



# MLDS CENTER

Maryland Longitudinal Data System

Address 550 West Baltimore Street  
Baltimore, MD 21201  
Phone 410-706-2085  
Email [mlds.center@maryland.gov](mailto:mlds.center@maryland.gov)  
Website [www.MLDSCenter.org](http://www.MLDSCenter.org)

## MEMORANDUM

**TO:** MLDS Governing Board  
**FROM:** Ross Goldstein  
**DATE:** December 9, 2019  
**SUBJECT:** External Researcher and Grant Funded Projects

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### Purpose

The Center received an application under the *Policies and Procedures for External Researchers and Grant Funded Projects*, which requires Governing Board approval.

### Project Title

*Long-Term Effects of PBISplus: A Randomised Controlled Trial in Maryland Public Elementary Schools*

### Background

The application is submitted by Dr. Angela Henneberger, Research Branch Director and Assistant Research Professor at the University of Maryland, School of Social Work. Dr. Henneberger is planning to submit this proposal to the Institute of Education Sciences (IES), U.S. Department of Education. The request for proposals (RFP) has not been formally issued by IES, but is expected later this month (or in early January). It is expected to have a very short application period that will be prior to the March Governing Board meeting. Accordingly, Dr. Henneberger is submitting her application for Governing Board approval at this time. It is possible that the RFP will require changes to the proposal. If significant substantive changes are required, the Board will be notified and Dr. Fielder's approval will be sought.

### Project Abstract

Schoolwide positive behavioral intervention and support (PBIS) is one of the most widely implemented school-based behavioral interventions in Maryland, adopted in over 1,000 public schools in Maryland across all 24 local school systems. One of the limitations of schoolwide PBIS is that it did not target students with advanced needs. In response, PBISplus is implemented to provide high-risk students with additional services. PBISplus demonstrated proximal effects for student academic performance and teacher's self-efficacy. However, little is known about the distal effects of PBISplus or the conditions under which PBISplus shows effects. The current study leverages a randomized controlled trial examining the value add of PBISplus in comparison to PBIS schoolwide. Dr. Henneberger and team will examine distal outcomes, including high school graduation and exclusionary discipline, college enrollment, workforce wages, and juvenile service involvement. The team will also examine individual-level, school-level, and district-level moderators of effects to determine under which conditions PBISplus may be most effective in the long-term. The results will be used to provide policymakers, educators, and researchers with a better understanding of the cost benefit of implementing the PBISplus prevention framework. The potential grant award is \$250,000.

Review Process

The project was favorably reviewed by the Research and Policy Advisory Board at its December 5<sup>th</sup> meeting. The RPB recommended it's referral to the Governing Board for final approval.

Recommendation

I recommend that the Governing Board approve this External Researcher and Grant Funded Project application. The research is cross-sector and is responsive to several of the Governing Board's Research Agenda . Dr. Henneberger and the assembled team has the requisite expertise and experience to conduct the planned research. Finally, the proposed research addresses an important topic that may provide actionable information for state and local education practitioners and policy makers.

[ERA-34]

Long-Term Effects of PBISplus: A Randomized Controlled Trial in Maryland Public Elementary Schools ([Link to tracking.](#))

<b>Deadline for Letter of Support:</b>	01/15/2019
<b>Project Title:</b>	Long-Term Effects of PBISplus: A Randomized Controlled Trial in Maryland Public Elementary Schools
<b>Abstract or Brief Description:</b>	<p>Schoolwide positive behavioral intervention and supports (PBIS) is one of the most widely implemented school-based behavioral interventions in Maryland, adopted in over 1,000 public schools in Maryland across all 24 local school systems. One of the limitations of schoolwide PBIS is that it did not target students with advanced needs. In response, PBISplus is implemented to provide high-risk students with additional services. PBISplus demonstrated proximal effects for student academic performance and teacher's self-efficacy. However, little is known about the distal effects of PBISplus or the conditions under which PBISplus shows effects. The current study leverages a randomized controlled trial examining the value add of PBISplus in comparison to PBIS schoolwide. We will examine distal outcomes, including high school graduation and exclusionary discipline, college enrollment, workforce wages, and juvenile service involvement. We will also examine individual-level, school-level, and district-level moderators of effects to determine under which conditions PBISplus may be most effective in the long-term. The results will be used to provide policymakers, educators, and researchers with a better understanding of the cost benefit of implementing the PBISplus prevention framework.</p>
<b>Research Project Question:</b>	<p>What are the long-term effects of PBISplus implementation on high school graduation and dropout, exclusionary discipline, college enrollment, college persistence and degree attainment, workforce participation and wages, and juvenile justice involvement?</p> <p>What are the individual-, school-, and district-level conditions under which PBISplus has the strongest long-term effects?</p>
<b>Research Agenda Questions:</b>	<p>2. Are Maryland students academically prepared to enter postsecondary institutions and complete their programs in a timely manner?, 19. What are the workforce outcomes for Maryland students who earn a high school diploma (via high school graduation or GED®) but do not transition to postsecondary education or training?</p>
<b>Benefit to the State of Maryland:</b>	<p>This study provides a benefit to the State of Maryland in three main ways. First, to address behavioral concerns, improve school climate, and ultimately improve student academic outcomes, over 1,000 schools across all 24 local school systems in Maryland have been trained in school-wide PBIS. The current study will provide statistics on the long-term effects of</p>

	implementation of PBISplus in elementary school, including high school, college, workforce, and juvenile service outcomes. Second, this study will provide an estimate of the cost- benefit information for PBIS in Maryland to better understand the monetary benefits of implementation. Third, this study will examine specific school- and student-level characteristics associated with stronger effects to help identify schools and students that benefit most from PBISplus implementation. This information will help state and local leaders to identify the types of students and schools for which PBIS implementation may be particularly cost effective.
<b>Explanation of Cross-Sector Qualities:</b>	This research is cross-sector by incorporating data from Maryland elementary school students and staff, data on college enrollments, and workforce wages. Juvenile service involvement will also be examined once approved by the MLDS Center governing board.
<b>Proposed Center Output:</b>	This project is expected to result in the following MLDS Center products: Research series presentation(s) Research report(s). Center products will focus on the long-term effects of PBISplus, including effects on high school, college, workforce, and juvenile service outcomes.
<b>Estimated Timeline for the Proposed Project:</b>	If funded, the project would likely begin in Summer 2020. If the project is not funded on the initial round, we will likely resubmit the proposal.
<b>Researcher Applicant Name:</b>	Angela Henneberger
<b>Researcher Email Address:</b>	<a href="mailto:angela.henneberger@maryland.gov">angela.henneberger@maryland.gov</a>
<b>Researcher Organization:</b>	University of Maryland at Baltimore
<b>Researcher Phone Number:</b>	4107066341
<b>Research Applicant Background and Qualifications:</b>	<p>Dr. Angela K. Henneberger, Ph.D., is Principal Investigator and Director of Research of the MLDSC. She is a Research Assistant Professor at the University of Maryland School of Social Work. Dr. Henneberger's research applies advanced quantitative methods to examine the academic, social, emotional, and behavioral development of children and adolescents, with a specific focus on at risk students. Dr. Henneberger received her Ph.D. from the University of Virginia, where she was awarded an Institute of Education Sciences (IES) predoctoral fellowship. She completed a postdoctoral fellowship at the Pennsylvania State University in the Prevention and Methodology Training (PAMT) program.</p> <p>Dr. Bess A. Rose, Ed.D., is a Statistician with the MLDSC and the University of Maryland School of Social Work. Dr. Rose's research interests include understanding the contributions of school and work environments to</p>

children's and adults' growth trajectories. She received her doctorate from the Johns Hopkins University School of Education, with support of an IES predoctoral fellowship. In her dissertation she applied cross-classified multiple membership growth models to examine the relative impact of different types of school moves on academic achievement. Prior to joining the MLDS Center, she was a senior study director at Westat, research and evaluation coordinator at the Maryland State Department of Education, and technical writing advisor at Goucher College's Graduate Programs in Education.

Dr. Elise Pas conducts school-based research to examine the effectiveness of behavioral and social emotional interventions, with a specific focus on the contextual factors that promote, or hinder, implementation fidelity. She received a Ph.D from the University of Maryland College Park in 2008. She is currently an Associate Scientist at Johns Hopkins Bloomberg School of Public Health.

Catherine Bradshaw, Ph.D., M.Ed. is a Professor and the Associate Dean for Research and Faculty Development at the Curry School of Education at the University of Virginia. Prior to her current appointment at U.Va., she was an Associate Professor and the Associate Chair of the Department of Mental Health at the Johns Hopkins Bloomberg School of Public Health, where she maintains an adjunct faculty position. She holds a doctorate in developmental psychology from Cornell University and a master's of education in counseling and guidance from the University of Georgia.

Her primary research interests focus on the development of aggressive behavior and school-based prevention. She collaborates on research projects examining bullying and school climate; the development of aggressive and problem behaviors; effects of exposure to violence, peer victimization, and environmental stress on children; children with emotional and behavioral disorders and autism; and the design, evaluation, and implementation of evidence-based prevention programs in schools. She has led a number of federally funded randomized trials of school-based prevention programs, including Positive Behavioral Interventions and Supports (PBIS) and social-emotional learning curricula. She also has expertise in implementation science and coaching models.

Dr. Bradshaw works with the Maryland State Department of Education and several school districts to support the development and implementation of programs and policies to prevent bullying and school violence, and to foster safe and supportive learning environments. She collaborates on federally-funded research grants supported by the NIMH, NIDA, CDC, NIJ, U.S. Department of Education, and the Institute of Education Sciences. She has published over 200 peer-reviewed articles and chapters in edited volumes.

	<p>She was previously the Associate Editor for the Journal of Research on Adolescence and is currently the editor of Prevention Science. She is a coeditor of the Handbook of School Mental Health (2014) and the editor of Handbook on Bullying: A Life Course Perspective (2017).</p>
<b>Multiple Research Applicants?:</b>	Yes
<b>Grant Funds:</b>	Yes, I plan to apply for grant funds for this project.
<b>Description of Grant Program:</b>	<p>Description is based on last year's RFP. This year's RFP will not be released until December/January.</p> <p>The Low-Cost, Short-Duration Evaluation of Education Interventions (Low-Cost Evaluation) grant program is designed to support rigorous evaluations of education interventions (broadly defined as practices, programs, and policies) that state or local education agencies expect to produce meaningful improvements in student education outcomes within a short period (for example, within a single semester or academic year). These evaluations are to be conducted for \$250,000 or less and completed within two years. The program will be carried out by research institutions and state or local education agencies working together as partners. The evaluations will use randomized controlled trials or regression discontinuity designs to determine the impact of interventions on student education outcomes, and will rely on administrative data or other sources of secondary data to provide measures of these student outcomes. Evaluation results are to be disseminated to the education agency and the public before the end of the grant.</p> <p>Applicants may propose to evaluate interventions for students in prekindergarten, primary and secondary, postsecondary, or adult education. The Institute is mainly interested in interventions that are expected to improve outcomes for students who are struggling or at risk of failure. The Institute is not specifying categories of interventions beyond that an intervention is implemented by a state or local education agency and of high importance to that agency, and that the intervention can be evaluated in a timely fashion. Note that the costs of interventions and their implementation are to be covered by the state and/or local education agency; they will not be covered by this grant program.</p> <p>Low-Cost Evaluation projects are to fill a specific niche in the evaluation process and are not applicable to all types of interventions (e.g., multi-year interventions) or situations (e.g., where the necessary data is not available from a secondary source). Through this grant program, the Institute intends to support better education agency decision making on specific interventions and to learn more about the value of this type of evaluation and what it can and cannot accomplish.</p>

<b>Name of Grantor:</b>	IES
<b>RFP or Grant Program Info:</b>	<a href="https://ies.ed.gov/funding/pdf/2019_84305L.pdf">https://ies.ed.gov/funding/pdf/2019_84305L.pdf</a>
<b>Amount of Grant Funds Sought / Awarded:</b>	\$250,000
<b>Grant Application Date:</b>	02/15/2020
<b>Letter of Support:</b>	Yes
<b>Intent to Proceed Without Grant:</b>	No
<b>Adult Ed. Sector - Data Categories:</b>	Correctional Education, GED
<b>K-12 Sector Data Categories:</b>	Assessments, Attendance, College Readiness, Completers / Graduates, Schools
<b>Post-secondary Sector Data Categories:</b>	Credits / Grades, Enrollment, Graduates
<b>Workforce Sector - Data Categories:</b>	Employer Information, K-12 Staff, Wage Data

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**Long-Term Effects of PBIS*plus*: A Randomized Controlled Trial in Maryland Public Elementary Schools**

Institute of Education Sciences\*

Low Cost Short Duration SLDS Evaluation Program (\$250,000)

Duration: Two Years

Due date: February 2020

Principal Investigator: Dr. Angela K. Henneberger, Research Director, MLDS Center

Co-Principal Investigator: Dr. Bess Rose, Statistician, MLDS Center

Co- Principal Investigator: Dr. Catherine Bradshaw, Professor and Associate Dean for Research,  
University of Virginia

Co-Principal Investigator: Dr. Elise Pas, Associate Scientist, Johns Hopkins University

November 26, 2019

\*RFP is last year's RFP. Maximum cost, duration, and due date are estimated based on late year's RFP.

## **Abstract**

Schoolwide positive behavioral intervention and supports (PBIS) is one of the most widely implemented school-based behavioral interventions in Maryland, adopted in over 1,000 public schools in Maryland across all 24 local school systems. One of the limitations of schoolwide PBIS is that it did not target students with advanced needs. In response, *PBISplus* is implemented to provide high-risk students with additional services. *PBISplus* demonstrated proximal effects for student academic performance and teacher's self-efficacy. However, little is known about the distal effects of *PBISplus* or the conditions under which *PBISplus* shows effects. The current study leverages a randomized controlled trial examining the value add of *PBISplus* in comparison to PBIS schoolwide. We will examine distal outcomes, including high school graduation and exclusionary discipline, college enrollment, workforce wages, and juvenile service involvement. We will also examine individual-level, school-level, and district-level moderators of effects to determine under which conditions *PBISplus* may be most effective in the long-term. The results will be used to provide policymakers, educators, and researchers with a better understanding of the cost benefit of implementing the *PBISplus* prevention framework.

## **Significance and Background**

Prior evidence suggests that school-based preventive interventions may be a particularly cost-effective approach for reaching a universal school-based population. One such approach that is scaling up nationwide, with over 26,000 schools across the country implementing the framework, is positive behavioral interventions and supports (PBIS; Sugai & Horner, 2006), a three-tiered prevention framework, which includes universal (school-wide), targeted (high-risk), and indicated (treatment) prevention programming. Growing experimental evidence supports the effectiveness of PBIS in reducing behavioral problems, improving school climate, improving student attendance, and increasing student academic performance (Bradshaw, Koth, Bevans, Ialongo, & Leaf, 2008; Bradshaw, Koth, Thornton, & Leaf, 2009; Bradshaw, Mitchell, & Leaf, 2010; Bradshaw, Waasdorp, & Leaf, 2012; Horner et al., 2009; Waasdorp, Bradshaw, & Leaf, 2012). However, little is known about the more distal effects of PBIS across public systems, limiting the current knowledge of the economic benefit of implementation and further scaling. The purpose of the current study is to link data from an existing randomized controlled trial (RCT) of PBIS in Maryland with statewide cross-system administrative data to determine the program's long-term effects. Doing so will provide specific cost-benefit information for PBIS in Maryland and will provide a framework for the use of linked administrative data to support economic evaluations in school-based prevention science.

To address behavioral concerns, improve school climate, and ultimately improve student academic outcomes, over 1,000 schools across all 24 local school systems in Maryland have

been trained in school-wide PBIS. Consistent with a response to intervention approach (Hawken, Vincent, & Schumann, 2008), by design, about 10-15% of students will not respond to universal prevention and will require targeted support (see Bradshaw, Pas, Goldweber, Rosenberg, & Leaf, 2012). *PBISplus* enhances supports to teachers and staff for the use of evidence-based practices targeted toward nonresponders to further prevent behavior problems and improve student outcomes.

In 2007-2008, elementary schools in Maryland that had received prior training and implementation of PBIS and demonstrated a need for targeted support were given the option to participate in a group RCT (see Bradshaw et al., 2012). Schools were stratified by district, and matched on baseline suspensions and select school demographics (e.g. free/reduced meals, school size), and then were randomized to either *PBISplus* (n = 20 schools) or comparison (n = 22 schools; PBIS school-wide implementation continued in these schools). Teachers in the intervention condition reported small improvements in student need for special education, student academic performance, and their own self-efficacy (Bradshaw et al., 2012).

The current project will draw upon faculty expertise across social work, education, and public health to leverage state longitudinal data from Maryland to examine the long-term effects of *PBISplus* implementation, including effects on high school graduation and dropout, exclusionary discipline, college enrollment, college persistence and degree attainment, workforce participation and wages, and juvenile justice involvement. We will leverage linked administrative records over at least ten years (academic years 2007-2008 through 2017-2018) to examine schoolwide and student-level outcomes. School-level implementation data will be used to examine differential effects by fidelity of implementation. District-level, school-level, and individual-level data will be used to examine whether the PBIS prevention approach has stronger effects for some groups of schools and students (i.e., under what conditions and for whom does PBIS have effects?). The results will be used to provide policymakers, educators, and researchers with a better understanding of the cost benefit of implementing the PBIS prevention framework.

### Research Questions

1. What are the long-term effects of *PBISplus* implementation on high school graduation and dropout, exclusionary discipline, college enrollment, college persistence and degree attainment, workforce participation and wages, and juvenile justice involvement?
2. What are the individual-, school-, and district-level conditions under which *PBISplus* has the strongest long-term effects?

### Methods

**Design.** The Maryland Longitudinal Data System (MLDS) is Maryland's statewide repository for individual-level education and workforce data that are longitudinally linked across

three state agencies: (1) the Maryland State Department of Education (MSDE); (2) the Maryland Higher Education Commission (MHEC); and (3) the Department of Labor, Licensing and Regulation (DLLR). Data are linked using students' social security number (SSN), state assigned student identification (SASID) number (for education data), name, date of birth, and demographics. Greater than 95% of student high school records can be linked to either a higher education or a workforce record. The MLDS currently houses data from academic years 2007-08 through 2017-18, and there are close to 7 million distinct student and employee records. Using the MLDS provides the opportunity to examine long-term outcomes for students beginning in 3rd grade.

In 2007-2008, elementary schools in Maryland that had received prior training and implementation of PBIS and demonstrated a need for targeted support were given the option to participate in a group RCT (see Bradshaw et al., 2012). Schools were stratified by district, and matched on baseline suspensions and select school demographics (e.g. free/reduced meals, school size), and then were randomized to either *PBISplus* (n = 20 schools) or comparison (n = 22 schools; PBIS school-wide implementation continued in these schools).

Data from Johns Hopkins will be included on program implementation. Identifiers collected for each student included the following variables: System name; School name; Teacher last name; Teacher first name; Student last name; Student first name; Student ID, Grade, DOB, Ethnic Code, Gender, Special education, and FARMS. The student ID likely pre-dates the SASID, so a probabilistic match on first name, last name, DOB, and demographics will likely be necessary. Match rates are likely to be high because students can be matched within the 42 schools participating in the *PBISplus* trial in 2007-2008.

**Population.** The cohort of Maryland public school students in 2007-2008 who were in elementary schools assigned to *PBISplus* or comparison will be identified using the MLDS data. Using this cohort enables examination of outcomes for a randomized program in elementary school into high school, college, and the workforce (through 2017-2018).

**Measures.** *PBISplus indicator.* Students in a total of 42 schools will be identified using a 0/1 indicator set to 1 if the student was initially in a *PBISplus* school (treatment) and set to 0 if the student was initially in a comparison school (control).

*High school graduation* will be measured using administrative records from MSDE to determine attainment of a regular high school diploma from a Maryland public high school. GED data may be used to determine the proportion of students obtaining a GED instead of a regular high school diploma.

*Exclusionary discipline* will be measured using administrative records from MSDE. Exclusionary discipline is not a pure measure of student behavior and includes staff subjectivity.

*College enrollment* will be measured using administrative records from MHEC for Maryland 2-year and 4-year public and private colleges and the National Student Clearinghouse (NSC) for out-of-state colleges. Persistence and degree attainment will also be measured for students who were in later grades in 2007-2008.

*Workforce wages* will be measured using administrative records from DLLR. A quarterly wage is provided for each quarter in which an individual worked for a company in Maryland that is eligible for unemployment insurance (UI). Wages will be summed across quarters within a year to create yearly wages.

*Juvenile service involvement* will be measured using administrative records from the Maryland Department of Juvenile Services (DJS), once approved for inclusion in the MLDS by the MLDS Center governing board. The PI will discuss with DJS to determine which data elements would be most useful for the current project.

*Student-level characteristics* include demographics, initial academic performance, initial attendance, program service enrollment (i.e., FARMS; special education; ELL). Self-report and teacher-reported measures may be received from Johns Hopkins University and may include reports of student academic performance and self-efficacy.

*School-level characteristics* include aggregate measures of student-level characteristics listed above and may also include staff characteristics. Data on fidelity of implementation and school climate will be received from Johns Hopkins University.

*District-level characteristics* will be measured using data that are publicly available.

**Analytic plan.** Matching of data from Johns Hopkins University will be completed in the master data management system by MLDS Center staff. The data will be de-identified prior to being provided to the researchers on the study. The data will be extracted from the MLDS into an analytic dataset and checked for missing values and outliers. Normality, linearity, and multi-collinearity will be assessed at the individual and school levels. Group equivalency between the program and control groups will be checked to ensure that randomization resulted in the balance of observable characteristics across groups. In the case of nonequivalency, propensity score methods may be used to equate the program and control groups.

A multi-level modeling approach will be used with students (level 1) nested within schools (level 2). Multi-level random effects models will be used for continuous outcomes, including workforce earnings, and multi-level logistic random effects models will be used for binary outcomes, including high school graduation, college enrollment, and college degree attainment. Multiple membership and cross classification may be accounted for in the multi-level models to correctly account for the elementary, middle and high schools which students attended, allowing for students to attend more than one elementary school and more than one middle school and more than one high school.

### **MLDS Research Agenda**

This proposal is responsive to the following questions on the MLDS Center research agenda:

- *Are Maryland students academically prepared to enter postsecondary institutions and complete their programs in a timely manner?*

- *What are the workforce outcomes for Maryland students who earn a high school diploma (via high school graduation or GED®) but do not transition to postsecondary education or training?*

### **Evaluation of a state or federal education program**

This research evaluates the implementation of PBIS*plus*, which is a federally and State funded program implemented in Maryland public elementary schools.

### **Cross-sector**

This research is cross-sector by incorporating data from Maryland elementary school students and staff, data on college enrollments, and workforce wages. Juvenile service involvement will also be examined once approved by the MLDS Center governing board.

### **Benefit to the State of Maryland**

This study provides a benefit to the State of Maryland in three main ways. First, to address behavioral concerns, improve school climate, and ultimately improve student academic outcomes, over 1,000 schools across all 24 local school systems in Maryland have been trained in school-wide PBIS. The current study will provide statistics on the long-term effects of implementation of PBIS*plus* in elementary school, including high school, college, workforce, and juvenile service outcomes. Second, this study will provide an estimate of the cost- benefit information for PBIS in Maryland to better understand the monetary benefits of implementation. Third, this study will examine specific school- and student-level characteristics associated with stronger effects to help identify schools and students that benefit most from PBIS*plus* implementation. This information will help state and local leaders to identify the types of students and schools for which PBIS implementation may be particularly cost effective.

### **Available Resources**

The University of Maryland Baltimore (UMB; PI: Dr. Angela Henneberger) will take the lead on the proposal and will lead all study activities, including data pulls from the MLDS operational data store (ODS; with Dr. Bess Rose), data cleaning, data analyses, and dissemination. Sub-contracts to the University of Virginia (PI: Dr. Catherine Bradshaw) and the Johns Hopkins University (PI: Dr. Elise Pas) will provide consultation services and assistance with data analyses and dissemination. A postdoctoral fellow will be hired at the University of Virginia to work under the mentorship of Dr. Bradshaw. Drs. Bradshaw and Pas and the postdoctoral fellow will need access to student-level data, but will not need access to the ODS. Drs. Henneberger and Rose are the only research team members who will have access to the ODS. A graduate student at UMB will be hired to coordinate project activities across sites.

### **Center Product and Further Development**

- **MLDS Center products.** This project is expected to result in the following MLDS Center products:
  - (1) Research series presentation(s)
  - (2) Research report(s).
 Center products will focus on the long-term effects of PBIS<sup>plus</sup>, including effects on high school, college, workforce, and juvenile service outcomes.
- **Further development.** We plan to submit results to academic conferences (e.g., Society for Child Development, Society for Research on Adolescence, Society for Prevention Science, American Educational Research Association) and academic journals (e.g., *Journal of Youth and Adolescence*, *Journal of School Psychology*, *Journal of Educational Psychology*, *Prevention Science*).

### **References**

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