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NewsScan
NIDA ADDICTION RESEARCH NEWS

NEWS UPDATE

Research News

Children's but Not Adolescents' Behavior Improves With Parents' Sobriety Counseling

Children of substance abusers are at increased risk for many problems, including depression and anxiety, poor school performance, and disruptive behavior; however, they often do not receive counseling or other mental health treatment. In a study of the family-involved Learning Sobriety Together (LST) drug and alcohol intervention and counseling program, researchers investigated whether parental behavioral couples therapy (BCT) and changes in the father's drug use affected behavioral and emotional problems exhibited by children and adolescents whose fathers were drug- or alcohol-dependent. Researchers enrolled 169 heterosexual couples in LST, which consisted of both individual counseling for the men and intensive couples counseling. Mothers, fathers, and their children's teachers all reported on the children's behavior before, during, and after their parents' participation in LST. In contrast to adolescents, over the course of treatment, mother, father, and teacher reports indicated that younger children (8 to 12 years old) experienced improvements in behavior associated with fathers' reduced drug use and their subsequent improvements in the parental marital relationship. Researchers noted that while parental relationship satisfaction did erode gradually during the posttreatment period, parents were able to maintain a much healthier level of functioning as compared to when they first began treatment. These results have important implications for mental health for the whole family. "A treatment approach that involves both couples-based treatment and individual counseling appears to be a viable preventative intervention for children living with a drug-abusing father and, in fact, may be a way to benefit children without identifying or treating [the children] directly," state the authors. "Adolescents who exhibit behavioral difficulties may need some form of direct intervention to address behavioral problems."

Kelley ML, Fals-Stewart W. Treating paternal drug abuse using Learning Sobriety Together: Effects on adolescents versus children. *Drug Alcohol Depend*. 2008;92(1-3):228–238.

Methadone Maintenance Before Prison Release Increases Participation in Community-Based Treatment

Relapse to heroin addiction following incarceration is a serious problem in the United States. Studies have shown that the first 3 months after release from prison is a critical period for risk of relapse for newly released prisoners. Thus, the development and implementation of treatment strategies for prereleased offenders with heroin addiction histories may be a promising strategy to prevent rapid relapse in these individuals. In a study of 197 male prisoners with a history of heroin addiction, an intervention consisting of counseling plus methadone maintenance treatment while in prison (Counseling + Methadone) was found to be more effective at encouraging participants to enter community-based treatment after release and reducing reincarceration compared to counseling plus opportunity to enter methadone treatment after release (Counseling + Transfer) or counseling alone (Counseling Only). Three to six months prior to release from prison, NIDA-funded researchers randomly assigned study participants to one of the three interventions and performed an assessment of participants' progress at 3 months following their release. Approximately 70 percent of men participating in the Counseling + Methadone group entered community treatment within 90 days of release, compared to 50 percent in the Counseling + Transfer group and 8 percent in the Counseling Only group. Self-reported heroin use was significantly lower in the Counseling + Methadone and Counseling + Transfer groups compared to the Counseling Only group, who were also slightly more likely to have a positive urine drug screen for opioids at followup. Finally, men in the Counseling + Methadone group were almost three times less likely to

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be rearrested and reincarcerated during the study period than men in the other two groups. Although the authors caution that additional studies are needed for female prisoners and in different geographic locations, they state that "this study suggests that opioid agonist maintenance treatment, provided to prisoners with preincarceration histories of heroin addiction, is an effective intervention for interrupting the cycle of relapse, recidivism, and reincarceration typically experienced by individuals with heroin-addiction histories who are released from American prisons."

Kinlock TW, Gordon MS, Schwartz RP, O'Grady KE. A study of methadone maintenance for male prisoners: 3-month postrelease outcomes. *Crim Justice Behav.* 2008;35(1):34–47.

Chromosome Region Involved in the Development of Dopaminergic Neurons Identified

Dopaminergic neurons mediate the effects of addictive drugs on the brain—all drugs of abuse directly or indirectly target the brain's reward system by flooding it with the neurotransmitter dopamine (DA), leading to feelings of euphoria. In a study led by the Cellular Neurobiology Research Branch at NIDA's Intramural Research Program, researchers identified several genes that are expressed during the development of DA neurons from human embryonic stem cells (hESCs). hESCs have tremendous potential value due to their ability to produce any type of human cell, including dopaminergic neurons in the brain. The researchers chemically directed hESCs to differentiate (i.e., to produce more-specialized cells), then used a protein marker found on the surface of developing nerve cells, such as DA neurons, to isolate those cells. They found that the genes expressed in the differentiated hESCs containing the protein marker were different from those expressed in undifferentiated hESCs: Out of 11,912 genes expressed in the developing DA neurons, 232 either were expressed in those neurons but not the undifferentiated hESCs or were expressed at levels at least 10-fold higher than detected in the undifferentiated hESCs. Five of the most highly expressed genes were "clustered" on a small region near the end of chromosome 11. This region contains several genes, many of which are known to play an important role in dopamine function, including the expression of tyrosine hydroxylase, the rate-limiting enzyme in the production of DA as well as other genes regulating the differentiation of DA neurons. The authors conclude that "The present data suggest that [this region on chromosome 11] is involved in regulation of the process through which undifferentiated cells are specified to become dopaminergic neuronal precursors and/or dopaminergic neurons…. Understanding the unique features of dopaminergic neurons is likely to be important for enabling the design of therapeutic and neuroprotective strategies."

Freed WJ, Chen J, Bäckman CM, Schwartz CM, Vazin T, Cai J, Spivak CE, Lupica CR, Rao MS, Zeng X. Gene expression profile of neuronal progenitor cells derived from hESCs: Activation of chromosome 11p15.5 and comparison to human dopaminergic neurons. *PLoS ONE.* 2008;3(1):e1422.

Onsite 12-Step Meeting at Treatment Program Improves Odds of Sustained Abstinence

In a study comparing clients' results at two outpatient substance-abuse treatment programs in New York City, NIDA-funded researchers found that attending a treatment program holding a 12-step meeting onsite increases almost sixfold the likelihood of abstaining from drugs for a full year after leaving treatment, relative to attending a program without an onsite 12-step meeting. The researchers compared 219 people treated at the two programs in underserved communities: one with and one without a weekly onsite 12-step meeting. The programs were otherwise similar in size, staff structure, and therapeutic orientation, as were clients' backgrounds (e.g., race and gender); histories of substance abuse, treatment, and 12-step participation; and attitudes and beliefs about 12-step recovery when they started treatment. People enrolled in the program with an onsite 12-step meeting were almost three times more likely go to meetings (at the program or in the community) during treatment than were clients in the other program. Moreover, while many people stop attending 12-step meetings a few months after leaving treatment, going to 12-step meetings *during* treatment increased over fivefold the likelihood of attending meetings in the second half of the posttreatment year. "Holding a 12-step meeting on site may represent a promising, effective and cost effective strategy to [foster] post-treatment recovery by providing clients with low-threshold opportunity to attend a meeting," conclude the authors.

Laudet A, Stanick V, Sands B. An exploration of the effect of on-site 12-step meetings on post-treatment outcomes among polysubstance-dependent outpatient clients. *Eval Rev.* 2007;31(6):613–646.

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Linked Gene Variations Associated With Nicotine Dependence

Genetic factors may play an important part in an individual's addiction to cigarettes. A recent study investigating genetic factors related to nicotine dependence found that the number of cigarettes an individual smokes per day (CPD) was associated with certain variations in a gene found to be important in nicotine addiction. Investigators, funded in part by NIDA, analyzed genetic samples that were collected from two different populations of individuals of European descent using a technique called whole genome association (WGA) to identify variations in gene sequences (known as single nucleotide polymorphisms [SNPs]) or in gene clusters (known as haplotypes) that are associated with smoking behavior and nicotine dependence. Researchers found that CPD was significantly associated with changes in alpha-3 and alpha-5 nicotinic cholinergic receptor (respectively, CHRNA3 and CHRNA5) genes. CHRNA3 and CHRNA5 are subunits of nicotinic cholinergic receptors that are expressed in brain regions relevant to addiction. In the first study, which comprised about 7,500 people, investigators found a common haplotype in the CHRNA5–CHRNA3 nicotinic receptor subunit gene cluster to be associated with CPD. In their second study, comprising a different group of about 7,500 people, the investigators identified in the same haplotype an SNP that was also strongly associated with CPD. While significant, these experiments did not identify the exact alleles in the haplotype that were responsible for the increase in nicotine dependence. As the functional alleles within the haplotype have yet to be identified, further studies are needed.

Berrettini W, Yuan X, Tozzi F, Song K, Francks C, Chilcoat H, Waterworth D, Muglia P, Mooser V. Alpha-5/alpha-3 nicotinic receptor subunit alleles increase risk for heavy smoking. *Mol Psychiatry*. 2008;13(4):368–373.

Adolescents Allowed to Smoke at Home Have Higher Levels of Nicotine Dependence

In a study from the Teen Tobacco Addiction Treatment Research Clinic at NIDA, researchers found that adolescents whose parents allowed them to smoke at home smoked more cigarettes per day and had higher scores on a nicotine dependence test than adolescents who were not allowed to smoke at home. Researchers spoke with 406 adolescents as part of a screening interview to determine eligibility in an ongoing smoking cessation trial. In addition to information on cigarette consumption, level of dependence, and whether or not adolescents were allowed to smoke at home, the researchers recorded participants' gender and ethnicity. Forty-seven percent of the adolescents reported that they were allowed to smoke at home. Even with differences in smoking associated with gender and ethnicity taken into account, adolescents allowed to smoke at home smoked an average of three more cigarettes per day and scored significantly higher on the Fagerström Test for Nicotine Dependence than those not allowed to smoke at home. Authors stated that results from this study "showed that parental allowance of adolescent in-home smoking is positively associated with adolescent tobacco consumption and dependence levels."

Luther EJ, Parzynski CS, Jaszyna-Gasior M, Bagot KS, Royo MB, Leff MK, Moolchan ET. Does allowing adolescents to smoke at home affect their consumption and dependence? *Addict Behav*. 2008;33(6):836–840.

Cigarette Reduction in Adolescent Smokers Does Not Reduce Toxin Exposure

In a pilot cigarette reduction study, teenage smokers who were not interested in quitting smoking were randomized to a NIDA-sponsored open-label trial of nicotine patch and nicotine gum to see if they could reduce their cigarette smoking. Results showed that even though overall cigarette consumption for both treatment groups was reduced by at least half, the teens did not experience a corresponding decrease in smoking-related toxin exposure. Ninety-four teens completed the study, which included weekly counseling visits until the end of treatment; and 67 were available for evaluation 6 months after the study. While 50 percent of participants had reduced their cigarette consumption by at least half by the end of treatment, levels of cotinine and NNAL—biomarkers for nicotine and toxins found in cigarette smoke—did not decrease significantly in urine samples taken from participants. These levels were still not reduced at the time of any followup visits. In fact, the average levels of cotinine per cigarette smoked actually increased during the study period, indicating that participants may have learned to smoke more efficiently (such as puffing harder on a cigarette). Authors note that results may be an artifact of when the assessments were made (during the summer, with no restrictions on smoking because of school) or could indicate that adolescents were smoking more cigarettes than they reported. By the end of the study, 53 teens (out of the original 103 participants) entered smoking cessation treatments; however, only five achieved a 30-day period of abstinence from smoking by 6 months after treatment. "Reduction in smoking may be a potential method to

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[initiate cessation among] adolescents who are unable or unwilling to quit but should not be an end goal," state the authors.

Hanson K, Zylla E, Allen S, Li Z, Hatsukami DK. Cigarette reduction: An intervention for adolescent smokers. *Drug Alcohol Depend*. 2008;95(1-2):164–168.

Effects of Drugs of Abuse on the Aging Brain Explored

While substance abuse affects Americans of all ages, particularly youth and young adults, little focus has been given to substance abuse among older adults. However, the aging of the baby boomer generation may lead to a dramatic increase in the abuse of illicit, prescription, and over-the-counter drugs among older adults, due in part to their larger numbers and their lifetime histories of substance abuse. The present review, written by scientists from NIDA, examines current trends and projected prevalence estimates of substance abuse among older adults as well as how drugs of abuse affect the aging brain. Large knowledge gaps exist of how age-related changes in the brain interact with drugs such as marijuana, cocaine, and heroin and other opiates. While it is known that some of the same brain systems involved in substance abuse are affected by aging, it is unclear whether these changes affect responsiveness to drugs—laboratory studies exploring these changes have shown mixed results as to whether aging may sensitize or dull the brain to the effects of drugs. Research does suggest, however, that susceptibility to neurotoxicity induced by some drugs of abuse may increase with age. The effects of illicit drugs may also be impacted by the many medical conditions that increase in prevalence with age, such as heart or kidney disease, diabetes, and lung disorders. Additionally, because the body's metabolism and the rate at which drugs leave the body also decrease with age, "even moderate use of alcohol, many prescription and over-the-counter medications, and illicit drugs may have devastating consequences" in this population, state the authors. Few screening tools exist to identify older adults with substance abuse problems, compounding the difficulty doctors may have in recognizing this diagnosis. Improvements in diagnosis and outreach for older drug abusers are needed, especially since older adults who do receive treatment for substance abuse have outcomes as good as or better than younger adults. Authors suggest that positive treatment outcomes such as these "suggest that the primary barrier to recovery is diagnosis and treatment entry; however, meeting the challenges will require a better understanding of the scope and effects of drug abuse in this population."

Dowling GJ, Weiss SR, Condon TP. Drugs of abuse and the aging brain. *Neuropsychopharmacology*. 2008;33(2):209–218.

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- Congressional staffers, call Geoffrey Laredo at 301-594-6852.

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