

# Targeting Psychological Flexibility, Sleep Hygiene, and Physical Activity in High School Students using the DNA-V Model

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## Abstract

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**Background:** Universal interventions in schools are an important component of comprehensive mental health promotion efforts for youth. Social emotional learning interventions have been tested in school settings and have shown promise, but no known studies have examined interventions targeting psychological flexibility. The DNA-V model explicitly targets psychological flexibility promote wellbeing in youth, and has yet to be evaluated in a universal preventive intervention delivered in a school setting. The study assessed the feasibility, satisfaction, effectiveness, and potential moderators of an enhanced physical education curriculum based on the DNA-V model (DNA-V-PE) in adolescent sample.

**Method:** 115 rural, mostly African American high school students enrolled in physical education participated. Students in the DNA-V-PE condition ( $n = 71$ ) received 6 weeks of DNA-V-consistent programming regarding sleep and physical activity. Students in the comparison condition received 6 weeks of the same evidence-based behavior change information on sleep and physical activity without DNA-V content. Outcome measures were collected pre-intervention, weekly, post-intervention, and at 1-year follow up. Implementation fidelity data were collected at each session, and teacher and student satisfaction were collected post-treatment.

**Results:** Over 70% of students rated DNA-V components, handling private experiences, and overall satisfaction "somewhat useful" or "very useful". Teachers reported overall programming and students handling thoughts and feelings better "very useful." Implementation demonstrated 98% fidelity. Preliminary multiple regression analyses indicate scores on post and follow-up measures of sleep hygiene and psychological inflexibility significantly predicted by baseline measurement; however, group membership was not a significant predictor. Participants in the DNA-V-PE condition reported significant improvement in total time engaging in physical activity at follow-up compared with comparison condition.

**Discussion:** The present study seeks to fill gaps in the literature regarding SEL programming for high school students from a diverse, economically disadvantaged area. Results indicate universal programming targeting psychological flexibility can be feasibly conducted with satisfaction in a high school setting. Improvement in psychological flexibility and health-related outcomes provides initial justification for psychological flexibility as a target for SEL curricula.

## Introduction

Adolescence is a particularly difficult time in the development of youth's social and emotional skills (Merikangas et al., 2010). The need for social and emotional skill development is critical and woefully unaddressed in the adolescent population, particularly high school students.

When problems are addressed adolescents typically receive services in school systems regardless of the empirical support backing this programming (Green et al., 2013). Schools are uniquely positioned to address adolescent mental health due to compulsory education and a range of service providers working in and with school systems. Universal prevention methods have emerged and proven somewhat effective relative to no-treatment control at deterring onset of psychological dysfunction. Mental health promotion in schools has consisted of fostering Social Emotional Learning (SEL) skills in youth that serve as a barrier against the onset of psychological problems.

SEL skills have also proven somewhat effective relative to no-treatment control for elementary and some middle school-aged children; however, the evidence-base for high school students is severely lacking. The mechanisms responsible for psychological and behavioral changes when youth are taught SEL skills are not clearly understood (Durlak et al., 2011).

ACT principles and the psychological flexibility model have been applied to a wide-range of behavioral and psychological dysfunction and proven efficacious with adults and emerging with youth (Swain et al., 2015). The approach has been adopted and adapted by child researchers for use in group format with middle and high-school aged students through the DNA-V model (Hayes & Ciarrochi, 2015).

## Methods

### Participants

- Participants ( $n = 115$ ) grades 9 through 12
- Male (55.7%)
- African American/Black (48.7%), Hispanic/Latino (27%), Caucasian/White (21.7%), American Indian (2.6%).
- Highest educational level of either parent: High school/GED (40.78%), not completing high school (31.1%).
- 96% received free or reduced lunch.

### Design

- DNA-V-enhanced Health/PE (DNA-V-PE) curriculum plus yoga or Health/PE class plus yoga.
- DNA-V-PE met twice weekly for 1 hour over a 6-weeks DNA-V-PE program components: DNA-V model, psychoeducation regarding sleep an physical activity.
- Both conditions participated in yoga approximately once per week.
- Measures completed pre-post, weekly, and at one-year follow-up.

### Measures

- Satisfaction: Satisfaction survey
- Psychological inflexibility: Avoidance and Fusion Questionnaire for Youth-8-item version (AFQ-Y8; Greco et al., 2008)
- Sleep hygiene: Adolescent Sleep Hygiene Scale (ASHS; LeBourgeois et al., 2005).

## Methods, Cont'd

- Physical activity: Total time engaging in physical activity.
- "Trait" mindfulness: Children and Adolescent Mindfulness Measure (CAMS; Greco et al., 2011).
- Fidelity: session-by-session monitoring by teachers and supervisor

### Data Analysis

1. **Q1:** Is this type of programming feasible and/or satisfactory to adolescents and teachers in a school setting? Satisfaction data were analyzed using simple descriptive statistics. Descriptive statistics including fidelity and satisfaction percentages, and mean satisfaction ratings.
2. **Q2:** Does an ACT-consistent PE curriculum improve psychological flexibility, sleep, and physical exercise levels in adolescents compared with same-aged peers? Do these changes persist at 1-year follow-up? Multiple linear regression models were used to predict post outcome data and follow-up outcome data from baseline and group membership across measures of sleep hygiene, physical activity, and psychological inflexibility.
3. **Q3:** Does "trait" mindfulness moderate changes in psychological inflexibility? A simple moderation analysis testing the conditional effect of X (pre-AFQ-Y8) scores on Y (post-AFQ-Y8) scores at values of M (CAMS) was conducted.

## Results

### 1. Q1:

Satisfaction Question	Not useful	A Little Useful	Somewhat Useful	Very Useful	Mean Satisfaction
Handle Thoughts	25/8	36/11	29/50	11/31	2.2/3
Handle Feelings	25/8	39/21	29/32	7/39	2.1/3
Goal Setting	8	21	35	36	3
Sleep Information	10	22	32	36	2.9
Values Exercises	3	25	38	35	3
Advisor Exercises	8	17	44	31	3
Overall Yoga/DNAVPE	18/4	39/13	36/44	7/39	2.3/3.2

Figure 1. Numbers on the right reflect DNA-V-PE satisfaction percentages. Numbers on the left reflect comparison.

- Implementation fidelity: 98%
- 70% of DNA-V-PE participants gained something of lasting value.
- 50% used DNA-V-PE skills at least once per week outside class.
- 10% in Yoga condition used skills outside class (70% reported "Never").
- Teachers reported all program components at least "somewhat useful" and overall programming as "very useful."
- 2. **Q2:** *Sleep.* Regression analyses indicated that pre-ASHS scores significantly predicted post-ASHS ( $b = .51, p < .01$ ) and follow-up ASHS scores ( $b = .44, p < .001$ ). Group was not.
- *Psychological inflexibility.* Regression analyses indicated that pre-AFQ-Y8 scores significantly predicted post-AFQ-Y8 ( $b = .59, p < .001$ ) and follow-up AFQ-Y8 scores ( $b = .75, p < .001$ ). Group was not.
- *Physical activity.* Regression analyses indicate no significant changes from pre-post scores on the physical activity questionnaire. Group membership significantly predicted follow-up scores of physical activity ( $b = .44, p < .01$ ) indicating participants in the DNA-V-PE condition spent significantly more time engaging in physical activity at follow-up.
- **Q3:** When "trait" mindfulness is 0, higher Baseline psychological inflexibility was associated with increased post-treatment psychological inflexibility,  $b = 0.840, p < .001$ . No evidence of moderation as indicated by an insignificant interaction term.

## Discussion

**Q1:** Overall DNA-V-PE programming and specific program components were feasible and satisfactory to both students and teachers.

**Q2:** Significant changes in sleep and psychological inflexibility at post-intervention and follow-up can not be attributed to students membership in the DNA-V-PE or comparison condition. Students in the DNA-V-PE condition were spent a significant more amount of time engaging in physical activity at follow-up than the comparison condition.

**Q3:** Moderation analysis findings indicate no current evidence for baseline "trait" mindfulness functioning as a moderator of the relationship between baseline and post-intervention psychological inflexibility.

### Limitations

1. A single researcher was responsible for implementing the entire intervention package to students, which may limit external validity of findings.
2. Missing data at post and follow-up time points could interfere with analyses.

### Future Directions

1. Reanalyze data using linear mixed effects regression modelling to make better use of the available longitudinal data.
2. Longitudinal mediation modeling will be used to assess whether changes in psychological inflexibility mediate changes in sleep and physical activity outcomes over time.
3. Evaluating potential moderators of treatment, such as demographic characteristics, could identify factors that may affect impact of DNA-V-PE programming.
4. Conduct DNA-V programming targeting mental health concerns in a school-based universal preventive intervention.

## Conclusions

1. Preliminary feasibility and satisfaction data indicate that the DNA-V model can be reliably and satisfactorily implemented in a school setting as a universal preventive intervention for high school students.
2. Participants in the DNA-V-PE program demonstrated significant gains in total time engaging in physical activity from baseline to follow-up.
3. Changes in sleep and psychological inflexibility in the context of a non-clinical school population provide initial justification for psychological flexibility as a target for SEL curriculum in schools.
4. "Trait" mindfulness does not appear to moderate changes from baseline to post-study psychological inflexibility.

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