

The Bio-Psycho-Social (BPS) Model:

A Comprehensive Approach to Risk Reduction (RR), Positive Youth Development (PYD) and Assessment





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INTRODUCTION

Background

- >40% of adolescents report feeling significant stress. (source: YRBS)
- Stress activates the 'fight or flight' sympathetic nervous system (SNS) inhibiting prefrontal cortex control necessary for emotion regulation and suppressing impulsive responses¹.
- Prefrontal control can be re-established with biological techniques like breathwork.
- Bio-psycho-social (BPS) Programs interweave biological techniques into psychological and social approaches (i.e. Social-Emotional Learning (SEL) and PYD curricula) to support positive adolescent development and risk reduction.
- BPS curricula have been shown to yield enhanced program outcomes in multiple domains including emotional regulation², psychological thriving³, and reduced problem behaviors⁴.

Importance of Breathwork in RR and PYD:

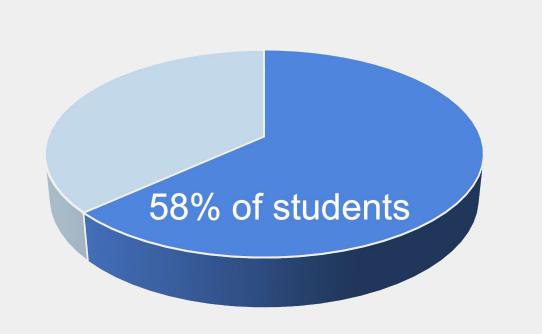
- Breathing is the only function of the autonomic nervous system that can be controlled,
- Breathwork can directly impact the SNS to restore autonomic homeostasis.
- This relaxed physiology is the foundation for executive function, emotion regulation and thriving.

SKY Schools: An Evidence-based BPS Approach

- The SKY Schools program, is an evidence based K-12 SEL curriculum that includes breathwork.
- It has demonstrated consistent decrease in risk behaviors, improvements in academic performance, and PYD constructs.

SEL/PYD and Behavioral Outcomes in SKY Schools Graduates (5)

Figure 1. Development of Positive Mindsets and Behaviors in SKY Schools Graduates



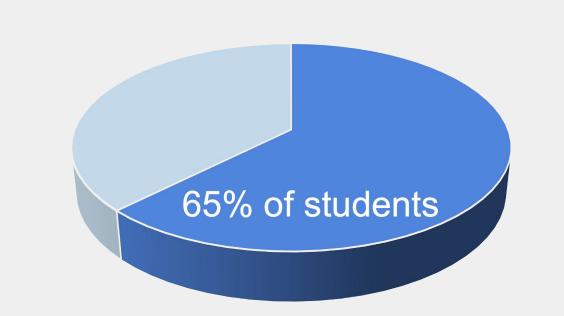
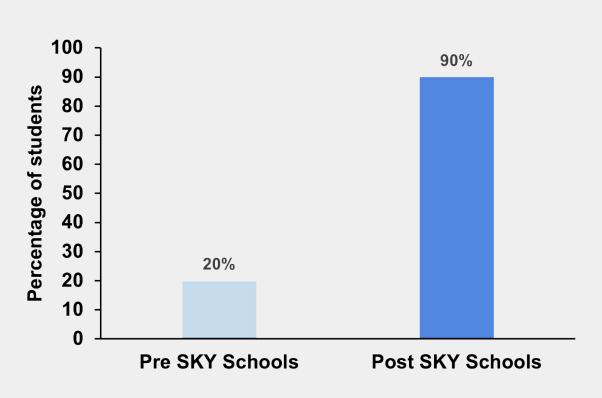


Figure 1a) Students reporting increased caring & cooperative behaviour post SKY Schools

Figure 1b) Students reporting increased growth mindset post SKY Schools

Figure 2. Improved Academic Performance in SKY Schools Graduates



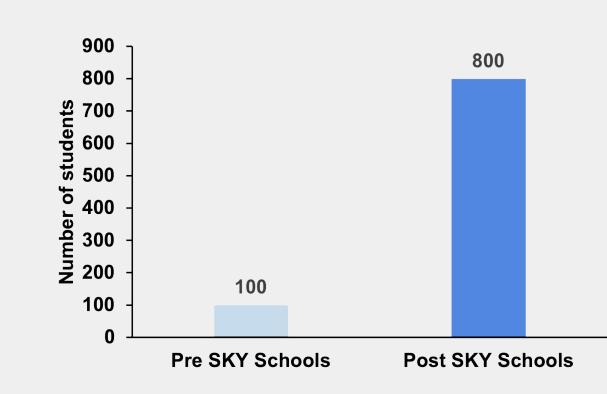
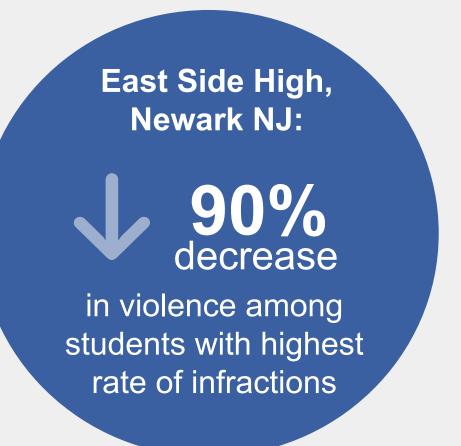


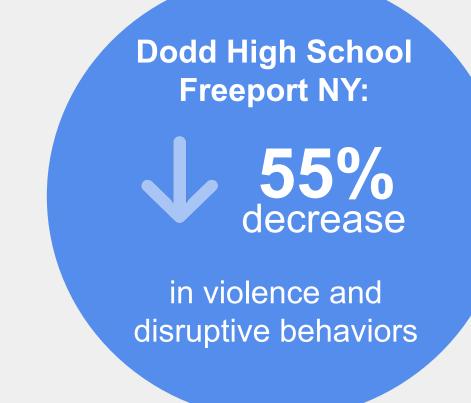
Figure 2a) Increase in percent of students achieving adequate yearly performance

Figure 2b) Increase in number of students achieving honor roll

Figure 3. Decreased Violence and Disruptive Behaviors in SKY School Students

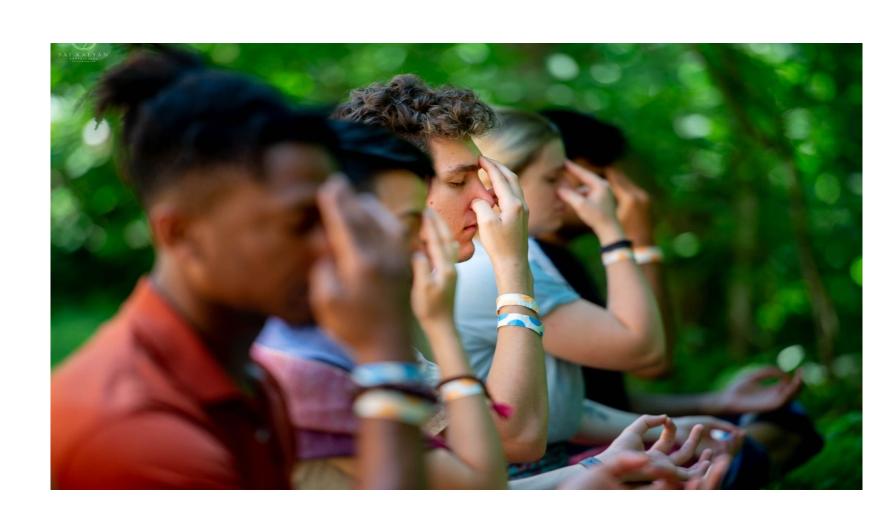






STUDIES

Study 1: SEL/PYD improvements across gender & ethnicity with SKY Schools—a breath-based BPS intervention (6)



Research Question:

- Are there gender and ethnicity differences in SEL and PYD outcomes of BPS programming? **Participants:**
- 59 New York Public High School Students (20 male/39 female) aged 14 – 16.

Table: 1 Student Ethnic Identification

Ethnicity	Number
African American/Black Latinx Hispanic	15 14
White/non-Latino	14
Other	13

Methods:

Pre test was one week prior and post test on the last day using standardized measures.

Table 2: PYD/RR Assessment Constructs and their Alignment with SEL Competencies

SEL Competencies	Constructs assessed in the current study	Scale
Self-awareness	Self-esteem***	Rosenberg Self Esteem Scale
	Identity formation***	Erikson Psychosocial Inventory Scale
Self-management	Anger coping ability***	ALEXSA Anger Coping Ability subscale
	Distractibility***	ALEXSA Distractability subscale
	Irritability***	ALEXSA Irritability subscale
Relationship Skills	Endorsement of aggression***	Endorsement of Aggression Scale
Responsible Decision Making	Planning and concentration**	ALEXSA Planning and Concentration Subscale
P<0.01, *P<0.001.‡ Assessment of Liability and Exposure to Substance use and Anti-social Behaviour		

Results: Equivalent Improvements in SEL and PYD Outcomes Across Gender and Ethnicity Figure 4. SKY Reduced Emotion Dysregulation Across Different Ethnicities

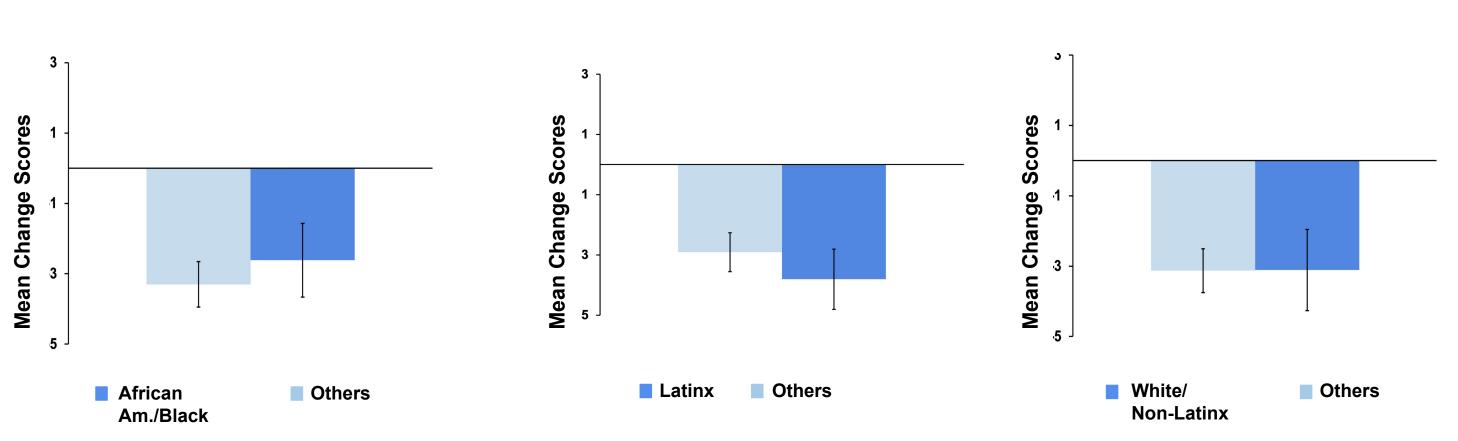


Figure 4a) Non sign. difference Figure 4b) Non sign. difference Figure 4c) Non sign. difference

White vs others

- Significant improvements were observed for all seven PYD/RR measures.
- There were no main effects or significant interactions when comparing ethnicities to the total cohort— suggesting program outcomes were universal across ethnicity.
- There was no main effect or significant interaction with gender indicating that participant outcomes were universal across gender.

Study 2: The SKY Schools BPS model enhanced PYD outcomes and Protective Factors in underserved middle school students (7)

Research Question:

 Does the SKY Schools BPS model significantly enhance PYD and Protective Factor outcomes in an underserved middle school cohort?

Participants:

79 Eighth grade students from a Title 1 Miami metro school (97% Latinx, 57% female, mean age 13.5).

Methods:

- Students were randomized to SKY Schools (group 1) or delayed-start control (group 2).
- SKY Schools had two phases—Phase 1: 2 hrs/day, 4 days per week for 2 weeks, Phase 2: 8 weekly one hour booster sessions spread over 10 weeks.
- Students were assessed before and after Phase1 at week 2, and post Phase 2 at week 13
- School scheduling required cross-over of controls at week 2. Thus, T-tests were performed for group comparison. Repeated ANOVA of all students was conducted at week 13.

Results: Growth of PYD Constructs & Protective Factors

Figure 5. SKY Enhanced Identity Consolidation at Week 2 and Week 13

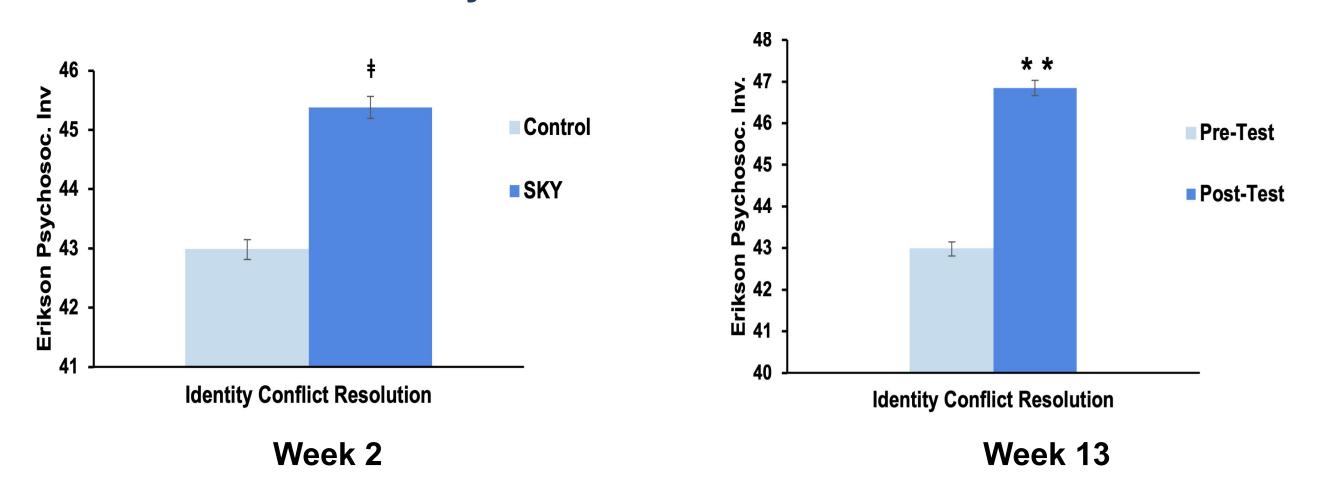


Figure 6. SKY Improved Anger Coping Ability at Week 2 and Week 13

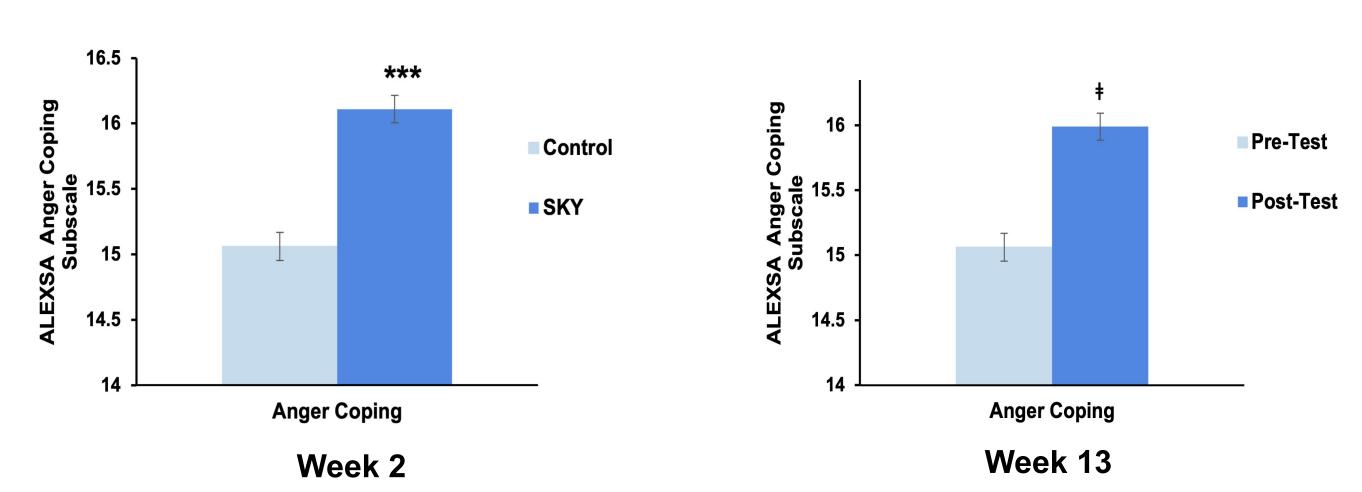
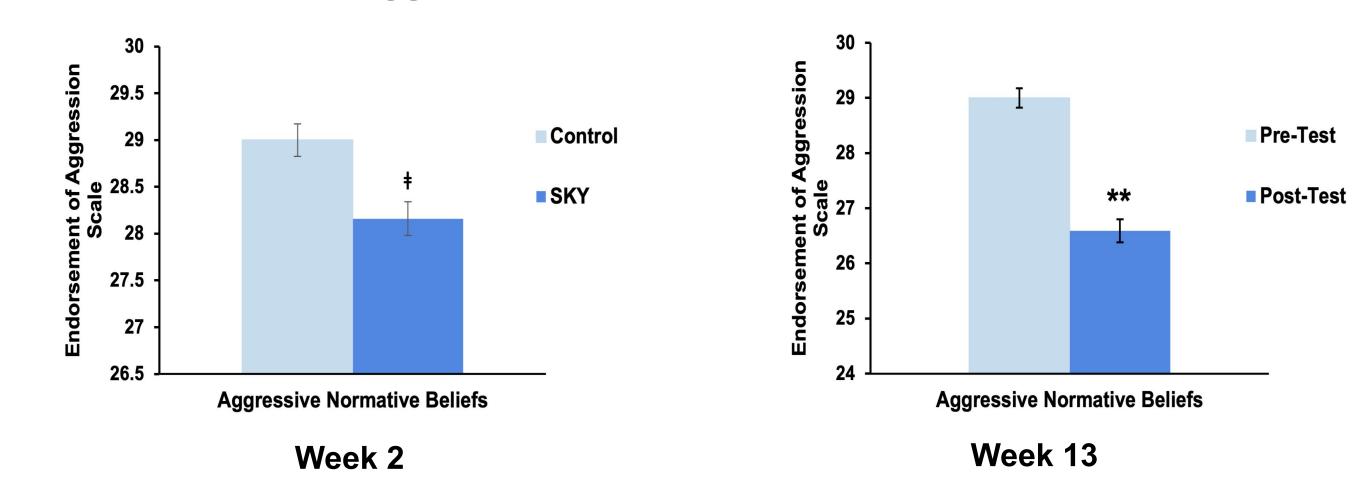
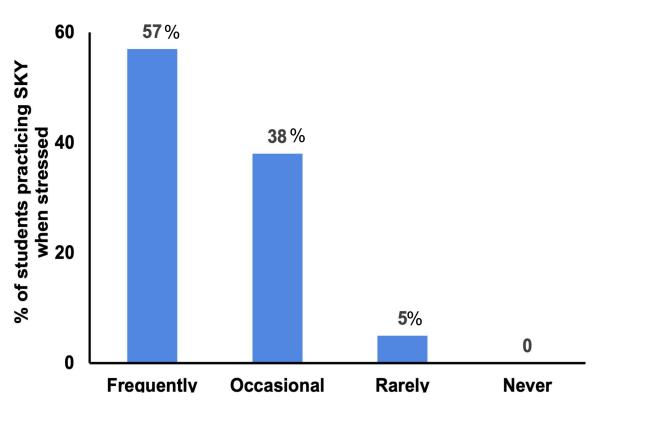


Figure 7. SKY Reduced Aggressive Attitude at Week 2 and Week 13



 $^{**}p < .005, ^{***}p < 0.0001$ indicates trend, $p \le 0.06$

Figure 8. 58% of Students Reported **Using SKY Breath Techniques** Frequently When Feeling Stressed or



INNOVATIONS IN ASSESSMENT

The known interaction between biology, psychology and behavior calls for research that investigates this relationship, and its potential to inform optimal RR and PYD programming. Below is a sample study:

 SKY Breath Meditation in the Treatment of Adolescent Onset Depression. Outcomes to include: Magnetic Resonance Imaging (MRI), salivary cortisol, blood pressure, resting heart rate, Beck Depression Inventory-II (BDI-II), and Generalized Anxiety Disorder Scale (GAD). ClinicalTrials.gov Identifier: NCT05388110

CONCLUSION

- BPS approaches can provide students with tangible strategies to directly reduce SNS overactivation.
- Strategies like breathwork can be effectively utilized during stressful periods to stabilize cortico-limbic networks⁸.
- Stress modulating practices will always be relevant in a changing adolescent landscape.
- BPS programs are non-stigmatizing, adaptable, cross-culturally and universally applicable, and cost effective—thus narrowing disparities.
- Such BPS interventions (i.e. SKY Schools) show promise for enhancing SEL/PYD/RR outcomes.
- As adolescence is a time of heightened physiological change, studies investigating the neurophysiological and neuroendocrine outcomes of BPS interventions and the relationship between physiologic, behavioral and psychological change would add to our understanding of underlying mechanisms.

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