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## Benefits of Universal Intervention Effects on a Youth Protective Shield 10 Years After Baseline

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### Abstract

**Purpose**—An earlier randomized controlled study found that a universal, family-focused preventive intervention produced protective shield effects—reduced adolescent exposures to illicit substance opportunities—in grade 12. This study examines a follow-up assessment of the sample during young adulthood.

**Methods**—A RCT evaluated the Iowa Strengthening Families Program (ISFP) implemented in 22 rural schools ( $N=446$  families) when participants were in sixth grade. Measures include adolescent substance use exposure and young adult lifetime illicit substance use (age 21;  $N=331$ ). Growth curve modeling examined indirect intervention effects through growth factors of adolescent exposure.

**Results**—Findings confirm protective shield effects that mediate long-term reduction of use,  $\beta = -.14$ ,  $P = .02$ , Relative Reduction Rate = 28.2%.

**Conclusions**—The benefits of decreasing substance use exposure during adolescence through universal interventions were supported, with positive effects extending into young adulthood.

### Keywords

Preventive Intervention; Protective Shield; Illicit Substance Use; Young Adulthood

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#### Contributors

Richard L. Spoth was the Principal Investigator on the project and was chiefly responsible for writing the brief. Linda S. Trudeau conducted the calculations, developed the figures, and assisting in editing. Max Guyll provided advice on content and editing; Chungyeol Shin provided methodological and statistical advice.

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A “protective shield” is defined in the epidemiological literature as mechanisms shielding hosts from contact with pathogens, including environmental factors that protect against agents of a health problem.<sup>1</sup> An earlier examination of preventive intervention outcomes applied this concept, operationally defined as the reduction of young adolescent exposures to substance use opportunities. That study evaluated ISFP, a universal preventive intervention for 6<sup>th</sup> graders and their families, designed to improve adolescent and parent skills that would likely reduce adolescent exposures to substance use opportunities. Intervention effects on illicit substance use at 12<sup>th</sup> grade were found, mediated by reduced substance exposures, with a 49% reduction of use.<sup>2</sup> The current study evaluated whether the protective shield effect extended into young adulthood (age 21).

## METHODS

University IRB approval and informed consent were obtained. Families of sixth graders in 22 Iowa schools were recruited in 1993;  $N=446$  (49% of those eligible) completed pretesting. Analyses indicated the sample was representative.<sup>3</sup> School selection was based on school lunch program eligibility (>15%) and community size (<8,500). Schools were randomly assigned to conditions. (Another intervention was included in the project, but because 12<sup>th</sup> grade illicit substance use was not significantly impacted by that intervention, we could not evaluate the protective shield effect in that earlier study, upon which the present one is based.)<sup>3</sup> Household incomes averaged \$40,600; 98% were White. Adolescents completed in-home interviews and questionnaires through 12<sup>th</sup> grade; at age 21 ( $N=331$ ), they completed computer-assisted telephone interviews and questionnaires. Figure 1 summarizes project participation. Following pretesting, facilitators implemented ISFP in partnerships with public school districts and the University Extension System.<sup>3</sup> ISFP addresses empirically-supported family risk and protective factors, such as parental nurturing, involvement, child management skills, and adolescent social skills. Observers reported high implementation fidelity, averaging 85% adherence to intervention content.<sup>3</sup>

Measures included *illicit substance use exposure*. Three items assessed general illicit substance use opportunities over the past year, asking: “During the past 12 months, did you ever have a chance to...” (1) “try marijuana?”, (2) “try other drugs, such as cocaine or crack?”, and (3) “sniff glue or inhalants to get high?” Summing dichotomous responses (*No* = 0, *Yes* = 1) and adding a value of 1 yielded scores between 1 and 4. Three additional items assessed opportunities specifically provided by peers, asking “How often do your friends try to get you to...” Item responses addressed the same three types of substances. Averaging item responses (*Never* = 1, *Often* = 4) yielded scores between 1 and 4. Scores on the two measures were averaged.

Because longitudinal assessments occurred at differing intervals, we determined the most appropriate outcome measure was dichotomous *lifetime illicit substance use*; its yes/no format avoids the imprecision of estimating amount or frequency of consumption. This measure was scored “0” for respondents until they answered “Yes” to any one of the 11 lifetime illicit substance use items (e.g., marijuana, inhalants, methamphetamine, cocaine, ecstasy, non-medical prescription drug use), after which it was scored as “1.”

Statistical modeling procedures replicated those reported in detail earlier.<sup>2,4</sup> The growth of illicit substance use exposure was modeled as linear across the post-intervention period thought to be most critical—through 10<sup>th</sup> grade—based on means across time. The model controlled for pre-intervention exposure. The intercept was set at posttest. The slope value was the estimated rate of linear increase in exposure (see Figure 2). The intervention (vs. control) effect on exposure was estimated by specifying direct effects on both the intercept (path *a*) and slope (path *b*). In turn, the model included direct effects of the growth factors

on illicit substance use (paths *c* and *d*) and also evaluated the intervention direct effect. Analyses were conducted in Mplus 5.2,<sup>5</sup> using full-information maximum likelihood estimation to address missing data.

## RESULTS

Results are presented in Figure 2. Two compound paths assessed mediation of ISFP's influence on illicit substance use through protective shield effects: (1) exposure immediately post-intervention (path *ac*); and (2) rates of increase in exposures across adolescence (path *bd*). Mediation of ISFP effects via reduction in exposures immediately post-intervention was not found ( $\beta=.01$ ,  $P=n.s.$ ). As expected, results supported an indirect effect of ISFP on young adult lifetime illicit substance use via reduction in the rate of increase of illicit substance use exposure across adolescence ( $\beta=-.14$ ,  $P<.001$ ; see Figure 2 for CIs and total ISFP indirect effects). Direct effects were not found. The model-based estimate of the percentage of ISFP participants who initiated illicit substance use at age 21 was 27.5%, and the corresponding percentage in the control group was 38.3%. The relative reduction rate (RRR—the difference between the control and intervention rates, expressed as a percentage of the control rate) was 28.2% (i.e.,  $[38.3\% - 27.5\%]/38.3\%$ ).

## DISCUSSION

Results support the idea that ISFP reduced illicit substance use into young adulthood by providing adolescents with a protective shield critical to preventing later illicit substance use. Relevant etiological research<sup>2,4,6-8</sup> demonstrates how youth behaviors (e.g., participation in supervised, structured, prosocial activities) discourage substance use. The ISFP was designed to improve prosocial child behaviors, plus enhance parenting behaviors (e.g., parental monitoring) and foster positive parent-child involvement—factors that also can decrease substance use opportunities. Specifically, previous research has demonstrated ISFP effects on parenting and adolescent skills expected to limit substance use exposure.<sup>3,6</sup>

A unique contribution of this research is the demonstrated effect of ISFP through age 21, a developmental period when most young adults no longer live with their parents. The current findings—especially considered in conjunction with other published intervention outcomes during young adulthood—contribute to an emerging literature on long-term effects of universal preventive interventions that illustrate the duration and size of effects.<sup>4</sup> It does so by showing how intervention effects during the adolescence can positively impact young adulthood, when the highest levels of substance misuse can be observed. Nonetheless, the generalizability of results to non-rural and more ethnically diverse populations remains to be examined.

Findings also support the public health benefits of scaling up family-focused interventions. If the RRR results were to replicate, for every 100 young adults (age 21) initiating illicit substance use in communities not offering an intervention, there could be as few as 72 initiating in intervention communities. Scaling up the delivery of universal preventive interventions is critically important if these positive results are to produce wide-scale public health benefits.<sup>9</sup> The present study was one in a series of projects informing the development and testing of effective community-based intervention delivery models that capitalize on the University Cooperative Extension System's success in spreading program innovations.<sup>10</sup>

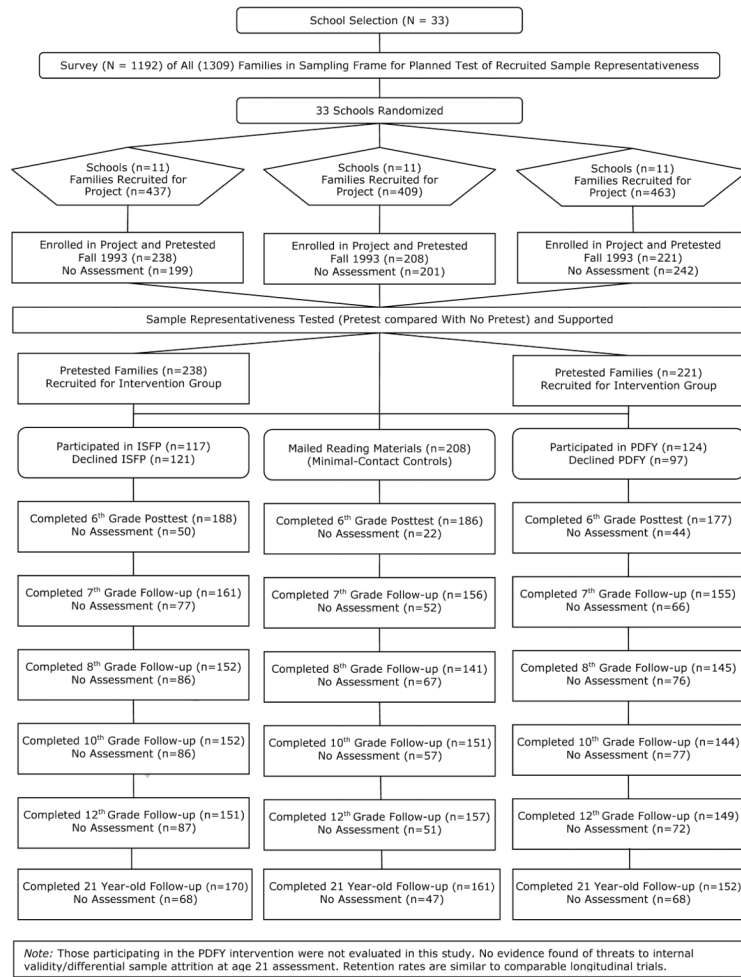
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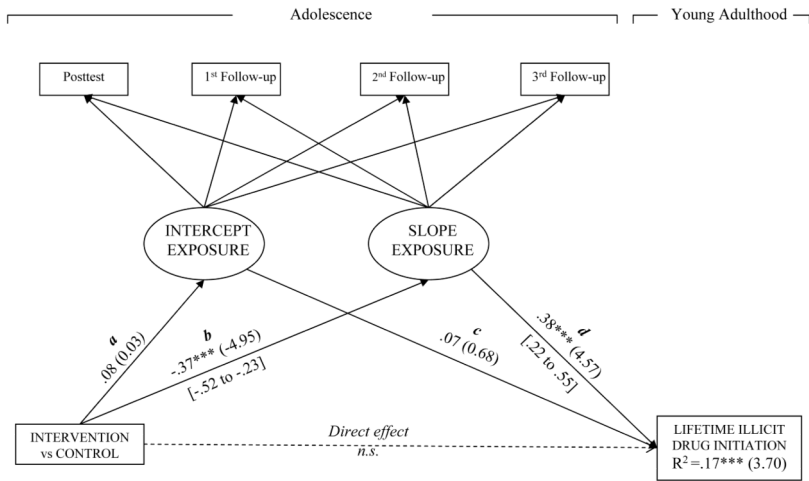
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**Figure 1.**  
Participation summary.



**Figure 2.**  
Growth curve model.