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Effects of Social Development Intervention in Childhood on Adult Life at Ages 30 to 39

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Abstract

Elementary schools can be effective sites for universal preventive interventions. Less is known about how long effects of intervention in elementary grades last. Can they improve outcomes in adulthood? To test effects of a social developmental intervention in the elementary grades on adult life through the 30s, the Seattle Social Development Project, a nonrandomized controlled trial, followed all consenting 5th-grade students ($N = 808$) from 18 Seattle public elementary schools from age 10 (in 1985) to age 39 (in 2014), with 88% retention. The sample was gender balanced and ethnically and economically diverse. The full intervention, called *Raising Healthy Children*, continued from Grades 1 through 6 and consisted of teacher in-service training in classroom management and instructional methods; cognitive, social, and refusal skills training for children; and parent workshops in child behavior monitoring and management, academic support, and anticipatory guidance. Using structural equation modeling, we examined intervention effects from age 30 to age 39 across 9 constructs indicating 3 domains of adult life: health behavior, positive functioning, and adult health and success. An omnibus test across all 9 constructs indicated a significant positive overall intervention-control difference. Examined individually, significant intervention effects included better health maintenance behavior, mental health, and overall adult health and success. Significant effects were not found on substance use disorder symptoms, sex-risk behaviors, or healthy close relationships in the 30s. Results indicate that sustained, theory-based, multicomponent intervention in the elementary grades can produce lasting changes in health maintenance, mental health, and adult functioning through the 30s.

Keywords Childhood intervention · Elementary school · Social development · Adult health · Adult functioning · Mental health · Raising Healthy Children

Almost all children attend elementary school in the USA and most other parts of the world (European Commission/EACEA/Eurydice 2016; National Center for Education Statistics 2009; Nationmaster n.d.). Given this broad reach, the elementary school setting holds great promise for universal preventive intervention to promote positive youth development (Cruden et al. 2016; Langford et al. 2014). The proximal goals of such interventions often include reducing problem behavior and promoting school success, but a larger aspiration is to change developmental trajectories, leading to improved well-being and more positive outcomes that persist beyond childhood (Hawkins et al. 2001; Heckman et al. 2013; Lewin-Bizan et al. 2010; Vergunst et al. 2019). Though preventive, primary school interventions show short-term success, less is known about how long effects last. If developmental trajectories are changed by preventive intervention during the elementary grades, is it possible that youth who experience these interventions have measurably better lives well into adulthood?

A handful of studies of preventive interventions provided early in life have reported long-term effects into the 20s (Dodge et al. 2015; Kellam et al. 2014; Olds et al. 2014; Reynolds et al. 2017), but only a few have followed

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participants further into adulthood (Campbell et al. 2014; Schweinhart 2013). We are aware of only one other follow-up of a universal intervention in public elementary schools that followed participants to age 30. Newcomer et al. (2016) reported that the Good Behavior Game, implemented with Baltimore public school children in Grades 1 and 2, was associated with reduced risk for suicide attempt to age 30 (mediated by effects on positive childhood peer relations). The present study examines the potential of universal preventive intervention during the elementary grades to improve outcomes further into the 30s when many behavior patterns have stabilized, and family formation, career development, and serious physical health problems are more prevalent (Arnett 2016; Arnett et al. 2014; Capaldi et al. 2013; Capaldi et al. 2015; Roberson et al. 2017). Specifically, we test the effects of a social developmental intervention implemented in Grades 1 through 6, the "full intervention" condition, on multiple domains of adult life from age 30 through age 39.

Raising Healthy Children

The Seattle Social Development Project (SSDP) is a longitudinal study of health behavior and health outcomes within which a multicomponent preventive intervention called *Raising Healthy Children* (RHC) is nested. The RHC intervention was guided theoretically by the social development model (SDM; Catalano and Hawkins 1996; Hawkins and Weis 1985) and sought to improve social developmental processes in schools and families (Hawkins et al. 2003). Based on the SDM, we hypothesized that providing children with greater opportunities, skills, and recognition for involvement in their classrooms and families would build stronger prosocial bonds of commitment and attachment to school, family, and prosocial peers that would, in turn, promote healthy norms and behaviors and protect against unhealthy behaviors. We further posited that, to the extent that changes in developmental experiences during elementary grades were successful, long-term developmental trajectories of children could be altered, leading to healthier adult lives.

Published analyses have found positive effects of the RHC intervention in Grades 1 through 6 across development up to age 30. In comparison with controls, girls assigned to intervention classrooms at the start of Grade 1 evidenced less self-destructive behavior and boys engaged in less aggressive behavior by the end of Grade 2 (Hawkins et al. 1991). By the beginning of Grade 5, fewer in intervention classrooms had initiated alcohol use and/or delinquency and they reported better family communication and perceived rewards from teachers and school, as well as higher bonding to family and school than controls (Hawkins et al. 1992). By Grade 6, at the end of the intervention period, intervention students had higher achievement test scores compared with controls (Abbott et al. 1998). By age 18, youth from intervention classrooms reported less heavy alcohol use, lifetime violence, and sex-risk behaviors, and higher bonding to school and self-reported school achievement (Hawkins et al. 1999). At age 21, fewer from intervention classrooms had criminal records and symptoms of mental health disorders, they were functioning better in school (more graduated from high school) or work, and, among females, they were less likely to report ever having been pregnant or having a baby than controls (Hawkins et al. 2005; Lonczak et al. 2002). Significant effects on better mental health continued at age 27 among those from intervention classrooms, in addition to more educational and economic attainment than controls (Hawkins et al. 2008). By age 30, fewer from the full intervention classrooms had experienced a sexually transmitted infection (Hill et al. 2014). This current report asks: To what extent do the effects of the RHC intervention persist through the 30s?

Adult Development in the 30s

In the 30s, the importance of health behavior and functioning may become more evident than in previous life stages. A sedentary lifestyle is associated with a number of poor health outcomes in adulthood, and, for some, weight gain accelerates in the 30s (de Rezende et al. 2014; Ostbye et al. 2011; Wang et al. 2017). Although heavy substance use typically decreases in the 30s, continued heavy use increases risk for health problems with age (Karlamangla et al. 2006; Schulte and Hser 2013). The importance of positive adult functioning with respect to work and finances, relationships, and community also becomes more prominent in the 30s as many seek to stabilize career paths and establish an independent home and family life (Settersten 2003; Settersten and Ray 2010). The present study examines multiple assessments of health behavior and positive functioning through the 30s, as well as mental health, physical health, and socioeconomic status indicators. We test effects on each of these outcomes of the RHC intervention that ended more than 18 years earlier.

Methods

Sample and Design

The first phase of the SSDP longitudinal study began in 1981 with an experimental intervention initiated with all first-grade students in eight Seattle public schools serving high-crime neighborhoods. This early intervention was randomized at both the school and classroom level, as shown in Fig. 1. In 1985, due to a change in funding, the study was expanded to a total of 18 matched Seattle public schools, adding new study conditions and additional control participants (Hawkins and

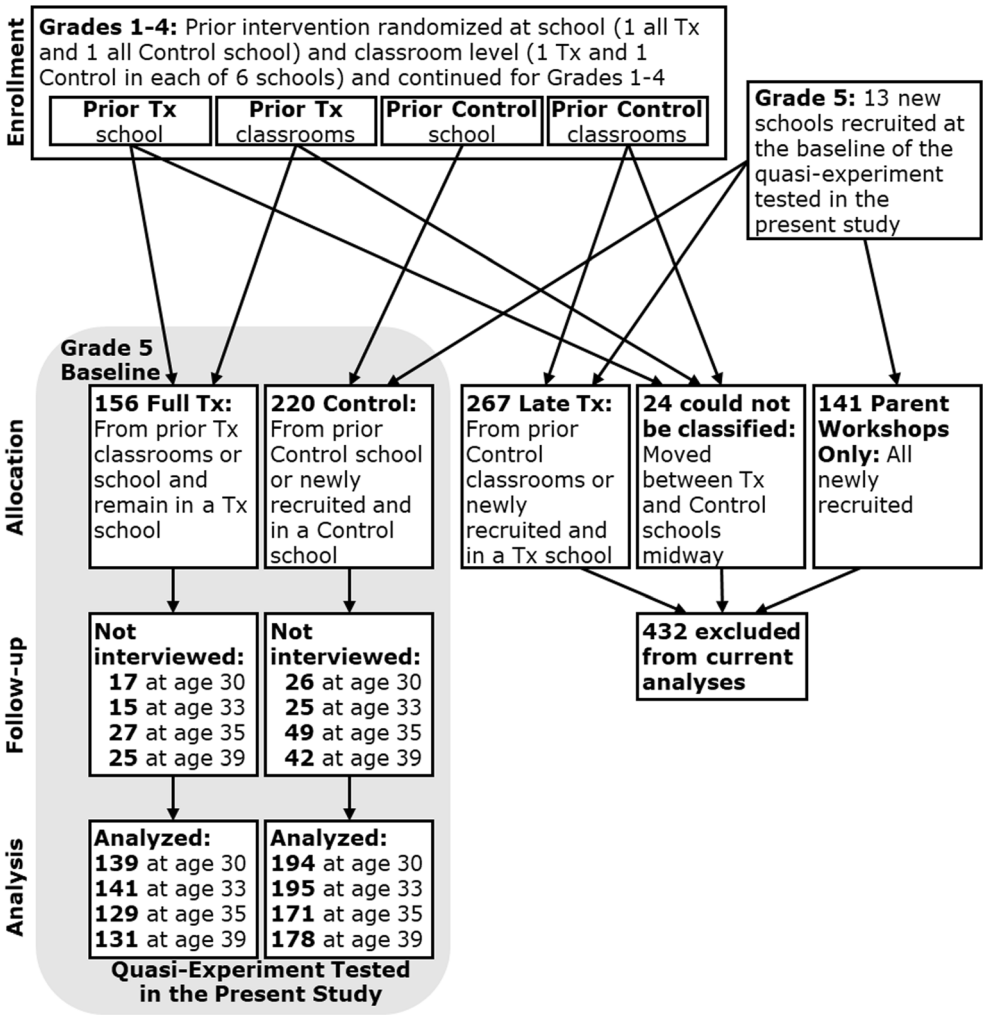

Fig. 1 Study flowchart. The quasi-experimental study (shaded portion) tested in the present study was established in Grade 5 and included participants recruited from an earlier trial of eight schools in addition to new participants from 13 added schools (three early schools closed and their students were merged into new schools, for a total of 18 schools at the Grade 5 baseline)

Catalano 2005). The longitudinal sample was established in 1985 from the population of 1053 students entering Grade 5 in these 18 schools, 808 (77%) of whom assented, with their parents' consent, to participate in the longitudinal study. Thereafter, all fifth-grade students in each school received either the intervention or no intervention according to their school's intervention assignment. This resulted in a nonrandomized controlled trial with four conditions, two of which—the "full intervention" and control conditions—are the focus of this report. The full intervention group consisted of those who received at least two semesters of intervention—one in Grades 1 through 4 and one in Grades 5 and 6—with an average dose of 4.13 years of intervention exposure. The control group received no intervention from the project throughout. Other conditions did not meet these criteria and are not discussed in this report (a "late intervention" group and a "parent workshops only" group received intervention components during Grades 5 and 6 only, and 24 students could not be classified because they left participating schools before spending at least one semester). A study flowchart and group sample sizes are shown in Fig. 1.

Of the 808 study participants, 49% are female; 47% are European American, 26% African American, 22% Asian American, and 5% Native American. Of these, 5% are Hispanic. Over 52% of the sample experienced childhood poverty as evidenced by participation in the National School Lunch/Breakfast Program between the ages of 10 and 12. Participants have been interviewed 15 times starting at age 10, with the most recent survey waves at ages 30, 33, 35, and 39 (the interview at age 35 used an abbreviated survey focusing on substance use and physical health). Retention of still-living participants averaged 88% from age 30 to 39 (37 participants were deceased by age 39).

Attrition and Internal Validity

The overall distribution of participants in the full intervention and control conditions by age 39 did not significantly differ for those lost to attrition (37% of whom were in the full intervention condition) versus the analysis sample (42% of whom were in the full intervention condition; $X^2 = .59, p = .444$); nor, among those retained in the analysis sample, did the

distribution of participants in the full intervention and control conditions differ with respect to gender (male is 47% vs. 51%, respectively; $X^2 = .32$, $p = .574$), ethnicity (European American is 48% vs. 46%; $X^2 = .20$, $p = .652$), foreign birth (15% vs. 12%; $X^2 = .54$, $p = .464$), childhood poverty (56% vs. 53%; $X^2 = .26$, $p = .611$), mother not a high school graduate (21% vs. 20%; $X^2 = .13$, $p = .720$), or single-parent home at age 11 (40% vs. 39%; $X^2 = .06$, $p = .809$). Given the requirement that full intervention students attended project schools at least one semester in Grades 1 through 4 and in Grades 5 and 6, whereas some control students were added to the study at Grade 5 (and may have been in non-project schools previously), it is important to rule out differences in residential stability, a potential threat to internal validity. Analyses comparing the full intervention and control groups found no significant differences in number of years living in Seattle by age 12 (10.43 vs. 10.09, respectively; $F = .64$, $p = .425$), number of residences lived in from age 5 to 14 (2.98 vs. 3.37; $F = 1.05$, $p = .306$), or in perceived safety of residential neighborhood from age 10 to 12 ($M = 2.05$ vs. 2.31 on 4-point scale; $F = .13$, $p = .720$). Differential school or teacher receptivity to intervention is also an unlikely threat to internal validity. Teachers in six of eight participating schools during Grades 1 through 4 were randomly assigned to either intervention or control classrooms. At Grade 5, newly eligible schools were matched demographically to early experimental schools, and each agreed to serve as a control or late intervention school prior to assignment. During the course of the intervention in the 1980s, the Seattle school district used mandatory busing to achieve comparable racial makeup of schools, which substantially reduced the risk that outcomes observed reflected contextual or neighborhood differences, school demographic differences, or parent school-selection effects.

An exception to the pattern of initial condition equivalence was a higher proportion of participants in the control condition who reported that their mothers were 19 years of age or less when they were born. Eleven percent of the full intervention condition, compared with 20% of the control condition, reported that their mothers were teens when they were born ($X^2 = 4.22$, $p = .040$). Therefore, having a teen mother was included as a covariate in all outcome analyses.

Intervention Components

The full intervention consisted of three core components (more fully described in prior reports (Hawkins et al. 1987; Hawkins et al. 1999, 2005; Lonczak et al. 2002)). Teacher staff development: Each year, during Grades 1 through 6, teachers received 5 days of in-service training in classroom management and instructional methods, including proactive classroom management, interactive teaching, and structured cooperative learning (Abbott et al. 1998; Cummings 1983; Cummings et al. 1982; Hawkins et al. 1997; Hawkins et al. 1988; Slavin 1991). Child competencies: Additionally, first-grade teachers received instruction in the use of a cognitive and social skills training curriculum (Shure and Spivack 1980, 1982) and, during Grade 6, a study consultant provided students with training in refusal skills (Comprehensive Health Educational Foundation 1999). All teachers in the full intervention condition participated in the child competencies and/or staff development trainings. Parent workshops: When children were in Grades 1 through 3, parents were offered a seven-session curriculum in child behavior management skills (Hawkins et al. 1987) and a four-session curriculum in skills for supporting their children's academic development (Hawkins and Catalano 2003b). During Grades 5 and 6, parents were offered a five-session curriculum designed to strengthen skills to reduce their children's risks for problem behaviors (Hawkins and Catalano 2003a). Forty-three percent of intervention parents attended at least one parenting class during Grades 1 through 3 (Hawkins et al. 1987), and 29% attended at least one class during Grades 5 or 6, indicating that the parent workshop component had less reach than the teacher and child components.

Measures

Guided by prior research on adult development and functioning, we sought to identify a broad but limited set of primary outcome indices that reflected the most meaningful, major domains of adult life (Kosterman et al. 2005, 2014, 2011; Scales et al. 2016). For each of three life domains, we then identified three key constructs that were assessed from age 30 to age 39 in SSDP. Finally, for each construct, three manifest indicators were computed, resulting in 27 distinct measures of adult health or functioning. The measurement framework is shown in Table 1. All measures were labeled and coded such that higher scores indicated better health or functioning. Unless noted below, measures were based on self-reports at ages 30, 33, and 39; multimodal survey administration included in-person, phone, and self-administered web-based confidential interviews. Survey instruments have been developed and updated over the course of the longitudinal study and are pilot-tested prior to each wave. Note that most measures are formula-based (e.g., obesity, which is derived from body mass index), summative indices (e.g., symptom counts), or derived from a single item at each age for which internal consistency estimates are not appropriate; for scales that averaged multiple items at each age, overall reliability (Cronbach's alpha) is reported.

Adult Health Behavior Scales assessing health maintenance included exercise (minutes of moderate and vigorous exercise per week), adequate sleep (frequency of "adequate" and at least 7 to 8 h of sleep; $\alpha = .87$), and stress management (frequency of controlling daily and life stress; $\alpha = .78$). Low

Table 1 Measurement framework used to examine intervention outcomes in the 30s

Life domains	Constructs	Measured indicators
Adult health behavior	Health maintenance	Exercise
		Adequate sleep
		Stress management
	Low substance use disorder	Few nicotine symptoms
		Few alcohol symptoms
		Few other drug symptoms
	Low sex-risk behavior	Familiarity with partner(s)
		Consistent condom use
		No new STI diagnosis
Positive adult functioning	Responsible and constructive	Financial responsibility
		Constructive engagement
		Work attendance
	Healthy close relationships	Prosocial partner/spouse
		Prosocial peers
		Low household conflict
	Civic engagement	Volunteer activities
		Local problem-solving
		Political activities
Adult health and success	Mental health	Emotion regulation
		Few depressive symptoms
		Few anxiety symptoms
	Physical health	General health
		Not obese
		Not high blood pressure
	Socioeconomic success	Exceeds U.S. median SES
		Owns home or condo
		Low public assistance

STI, sexually transmitted infection; *SES*, socioeconomic status

substance use disorder was assessed by the Diagnostic Interview Schedule (DIS; Robins et al. 1999) to obtain DSM-IV (American Psychiatric Association 1994) criterion counts for nicotine dependence, alcohol abuse and dependence, and other drug abuse and dependence (all reverse coded); these measures included assessments at age 35 in addition to ages 30, 33, and 39. Indicators of low sexual risk behavior were familiarity with sex partner(s) (e.g., spouse, steady relationship, casual partner), consistency of condom use (if not married or cohabitating), and no new diagnoses of sexually transmitted infection.

Positive Adult Functioning Scales assessing responsible and constructive behavior included financial responsibility (reverse frequency of squandering needed money), constructive engagement (cumulative time engaged in work, school, and/or homemaking), and work attendance (reverse frequency of missing work not due to illness). Healthy close relationships were indicated by prosocial partner or spouse (degree to which partner is physically active; volunteers; and avoids smoking, drinking heavily, using other drugs, and arrest; $\alpha = .75$), prosocial peers (degree to which close friends are physically active; volunteer; and avoid smoking, drinking heavily, and using other drugs; $\alpha = .87$), and low household conflict (reverse frequency of insulting, swearing, pushing, threatening, etc.; $\alpha = .72$). Civic engagement was indicated by the frequency of volunteer activities and involvement in local problem solving with others in the community, and by political activities (e.g., voting, contributing money, joining a march; $\alpha = .82$).

Adult Health and Success Mental health measures included emotion regulation (reverse frequency of feeling distressed, frustrated, upset, quick-tempered, and annoyed; $\alpha = .89$) and DIS assessments of DSM-IV depressive symptoms and generalized anxiety symptoms (reverse coded). Physical health was indicated by self-reported general health (excellent, good, fair, or poor) and objective measures of body mass index (not obese) and blood pressure (not high) collected in person, including assessments of these at age 35. Indicators of

socioeconomic success were attainment of above-median education or household income (relative to U.S. Census measures for corresponding year), owning a home or condominium, and low reliance on public assistance (reverse percent of income from TANF, food stamps, WIC vouchers, child care subsidy, etc.).

Analysis

A Global Test Statistic (Feng and Thompson 2002) was used to test for an overall intervention effect across the nine different constructs in Table 1. Next, using a structural equation modeling approach with Mplus 7.4 (Muthén and Muthén 1998–2015), we examined intervention effects on each construct separately modeled as a latent variable indicated by three manifest measures as outlined above (see Fig. 2). We then examined intervention effects on each of the three life domains modeled as a second-order latent variable indicated by three latent constructs. To include all available data, the intervention variable was dummy coded to compare the full intervention group with controls, coded as the reference category. Other conditions in which participants received partial intervention are also compared with controls in the models, although this was not a focus of the present study. (We found in prior reports that participants in these other conditions were rarely significantly different from controls; Hawkins et al. 1999, 2005, 2008. This led to the approach taken in the current analyses that focused on the full intervention and control conditions.) A dichotomous measure of having been born to a teen mother was included in all models as an exogenous covariate to control for the preexisting group differences on this factor. Full information maximum likelihood methods were used for missing data; two-tailed tests were used throughout.

Given the study's design, the unit of intervention assignment consisted of the series of classrooms to which some individuals were assigned in Grades 1 through 4 and the condition assignments of schools attended by all participants in Grades 5 and 6. Of the 376 participants assigned to the control and full intervention conditions, over 124 different classroom/school sequences were identified, consistent with the unit of intervention assignment. On average, only 3.03 participants experienced the same units of intervention within conditions. For this reason, and to be consistent with prior reports, analyses were conducted at the individual level (Hawkins et al. 1999, 2005, 2008; Lonczak et al. 2002).

Results

Given the multiple health and functioning constructs of interest and the relatively large number of possible comparisons, the Global Test Statistic (Feng and Thompson 2002) was used to examine the average t value from analyses of the nine constructs in Table 1, taking into account their intercorrelation (Feng and Thompson 2002). This omnibus test indicated a significant overall positive effect of the RHC intervention on health and functioning through age 39 among those in the full intervention group compared with controls ($T = 2.91$, $p = .004$). Given this overall effect on health and functioning, we examined intervention effects on each individual construct and on each life domain to understand what specific constructs and domains were most affected by the intervention and contributing to the overall positive effect of RHC.

Effects on Health and Functioning Constructs in the 30s

A series of structural equation models corresponding to panel a in Fig. 2 was examined to test possible long-term effects of the full intervention on each adult health

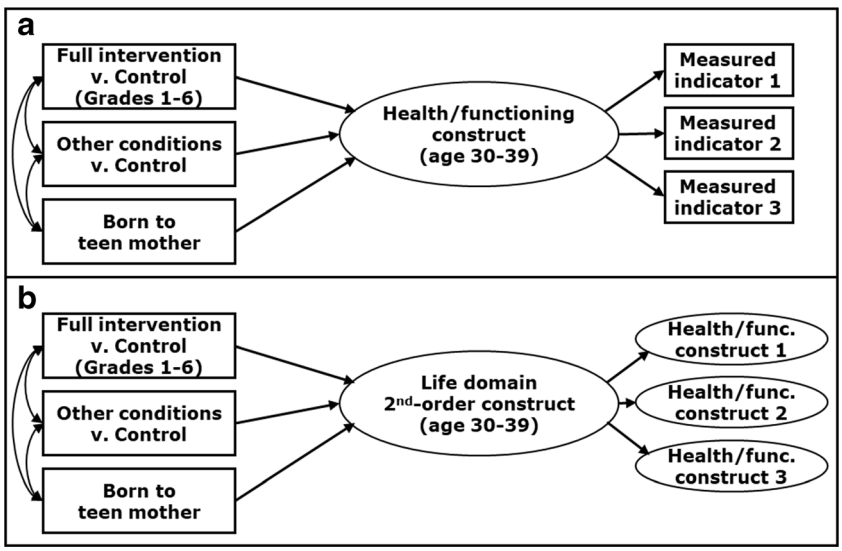

Fig. 2 Illustration of structural models used to test intervention effects. Panel **a** illustrates the model used to test intervention effects on the nine constructs shown in Table 1. Panel **b** illustrates the second-order factor model used to test intervention effects on the three life domains in Table 1

and functioning construct assessed in the 30s. As shown in Table 2, after controlling for having been born to a teen mother, the full intervention had significant effects on better health maintenance and better mental health, as well as marginally significant effects on responsible and constructive behavior and socioeconomic success. Differences in substance use disorder symptoms, sex-risk behavior, healthy close relationships, civic engagement, and physical health were not significant. (In order to provide results for all the structural pathways corresponding to the models shown in Fig. 2, the combined "other conditions versus control" results are also included in Table 2, though not a focus of the current investigation.)

Effects on Life Domains in the 30s

To examine intervention effects on overall life domains, we created 3 second-order latent factors, each indicated by three corresponding constructs, as illustrated in panel b of Fig. 2. The full intervention was associated with significantly better overall adult health and success, as shown in Table 2. Significant effects were not found for overall adult health behavior or positive adult functioning.

Effects of Being Born to a Teen Mother

It is worth noting the strong association of being born to a teen mother with most of the outcomes examined. Those born to a mother under age 20 had consistently worse health and functioning, and the disparities were often highly significant. Intervention effects reported are after controlling for these strong effects of being born to a teen mother.

Differential Effects by Gender, Childhood Poverty, and Ethnicity

Multiple-group models were examined to identify possible differential effects of the full intervention by gender, childhood poverty, or ethnicity. One gender difference was found: The intervention was associated with reports of significantly more responsible and constructive behavior for males (β (SE) = .68 (.26), p = .008), but not for females (β (SE) = − .07 (.24), p = .758) (ΔX^2 = 5.37, p = .021). Two differential effects were found for those experiencing childhood poverty (who participated in the National School Lunch/Breakfast Program): Intervention group members who experienced childhood poverty reported significantly more responsible and constructive behavior than control counterparts (β (SE) = .57 (.23), p = .012), but there was no effect for those

Table 2 Effects of full intervention and covariates on intervention outcomes in the 30s

	Predictor pathways								
	Full intervention vs. control			Other conditions vs. control			Born to teen mother		
Intervention outcomes	β	(SE)	p	β	(SE)	p	β	(SE)	p
Health/functioning constructs									
Health maintenance	.44**	(.13)	.001	.22*	(.10)	.035	− .08	(.13)	.513
Low substance use disorder	.12	(.14)	.391	.07	(.11)	.505	− .14	(.12)	.255
Low sex-risk behavior	.03	(.11)	.769	.04	(.09)	.678	− .41**	(.10)	< .001
Responsible and constructive	.30^{+}	(.17)	.073	.34*	(.14)	.014	− .31*	(.15)	.047
Healthy close relationships	.08	(.12)	.482	− .12	(.10)	.228	− .28**	(.11)	.008
Civic engagement	.12	(.11)	.304	− .05	(.09)	.577	− .10	(.10)	.303
Mental health	.26*	(.12)	.038	.13	(.10)	.180	− .39**	(.11)	< .001
Physical health	.19	(.13)	.154	.15	(.10)	.154	− .52**	(.11)	< .001
Socioeconomic success	.23^{+}	(.13)	.072	.19^{+}	(.10)	.064	− .59**	(.11)	< .001
Life domains									
Adult health behavior	.16	(.15)	.267	.09	(.11)	.412	− .24	(.16)	.140
Positive adult functioning	.18	(.13)	.175	.00	(.10)	.993	− .32**	(.12)	.005
Adult health and success	.35*	(.14)	.012	.22*	(.11)	.047	− .74**	(.12)	< .001

Path coefficients are standardized betas (standard errors in parentheses). Intervention outcomes were labeled and coded such that higher scores indicated better health or functioning. Intervention condition was dummy coded to compare the full intervention group to controls; all other conditions were combined in this coding, including "could not be classified," and effects were not hypothesized

$^{+}p < .10$, $^{*}p < .05$, $^{**}p < .01$

from middle- and working-class childhoods (β (SE) = − .49 (.57), p = .392) (ΔX^2 = 6.28, p = .012). Conversely, intervention group members from middle- and working-class childhoods reported better physical health than control counterparts (β (SE) = .57 (.18), p = .001), but no effect was found for those experiencing childhood poverty (β (SE) = − .11 (.18), p = .541) (ΔX^2 = 6.82, p = .009). No interactions with ethnicity were found. It should be noted that, consistent with prior reports (Hawkins et al. 2008; Hill et al. 2014), there continued to be a large and significant difference in lifetime prevalence of STI among African Americans (but not for new STI diagnoses in the 30s examined in this report): 35% of African Americans in the intervention group reported a lifetime STI, compared with 69% of African Americans in the control group (β (SE) = − .82 (.31), p = .008).

Discussion

More than 18 years after the RHC intervention ended, all intervention-control differences were in the expected direction and, overall, showed significant improvement of the full intervention group compared with controls as indicated by a significant omnibus test of these differences. Modeling nine key health and functioning constructs across three major life domains in the 30s, significant intervention effects were found for health maintenance behavior, mental health, and overall adult health and success. Further, tests of interactions found that the intervention was associated with more responsible and constructive behavior among males and those who experienced childhood poverty, and better physical health among those from working- and middle-class childhoods. We found no evidence of significant effects through the 30s for substance use disorder symptoms, sex-risk behavior, or close relationships. These findings extend and are consistent with prior reports showing RHC intervention effects on mental health and SES attainment outcomes at age 27 (Hawkins et al. 2008), but effects on current sexual risk behaviors were not found in the 30s (Hawkins et al. 2008; Hill et al. 2014), when sex-risk behaviors typically decline (Chandra et al. 2012).

The Raising Healthy Children intervention targeted children's opportunities, skills, and recognition to increase prosocial bonds to school and family through specific instructional and behavior management interventions during the elementary school years. It is noteworthy that effects not only persisted into the 30s but that they encompassed diverse health and well-being outcomes, consistent with the contention that targeting common risk and protective factors can have broad "crossover" effects across a range of outcomes (Bailey 2009; Hawkins et al. 1999, 2005; Hill et al. 2014). Results are also consistent with the premise that developmental trajectories can be changed by early intervention, leading to healthier adult lives in general. Although modeling of longitudinal trajectories and mechanisms is beyond the scope of this report, other SSDP studies bolster the hypothesized pathways of improved opportunities and bonding (Hawkins et al. 2001; Hill et al. 2014). Significant intervention effects on the life domain of adult health and success are particularly notable given the associations of mental health, physical health, and socioeconomic status with healthy aging (Depp and Jeste 2006; Peel et al. 2005; White et al. 2015).

Not all beneficial effects of the RHC intervention were maintained through the 30s. It is important to note the absence of significant effects on substance use disorder symptoms and sexual risk behaviors in the 30s in this study.

Study limitations include the quasi-experimental design and the geographic and demographic limitations of study participants, all of whom originated from urban Seattle schools. About half of the participants were ethnic minorities and/or from low SES families. While these populations are often underrepresented in other studies, SSDP findings may not be generalizable to more homogeneous populations. With important exceptions (obesity, blood pressure), the study relied on self-report measures; however, SSDP's long history of confidential interviews with the sample bolsters confidence in honest reporting.

Important strengths of the study include a theory-guided, universal intervention offered to all students and their parents in intervention classrooms; intent-to-treat analyses (with minimal enrollment requirements for the full intervention group); control of an important covariate (teen mother); little evidence of internal validity threats; a significant omnibus test; systematic tests of latent variable models for a broad set of important adult outcomes; and tests of moderation.

This study supports the proposition that sustained, theory-based, multicomponent intervention during the elementary school grades can produce lasting changes in important indicators of adult health and functioning through the 30s. Overall, results show the promise of universal preventive intervention during elementary school to improve meaningful life outcomes well into adulthood.

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Compliance with Ethical Standards

Informed consent was obtained from all individual participants included in the study. All procedures were in accordance with the ethical standards of the Human Subjects Review Committee at the University of Washington (STUDY00002228) and with the 1964 Helsinki declaration and its later amendments.

Conflict of Interest Dr. Catalano is a board member of Channing Bete Company, distributor of *Guiding Good Choices®*. This program was tested in the study that produced the dataset used in this paper. Other authors have no conflicts of interest to report.

Disclaimer Content is solely the responsibility of the authors and does not necessarily represent the offical views of NIDA. NIDA played no role in the study design; in the collection, analysis and interpretation of data; in the writing of the report; nor in the decision to submit the article for publication.

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