

Prenatal Tobacco Exposure & Child Outcomes

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on Drug Abuse

Prenatal Tobacco Exposure: Self-Regulatory Pathways to Externalizing Behaviors

Project Number
5K01DA048135-04

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Awardee Organization
BROWN UNIVERSITY

Background

Maternal Smoking during Pregnancy

A major public health concern

- Adverse consequences for offspring and costs to society.
 - Seven to fifteen percent of U.S. infants born per year are exposed to SDP
 - SDP imposes a \$4 billion annual burden on the U.S. economy due to health-care costs.
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SDP Effects

SDP-exposed children have increased rates of:

Attention-deficit/hyperactivity disorder

Conduct disorder

Substance use

Self-regulatory problems

Externalizing behaviors

Self-regulation

the ability to understand and manage
your own behaviour and reactions

- executive function
 - emotion regulation
 - effortful control
 - vagal tone
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Mechanisms of effect

1. Deficits in aspects of self-regulation are core symptoms in early substance use initiation and progression and externalizing behaviors
2. Self-regulation deficits may be a common mechanism linking smoking during pregnancy to externalizing

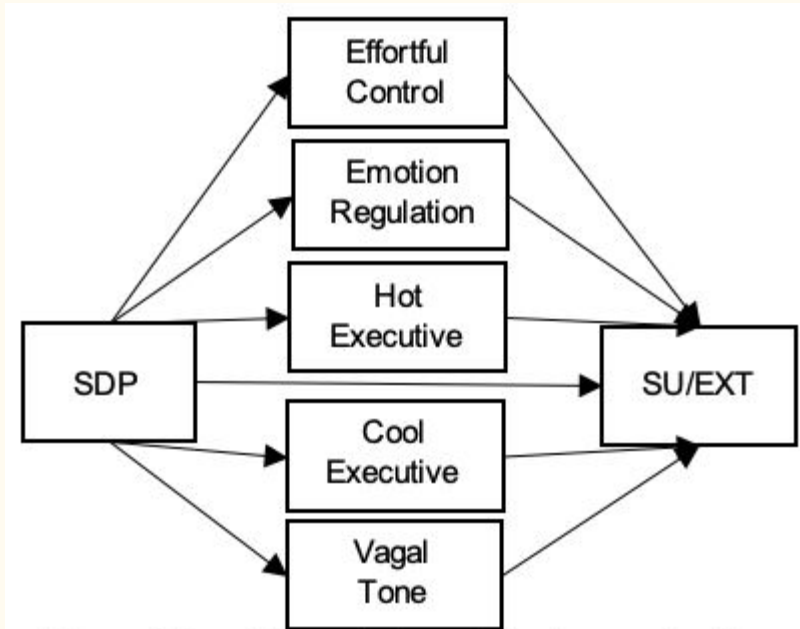


Figure 1. Possible mediations through aspects of SR. Mediators represents different aspects of SR.

Study Design





A tailored video intervention to reduce smoking and environmental tobacco exposure during and after pregnancy: Rationale, design and methods of Baby's Breath

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The original study

Overview of the original study

$N \sim 800$ pregnant people

- Smoke exposed (current smokers, quit smoking on their own, or were exposed to smoke of others), pregnant with only one baby, and had access to a telephone and video player, were randomized to experimental or control conditions.
- **Intervention** participants received newsletters containing content aimed at smoking cessation and avoidance (5 during and 3 after pregnancy), in addition to videos (3 during and 2 after pregnancy) individually tailored on behavioral theory-based survey questions.
- **Comparison** participants received newsletters and videos on healthy pregnancy topics.

Overview of the current study

N = a subset of 100 mothers + children (now ~12-16 years old)

- Baseline, 6-month, and 12-month laboratory sessions
- Computerized self-regulatory assessments, self-reported substance use, self-regulation, EKG
 - Parent-report and child-report of several behaviors

Primary Aims

AIM 1: Examine self-regulation and SU/EXT in youth who were prenatally exposed to SDP.

HYP1a: Children with greater early smoke exposure will demonstrate poorer self-regulation, earlier SU initiation, faster SU escalation and more EXT than non-exposed children. HYP1b: Controlling for prenatal and postnatal risk factors will partially attenuate effects of prenatal SDP and yield less biased estimates of the effects of SDP.

AIM 2: Assess timing of prenatal exposure and dosage effects of SDP on adolescent self-regulation and SU/EXT.

HYP2a: Children exposed to greater cumulative SDP will exhibit more self-regulation deficits, earlier SU initiation, faster SU escalation, and more EXT than children with lower exposures to SDP. HYP2b: The magnitude of SDP exposure during the first and third trimesters, vulnerable periods for the impact of SDP on fetal brain development, will be more predictive of problems than cumulative SDP. HYP2c: Control for prenatal and postnatal risk factors will partially attenuate effects.

AIM 3: Identify self-regulation deficits that may explain the link between SDP and SU/EXT over time. HYP3: Hot executive function and emotion regulation will be stronger statistical mediators between SDP and SU escalation and EXT than cool executive function and effortful control.

Analysis plan (SDP)

From these variables, two independent variables (IV) will be created that incorporate both timing and dosage effects.

(1) A prenatal exposure severity variable will be informed by prospective maternal report of SDP and ETS throughout the prenatal period and maternal salivary cotinine;

(2) the postnatal exposure severity variable will be informed by infant and mother cotinine and maternal report of ETS across postpartum assessments.

Smoke exposure variables to inform IVs.		
IV	Exposure Information	Assessed in R01
SDP	Currently smoke? Y/N	16, 22, 32 weeks' gestation; 3, 6 months postpartum
	# cigarettes past 7 days	16, 22, 32 weeks' gestation; 3, 6 months postpartum
	Cotinine (mom)	34 weeks' gestation
ETS	Frequency of ETS exposure	16, 22, 32 weeks' gestation; 3, 6 months postpartum
	Cotinine (mom, baby)	6 months postpartum

Analysis plan (self-regulation)

Composite scores will be calculated separately for each aspect of SR (i.e., separate composite scores for hot executive function, cool executive function, effortful control, emotion regulation) based on conceptual and statistical relatedness of self-report, parent report, and behavioral data for each aspect of self-regulation.

Analysis plan (dependent variables)

Externalizing

Self-regulation

Substance use

Questions/Opportunities

- Evaluate descriptive statistics (identify outliers, missing data)
- Creating timing (trimester) and dosage (amount of exposure) SDP variables
- Calculate postnatal exposure variables; look at interrelatedness of prenatal and postnatal exposure
- Examine interrelations among self-regulation variables
- Run initial regressions to examine prenatal exposure \rightarrow outcome variables (controlling for postnatal exposure) and vice versa

Code available

```
/* Smoking Variables:
bl_5 (current smoker 1=yes 2=no)
bl_12 (smoke even a puff in last 7 days 1=yes 2=no)
bl_280 (how many cig in last 7 days 1=less than 1 2=1 3=2 4=3 5=4 6=5 or more)
bl_7 (smoked more than 100 cig ever (1=yes 2=no)
bl_8 (when stopped 1= >3 months 2= within 3 months 3=pregnant 4=after deliv
bl_23 (plan for smoking before delivery 1=start again 2=not sure 3=not start again
bl_45 (plan for smoking after delivery 1=stay off 2=control smoking 3=smoke 4=not sure
*/

if bl_smk_stat=. and bl_7 NE 2 AND bl_8=1 then bl_smk_stat=4; /* non smoker showing up with no bl smoke status*/
if bl_smk_stat=4 AND s3_smk_stat=. then s3_smk_stat=4; /* non smoker showing up with no 32 week smoke status*/
if bl_smk_stat=1 AND s3_smk_stat=. and s3_5=2 AND s3_12=1 then s3_smk_stat=2; /* smoker showing up with no 32 week smoke status*/

blsmknew=.;
if bl_5=1 or bl_280>1 then blsmknew=1; /*smoker */
if (bl_12=2 or bl_7=1) AND bl_8>1 AND (bl_45>1 or bl_45=.) then blsmknew=2; /*Pauser */
if (bl_12=2 or bl_7=1) AND bl_8>1 AND bl_45=1 then blsmknew=3; /*Quitter */
if ((bl_5=2 or bl_12=2)AND bl_7=2) OR (bl_7 NE 2 AND bl_8=1) then blsmknew=4; /*non-smoker*/

birthsmoke=.;
if s3_smk_stat=4 AND (s4_5=2 OR s4_12=2 OR s4_280=1 ) then birthsmoke=5; /*NON SMOKER previous non smoker, still not smoking */
if s3_smk_stat in (2 3) AND (s4_5=2 OR s4_12=2 OR s4_280=1 ) then birthsmoke=3; /* QUIT quitter or pauser still quit*/
if s3_smk_stat in (1) AND (s4_5=2 OR s4_12=2 OR s4_280=1 ) then birthsmoke=4; /* QUIT previous smoker newly quit*/
if s3_smk_stat in (1 4) AND (s4_5=1 or s4_280>1) then birthsmoke=1; /* SMOKER previous smoker, still smoking + 2 new smokers (one long time ago previous smoker*/
if s3_smk_stat in (2 3) AND (s4_5=1 or s4_280>1) then birthsmoke=2; /*SMOKER - relapse - quitter or pauser back to smoking */
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