**COVER PAGE**

**OFFICIAL TITLE OF THE STUDY:** PREVENTING DRUG USE AND RISK BEHAVIORS IN ADOLESCENT GIRLS

**BRIEF TITLE**: SAFE, HEALTHY, ADOLESCENT RELATIONSHIPS AND PEERS (SHARP-TEEN)

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# STUDY PROTOCOL WITH SAP

## Brief Summary

Initiation of drug use and participation in sexual-risk behaviors such as having multiple sexual partners, unprotected sexual intercourse, and intercourse with drug users are all too common among female youth with involvement in the child welfare or juvenile justice system. Studies consistently find that these youth have disproportionately higher rates of these problems that, in addition to increasing risk for negative outcomes, have other costly sequelae such as drug addiction, early pregnancy, sexually transmitted infection, HIV contraction, delinquency, and early mortality (e.g., Santelli et al., 2001; Stueve et al., 2005). The goal of this study, which is Research Component 2 within a P50 Center Grant, is to prevent drug use and sexual-risk behaviors in 13–18 year-old girls with early adverse life experiences such as maltreatment (*n* = 123) through the development and evaluation of a preventive intervention.

1. **To Examine the Effects of the SHARP (Safe, Healthy, Adolescent Relationships and Peers) Intervention on the Developmental trajectories of Drug Use, Sexual-Risk Behaviors, and Delinquency.** We will examine outcomes at intervention termination (approx. 6 months) and a 12-month follow-up using quantitative analysis methods.

2. **To Examine Mediating Processes Linking the Intervention with Developmental Trajectories of Drug Use, Sexual-Risk Behaviors, and Delinquency.** We will examine two sets of mediators, directly targeted in our intervention: a) improvement in parenting practices, including positive reinforcement, limit setting, and supervision; and b) improvements in the girls' relationships and skills, including peer and partner relations, refusal skills, and goal setting skills. Analyses will focus on whether these two domains partially mediate the effects of the SHARP intervention on the developmental outcomes. Trajectories of drug use, sexual-risk behaviors, and delinquency will be examined separately, and together, in relation to the two proposed sets of mediators.

3. **To Examine the Influence of Girls' Knowledge and Comfort Around Safe Behaviors on Her Drug Use and Sexual-Risk Behaviors.** Our prior work with girls in the juvenile justice system indicates that they have poor knowledge about safe sex practices and the effects of drugs. Further, a lack of comfort talking about safe sex practices exacerbated the odds contracting a sexually-transmitted infection (Leve et al., 2013). In this Aim, we will examine the role that comfort in discussing safe behaviors and knowledge about safe sex and drug use behaviors has on moderating the intervention effect on trajectories of drug use and sexual-risk behaviors.

4. **(Exploratory). To Examine Whether Brain Development Moderates the Effect of the Intervention on Developmental trajectories of Drug Use, Sexual-Risk Behaviors, and Delinquency Observed in Aim 1 (above).** We will employ indices of structural and functional brain development as identified in previous studies (Bloch et al. 2013; Dosenbach et al., 2010) in a subset of 25 participants, in order to identify potential salient neurodevelopmental moderators of treatment outcomes.

## Study Protocol

**Recruitment and retention**. The sample will consist of 123 girls between the ages of 13 and 18 and her primary caregiver (123 primary caregivers). Girls will be eligible if they are: (a) female; (b) age 13–18 years at enrollment; (c) reside in Lane County and within 70 miles of the University of Oregon at the time of enrollment; (d) have a current caregiver; (e) and both girl and caregiver are fluent in English. Girls will not be eligible for the study if they (a) are medically fragile; (b) have a significant developmental disability; or (c) have graduated from high school or have a GED. The sample will be recruited in three annual cohorts, with approximately 40 participants each year (~20 intervention, ~20 control/year). A subset of 25 girls in the full sample will be drawn from the final cohort to complete an MRI assessment to address Aim 4.

To recruit the sample, the research team will work collaboratively with the Department of Youth Services in Lane County (DYS) and other community and school-based organizations. For recruitment through community agencies, study staff will provide information about the project and recruitment flyers to liaisons at each agency. Interested families will contact the study recruiter to complete eligibility screening and provide contact information. For recruitment through DYS, a designated study liaison working at these organizations will identify female youth who meet study age eligibility requirements. The liaison will contact eligible families to

provide them with basic information about the study, using the study's recruitment script. Interested families will complete a short screening questionnaire with the liaison. If the family is determined to be eligible, the liaison will collect contact information from the family. During regular meetings, the liaison will provide the study recruiter with the contact information for families who meet study eligibility criteria.

Once the study has received contact information from a potential participant, the recruiter will call the family to provide specific information about the study using the recruitment script. If the girl and her caregiver decide to participate in the study, the recruiter will schedule a time for an in-home visit. At the home visit, both written and verbal explanations of the project will be presented to the caregiver and the youth, along with an opportunity to ask questions about the project. If they agree, caregivers and youth age 18 will sign a study consent form and youth > age 18 will sign a study assent form.

We will use several strategies that we have found facilitate high retention in studies with DYS-involved populations, including adequate compensation for participation, assistance with transportation costs, incentives for updating contact information, and continuity in the staff member responsible for family contact. In addition to tracking placement change information, we have found that we can improve retention for follow-up assessments by sending holiday and birthday cards and study newsletters. Finally, the teen and caregivers will be asked to provide contact information for people who might help locate them and permission to contact those people.

**Assessment.** Data will be collected through three 2-hour in-person interviews with the teenage girl and her primary caregiver. The interviews will take place either at the participant's home or at the university research center, whichever is most convenient for the participant. The first interview (baseline) will be scheduled immediately after recruitment. The second two interviews will occur 6- and 12- months after the baseline interview, respectively. The caregiver and youth interviews will consist of self-administered questions on a computer and interviewer-administered questions. For the drug use and sexual-risk behavior questions, the interviews and questionnaires have skip patterns, such that youth who report never engaging in any drug use (or sexual-risk behavior) are not asked the follow-up questions about frequency, etc. A short, 10-minute discussion activity involving the teen and her caregiver will be videotaped at the 6-month assessment. Child welfare records pertaining to incidents where the youth participant was reported to be a victim of child maltreatment or neglect will be requested from the State of Oregon. Staff will also collect juvenile court information about the girl from the Department of Youth Services. At the 12-month interview, the teen will provide a urine specimen for a urinalysis (UA). The UA will reveal the presence or absence of a class of drugs in the urine specimen and a second assay will be completed for a subset of youth at the Levitt Laboratory at Children's Hospital Los Angeles (CHLA) to measure isoprostane levels (a measure of oxidative stress).

**Intervention.** Three intervention groups will be conducted per year (7-8 caregivers per parenting group), held on a rolling basis. Girls will be randomly assigned to intervention or control conditions during the baseline assessment home visit, where caregivers will be presented with two sealed, blank envelopes from which to choose. A slip of paper in the envelope will determine study condition (the randomization procedure will target blocks of 20, representing 10 girls in SHARP and 10 corresponding control girls; 10 pieces of paper labeled "SHARP group" and 10 pieces of paper labeled "Usual Services" will be placed in 20 separate unlabeled envelopes).

The intervention (Safe, Healthy, Adolescent Relationships and Peers; SHARP) has two components: a caregiver parenting group that meets weekly for 90-min for 14 weeks, focused on increasing parenting skills, and a Life Coach component where trained and supported skills coaches meet individually with youth weekly for 60 min over the same period to build the girls' social skills and peer/partner relationships skills. Both intervention approaches have been implemented successfully in our previous efficacy trials. We will include all caregiver types (biological, foster, kinship) in parenting groups together. The sessions for the components are based on manualized curricula. Sessions focus on topics such as drug use, HIV-risk behaviors, parental supervision, communication, and peer relations. All intervention staff attend a 5-day experiential training where they are oriented to the theory and perform each of the intervention sessions with other participants playing the role of the caregiver or youth. During the weekly sessions, caregivers and youth are given specific home practice assignments to complete during the week. Intervention sessions are structured to first debrief the home practice, then discuss new content as it relates to the ongoing experiences of the caregivers/youth. Finally, a new home practice is given.

**Statistical Analysis Plan**

Data will primarily be collected using a computerized program, which allows ready access to the dataset for analysis. The data management and analysis team will clean and check the data on an ongoing basis to ensure quality of the data following the centralized data management protocols. Below we provide descriptions of our procedures for construct development and handling missing data, our hypothesis-testing approach (with specific examples relevant to each Specific Aim), and power analyses.

**Construct Development.** To avoid inflation of the Type I error rate due to multiple comparisons, we will employ latent construct-building strategies that have standardized criteria for combining various sources of information referring to specific higher-order concepts into latent construct measures (Patterson & Bank, 1986). Multiple indicator composites for core theoretical constructs will be developed where feasible, thus increasing measurement fidelity through stringent requirements of convergent, discriminant, and construct validity (Campbell & Fiske, 1959; Cronbach, 1970). For example, the parenting behavior construct will include youth reports and caregiver reports on parenting behavior. Our criteria for including an indicator in a construct are as follows: the items comprising the indicator must show internal consistency ($\alpha \geq .6$; item-total correlation $\geq .2$), and the scale or indicator created must converge with other indicators designed to assess the construct (the factor loading for the forced one-factor solution $\geq .3$). Some exceptions to these criteria may exist. For example, official arrest records are not necessarily expected to correlate highly with adolescent self-report of delinquent behavior. When disagreements exist between different methods/informants of specific constructs, we will analyze measures separately.

We expect very little missing data over time due to our data collection and data checking procedures, and high retention rates in our previous RCT studies involving similar families. We will first examine the nature of missing data (whether or not the data are missing at random [MAR]) and the pattern of missing data with other predictor variables. Within the context of multiple regressions and multivariate analysis of variance, we will use multiple imputation strategies (Schafer, 1997). For other analyses using latent variable framework (e.g., latent growth model), we will utilize full information maximum likelihood (FIML) estimation, which enables modeling of data sets that have missing data (i.e., the full sample will be used in the analyses without listwise deletion; Curran & Hussong, 2003). FIML is known to produce less biased estimates than listwise deletion, even when the missing at random (MAR) assumption is not strictly met (Arbuckle, 1996).

**Analysis Approach.** We will rely primarily upon latent growth modeling (LGM) using Mplus 6.12 (Muthén & Muthén, 1998-2010) and the r statistical package to take advantage of the longitudinal nature of the study design. The description below presents specific examples of analyses that will be used to test each Aim. Note that demographic characteristics, intervention dosage, caregiver type (foster, biological), and sample (DYS or other) will be included in models as control variables. Early adversity will be included as a covariate. We will use an intent-to-treat approach to all analyses, including all participants in their randomly assigned intervention group, regardless of how many sessions were received.

Aim 1. To Examine the Effect of the SHARP intervention on the Developmental trajectories of Drug Use, HIV-Risk Behaviors, and Delinquency. We hypothesize that girls in the SHARP intervention will show significantly lower levels of drug use, HIV-risk behaviors, and delinquency during follow-ups than the girls in the services-as-usual (SAU) condition. We will test intervention effects using a latent growth modeling (LGM) approach, whereby we will examine group differences in the slope of developmental trajectories of each outcome across T1–T3, controlling for factors described above. As an example, we will examine a two-factor LGM (the intercept and slope) of marijuana use across baseline (T1) through the 12-month follow-up (T3). We hypothesize that the SHARP girls will show significantly lower levels of growth in marijuana use over time than the SAU girls. LGM offers the advantage of testing both the longer-term effects of the SHARP intervention and also to model developmental trajectories. Our assessment includes the same measures at every wave and data are thus particularly well-suited to LGM analyses. Parallel models will be used to examine developmental trajectories of each substance (alcohol, tobacco, marijuana, and all other illicit drugs), HIV-risk behaviors, and delinquency, as well as their co-occurrence.

Aim 2. To Examine Mediating Processes of the Developmental Trajectories of Drug Use, HIV-Risk Behaviors, and Delinquency. This Aim addresses two domains of mediating processes that lead to drug use, HIV-risk behaviors, and delinquency in girls with risk histories. A latent variable model will be used to test the hypothesis that caregivers' parenting practices at T2 mediate the SHARP intervention effect on outcomes at T3. We hypothesize that intervention effects will be significantly related to outcomes (drug use, HIV-risk behaviors, delinquency) at T3 directly and indirectly through parenting behaviors at T2. By comparing the path weights, this test will also allow us to understand the relative strength of immediate and longer-term

intervention effects. All three sets of outcomes (drug use, HIV-risk behaviors, delinquency) will be tested for each of the two hypothesized mediating process separately and simultaneously. In addition, both mediating processes can be examined simultaneously in the model. In the course of these mediational models, we will also examine main effects of the intervention on the mediators.

Aim 3. To Examine the Influence of Girls' Knowledge and Comfort Around Safe Behaviors on Her Drug Use and HIV-Risk Behaviors. We expect moderation of intervention effects by girls' knowledge about safe sex practices, her knowledge of drug use risks and norms, and her comfort talking about safe sex practices. We expect that significant intervention effects on drug use and HIV-risk behaviors will vary depending on girls' level of knowledge and comfort. Lack of knowledge and lack of comfort are expected to potentially reduce intervention effects. The direct effect model can be expanded to test the potential moderating effects of girls' knowledge of safe sex practices and drug use risks and norms.

Aim 4 (exploratory). Indices or brain maturation will be added to the analyses described in Aim 1 to examine the main effect and interaction of brain maturation on intervention outcomes for the three sets of outcomes (drug use, HIV-risk behaviors, delinquency).

**Power**. In line with the results of our previous work on girls, we expect a medium effect size for the proposed intervention. Power analyses were conducted for two key models to determine whether the proposed sample size ($N$ = 123) would be sufficient to detect the hypothesized effects with alpha set at .05 and power of at least .80 (Cohen, 1988). We conducted Monte Carlo simulations in Mplus (Muthén & Muthén, 2002) based on the LGM pictured using 5,000 draws with $\alpha = .05$. We used an estimate of 10% missing data across time in Aim 1. For a medium effect size ($d \approx .45$), all resulting values for the parameter bias (< 10%), standard error bias (< 10%), and coverage (< .5%) satisfied the recommended criteria (Muthén & Muthén, 2002). Furthermore, power to detect intervention effects on the slope factor was .81. We conducted another Monte Carlo analysis to examine power for the mediated model described in Aim 2 including the four control variables listed above. Again, five thousand draws, assuming medium effect sizes (coefficient range = .4–.45) with 10% missing data over time were specified to ensure robustness of the results. All values for the parameter bias, standard error bias, and coverage satisfied the recommended criteria (Muthén & Muthén, 2002) and power to detect direct and indirect intervention effects ranged from .81 to 1.00 in the model. Thus, even though our sample size is modest, current power analyses suggest that it will be sufficient to test all hypothesized models (detect medium effect sizes with power of at least .80).