Prevention of Antisocial Behavior: The Most Effective Interventions for Changing the Most Predictive Risk Factors

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Overview

We use meta-analysis of relevant empirical research to address three questions:

❑ What risk factors are most predictive of antisocial behavior (ASB) in adolescence and early adulthood?

❑ What interventions prior to adolescence are most effective for changing those risk factors?

❑ Given the evidence about the effects of intervention on risk and the relationship of risk to ASB, what is the maximum expected preventive effect of early intervention on later ASB?

First of two meta-analytic databases: "Predictors"

- Longitudinal studies reporting risk-ASB relationships

- Risk factors at age 10 ± 4 years; ASB at age 16 ± 4 years

- 419 independent subject samples (>173K children)

- 2437 correlational effect sizes for a risk variable at Time 1 predicting ASB at Time 2

Second of two meta-analytic databases: "Early Intervention"

- Experimental & quasi-experimental studies with risk predictors as outcome variables

- Effects for children under 14 years old

- 487 independent subject samples (>70K children)

- 1809 standardized mean difference effect sizes for treatment effects on risk variables.

Linking the two databases by way of risk constructs

- Original coding categories for risk predictor and early intervention outcome constructs had been derived inductively from the respective sets of studies.

- Overlapped thematically but did not align well in their particulars.

- A common set of categories and definitions was developed and all Predictor and Early Intervention effect sizes were recoded into those categories.

Risk factors appearing as both predictors of ASB and early intervention outcomes

Prior antisocial behavior

- *Delinquency*: Early delinquency and comparably serious destructive or aggressive behavior.

- *Externalizing*: Externalizing behavior such as aggressive-disruptive and problem behaviors in school and family settings.

- *Substance use orientation*: Use of tobacco or limited use of other substances; positive attitudes toward substance use; exposure to substance use among friends or family.

- *Substance use*: Use of alcohol, marijuana, or mixed use of either and/or other drugs.

Risk factors appearing as both predictors and intervention outcomes (continued)

Personal characteristics

- *Internalizing*: Internalizing symptoms such as anxious, withdrawn, socially isolated, or depressed.
- *Self-esteem*: Regard for self represented as self-esteem, self-concept, perceived efficacy, self-confidence, locus of control.
- *Emotional regulation*: Self-control, impulsivity, anger management, frustration tolerance.
- *Attention-activity*: ADHD symptoms, attention, on-task behavior, hyperactivity.
- *Overall problems*: Overall scores on the CBCL or similar diagnostic instruments for psychological and behavioral problems in children.

Risk factors appearing as both predictors and intervention outcomes (continued)

Family factors

- *Parenting practices*: Parenting behaviors or skills with the child, mainly representing discipline and supervision/monitoring.

- *Parental warmth*: Warmth, affection, attachment, rejection/acceptance of child.

- *Family functioning*: Overall scores on multifaceted instruments about family functioning, e.g., family integration, communication, conflict, and the like.

Risk factors appearing as both predictors and intervention outcomes (continued)

Social relations

- *Sociability*: Peer relationships, general and specific social skills, social competence, popularity etc. from the perspective of others (teachers, parents, peers).

- *Social self-concept*: The child's self perceived social skills, interpersonal relationships, popularity.

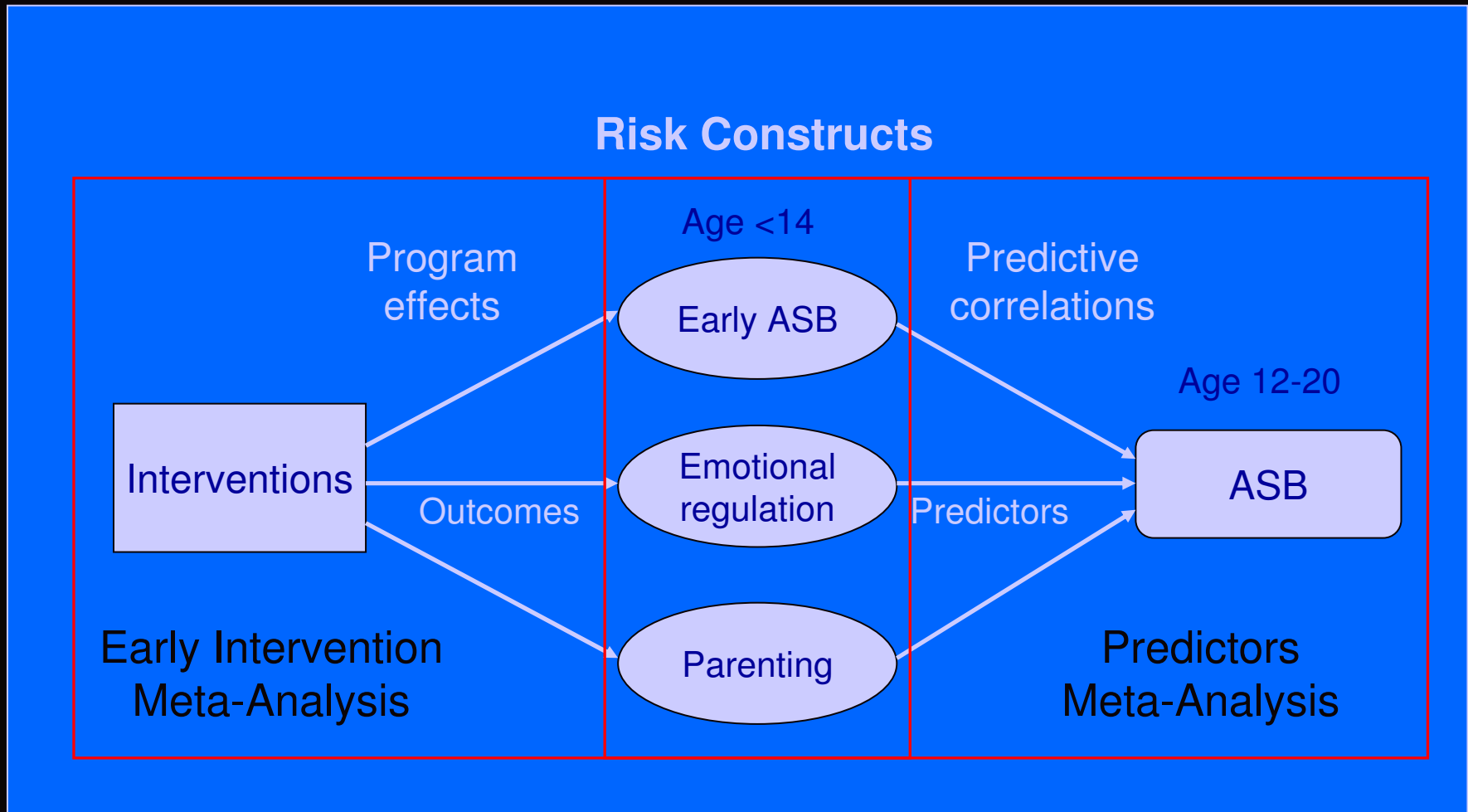# Risk factors appearing as both predictors and intervention outcomes (continued)

School behavior

- *Academic performance*: Achievement test scores, grades, retention, general cognitive skills.
- *School participation*: Attendance, truancy, dropout.
- *School adjustment*: General multifaceted measures of appropriate school behaviors, learning and study skills, attitudes toward school, cooperating with teachers, and the like.

Disconnects between the risk constructs in longitudinal research and outcomes in intervention research

- Affiliation with antisocial peers-- appears in longitudinal research but rare as an outcome in intervention research..

- Interpersonal problem solving skills-- appears as an outcome for intervention research but is not well represented in the longitudinal risk research.

- Theoretically relevant constructs such as empathy, rule-following, and moral reasoning have limited representation in both forms of research on antisocial behavior.

Summary: Intervention effects & risk predictors linked by common risk constructs

Risk Constructs

Program effects

Age <14

Early ASB

Predictive correlations

Age 12-20

Interventions

Outcomes

Emotional regulation

Predictors

ASB

Early Intervention Meta-Analysis

Parenting

Predictors Meta-Analysis

Meta-Analysis of Longitudinal Studies to Identify the Risk Factors Most Predictive of Later Antisocial Behavior

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General Criteria for Studies Included in the Meta-Analysis

- Prospective longitudinal panel studies.

- Majority of the subject sample under age 19 at the first wave of measurement; restricted to 14 or under for this analysis.

- Participant sample represents the general population or a population distinguished only by general indicators of risk, e.g., sex, race, SES, previous ASB, conduct disorder.

- Study reports on the relationship between a predictor variable and antisocial behavior measured at a later time.

- Conducted in the U.S. with the earliest study report published in English after 1950. No exclusions based on type of publication, characteristics of the researchers, or method features other than those identified above.

Major Types of ASB Outcomes (Measured Between Ages 12 and 20)

Delinquent and aggressive/disruptive behavior:

- delinquent or illegal behavior*
- interpersonal aggression, intentional violence
- general externalizing and undifferentiated problem behavior

* Target outcome at age 16

Major Categories of Predictor Variables (Measured Between Ages 6 and 14)

	Studies	Samples	ESs
Prior ASB			
Delinquency	41	69	415
Externalizing	50	85	497
Substance use orientation	11	15	138
Substance use	6	6	17
Personal characteristics			
Internalizing	23	36	97
Self-esteem	14	25	81
Emotional regulation	7	7	24
Attention-activity	7	10	43
Overall problems	7	14	39

Major Categories of Predictor Variables (continued)

	Studies	Samples	ESs
Family factors			
Parenting practices	18	26	341
Parental warmth	17	28	187
Family functioning	15	17	42
Social relations			
Sociability	18	21	91
Social self-concept	8	14	33
School behavior			
Academic performance	27	40	159
School participation	5	6	11
School adjustment	15	29	222

We Fit a Regression Model for Each Category of Predictor Variables

Dependent Variable: T1 Risk-T2 Outcome correlation

Independent Variables:
- Sample size (logged)
- Attrition, T1 to T2
- Age, sample mean at T1
- Time interval, T1 to T2
- Time interval squared
- T1 measure: questionnaire (vs. other)
- T1 informant: parents vs. teachers vs. peers vs. multiple
- T1 measure: number of items
- T1 measure: scaling (dichotomous vs. continuous)
- T1 & T2 informant different (vs. same)
- T1 & T2 N of items different (vs. same)
- T1 & T2 scaling: different (vs. same)
- Risk level of sample
- Percent male
- Predominant ethnicity
- Outcome variable: delinquency (vs. externalizing, aggression)

Example: Predicting the T1 Prior Delinquency/T2 Delinquency Correlation

Independent Variable	Coefficient	
Constant	.553	
Sample size (logged)	-.053*	
Attrition, T1 to T2	-.178*	
Age, sample mean at T1	.001	
Time interval, T1 to T2	-.007*	
Time interval squared	.001*	
T1 measure: questionnaire	.052*	
T1 informant: peers	.116*	
T1 informant: records	-.075*	
T1 measure: number of items	.074*	
T1 measure: scaling	.017*	
T1 & T2 informant different	-.160*	
T1 & T2 N of items different	.070*	
T1 & T2 scaling: different	-.014	
Risk level of sample	-.003	
Percent male	.017	
Predominant ethnicity white	.035*	
Outcome variable: delinquency	-.049*	* $p<.10$

Example: Predicting the T1 Prior Delinquency/T2 Delinquency Correlation

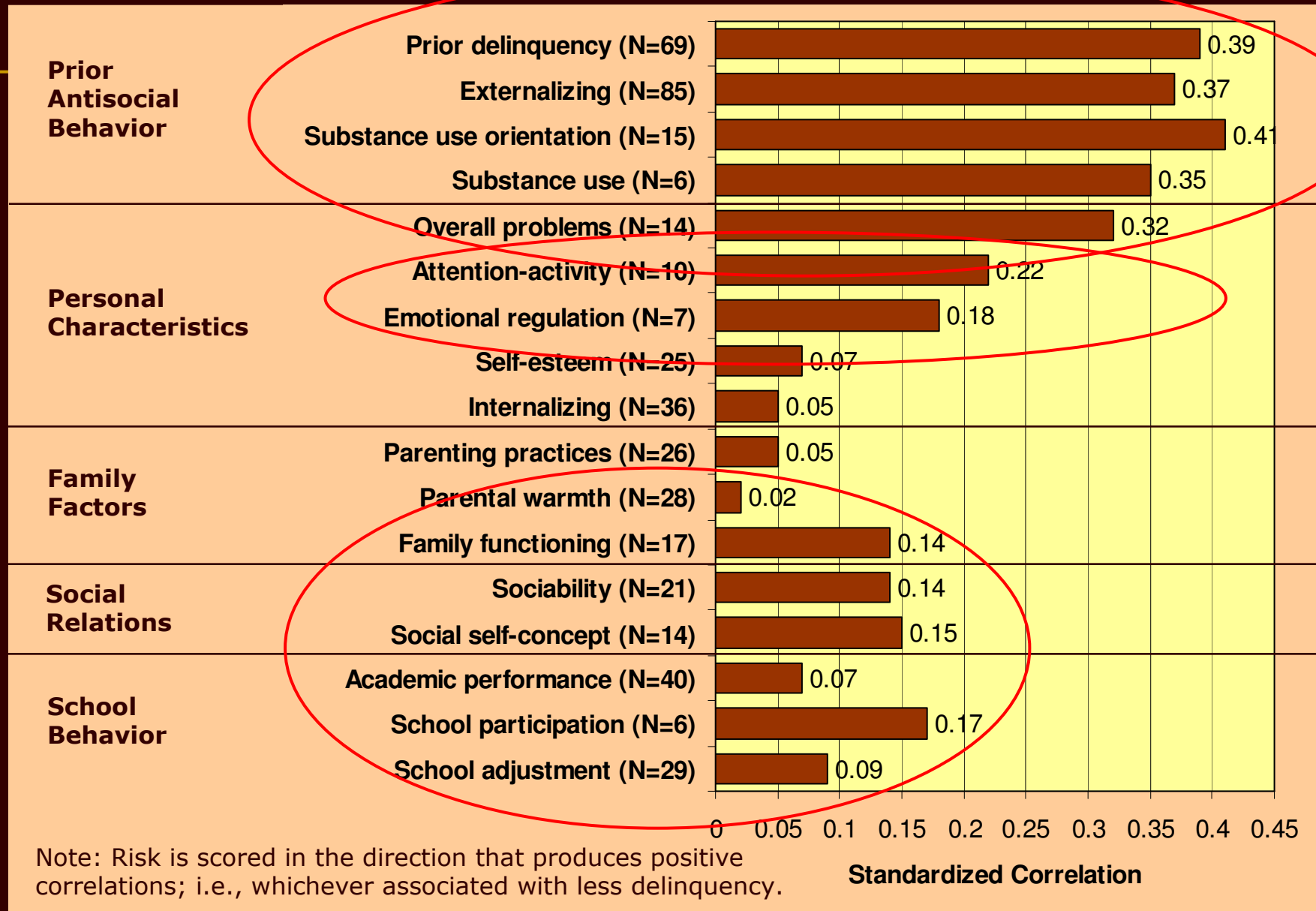| Independent Variable		Coefficient
Constant	[include]	.553
Sample size (logged)	[median N=300]	-.053
Attrition, T1 to T2	[0=no attrition]	-.178
Age, sample mean at T1	[10 years]	.001
Time interval, T1 to T2	[72 mo = 6 years]	-.007
Time interval squared	[square in months]	.001
T1 measure: questionnaire	[1=Yes, Q used]	.052
T1 informant: peers	[0=No, self report]	.116
T1 informant: records	[0-No, self report]	-.075
T1 measure: number of items	[2=multiple]	.074
T1 measure: scaling	[4=continuous]	.017
T1 & T2 informant different	[0=no diff]	-.160
T1 & T2 N of items different	[0=no diff]	.070
T1 & T2 scaling: different	[0=no diff]	-.014
Risk level of sample	[5=individual risk]	-.003
Percent male	[.50= 50/50 mix]	.017
Predominant ethnicity white	[4=mainly Anglo]	.035
Outcome variable: delinquency	[1=delinquency]	-.049

Magnitude of T1-T2 Correlation Between Prior and Later Delinquency

Correlation from regression prediction ("standardized correlation")= .39

Distribution of N=385 observed correlations:

<u>Mean</u>	<u>.37</u>
25th percentile	.22
Median	.37
75th percentile	.50

Standardized Correlations: Risk at Age 10 Predicting Delinquency at Age 16

Category	Factor	Standardized Correlation
Prior Antisocial Behavior	Prior delinquency (N=69)	0.39
	Externalizing (N=85)	0.37
	Substance use orientation (N=15)	0.41
	Substance use (N=6)	0.35
Personal Characteristics	Overall problems (N=14)	0.32
	Attention-activity (N=10)	0.22
	Emotional regulation (N=7)	0.18
	Self-esteem (N=25)	0.07
	Internalizing (N=36)	0.05
Family Factors	Parenting practices (N=26)	0.05
	Parental warmth (N=28)	0.02
	Family functioning (N=17)	0.14
Social Relations	Sociability (N=21)	0.14
	Social self-concept (N=14)	0.15
School Behavior	Academic performance (N=40)	0.07
	School participation (N=6)	0.17
	School adjustment (N=29)	0.09

Standardized Correlation

Note: Risk is scored in the direction that produces positive correlations; i.e., whichever associated with less delinquency.

Summary

- A large number of longitudinal studies provide data on predictors of delinquency and related forms of antisocial behavior

- T1 Risk-T2 Outcome correlations, standardized for comparability, show:

  - Prior antisocial behavior variables are the strongest predictors of later delinquency, including early substance use

  - Self-regulation variables are under-studied but show relatively large correlations

  - Some social, family, and school variables show modest correlations but, overall, these categories of predictors are not strong.

Effects of Early Intervention on Risk Factors for Antisocial Behavior
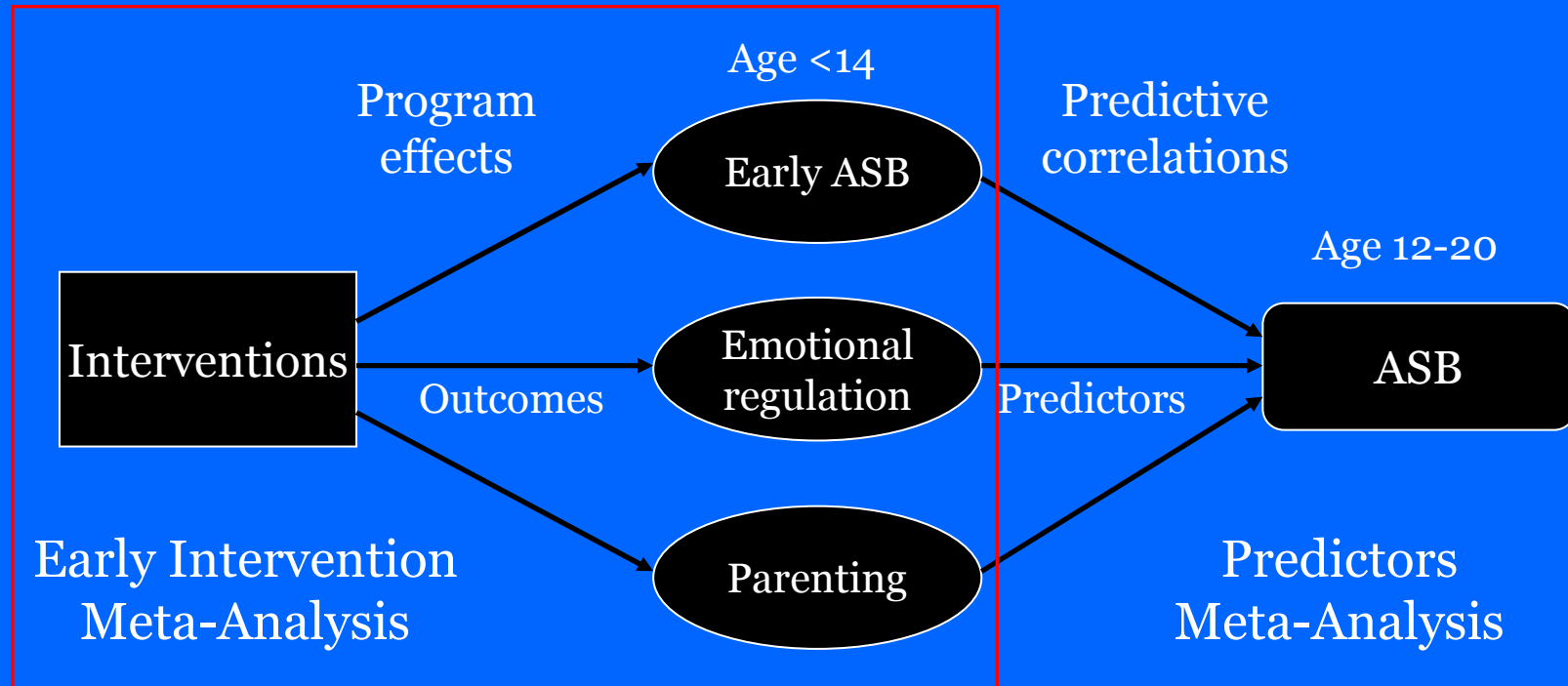
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Intervention Effects & Risk Predictors

Intervention Meta-analysis

- Intervention programs delivered to children, youth, and/or families that target antisocial behavior or risk factors for antisocial behavior.

- Experimental and quasi-experimental designs.

- Published and unpublished research from the U.S. and other western countries was included.

Study Identification & Coding

- Comprehensive search of databases, meta-analyses & reviews, and primary research identified potential studies, which were screened for eligibility.

- Coding categories:
  - Method and Study Characteristics
  - Subject Characteristics
  - Treatment Characteristics
  - Dependent Variables/Outcomes
  - Study Results:
    - Standardized mean difference effect sizes

Study Characteristics

- 474 controlled studies of 487 independent samples.
  - Over 70,000 children and youth.
- Mainly U.S. studies (~90%) conducted by researchers from psychology and education.
- 2/3 published; 1/3 unpublished.
- Published between 1965 and 2004; over half published since 1990.

Method Characteristics

- Experimental and Quasi-experimental Studies:
  - Nearly half were randomized at subject level.
  - About 1/5 were cluster randomized studies; remaining studies were quasi-experimental, mainly assigned at group level.
- Most studies provided pretest data to assess pre-treatment equivalence.
- Attrition averaged 10%, but some studies had significant attrition problems (up to 50% loss).
- Dependent measures most commonly self- or teacher-reported; parent reports, school records, and observations also used.

Participant Characteristics

- 14 years old or younger.
- Predominantly mixed gender subject groups, though high risk groups were mostly male.
- About 1/3 of the samples were mostly minority children.
- Low SES children well-represented.
- Youth risk ranged from low to serious behavior problems.

Program Characteristics

- About 80% of the studies were school-based and delivered to groups of children.
- Community-based studies often involved families.
- Median program length = 12 weeks.
- Majority of studies characterized by significant researcher involvement in service delivery. Less than 15% of the programs were "routine practice."

Program Approaches

- *Behavioral approaches*: behavioral contracts, contingency management, and similar shaping and reinforcement techniques.

- *Cognitive approaches*: cognitive restructuring, skill streaming, cognitive techniques for handling anger and stress, and the like.

- *Social skill training*: interpersonal skill building exercises, taking the perspective of the other, assertiveness, resisting group pressure, conflict management.

- *Counseling*: individual, group, and family counseling in some mix in which individual or group sessions were the most frequent.

- *Parent skill training*: Consultation, counseling, and training aimed at increasing parenting skills and general family functioning.
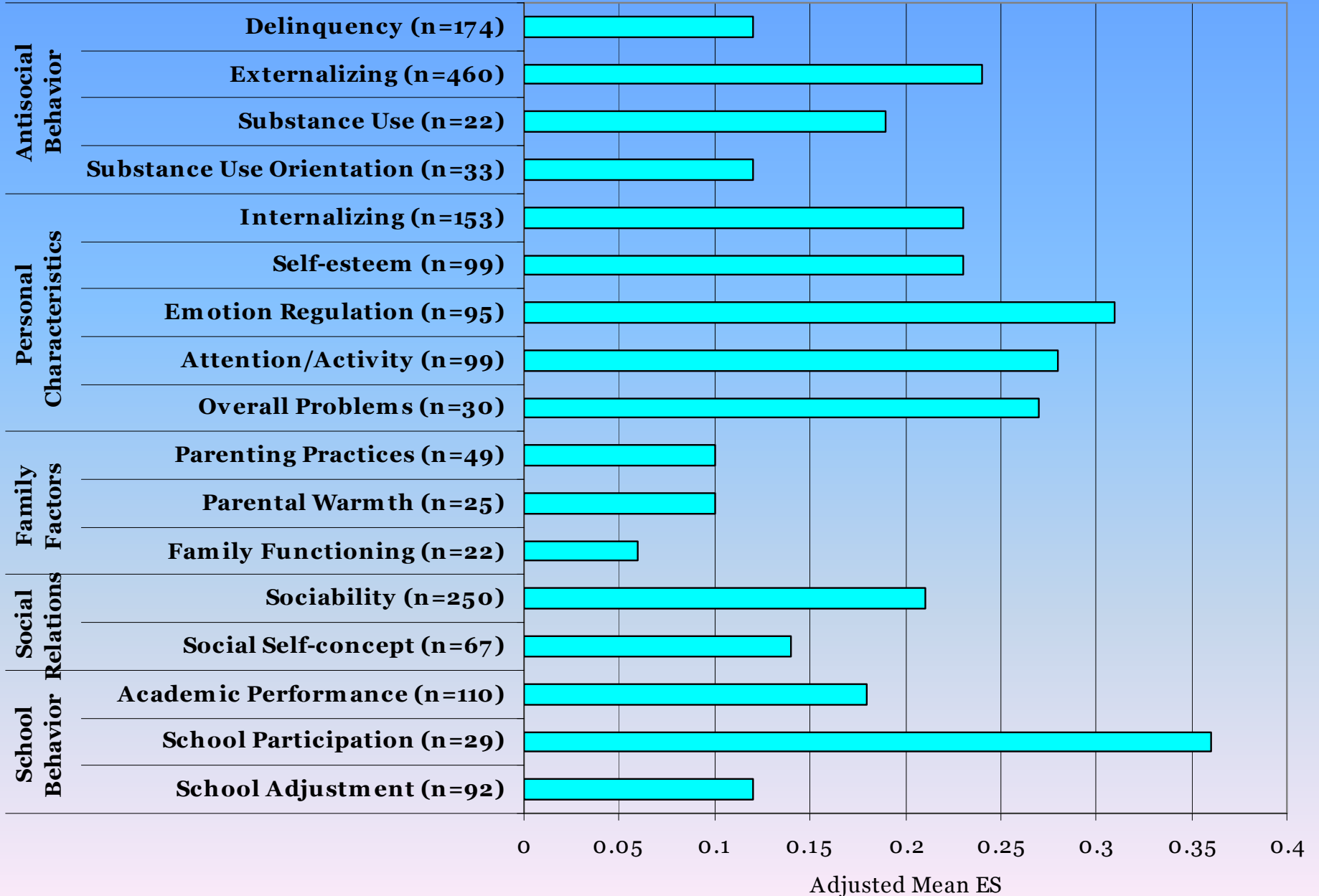
Risk Factor Outcomes

- Antisocial behavior
- Personal characteristics
- Family factors
- Social relations
- School behavior

Effect Size Adjustments

- Regression models were fit to identify between-study differences in:
  - Research design and initial equivalence
  - Measurement characteristics and informants
  - Subject characteristics (age, gender, ethnicity)
- Optimal methodological and average subject characteristics were used to predict effect sizes with those features constant.
- Result was added to residuals to produce adjusted effect sizes.

Effects of Intervention on the Risk Factors

Antisocial Behavior
- Delinquency (n=174)
- Externalizing (n=460)
- Substance Use (n=22)
- Substance Use Orientation (n=33)

Personal Characteristics
- Internalizing (n=153)
- Self-esteem (n=99)
- Emotion Regulation (n=95)
- Attention/Activity (n=99)
- Overall Problems (n=30)

Family Factors
- Parenting Practices (n=49)
- Parental Warmth (n=25)
- Family Functioning (n=22)

Social Relations
- Sociability (n=250)
- Social Self-concept (n=67)

School Behavior
- Academic Performance (n=110)
- School Participation (n=29)
- School Adjustment (n=92)

Adjusted Mean ES

0   0.05   0.1   0.15   0.2   0.25   0.3   0.35   0.4

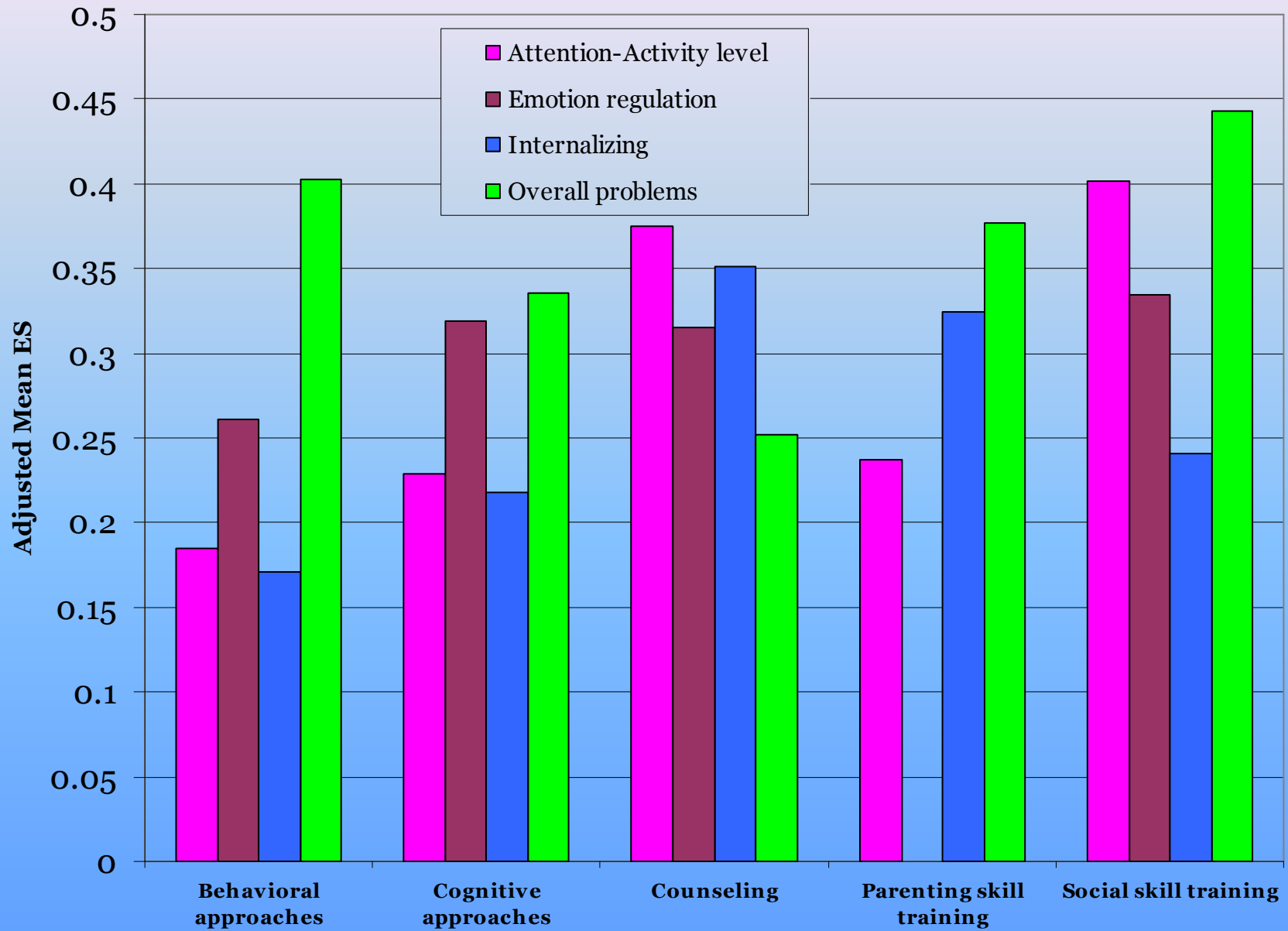**Mean Treatment Effects for School vs. Community-Based Programs on Select Risk Factors**
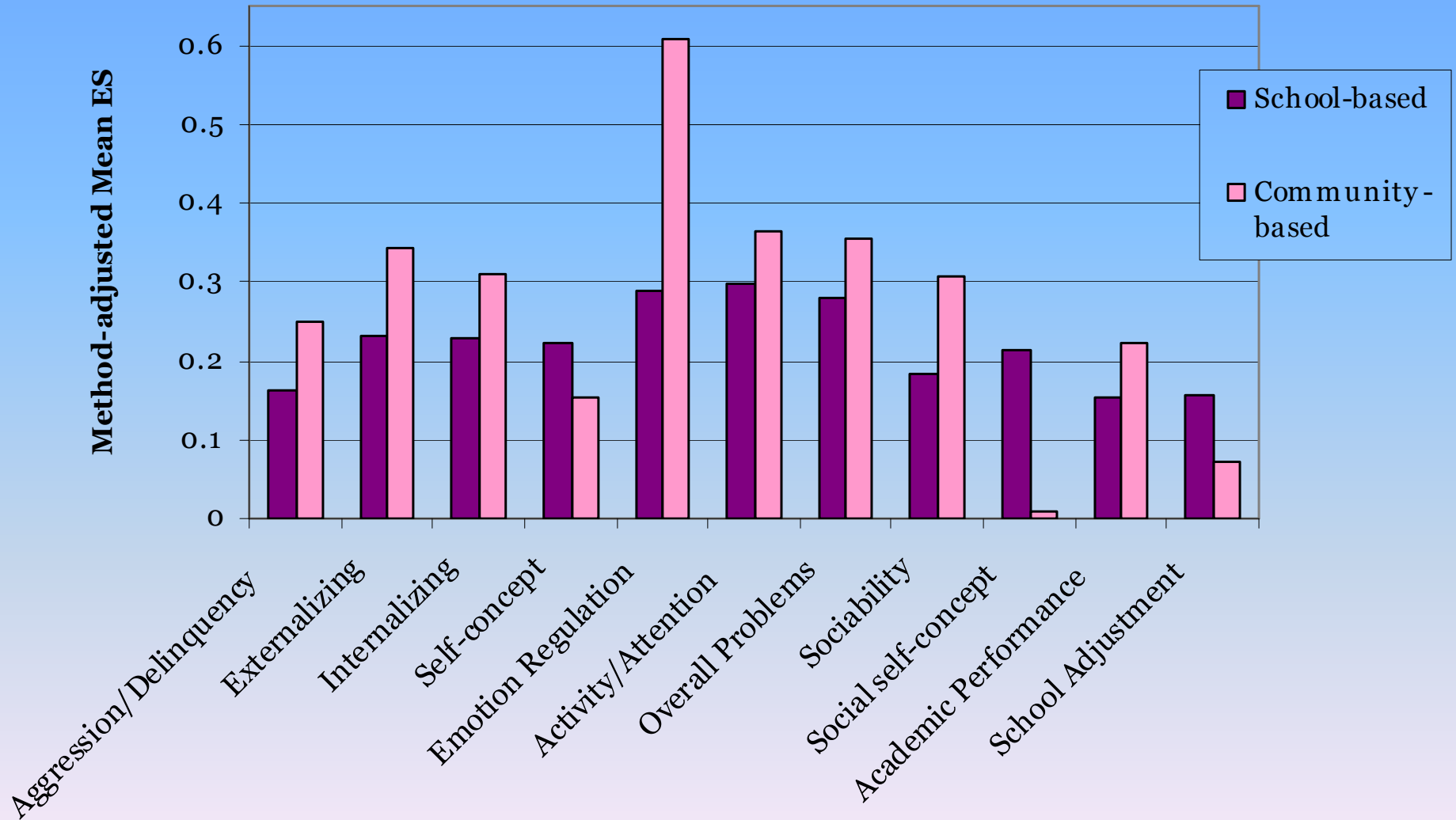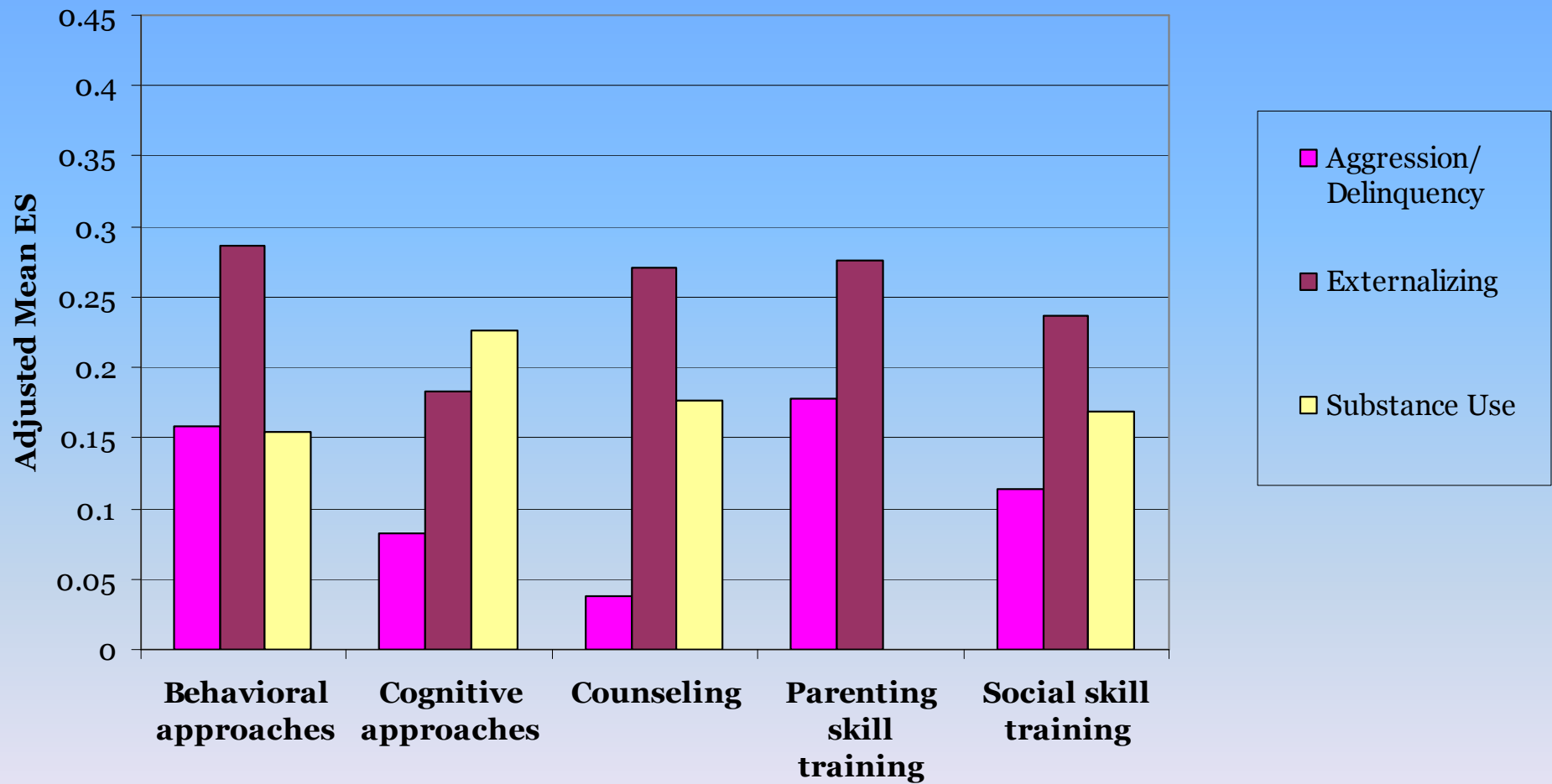
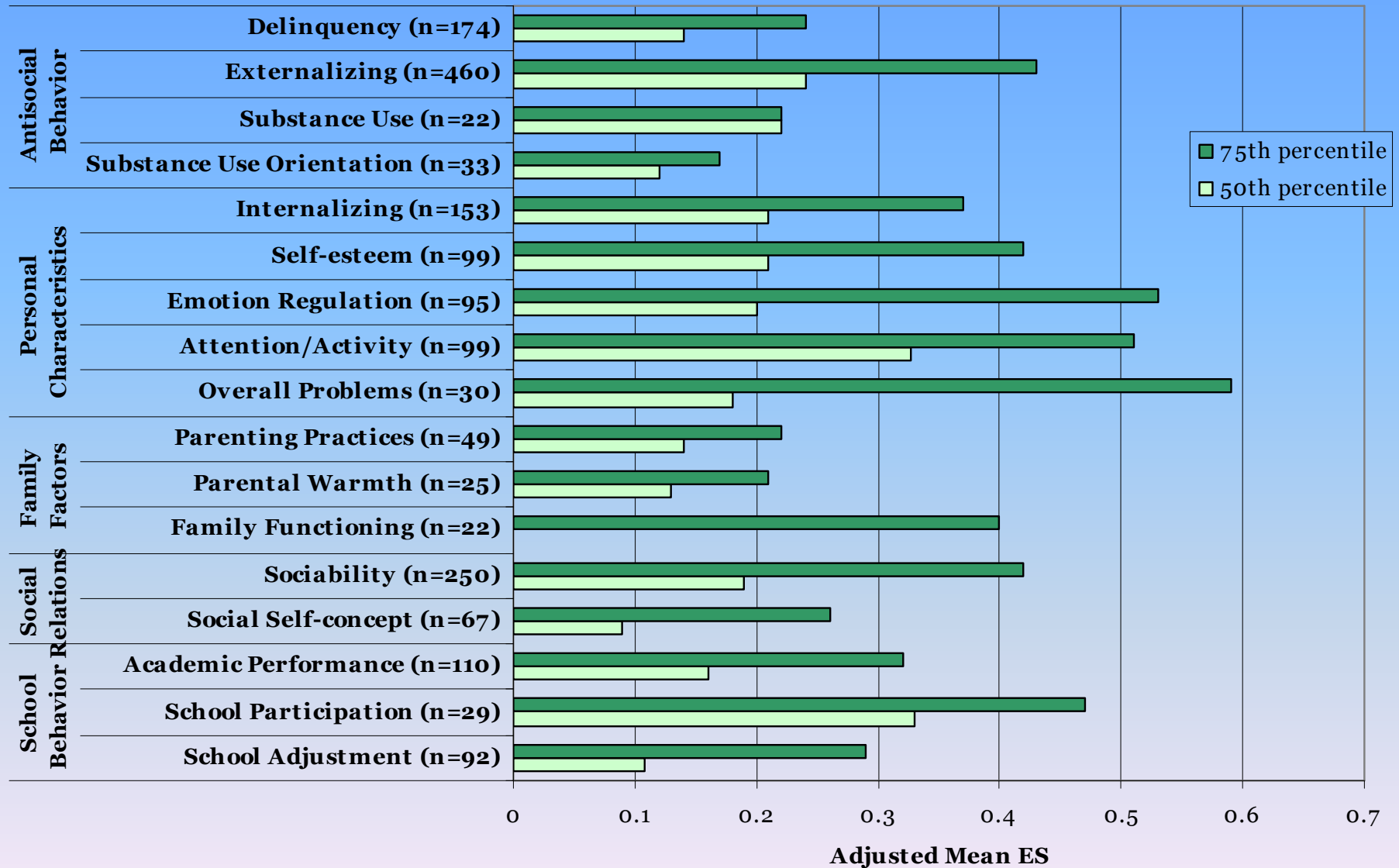**Mean Treatment Effects by Subject Risk Status on Select Risk Factors**
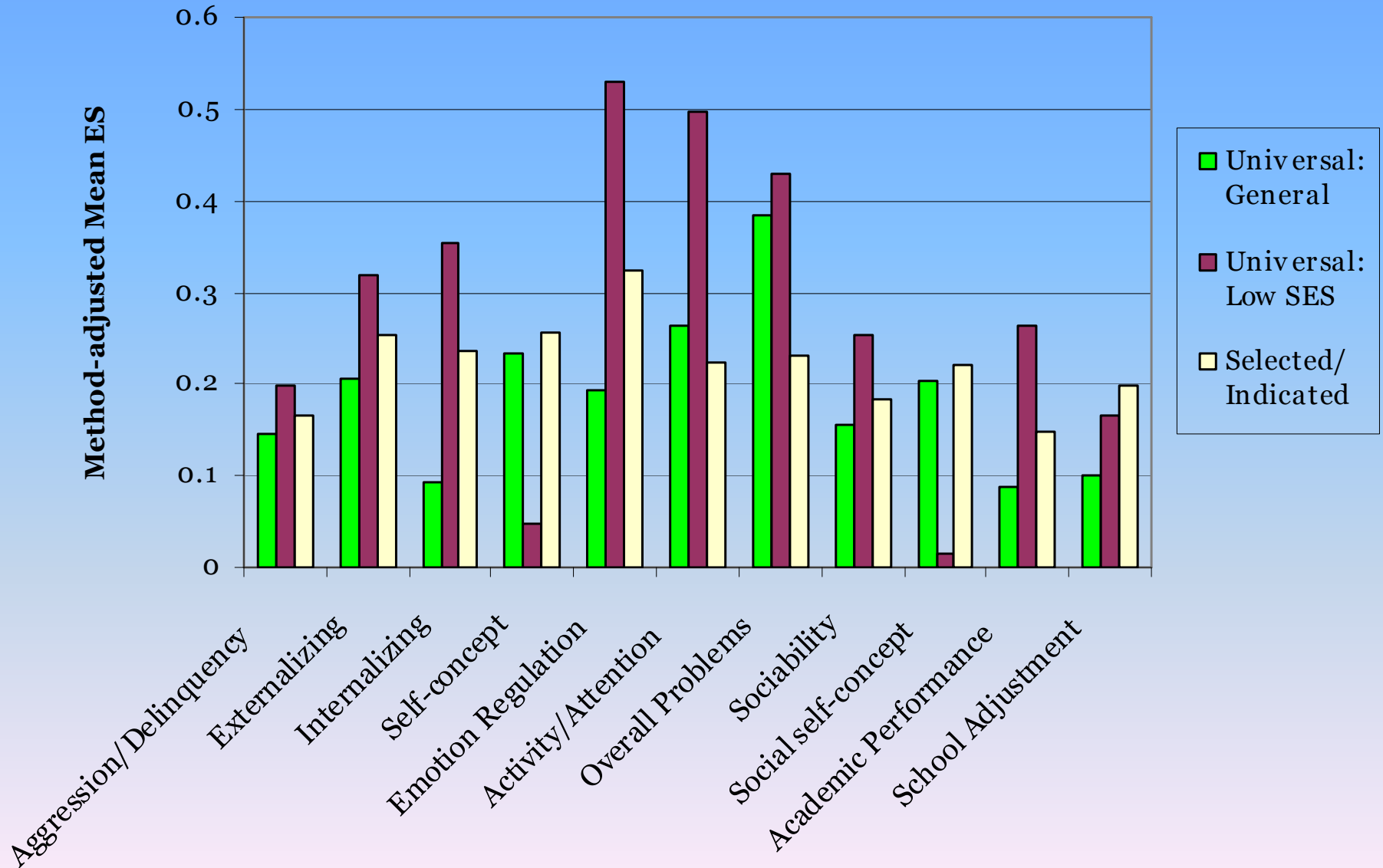
Program Effects on Person Risk Factors

Program Effects on Antisocial Behavior

Effects of Intervention on Risk Factors

A horizontal bar chart titled "Effects of Intervention on Risk Factors" showing Adjusted Mean ES (x-axis from 0 to 0.7) for various risk factors grouped into categories. Each factor has two bars: 75th percentile (dark green) and 50th percentile (light green).

Antisocial Behavior
- Delinquency (n=174): 75th ≈ 0.24, 50th ≈ 0.14
- Externalizing (n=460): 75th ≈ 0.43, 50th ≈ 0.24
- Substance Use (n=22): 75th ≈ 0.22, 50th ≈ 0.22
- Substance Use Orientation (n=33): 75th ≈ 0.17, 50th ≈ 0.12

Personal Characteristics
- Internalizing (n=153): 75th ≈ 0.37, 50th ≈ 0.21
- Self-esteem (n=99): 75th ≈ 0.42, 50th ≈ 0.21
- Emotion Regulation (n=95): 75th ≈ 0.53, 50th ≈ 0.20
- Attention/Activity (n=99): 75th ≈ 0.51, 50th ≈ 0.33
- Overall Problems (n=30): 75th ≈ 0.59, 50th ≈ 0.18

Family Factors
- Parenting Practices (n=49): 75th ≈ 0.22, 50th ≈ 0.14
- Parental Warmth (n=25): 75th ≈ 0.21, 50th ≈ 0.13
- Family Functioning (n=22): 75th ≈ 0.40

Social Relations
- Sociability (n=250): 75th ≈ 0.42, 50th ≈ 0.19
- Social Self-concept (n=67): 75th ≈ 0.26, 50th ≈ 0.09

School Behavior
- Academic Performance (n=110): 75th ≈ 0.32, 50th ≈ 0.16
- School Participation (n=29): 75th ≈ 0.47, 50th ≈ 0.33
- School Adjustment (n=92): 75th ≈ 0.29, 50th ≈ 0.11

Legend: 75th percentile (dark green), 50th percentile (light green)

X-axis: Adjusted Mean ES

Findings

- Effects for prevention programs were modest overall.

- Largest prevention effects were found for emotion regulation, attention-activity level, and overall problems.

- Higher risk youth, and those in community-based programs achieved greater benefits across all risk factors.

- Program approaches were not widely different in overall effectiveness.

Linking the Most Predictive Risk Factors for Antisocial Behavior with the Most Effective Interventions for Changing those Risk Factors
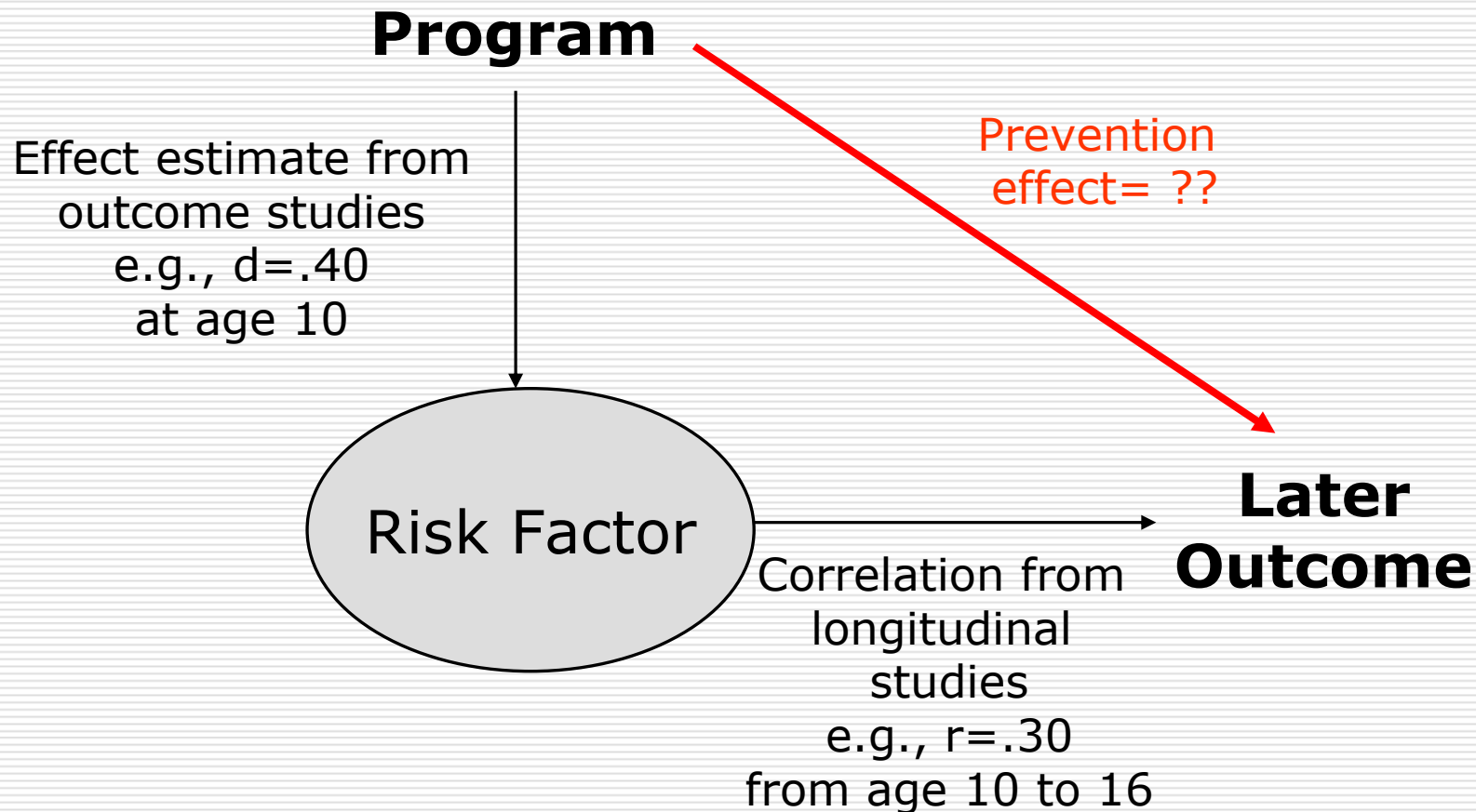
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Major Functional Relationships Central to the Risk-Oriented Prevention Strategy

Program

Effect estimate from outcome studies
e.g., d=.40
at age 10

Prevention effect= ??

Risk Factor

Later Outcome

Correlation from longitudinal studies
e.g., r=.30
from age 10 to 16

Estimating Possible Prevention Effect Sizes

r = change in SD units on the T2 variable with a 1 SD difference on the T1 predictor

d = intervention effect size in SD units

d x r = change in SD units on T2 variable with intervention effect d on T1 variable
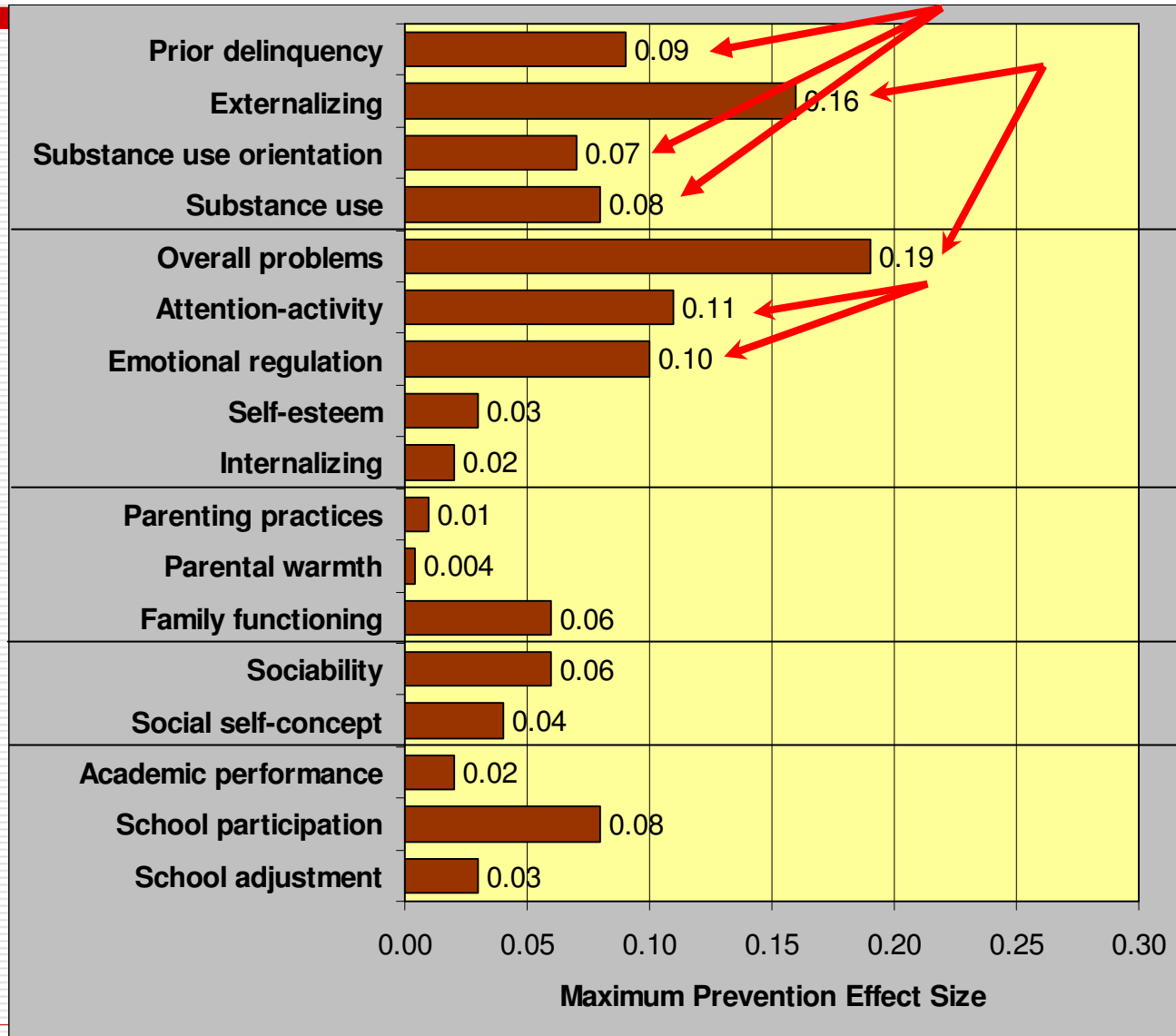
if r represents a causal relationship

E.g. .40 x .30 = .12 (effect size)

An estimate of the upper limit of the prevention effect size

Prevention Effects on Major Delinquency Risk Factors

Risk Factor	d=75th %tile ES	r=Risk-outcome correlation	d x r = max T2 ES
Prior delinquency	.24	.39	.09
Externalizing	.43	.37	.16
Sub use orientation	.17	.41	.07
Substance use	.22	.35	.08
Overall problems	.59	.32	.19
Emotional regulation	.53	.18	.10
Attention-activity	.51	.22	.11

Estimated Maximum Prevention Effect Sizes with Intervention for Risk Factors

Bar chart titled "Maximum Prevention Effect Size" showing:

Risk Factor	Maximum Prevention Effect Size
Prior delinquency	0.09
Externalizing	0.16
Substance use orientation	0.07
Substance use	0.08
Overall problems	0.19
Attention-activity	0.11
Emotional regulation	0.10
Self-esteem	0.03
Internalizing	0.02
Parenting practices	0.01
Parental warmth	0.004
Family functioning	0.06
Sociability	0.06
Social self-concept	0.04
Academic performance	0.02
School participation	0.08
School adjustment	0.03

Change in T2 Delinquency Prevalence Rate with a .20 Prevention ES

Not all juveniles at risk at T1 will become delinquent

Baserate proportion becoming delinquent	Rate after intervention	Reduction	Reduction as a % of base
.10	.074	-.026	26%
.15	.113	-.037	25%
.20	.153	-.047	24%
.25	.194	-.056	22%
.30	.237	-.063	21%
.35	.280	-.070	20%

General Early Intervention Program Approaches

- *Behavioral approaches*: behavioral contracts, contingency management, and similar shaping and reinforcement techniques.

- *Cognitive approaches*: cognitive restructuring, skill streaming, cognitive techniques for handling anger and stress, and the like.

- *Social skill training*: interpersonal skill building exercises, taking the perspective of the other, assertiveness, resisting group pressure, conflict management.

- *Counseling*: individual, group, and family counseling in some mix in which individual or group sessions were the most frequent.

- *Parent skill training*: Consultation, counseling, and training aimed at increasing parenting skills and general family functioning.

Prevention Potential of Program Approaches on Strongest Risk Factors

Program approach	Prevention potential (mean ES)	Prevention potential (highest ES)
Behavioral	.08	.14
Cognitive	.06	.12
Social skill training	.08	.13
Counseling	.07	.11
Parent skill training	.10	.16

NOTE: Revised Figures

*Averaged over the Delinquency, Externalizing, Emotional Regulation, Attention-activity, and Overall Problems risk-delinquency correlations x 75th percentile program effects.

Considerations and Caveats

- ☐ Extent to which the risk-delinquency correlations are causal is unknown.
- ☐ Risk predictors are correlated; relationship of one overlaps that of others.
- ☐ Risk predictors are not perfectly correlated; collective prediction will be stronger than for any one.
- ☐ Observed risk-outcome relationships are attenuated by measurement error.
- ☐ Small N of studies provide evidence on some risk-outcome relationships and some program effects on risk.

Key Findings and Observations

- The evidence reviewed here is consistent with the possibility of worthwhile but somewhat modest prevention effects on antisocial behavior. Direct tests of those effects requires expensive longitudinal intervention studies.

- Prior ASB and related factors are the strongest predictors of later ASB. Of these factors, early substance use and self-regulation are understudied and warrant more attention.

- The effects of intervention programs on the strongest risk factors are uneven. Larger effects appeared for general externalizing behavior and self-regulation than for early delinquency and substance use.

Key Findings and Observations (continued)

- ❑ Programs for higher risk children generally show larger effects, as do community based programs (in contrast to school-based), perhaps because they tend to deal with higher risk children.

- ❑ The major program approaches have similar overall effects on the main ASB predictors but differ on which they impact the most. They also show similar prevention potential when their effects are analyzed in relation to the relative predictive strength of the different risk factors.

- ❑ Counseling approaches, though not far behind, appear to have smaller effects on key risk factors and somewhat less prevention potential than the other program approaches.

Key Findings and Observations (continued)

- ☐ To achieve large prevention effects for ASB, early intervention programs will need to have greater impact on the main risk factors than shown by most of the programs studied.

- ☐ The most effective programs showed notably larger effects than the average programs, indicating overall room for improvement.

- ☐ Studies of research and demonstration programs dominate the research evidence; few studies investigated the effects of programs in routine practice. It is an open question whether the impact on risk factors needed for worthwhile prevention effects can be attained in routine program practice.

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