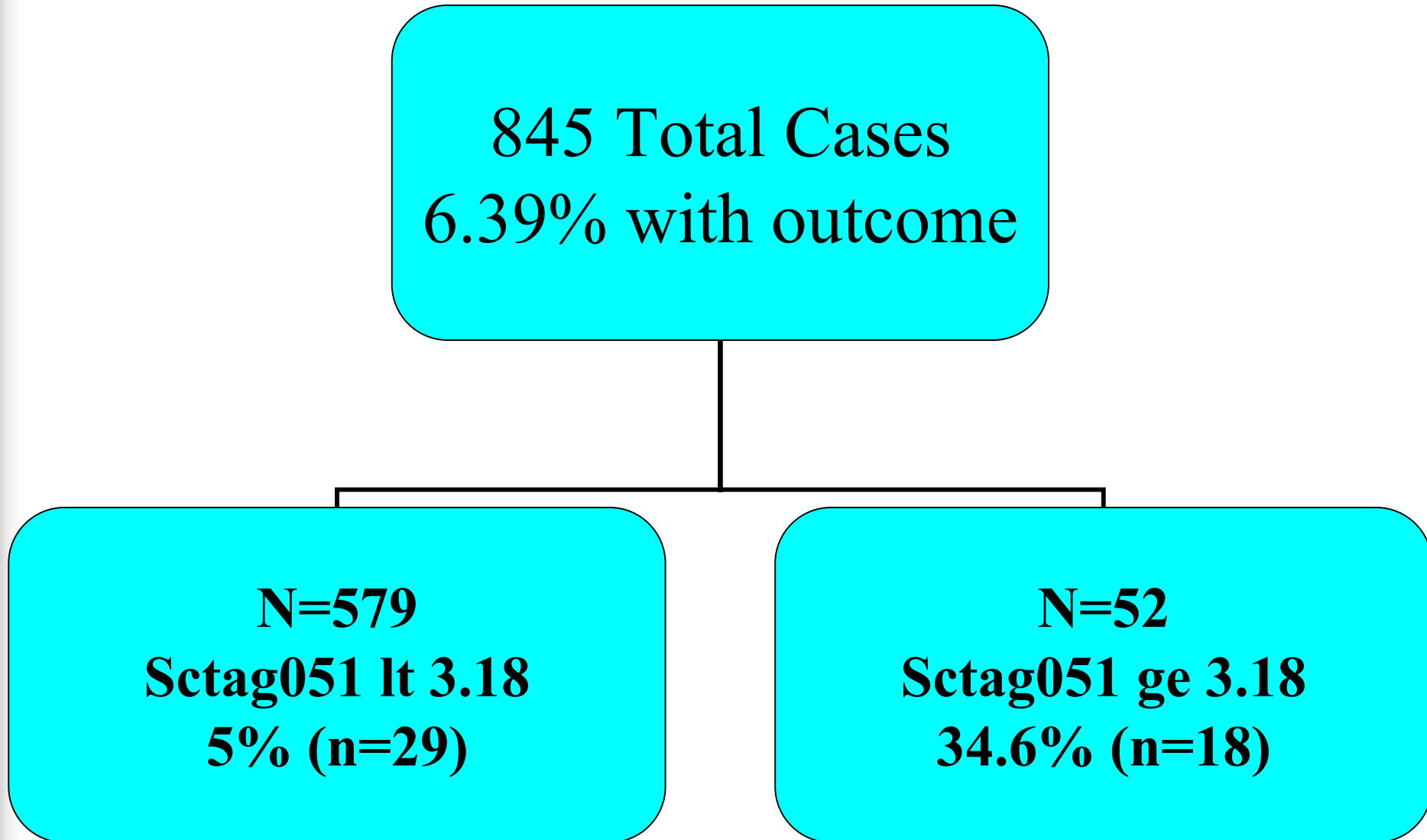


Sensitivity / Specificity - Girls



Kappa	1F	1S	2S	3S	4S	5S
R=0.0 (OSP)	0.199	0.287	0.113	0.221	0.166	0.312
R=0.5 (OE)	0.130	0.140	0.134	0.193	0.117	0.310
R=1.0 (OS)	0.390	0.372	0.416	0.693	0.621	0.803

Decision Tree for Girls (Kappa weight $r=0.5$)

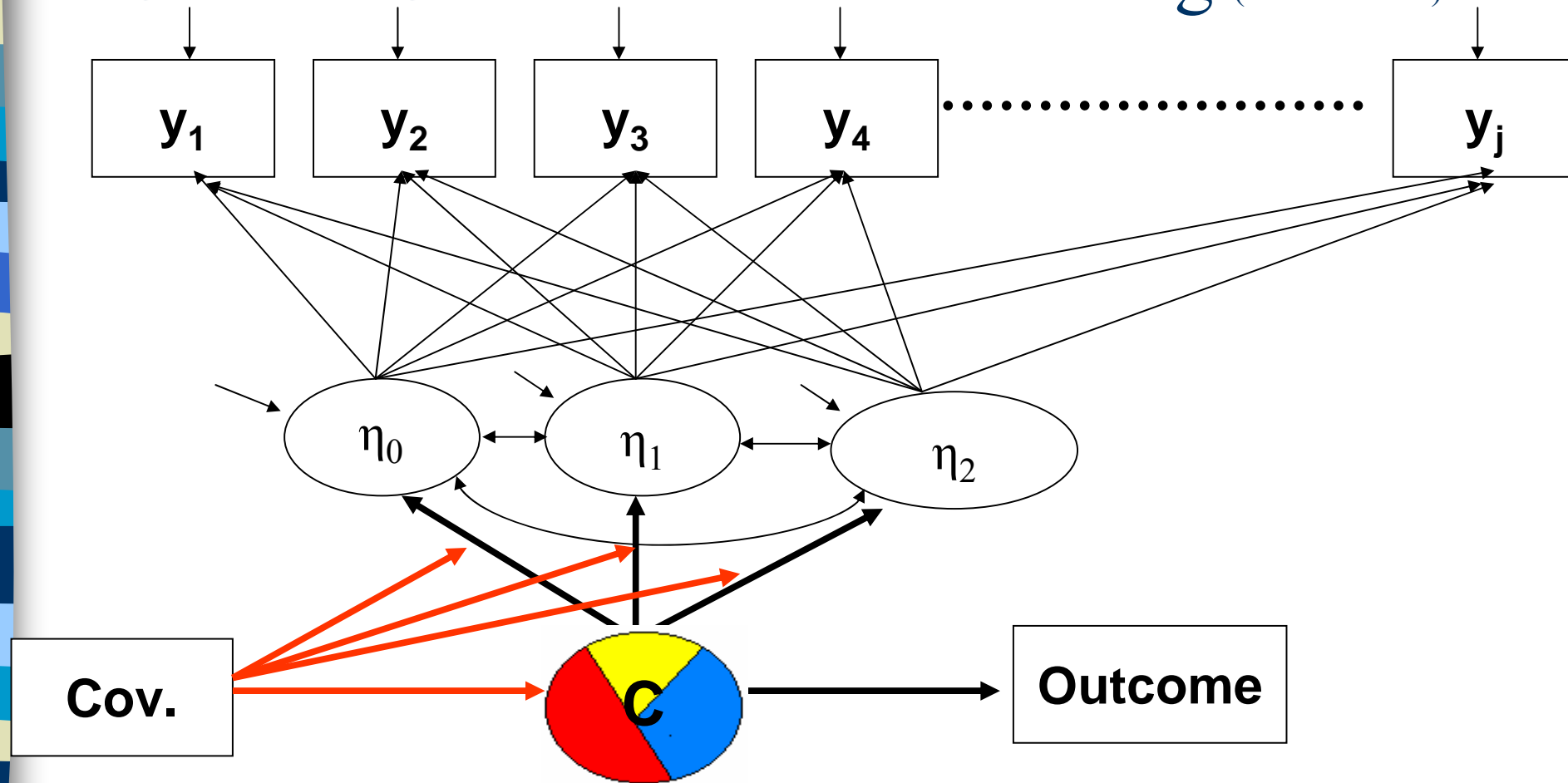




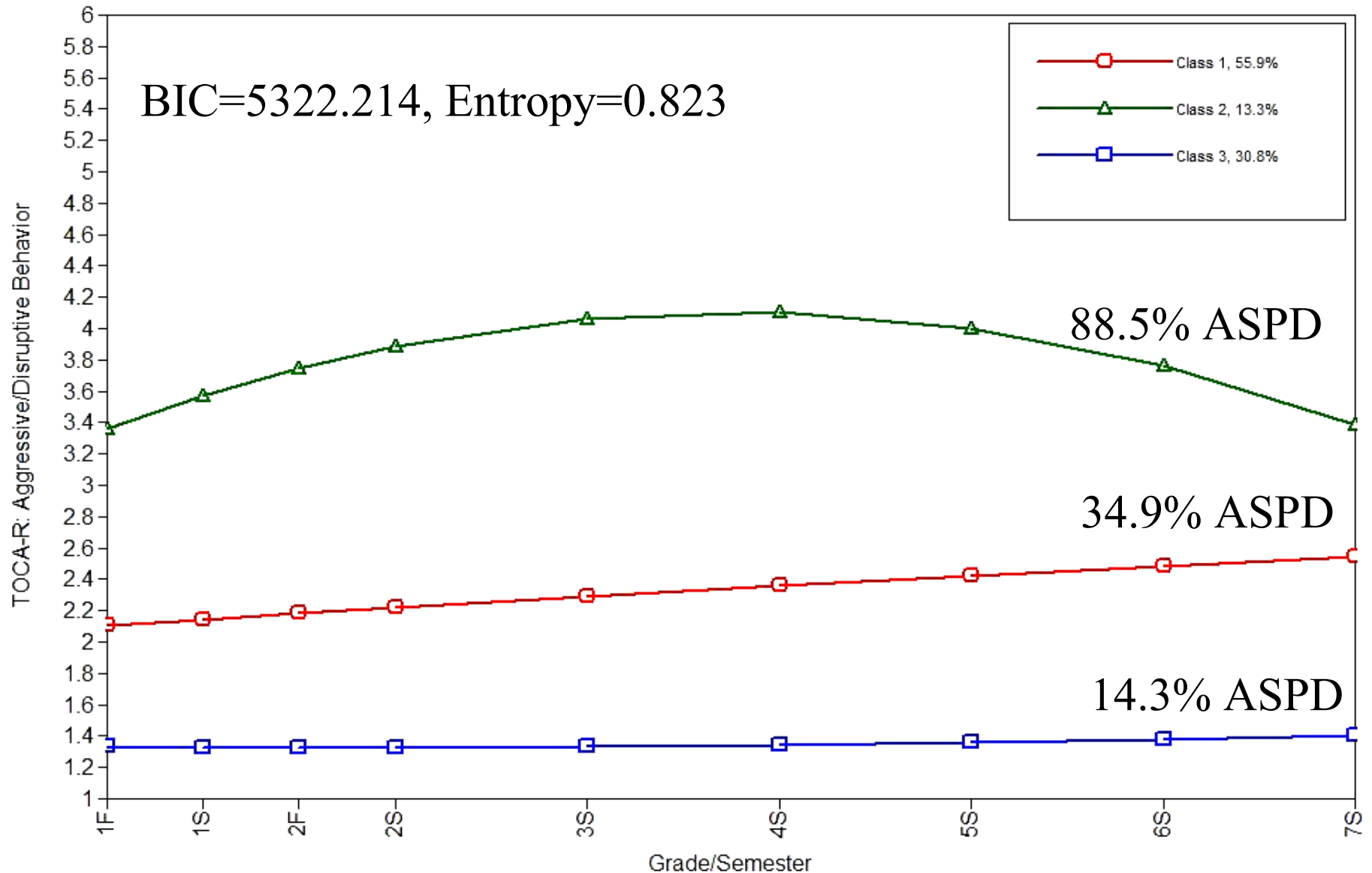
Conclusion: Utility of Single Time Points

- Based on teacher rated aggression, boys at-risk for violence can be identified more accurately and earlier than girls, when the emphasis is on reducing false positives or false negatives.
- When the emphasis is on reducing both false negatives and positives, the screening utility found for both boys and girls is limited.

Utility of Multiple Time Points: General Growth Mixture Modeling (Muthén 2004)



Cohort 1 Control Boys (n=337)



Level of Identification Accuracy

Area Under the Curve

Test Result Variable(s)	Area
cprob1	.429
cprob2	.776
cprob3	.310



Future Steps

- Determine the Sensitivity/Specificity of later outcome in the General Growth Mixture Framework
 - How many time points are need to reach sufficient levels of sensitivity/specificity?
- Which items of the TOCA-R construct show the highest utility in identifying problem youth?



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