Behavioral Vaccines for Prevention of Mental, Emotional, Behavioral and Related Physical Disorders

HEALTH PROMOTION CONFERENCE
Tallin, Estonia • 2015

Dennis D. Embry, Ph.D., president/senior scientist, PAXIS Institute;
Co-investigator, Johns Hopkins Center for Prevention & Intervention;
Co-investigator, Manitoba Centre for Health Policy

https://www.researchgate.net/profile/Dennis_Embry

Nurturing Environments…

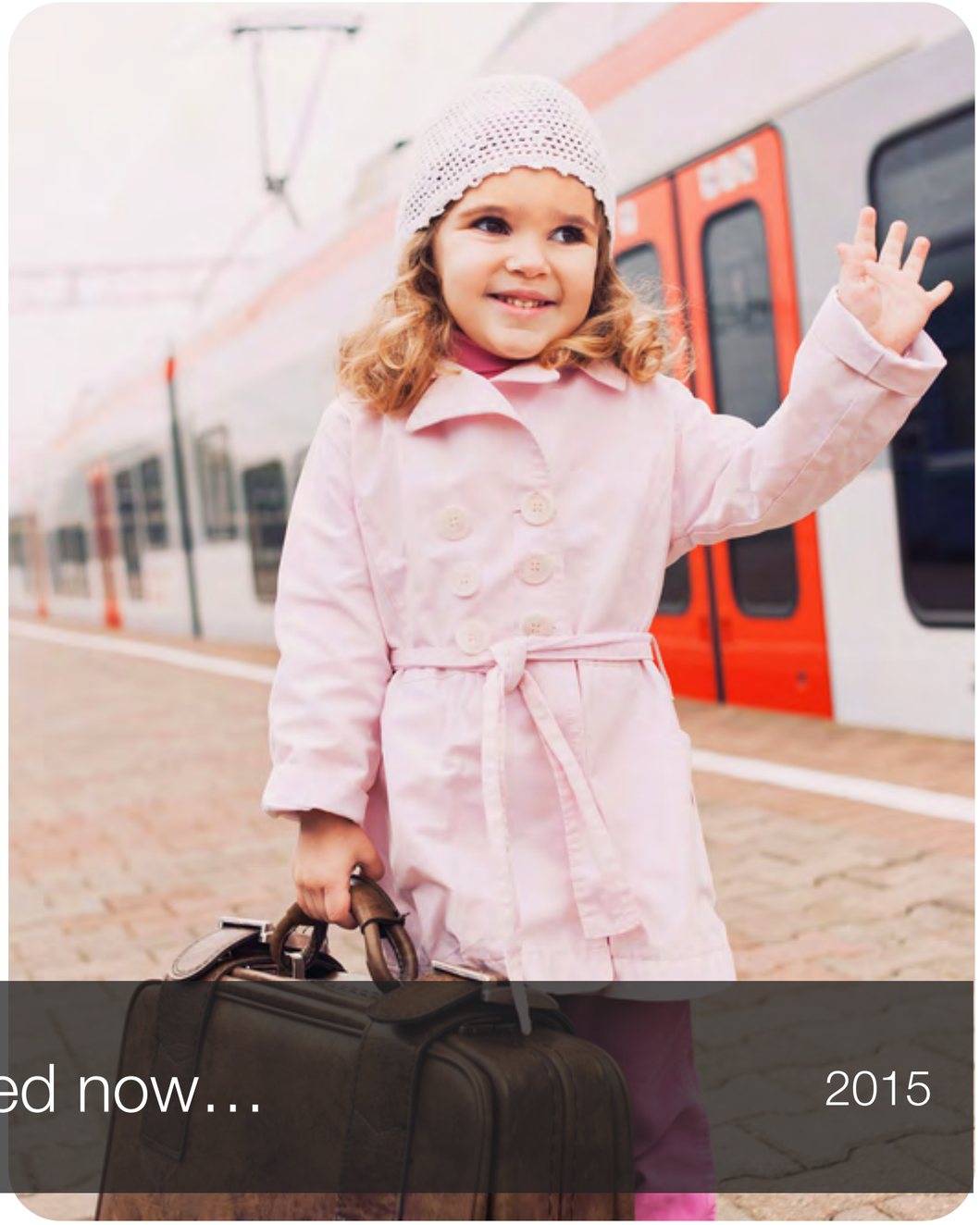
- Can evolve the future
- Change the expression of genes and wiring of the brain, and those changes can directly and indirectly change the expression of genes in next generation(s)
- Alter behavior for a lifetime including educational outcomes
- Can protect against multiple mental, emotional, behavioral and related physical disorders
- Cut across scientific disciplines and both challenges existing theories and integrates diverse scientific findings across specialty fields

Read more at: http://www.researchgate.net/profile/Dennis_Embry

Note: You have to join and you don't have to be "researcher"

Suitcases for children’s lives

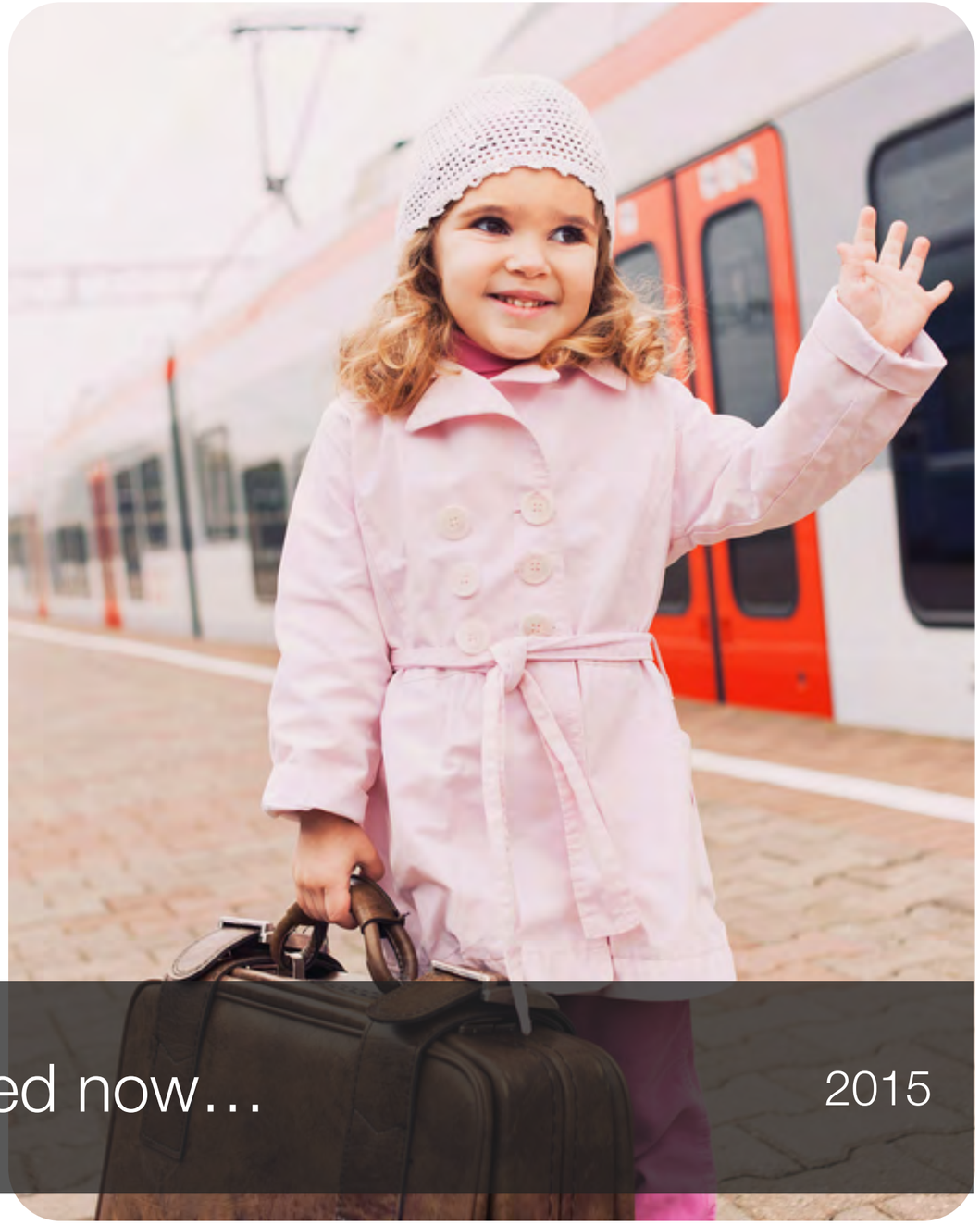
in 1938



Estonia’s Futures are being packed now…

2015

A shared responsibility to fill well



Estonia’s Futures are being packed now…

2015

#1

#3

#2

#4

Biglan et al., American Psychologist, (4), 2012

Principles of Nurturing Environments

Richly Reinforce
Prosocial
Behaviors

#3

#2

#4

Biglan et al., American Psychologist, (4), 2012

Principles of Nurturing Environments

Richly Reinforce
Prosocial
Behaviors

#3

Limit
Problematic
Behaviors

#4

Biglan et al., American Psychologist, (4), 2012

Principles of Nurturing Environments

Richly Reinforce
Prosocial
Behaviors

Reduce/minimize
All Toxic
Influences

Limit
Problematic
Behaviors

#4

Biglan et al., American Psychologist, (4), 2012

Principles of Nurturing Environments

Richly Reinforce
Prosocial
Behaviors

Reduce/minimize
All Toxic
Influences

Limit
Problematic
Behaviors

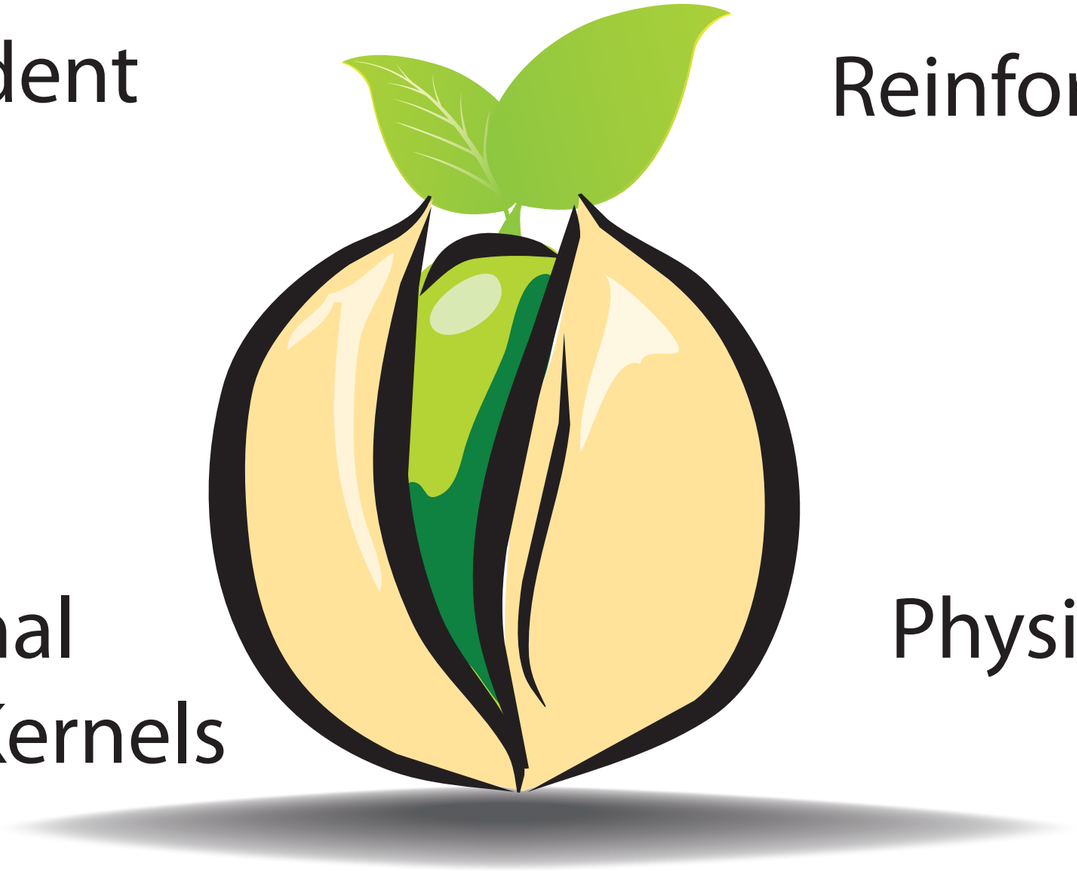
Increase
Psychological
Flexibility

Biglan et al., American Psychologist, (4), 2012

Principles of Nurturing Environments

Antecedent Kernels

Reinforcement Kernels

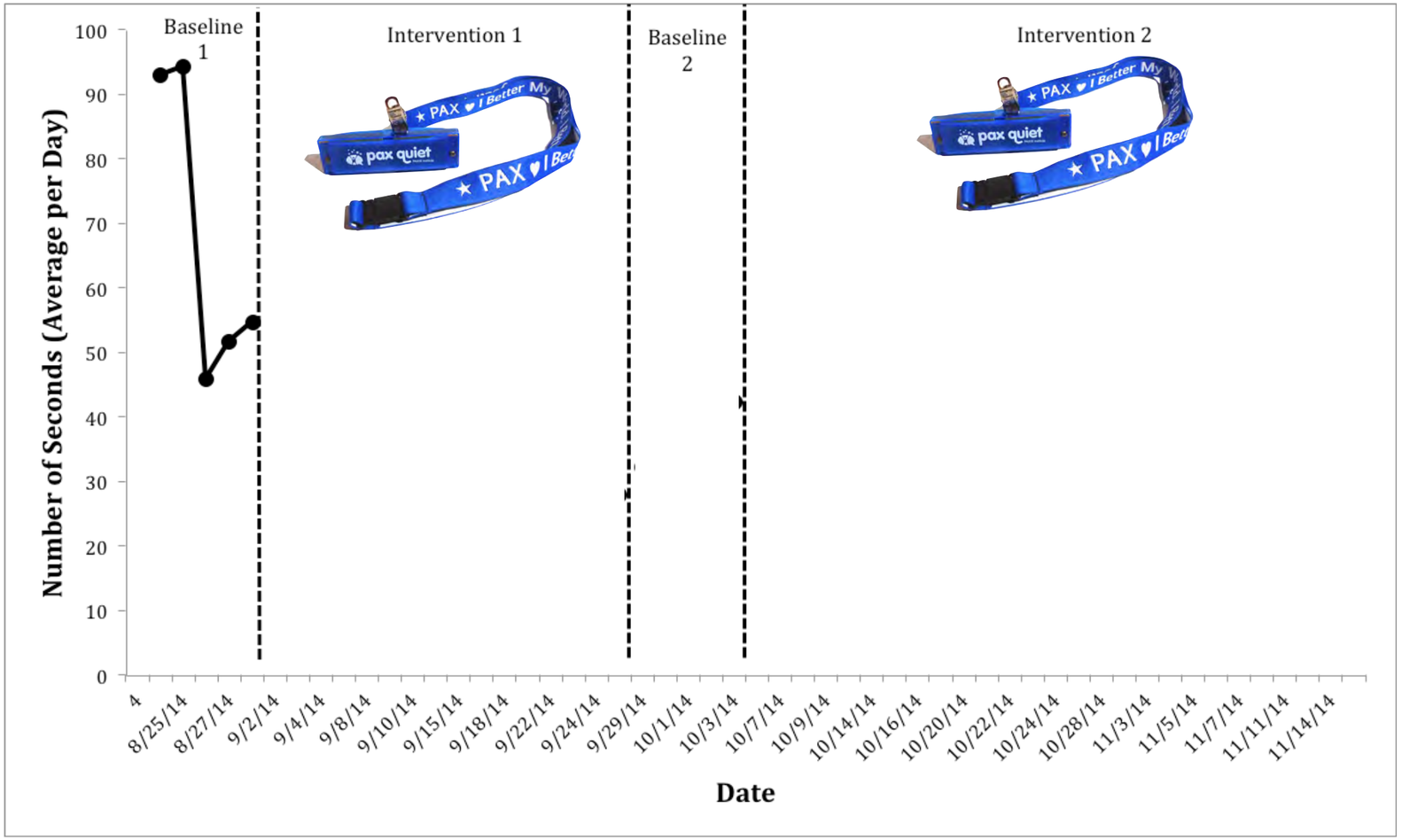


Relational Frame Kernels

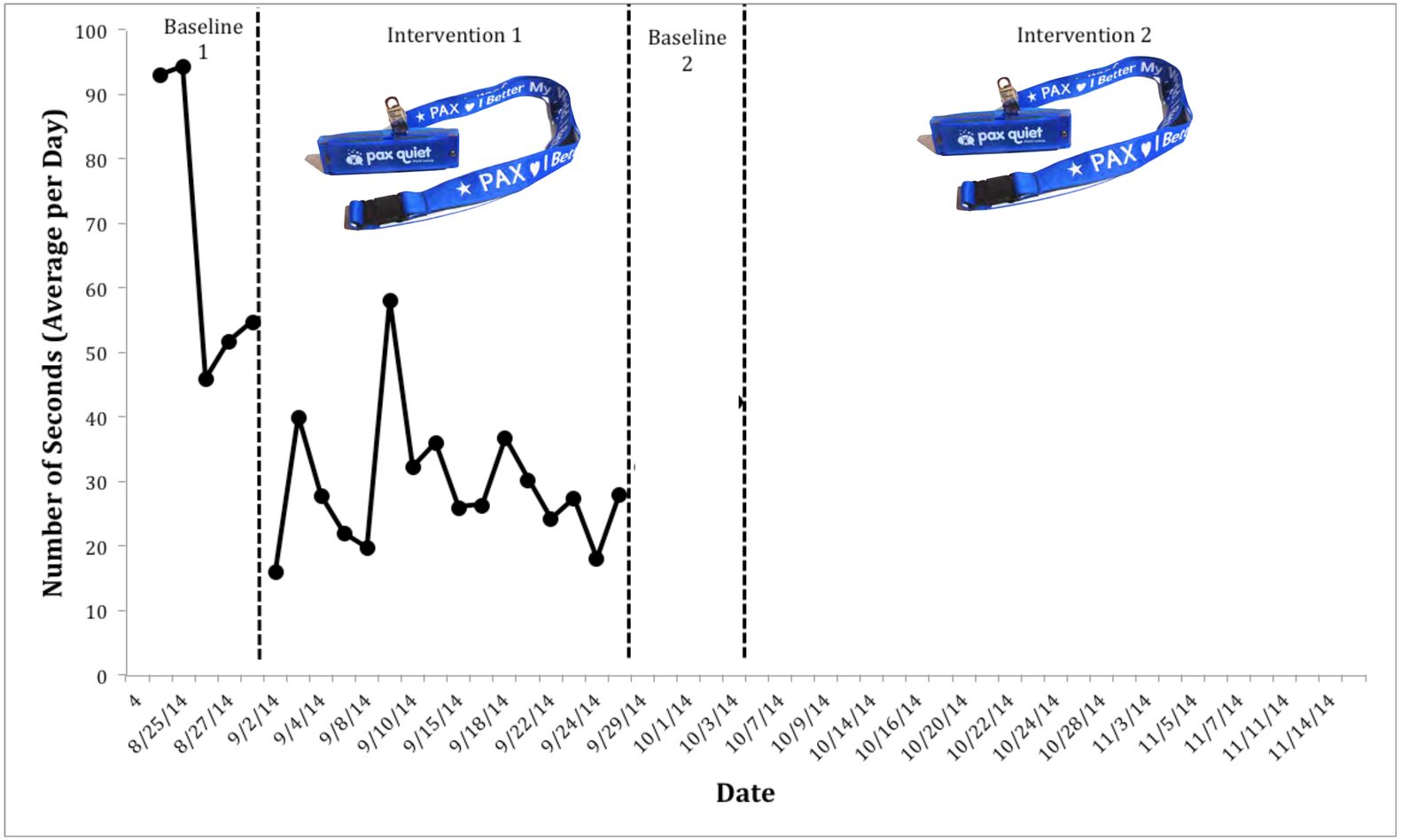
Physiological Kernels

Embry & Biglan, Clinical Child & Family Psychology Review 11(3), 2008

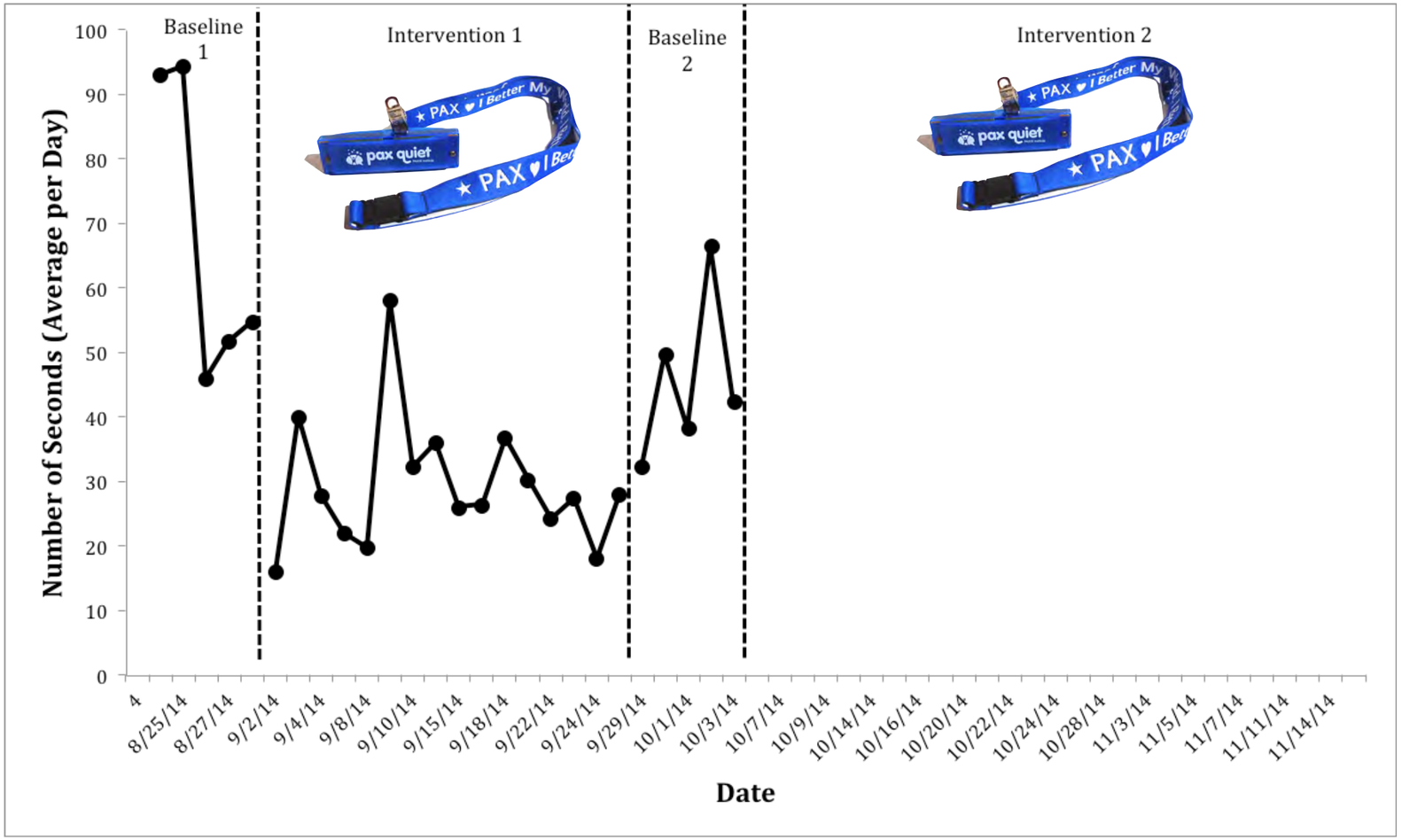
Evidence-Based Kernels: Smallest Proven Unit of Growing Nurturing Environments



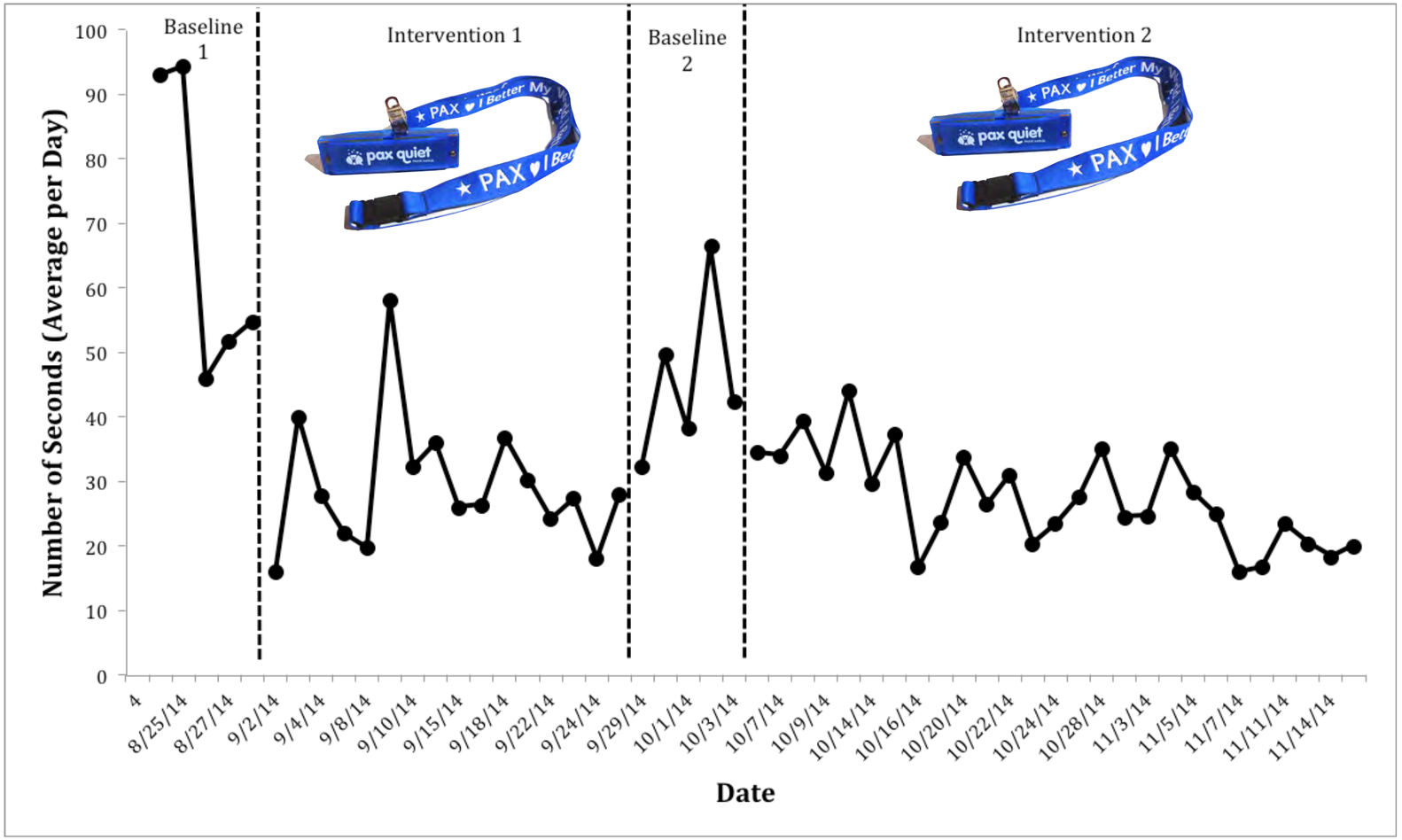
An evidence-based kernel creates early wins



An evidence-based kernel creates early wins



An evidence-based kernel creates early wins



An evidence-based kernel creates early wins

BEFORE

Draw or Write What Adults Do to Get Students to Be Quiet BEFORE PAX QUIET

Teacher use to shush kids when they to niosy or they would shout to the kids and tell the to be quiet.

AFTER

Draw or Write What Adults Do to Get Students to Be Quiet AFTER PAX QUIET

· Teacher do the peace sine now and blow harmonicas now.

Behavioral Vaccines and Evidence-Based Kernels: Nonpharmaceutical Approaches for the Prevention of Mental, Emotional, and Behavioral Disorders

Dennis D. Embry, PhD

KEYWORDS
• Evidence-based kernels • Behavioral vaccines • Prevention
• Public health

The Institute of Medicine Report on the Prevention of Mental, Emotional and Behavioral Disorders Among Young People[1] (IOM Report) provides a powerful map for how the United States might significantly prevent mental illnesses and behavioral disorders like alcohol, tobacco, and other drug use among America's youth. This document is already shaping United States policies, and will almost certainly affect Canada and other countries' policies. Mental, emotional, and behavioral disorders (MEBs) among America's youth and young adults present a serious threat to the country's national security[2] and to our economic competitiveness compared with 22 other rich countries.[3–7] Such MEBs are also the leading preventable cost center for local, state, and the federal governments.[1,4] Further, safe schools, healthy working environments, and public events or places are seriously compromised by MEBs as well.

A behavioral vaccine is…

A repeated behavior that nurtures wellbeing and reduces sickness and /or death

The Good Behavior Game: A Best Practice Candidate as a Universal Behavioral Vaccine

Dennis D. Embry[1]

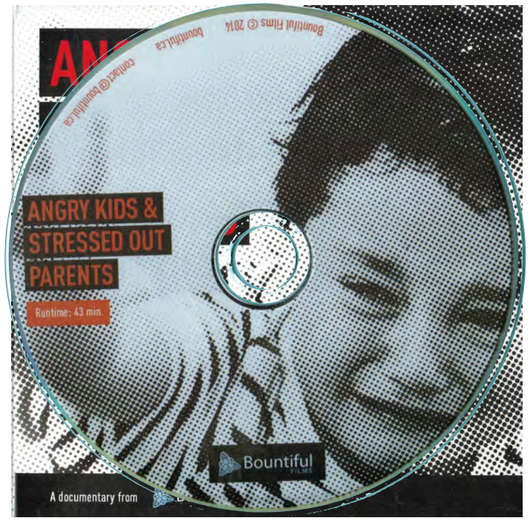
A "behavioral vaccine" provides an inoculation against morbidity or mortality, impacting physical, mental, or behavior disorders. An historical example of a behavioral vaccine is antiseptic hand washing to reduce childbed fever. In current society, issues with high levels of morbidity, such as substance abuse, delinquency, youth violence, and other behavioral disorders (multiproblems), cry out for a low-cost, widespread strategy as simple as antiseptic hand washing. Congruent research findings from longitudinal studies, twin studies, and other investigations suggest that a possibility might exist for a behavioral vaccine for multiproblem behavior. A simple behavioral strategy called the Good Behavior Game (GBG), which reinforces inhibition in a group context of elementary school, has substantial previous research to consider its use as a behavioral vaccine. The GBG is not a curriculum but rather a simple behavioral procedure from applied behavior analysis. Approximately 20 independent replications of the GBG across different grade levels, different types of students, different settings, and some with long-term follow-up show strong, consistent impact on impulsive, disruptive behaviors of children and teens as well as reductions in substance use or serious antisocial behaviors. The GBG, named as a "best practice" for the prevention of substance abuse or violent behavior by a number of federal agencies, is unique because it is the only practice implemented by individual teachers that is documented to have long-term effects. Presently, the GBG is only used in a small number of settings. However, near universal use of the GBG, in major political jurisdictions during the elementary years, could substantially reduce the incidence of substance use, antisocial behavior, and other adverse developmental or social consequences at a very modest cost, with very positive cost-effectiveness ratios.

Used 3+ times per day during any school activity

To teach, practice, self-monitor, and celebrate self-regulation with peers for a purpose of bettering self and others

Why is self-regulation to our futures?

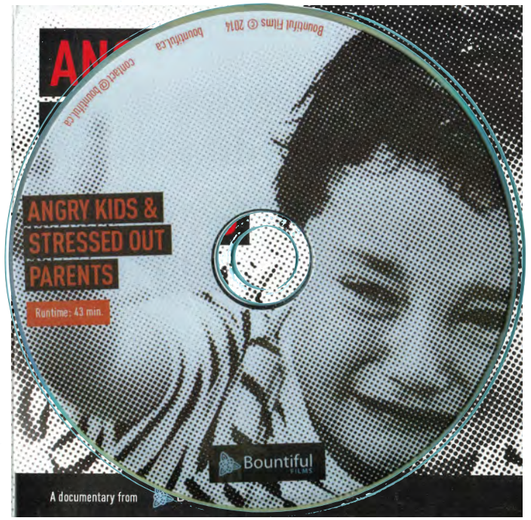
Watch Prime Time Media Headlines and Data



Use Hashtag: **#SaveAllKids**

Why is self-regulation to our futures?

Watch Prime Time Media Headlines and Data



Use Hashtag: **#SaveAllKids**

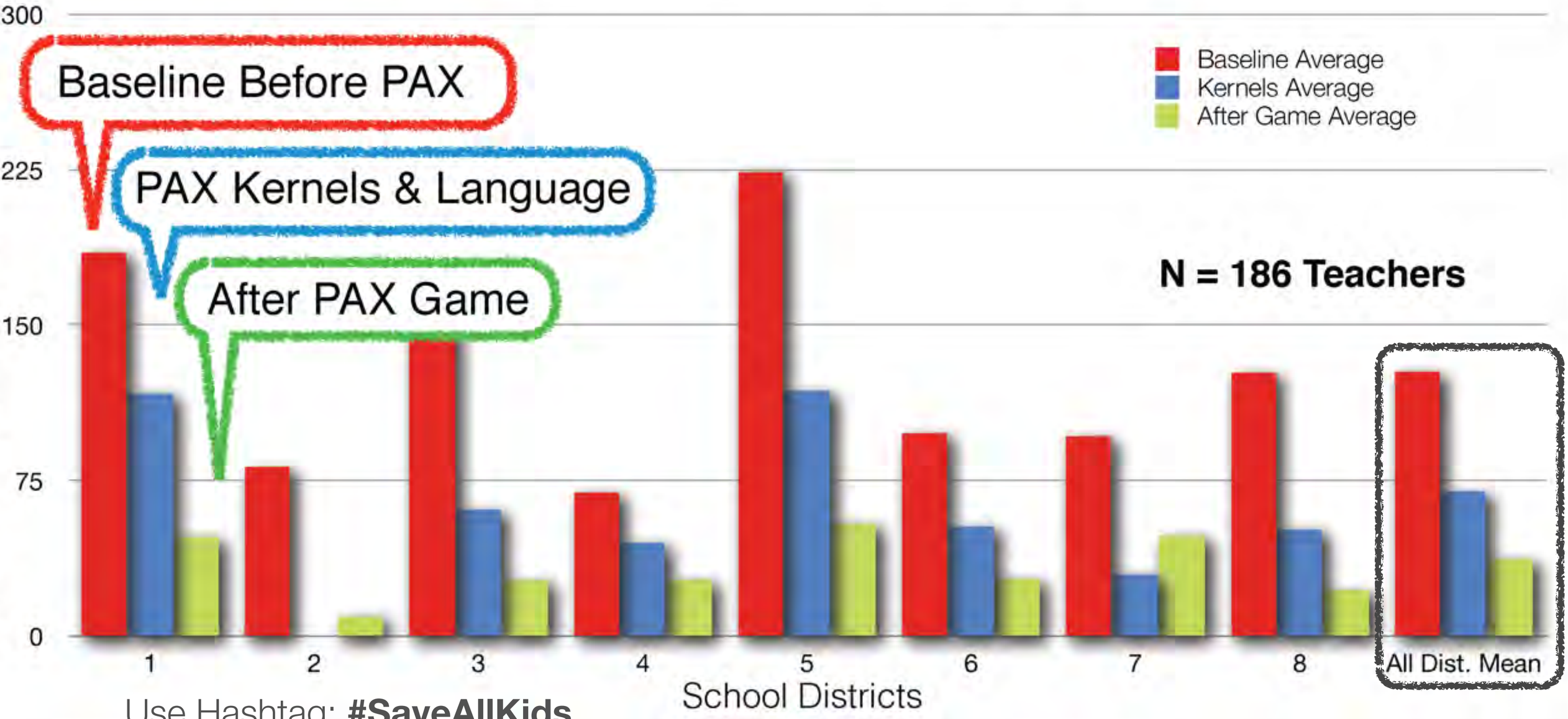
What might be the ROI if all Estonian 18,000 first graders were protected by the PAX Good Behavior Game?

1,548	Fewer young people will need any form of special education services
1,002	More boys will likely graduate from high school.
1,202	More boys will likely enter university
1,598	More girls will likely graduate from high school
1,248	More girls will likely enter university
175	Fewer young people will commit and be convicted of serious violent crimes
1,731	Fewer young people will likely develop serious drug addictions
1,184	Fewer young people will likely become regular smokers
638	Fewer young people will likely develop serious alcohol addictions
873	Fewer young women will likely contemplate suicide
1,184	Fewer young men will likely attempt suicide

Saving Estonia between €120m to €170m Per Cohort by Age 19-21 (for €2.4m)

Use Hashtag: **#SaveAllKids**

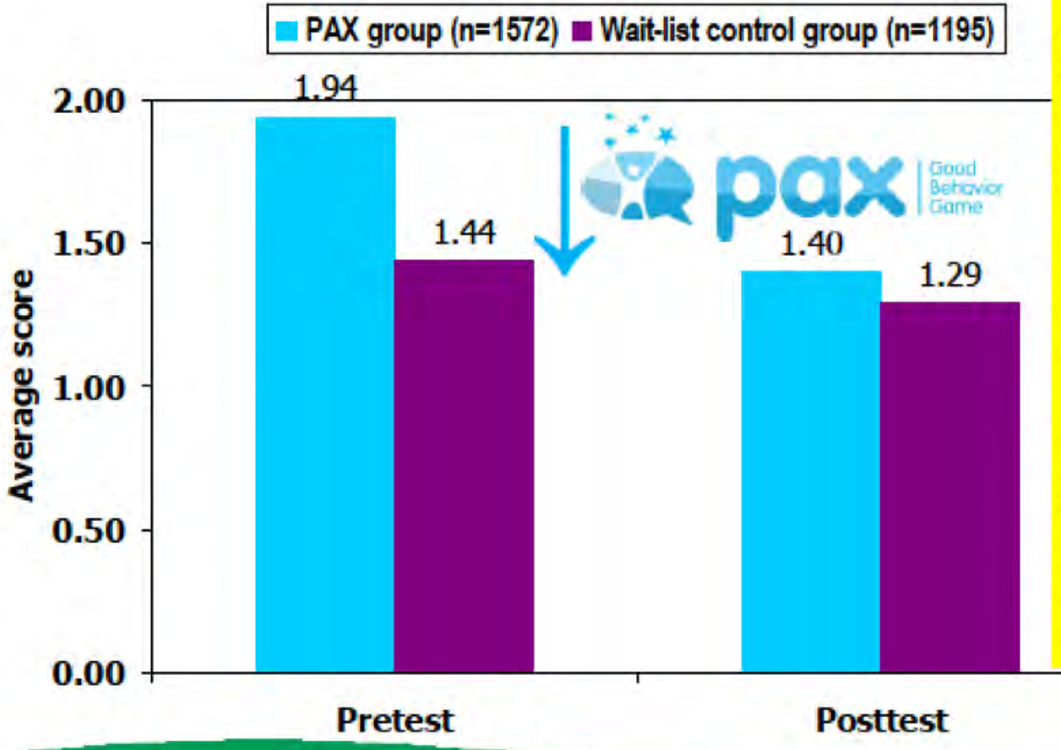
3-Month Impact of PAX in Eight US School Districts on Disturbing, Disruptive and Inattentive Behaviors Per 15 minutes



Use Hashtag: **#SaveAllKids**

PRELIMINARY

Immediate Effect of PAX on Children`s Emotional Symptoms, 2011-2012 (SDQ - Strengths and Difficulties Questionnaire)



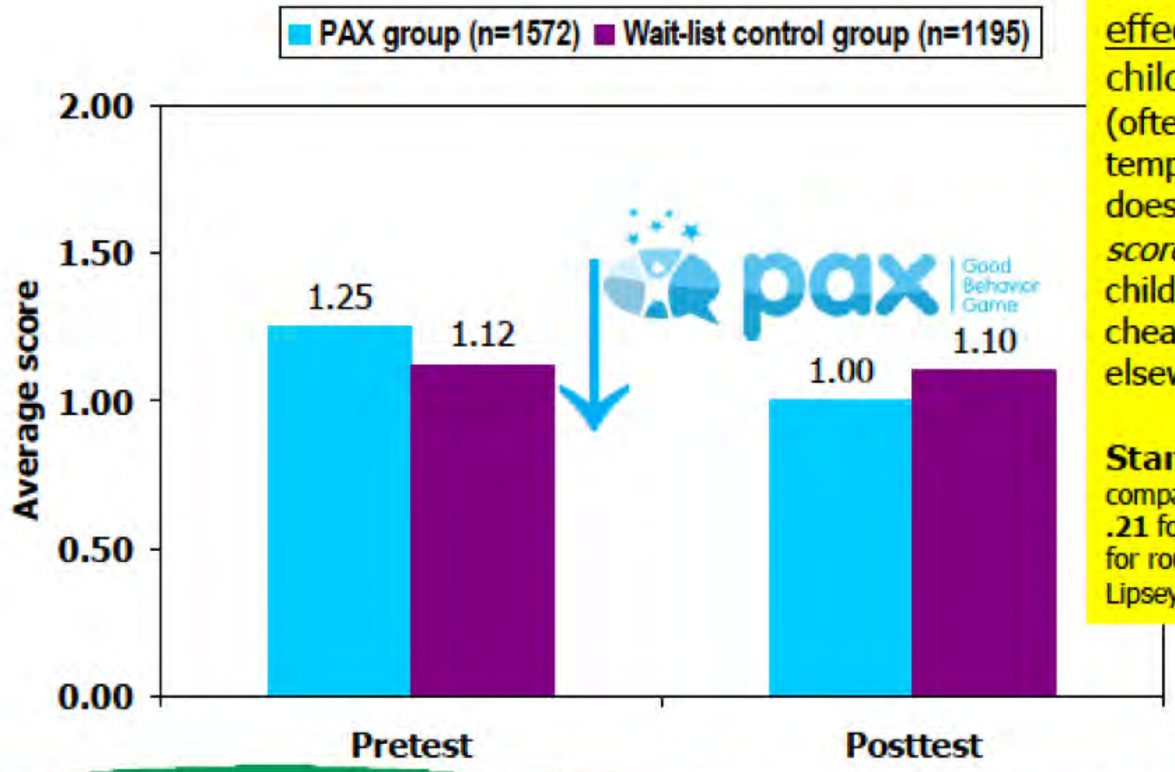
PAX had a statistically significant effect (-.59, p=.02) in reducing children's emotional symptoms: (often complains of headaches, stomach-aches or sickness; many worries, often seems worried; often unhappy, down-hearted or tearful; nervous or clingy in new situations, easily loses confidence; many fears, easily scared)

Standardized effect size: .29
compared to **.18** for prevention programs for child anxiety and **.25-.30** for the FRIENDS program (Fisak et al., 2011), and **.16-.22** for prevention programs for child depression (Fingeret et al., 2006; Horowitz & Garber, 2006; Jane-Llopis et al., 2003)

NOTE: Shorter bars are better

PRELIMINARY

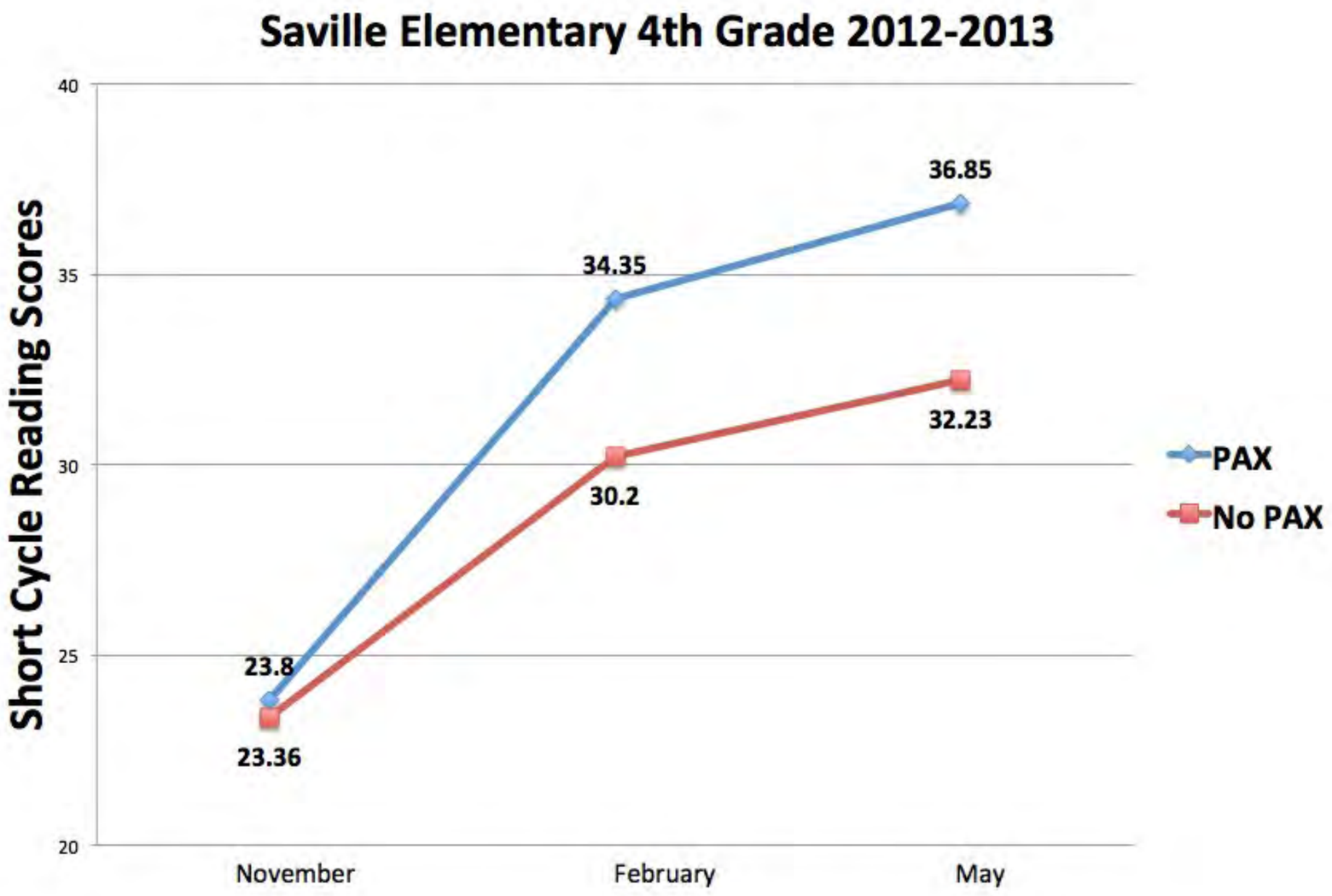
Immediate Effect of PAX on Children`s Conduct Problems, 2011-2012 (SDQ - Strengths and Difficulties Questionnaire)

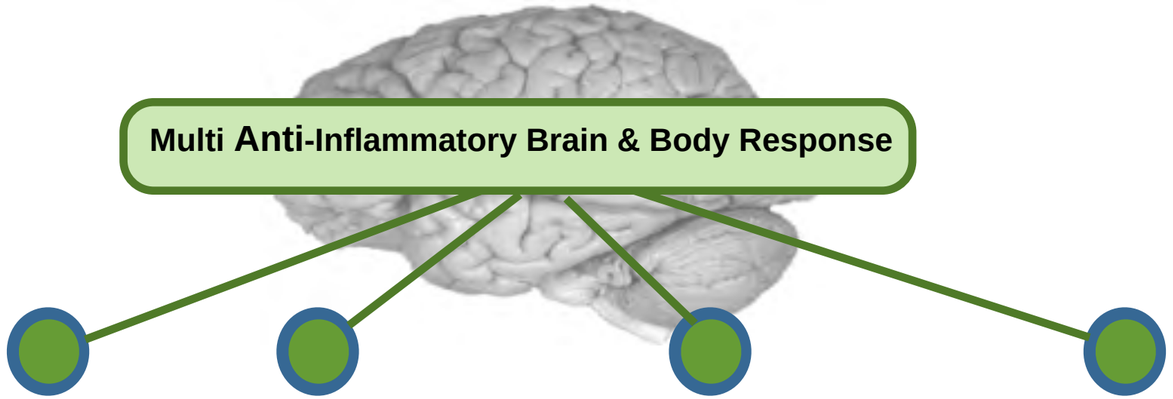


PAX had a statistically significant effect (-.82, p=.002) in reducing children's conduct problems: (often has temper tantrums or hot tempers; generally obedient, usually does what adults request *[reverse scored]*, often fights with other children or bullies them; often lies or cheats; steals from home, school or elsewhere)

Standardized effect size: .47
compared to **.25** for ROE (Santos et al., 2011), **.21** for model/demonstration programs, and **.10** for routine practice (Wilson et al., 2003; Wilson & Lipsey, 2007)

NOTE: Shorter bars are better


Saville Elementary 4th Grade 2012-2013
Short Cycle Reading Scores
40
35
30
25
20
36.85
34.35
32.23
30.2
23.8
23.36
November
February
May
PAX
No PAX



Multiple Behavioral Vaccines Protect the Futures of *ALL* Children, Youth and Adults

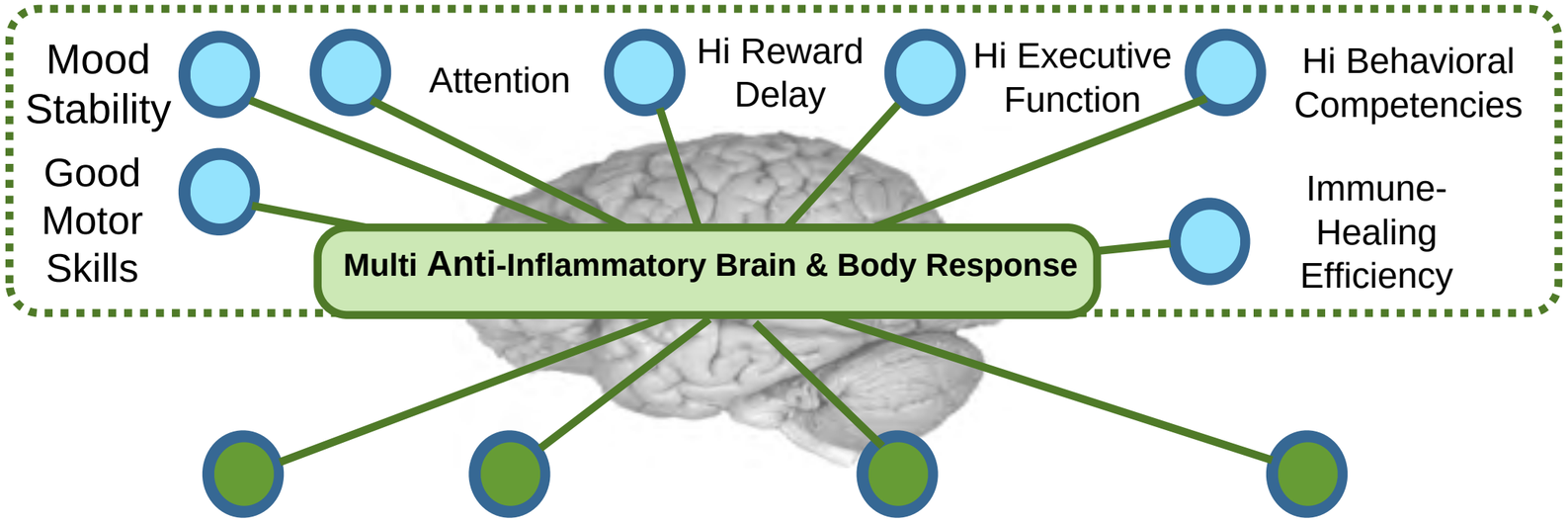
Reinforcement
more for prosocial behaviors

Antecedents
cue prosocial behaviors

Physiological
influences trigger protective biological mechanisms

Verbal Relations
occasion perceived safety and affiliation

Changing Conditions to Protect and Prevent



Multiple Behavioral Vaccines Protect the Futures of *ALL* Children, Youth and Adults

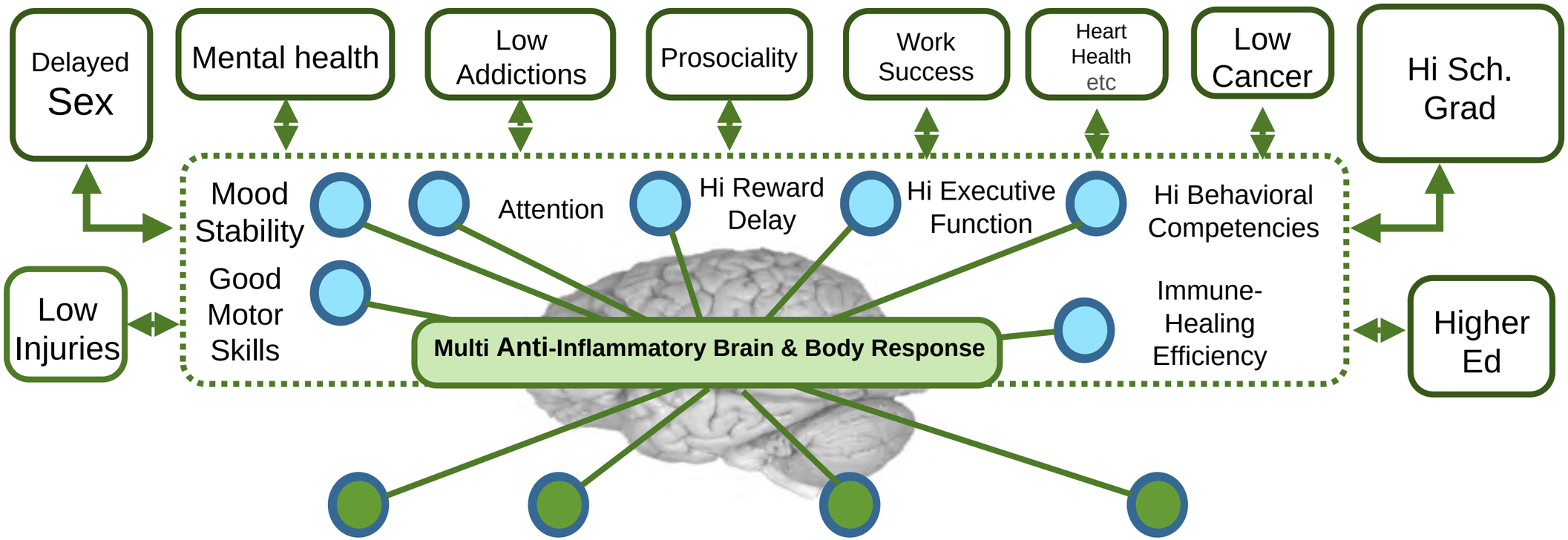
Reinforcement
more for prosocial behaviors

Antecedents
cue prosocial behaviors

Physiological
influences trigger protective biological mechanisms

Verbal Relations
occasion perceived safety and affiliation

Changing Conditions to Protect and Prevent



Multiple Behavioral Vaccines Protect the Futures of *ALL* Children, Youth and Adults

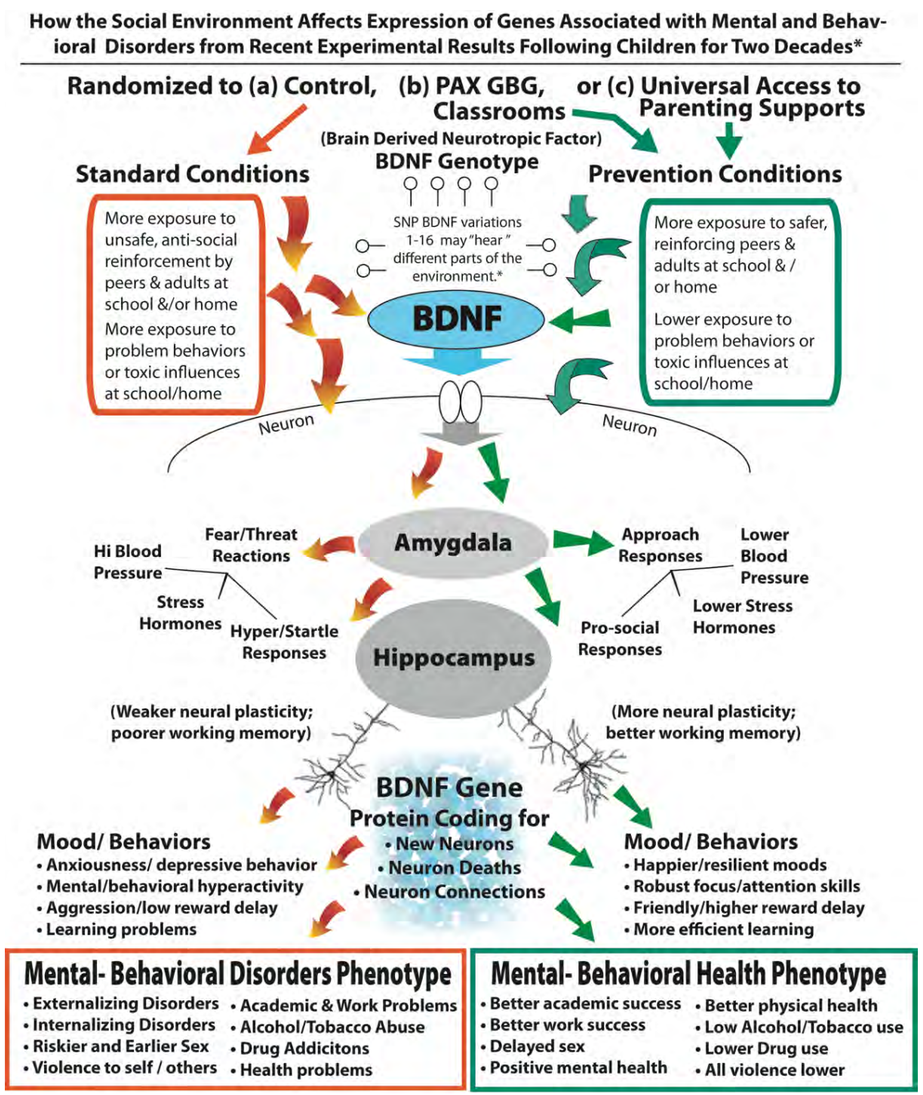
Reinforcement
more for prosocial behaviors

Antecedents
cue prosocial behaviors

Physiological
influences trigger protective biological mechanisms

Verbal Relations
occasion perceived safety and affiliation

Changing Conditions to Protect and Prevent



Prev Sci
DOI 10.1007/s11121-013-0441-3

Reducing Aggression and Impulsivity Through School-Based Prevention Programs: A Gene by Intervention Interaction

Rashelle J. Musci · Catherine P. Bradshaw · Brion Maher · George R. Uhl · Sheppard G. Kellam · Nicholas S. Ialongo

Abstract A variety of school-based, universal preventive interventions have been developed to address behavioral and mental health problems. Unfortunately, few have been evaluated within the context of randomized controlled trials with long-term follow-up. Even fewer still have examined the potential genetic factors that may drive differential impact of the intervention. In the present analysis, we examine the extent to which the longitudinal effects of two elementary school-based interventions were moderated by the brain-derived neurotrophic factor (BDNF) gene, which has been linked with aggression and impulsive behaviors. The sample included 678 urban, primarily African American children who were randomly assigned along with their teachers to one of three first grade classroom conditions: classroom-centered (CC) intervention, Family School Partnership (FSP), or a control condition. The teacher ratings of the youth's aggressive and impulsive behavior were obtained at baseline and in grades 6–12. Single-nucleotide polymorphisms (SNPs) from the BDNF gene were extracted from the genome-wide data. Longitudinal latent trait–state–error models indicated a significant interaction between a particular profile of the BDNF SNP cluster (46 % of sample) and CC intervention on impulsivity ($\beta=-.27$, $p<.05$). A similar interaction was observed for the BDNF SNP cluster and the CC intervention on aggression ($\beta=-.14$, $p<.05$). The results suggest that the impacts of preventive interventions in early elementary school on late adolescent outcomes of impulsivity and aggression can be potentially modified by genetic factors, such as BDNF. However, replication of these results is necessary before firm conclusions can be drawn.

Keywords Aggression · Impulsivity · Genes · Brain-derived neurotrophic factor · Intervention · Schools

An early onset of aggressive and impulsive behavior problems in childhood is associated with increased risk for mental health and problems in adolescence and adulthood (Bradshaw et al. 2010; Ialongo et al. 2006; Moffitt 2006; Petras et al. 2004). The need for efficacious prevention programs is particularly great in urban communities, where the risk for behavioral, mental health, and academic concerns is considerably increased (Institute of Education Sciences 2011; Institute of Education Sciences 2012; Perie et al. 2006). Only a select number of school-based prevention programs have been effective at reducing rates of behavioral and mental health problems through late adolescence (Wilson and Lipsey 2007). One such program is the Good Behavior Game (GBG). Another program of interest is the Family School Partnership (FSP), which was designed to reduce early risk behaviors by enhancing family–school communication and parent behavior management and academic instruction skills. These interventions are designed to target the early antecedents of problem behaviors such as substance abuse, depression, and antisocial behavior. This work is supported by previous work showing that learning problems in childhood can predict psychiatric distress and that early aggressive behavior can predict later antisocial behavior and substance use (Kellam et al. 2008).

The preventive effects of the GBG and FSP interventions were evaluated within the context of a randomized controlled trial by the Johns Hopkins Prevention Intervention Research

Electronic supplementary material The online version of this article (doi:10.1007/s11121-013-0441-3) contains supplementary material, which is available to authorized users.

R. J. Musci (✉) · C. P. Bradshaw · B. Maher · S. G. Kellam · N. S. Ialongo
Department of Mental Health, Johns Hopkins Bloomberg School of Public Health, Rm. 806, 624 N. Broadway, Hampton House 850t, Baltimore, MD, 21205, USA
e-mail: rmusci@jhsph.edu

G. R. Uhl
Molecular Neurobiology Division, NIDA Intramural Research Program, Baltimore, MD, USA

Published online: 01 November 2013

Earliest version of PAX GBG

Causes protective phenotypic BDNF gene expression

Journal of Education and Human Development
March 2015, Vol. 4, No. 1, pp. 245-254
ISSN: 2334-296X (Print), 2334-2978 (Online)

Published by American Research Institute for Policy Development
DOI: 10.15640/jehd.v4n1a22
URL: http://dx.doi.org/10.15640/jehd.v4n1a22

Teaching Prevention: The Impact of a Universal Preventive Intervention on Teacher Candidates

Jason D. Fruth[1] & Mary J. Huber[2]

Abstract

This study examines the impact of delivering a universal preventive intervention topre-service early childhood teacher educator candidates. Multiple studies list classroom impacts of the PAX Good Behavior Gameon students' proximal and distal outcomes including decreased disruptive behaviors, decreased substance abuse, alcohol dependence, and tobacco use. However, little is known about the impact of PAX GBG on teachers. This randomized control study included a group of teacher candidates who received PAX GBG as part of their teacher education instruction and a control group that received traditional teacher education instruction. The results showed that the PAX group reported significantly higher levels of self-efficacy in all areas after the intervention andalso when compared to the control group.

8,000 teachers trained in the US last year

To protect Estonia's Future, must make sure 800 teachers this behavior vaccine well each year.

8,000 teachers trained in the US last year

Recall The Thomas Francis Polio Public Health Study: Bigger Picture Design of Public Health Brain Protection Studies Across Multiple Nations

1. **Three Conditions**
   - 1.1. Proven Scalable Behavioral Vaccine (e.g. PAX GBG)
   - 1.3. Site Chosen Behavior Vaccine Innovation
   - 1.4. Programs as Usual

2. **Sample Sizes**
   - 2.1. 30-90 first grade classrooms (750 to 2,500 children)
   - 2.2. Randomly assigned to condition

3. **Analyses**
   - 3.1. Within Country/Community
   - 3.2. Pooled Across Sites
   - 3.3. Mediators/Moderators
   - 3.4. ??

- Mobilization & Investigator Teams for Each Site
- Implementation Teams for Each Site
- Common & Special Measures for Each Site
- National supports
- National media

See Resource Table for Children's Network By PAXIS Institute…for some relevant details and steps

Use Hashtag: **#SaveAllKids**

1 Year Old

64 Years Old

Further Reading

- Search www.pubmed.gov (National Library of Medicine) for the following:
  - "Behavioral Vaccines
  - "Evidence-based kernels"
  - "Nurturing Environments
- **Visit http://bit.ly/DennisPublications**

Image of the ***Koru***, the Maori infinite symbol of spiral of life

Thank you

Dennis D. Embry

Image Credits

- Photos and illustrations from PAXIS Institute
- Selected photos from Shutterstock under license
- Video clip from Driving Mum & Dad Mad, ITV and Triple P International
- Video clip from CBC National for Good Behavior Game
- Nobel Prize Committee photo of Elinor Ostrum

Dennis D. Embry
dde@paxis.org