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Accelerating the Pace of Science: Improving Parenting Practices in Parents with Opioid Use Disorder

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SYNOPSIS

A public health emergency exists in the United States as a result of rising overdose deaths related to Opioid Use Disorder (OUD). With the rise of OUD has also come an increase in the number of children exposed to parents who suffer from an OUD. There is a pressing need for parenting interventions for individuals with OUD to provide safe environments for the children being reared in the face of this epidemic. Research on parenting with an OUD is sparse, but it is impractical to move linearly from basic research to program development and implementation given the urgent need for intervention - a trajectory that prior research has established takes approximately 17 years. We have created an outline of strategies that can be used to accelerate the pace of science so that parenting practices are more immediately improved for this population. First, we summarize what is already known about OUD and parenting to characterize mechanisms that existing interventions have targeted and optimal settings for the wide dissemination of implementable interventions. Next, we identify existing interventions that either specifically target parents with OUD or mechanisms specific to parents with OUD. We describe four different approaches for accelerating the pace of science to improve the lives of parents with OUD and their children. By doing so, we hope to provide a roadmap for future researchers and practitioners to deliver more timely evidence-based interventions to address the additional burden placed on families and communities due to the rise in OUD in the United States.

Keywords

opioid use disorder; substance use; research design; implementation

INTRODUCTION

In October of 2017, the United States Department of Health and Human Services declared a public health emergency to address rising overdose deaths related to Opioid Use Disorder

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Ethical Principles: The authors affirm having followed professional ethical guidelines in preparing this work. Although this was a review and no independent research was conducted, the studies reviewed described obtaining informed consent from human participants, maintaining ethical treatment and respect for the rights of human or animal participants, and ensuring the privacy of participants and their data, such as ensuring that individual participants cannot be identified in reported results or from publicly available original or archival data.

(OUD; DHHS, 2017). With the rise of OUD has also come an increase in the number of children exposed to parents who suffer from an OUD. A 2018 report from the Centers for Disease Control and Prevention found that from 1999 to 2014, the prevalence of OUD among women delivering children more than quadrupled, from 1.5 per 1,000 deliveries to 6.5 (Haight, Ko, Tong, Bohm, & Callaghan, 2018). Moreover, the number of children born with Neonatal Abstinence Syndrome/ Neonatal Opioid Withdrawal Syndrome (NAS/ NOWS) increased 300%, from 1.5 per 1,000 hospital births in 1999, to 6.0 per 1,000 hospital births in 2013 (Ko et al., 2016). These increases have also exacerbated the burden on the child welfare system. Specifically, compared to reports of child welfare involvement as a result of Fetal Alcohol Spectrum Disorder (FASD), which have remained relatively stable, reports of NAS/NOWS have increased from 4.72% of reports in 2004 to 9.19% of reports in 2014 (Lynch, Sherman, Snyder, & Mattson, 2018). These statistics highlight the pressing need for parenting interventions for parents with OUD to provide safe environments for the children being reared in the face of this epidemic, especially because opioid cessation alone does not result in parenting improvements (Suchman, Decoste, McMahan, Rounsaville, & Mayes, 2011). In this review, we describe the need for parenting interventions for this population and provide guidance on how to accelerate the pace of science to more rapidly move from knowledge gained from basic research findings to implementation (i.e., adopting and incorporating interventions into community-based settings) and wide dissemination (i.e., distributing interventions to relevant groups) of effective parenting interventions for parents with OUD.

Several reviews related to OUD and parenting have been previously conducted; one relied primarily on qualitative data (Mirick & Steenrod, 2016), and others focused on issues specifically related to medication-assisted treatment and NAS/NOWS, rather than issues affecting parenting (Klaman et al., 2017), or focused on child outcomes related to parental substance use (Morton & Wells, 2017). In the only publication to our knowledge that has systematically reviewed the literature on opioid use and parenting, Peisch et al. (2018) provided an in-depth overview of the sparse literature on parenting with OUD and presented a framework for advancing research starting with basic research and ending with the creation of a research-supported intervention. Peisch and colleagues found few rigorously conducted studies examining parenting and child outcomes for parents with OUD and few research-evaluated interventions for parents with OUD, and they called for an increase in the generation of basic science and intervention development related to parenting with OUD. Generating basic science is a crucial next step in serving the needs of parents with OUD. However, given evidence suggesting that moving from basic research to implementation takes approximately 17 years (Balas & Boren, 2000), it is equally important to accelerate the pace of science so that parents who are currently experiencing an OUD can receive practical, evidence-based guidance for parenting their child(ren) now, without having to wait for the basic research to implementation cycle to be completed.

The goals of this review are two-fold: 1) to review extant literature to identify malleable intervention targets and factors to consider for intervention implementation that pertain to parents with OUD, and 2) to propose methods and interventions for accelerating the pace of science by capitalizing on the identified intervention targets and implementation considerations to address parenting challenges for parents with OUD. By doing so, we hope

to pave a clear pathway for rapidly developing maximally potent and implementable interventions which are ready to be widely disseminated to, in turn, improve developmental outcomes for children.

Throughout this review, we refer to “parents” as the individuals who are actively parenting their child(ren) within their home or in a residential treatment setting. We refer to “parents with OUD” as parents who may or may not have been formally diagnosed with an OUD, but who are exhibiting misuse of opioid which falls within the spectrum of OUD defined as disordered opioid use, ranging from tolerance/withdrawal and impaired control of use (e.g., taking the opioids in larger amounts or over a longer period than was originally intended) at best, and social impairment and risky use at worst (e.g., failing to fulfill family obligations and using in hazardous situations) (American Psychiatric Association, 2013). Opioids include heroin, synthetic opioids such as fentanyl, and pain relievers available legally by prescription, such as oxycodone, hydrocodone, codeine, morphine, and many others (NIDA, n.d.). There is very limited research on parenting and OUD, and thus our framework builds on relevant research from individuals with other substance use disorders, when appropriate. In some cases, findings from studies conducted with parenting with low socioeconomic status or other mental health disorders are presented as they highlight important comorbid conditions and disorders that might be relevant for parents with OUD. Implementation and dissemination are distinct process, implementation refers to the adoption of an intervention in community setting, whereas dissemination refers to the distribution of the intervention information and materials to relevant groups (Onken et al., 2014) but because they are closely linked, we use implementation to describe both processes for the remainder of this review.

BROFENBRENNER’S ECOLOGICAL THEORY AND NATIONAL INSTITUTES OF HEALTH (NIH) STAGE MODEL

To maximize the benefits of previous research and existing interventions and move more rapidly to implementation, we propose a transdiagnostic approach that leverages interventions that have already been developed for other populations which target mechanisms and/or implementation strategies may be relevant for parents with OUD (Sauer-Zavala et al., 2017). Bronfenbrenner’s (1979) Ecological Theory posits that human development is shaped by the interactions between an individual and their environment. Therefore, an individual’s attributes, their microsystem (an individual’s immediate surroundings), interactions between an individual’s surroundings (mesosystem), systems that indirectly affect the individual (exosystem), and cultural beliefs/values (macrosystem) and effects that unfold over time (chronosystem) all simultaneously affect outcomes for an individual. We base our review of research on parenting with OUD within this ecological theory, to help identify intervention targets and implementation strategies. Figure 1 outlines our conceptual framework and the target mechanisms and implementation considerations specific to parents with OUD. The figure calls attention to a parent’s individual attributes and microsystem for target mechanisms and contextual factors to consider for implementation considerations.

Then, we apply the National Institutes of Health (NIH) Stage Model (Onken, Carroll, Shoham, Cuthbert, & Riddle, 2014) to identify how to integrate intervention targets and implementation strategies into each stage of research to accelerate the pace of science. The NIH Stage Model includes six stages; stage 0, basic research; stage 1, intervention generation and refinement; stage 2, efficacy (research clinics); stage 3, efficacy (community clinics); stage 4, effectiveness and; stage 5, implementation & dissemination. The utility of this framework is that it clarifies that “even though the stages of behavioral intervention development do not always—or even usually—occur in a prescribed order, and even though it is not always—or even usually—necessary to progress through every stage, [the Stage Model] facilitates communication and helps clarify research activities and necessary next steps when the stages of intervention development research are defined” (Onken et al., 2014, p.9). For example, the generation of basic science can be incorporated into each stage of intervention development by oversampling parents with OUD and testing whether the potential moderating effects of an intervention were enhanced or attenuated depending on parental opioid use, or oversampling parents with OUD to identify additional moderators in this population, including the contextual factors that often co-occur with OUD (e.g., other substance use disorders, mental disorders; Grant et al., 2004; McCabe, Cranford, & West, 2008; McHugh et al., 2017) rather than waiting on additional knowledge to be generated prior to implementing an intervention. Specifically, understanding for whom and why an intervention is most useful are integral parts of stages 1–4 (Onken et al., 2014). By taking these approaches, researchers could reduce the amount of time it would take for a parenting intervention to be implemented for parents with OUD. Incorporating basic research into each stage of intervention development will also reduce the likelihood that evidence-based interventions will not reach parents with OUD when there are many interventions that would likely be benefit this population.

USING ECOLOGICAL THEORY TO IDENTIFY INTERVENTION TARGETS FOR PARENTS WITH OUD

Individual Considerations for Identifying Intervention Targets

Consistent with the ecological model, individual factors are important to consider for identifying key intervention targets for parents with OUD. Individual factors that contribute to opioid use and negative parenting include the personal attributes of parents with OUD such as psychopathology, accumulated beliefs and knowledge about parenting, parenting style, parent biological sex, and emotion regulation challenges. We highlight the most widely studied individual factors associated with OUD and parenting in this section and revisit these factors in the final section of the review where we discuss the selection and adaptation of existing interventions that target risk factors relevant to parents with OUD.

Compared to those without OUD, individuals with OUD are more likely to have a personality disorder. Specifically, cluster B personality disorders, such as antisocial and borderline personality disorders are more prevalent in individuals with OUD (Barry et al., 2016; Hans, Bernstein, & Henson, 1999). Individuals with OUD are also likely to experience general symptoms of psychopathology and a family psychiatric history (Bawor et al., 2015). Given the link between maternal personality disorders and negative parenting behaviors

(Stepp, Whalen, Pilkonis, Hipwell, & Levine, 2011), the comorbidity of personality disorders and OUD may be particularly problematic. In fact, evidence suggests that the interaction between maternal psychopathology and opioid use negatively impacts parenting. Specifically, compared to mothers without OUD, mothers with OUD and who had a personality disorder, but not mothers with OUD alone, were less likely to have their children remain in their care and were more likely to display unresponsive and negative parenting during infancy (Hans et al., 1999). Individuals with OUD were also more likely to have other disorders such as anxiety and depression (Grattan, Sullivan, Saunders, Campbell, & Von Korff, 2012; Hans et al., 1999) and to have another substance use disorder (e.g., cocaine use disorder, amphetamine use disorder; Brooner, King, Kidorf, Schmidt, & Bigelow, 1997; Kidorf, Solazzo, Yan, & Brooner, 2018; The Lancet, 2018).

Given the higher incidence of mental health disorders for individuals with OUDs, it is unsurprising that emotion regulation challenges have been implicated in the manifestation of OUDs and the intensified expression of OUD (Wilcox, Pommy, & Adinoff, 2016; Wilens, Martelon, Anderson, Shelley-Abrahamson, & Biederman, 2013; Wilson et al., 2017; Wolff et al., 2016). Moreover, there is evidence that the pathways between emotion regulation difficulties and OUD are bidirectional, with emotion regulation as both a precursor and an outcome of OUD. For example, emotion regulation challenges as a precursor to OUD may develop as a result of early maltreatment (Wolff et al., 2016). Furthermore, the states of use and withdrawal may induce emotion regulation challenges (Pierro, Benzi, & Madeddu, 2015). In turn, parenting requires the deployment of emotion regulation to respond appropriately to child inputs and to teach regulatory strategies to their offspring (Rutherford, Wallace, Laurent, & Mayes, 2015). However, emotion regulation is malleable and thus amenable to intervention (Rutherford et al., 2015). Parents with OUD also have problematic parenting beliefs regarding inappropriate child expectations, reversed parent-child roles, oppression of children's power and independence, corporal punishment, and low levels of empathy (Rizzo et al., 2014). Parents with OUD often lack basic parenting information such as understanding signs of illness, nutrition, and information about infant development (Butz, Lears, O'Neil, & Lukk, 1998). As children transition from middle childhood to adolescence, mothers with an OUD appear to struggle with effective discipline (Slesnick, Feng, Brakenhoff, & Brigham, 2014).

The health consequences of NAS/NOWS have been referenced as the primary concern of mothers with an OUD who are pregnant, while they are seemingly unconcerned about their ability to parent their newborn child (Rizzo et al., 2014). However, the effects of NAS/NOWS on child physical development are not stable over time and are influenced by contextual factors, such as low-quality parenting (see Logan, Brown, & Hayes, 2014, for a review), and prenatal opioid agonist exposure may not be deleterious to normal physical and mental development (Kaltenbach et al., 2018). Specifically, a mothers' ability to appropriately and immediately respond to her child may be a stronger predictor of infant and child behavior than prenatal exposure to opioids (Lowe et al., 2017). Moreover, maternal psychological distress is a salient predictor of child behavior and health outcomes, whereas exposure to opioids is not (Sarfi, Martin, & Waal, 2013). Exposure to opioids also does not appear to make children more susceptible to the effects of maternal psychological distress (Sarfi et al., 2013). Heavier levels of prenatal cocaine exposure are related to more negative

interchanges between mother and baby (Mayes & Bornstein, 1995, 1997), but the same effect has not been found for prenatal exposure to opiates (Tronick et al., 2005). Similar results have been obtained comparing 6-month old infants with prenatal exposures to opioids and infants in a low risk group who were not exposed to opioids in utero (Sarfi, Smith, Waal, & Sundet, 2011). Maternal style, including greater sensitivity and warmth, rather than in utero exposure, predicted positive dyadic interchanges for both exposed and non-exposed infants. However, the group of mothers with OUDs had slightly fewer sensitive/warm interactions compared to mothers without OUD (Sarfi et al., 2011).

There also appear to be differences between mothers and fathers with OUD. Fathers with OUD are more likely to be living away from their children (McMahon, Winkel, & Rounsaville, 2005) and thus less likely to have children in their care. However, when children are in the care of their father, fathers with an OUD have been observed to have compromised fathering, including less frequent positive parenting and less satisfaction as a father, compared to fathers without a substance use disorder (McMahon et al., 2005). Compared to mothers, fathers are also more likely to be misuse opioids when they first become a parent (McMahon et al., 2005). Compared to men with OUD, women with OUD are more likely to commence opioid use through physician prescription, to have physical health problems, to be unemployed and to have childcare responsibilities (Bawor et al., 2015). The more children a woman has, the less likely she is to seek treatment; this is especially true for women who are European American and for high chronicity opioid users (McMahon, Winkel, Suchman, & Luthar, 2002). However, women often choose to enter treatment for child-related reasons such as pregnancy or a desire to retain custody of their children (Taplin & Mattick, 2015).

Microsystemic Considerations for Identifying Intervention Targets

The microsystem includes the influences of an individual's family, peers, and partner(s), as well as the influences of services that individuals obtain. The mesosystem comprises interactions between microsystems. We focus this section on the microsystem given the dearth of research on the interaction between microsystems for parents with OUD. Similar to the previous section, here we outline some of the most widely studied microsystemic factors related to parenting and OUD and revisit these factors in the final section of this review, where we discuss the selection and adaptation of existing interventions that target factors relevant to parents with OUD. We focus mainly on the complex dynamic between child and parent and partner/family support, due to our focus on identifying mechanisms for parenting interventions.

There are multiple associations between parenting and opioid use for non-medical and prescription reasons. For example, the National Longitudinal Study of Adolescent to Adult Health found that a higher percentage of parents compared to nonparents had taken a prescription opioid, but fewer parents reported any medical condition which may precipitate such use (Austin & Shanahan, 2017). Furthermore, compared to parents who had not reported prescription opioid use, parents who had reported prescription opioid use were more likely to be at risk for substance misuse (Austin & Shanahan, 2017). Mothers with OUD experience heightened stress during pregnancy as they anticipate giving birth to a child

with NAS/NOWS (Rizzo et al., 2014). Given that many mothers with OUD give birth to a child with NAS/NOWS, this stress may continue as the parent is confronted with difficulties with infant feeding and extended Neonatal Intensive Care Unit stays (Klaman et al., 2017). Although the stresses of parenting may exacerbate negative parenting and parental opioid use, for individuals in recovery from an OUD, parenting may serve as a protective factor for later use. Comiskey (2013) found that individuals with an OUD who were in recovery and had children in their care were less likely to use heroin, illegal methadone, and benzodiazepines and were slightly less likely to experience symptoms of depression compared to individuals with an OUD who did not have children in their care.

When children reside in the custodial care of a parent with an OUD, parental substance use and other parental factors that precipitate and co-occur with substance use (e.g., parental trauma, parental mental health challenges) may directly impact child developmental outcomes. Specifically, children living with a parent with an OUD are likely to experience a lack of supervision, exposure to illegal activities, and unsafe adults (Powis, Gossop, Bury, Payne, & Griffiths, 2000). Some studies suggest child outcomes occur directly as a result of parent substance use (Wilens et al., 2013), whereas others suggest that a toxic environment, rather than the type of drug used, is related to child psychopathology (Stanger et al., 2002). Mothers with OUD had lower scores on maternal sensitivity and non-intrusiveness compared to mothers without a substance use disorders or mothers with depression (Salo et al., 2009; Salo, Politi, Tupola, Biringen, & Kalland, 2010) and less parental involvement compared to a socioeconomic status matched comparison group (Suchman & Luthar, 2000).

Partner and family support, or the lack thereof, are also important target mechanisms to consider for parents with OUD. In general, less perceived support from a partner or family member is a risk factor for OUD (Cooper, Campbell, Larance, Murnion, & Nielson, 2018). For individuals experiencing OUD, those who have more supportive families and partners who are receiving medication assisted treatment for opioid use are more likely to be ready to change, to have improved relationships (family and partner) following treatment, and more likely to be abstinent following treatment (Fulmer & Stout, 2015). Moreover, specific to mothers with OUD, limited social support has been related to a greater risk for comorbid depression and opioid use, whereas greater social support has been related to improvements in parenting and parent-child bonding (Suchman, McMahon, Slade, & Luthar, 2010). OUD has also been directly associated with a lack of a supportive partner, marked by high rates of interparental conflict when a partner is present and limited or non-existent parenting support when parents are no longer partnered (Spehr, Coddington, Ahmed, & Jones, 2017).

Other Considerations for Intervention Targets

Regardless of the specific effects of parental opioid use on child outcomes, OUD does not occur in a vacuum (Dawe, Harnett, Staiger, & Dadds, 2000; Peisch et al., 2018). For example, children of heroin-dependent mothers do not show deficits in cognitive or behavioral functioning except that they have a higher risk for ADHD when compared to parents with low SES (Ornoy, Segal, Bar-Hamburger, & Greenbaum, 2001). Additionally, parental provision of autonomy and limit setting are better explained by contextual factors (e.g., single status and family size) for parents with OUD rather than OUD alone (Suchman

& Luthar, 2000). Moreover, much like other mental health disorders, including other substance use disorders, OUD often co-occurs with a variety of other disorders and stressful life circumstances (Austin & Shanahan, 2017; McCabe et al., 2008; Peisch et al., 2018). The compounding effects of these stressors may make regulated parenting near impossible from a cumulative risk orientation (Atzaba-Poria, Pike, & Deater-Deckard, 2004). In turn, children are faced with taxing environments as they are developing complex abilities such as self-regulation and autonomous decision making (Bridgett, Burt, Edwards, & Deater-Deckard, 2015). Exposure to these taxing environments may lead to disordered child self-regulation and to risky adolescent and young adult behaviors, including substance use (Lambert et al., 2013).

Socio-cultural Considerations for Implementation Strategies

The exosystem, macrosystem, and chronosystem levels of Bronfenbrenner's Ecological Theory (1994) explain socio-cultural considerations for parents with OUD that researchers can utilize for the purpose of intervention adaptation. The exosystem comprises linkages and processes taking place between two or more settings, at least one of which does not contain the individual, but in which events occur that indirectly influence processes within the immediate setting of the individual. These include the societal structures in place that can affect an individual. The macrosystem includes the attitudes and ideologies of the culture including belief systems, bodies of knowledge, customs, and life-styles embedded in each of these broader systems. Studies of the macrosystem for parents with OUD are limited and are not described in this section. However, similar to parents with other substance use disorders, parents with OUD experience a high degree of perceived and experienced stigma related to their use, especially in the context of their parenting decisions and abilities (Howell & Chasnoff, 1999; Snoek & Horstkötter, 2018; Stone, 2015). The chronosystem includes sociohistorical conditions, patterns of events, and transitions over the life course.

The exosystem for parents with OUD can include exposure to a range of community services. For example, parents with OUD are at high risk for incarceration, family disruptions, health problems, and financial hardship (Austin & Shanahan, 2017; Skinner, Haggerty, Fleming, Catalano, & Gaaney, 2012), which increases their likelihood of involvement in support services such as the correctional system, child welfare system, health care system, and social welfare system. Specific to the health care system, a need has been identified for interventions that provide additional support to pediatric trainees who report feeling uncomfortable discussing addiction and trauma, but feel comfortable managing symptoms of NAS (Schiff, Zuckerman, Wachman, & Bair-Merritt, 2017). Moreover, women who have a substance use disorder and have children are less likely to be able to find successful employment due to lack of education and job skills (Bowden & Goodman, 2015). Obtaining employment may be further complicated by mental health challenges or stigma related to previous criminal history (Bowden & Goodman, 2015). Parents with an OUD are also more likely to have been involved with child protective services. Children may enter into custody of child protective services due to a myriad of reasons related to parent OUD, including low levels of maternal treatment completion (Choi & Ryan, 2006), high rates of OUD relapse (Hser, Evans, Grella, Ling, & Anglin, 2015), and in some states, prenatal opioid use (Children's Bureau, 2015). About half of children of a parent with OUD remain

in the care of that parent (Taplin & Mattick, 2015). This highlights the need for strategies to prevent OUD among parents and for interventions nested within child welfare systems to provide parenting support and treatment for parents with OUD.

One component of the exosystem that indirectly influences processes within the immediate setting of the individual is the relation between research and practice. Specifically, there is a lack of guidance related to parenting support for parents with OUD. Often, the guidance on best practice for providing care for pregnant and parenting women is limited to indications and contraindications related to medication dosage and treatment related to parent and child withdrawals, relapse prevention, and breastfeeding (Substance Abuse Mental Health Services Administration, 2016). However, there are sources which expand best practices to include specific information about parenting. For example, Gopman (2014) suggested the best practice for prenatal and postpartum care of women with substance use disorders, including mothers with opioid addiction, is supporting the preparation of parenting such as referrals to educational programs, which include education regarding the diagnosis and treatment of NAS. Furthermore, in a policy briefing, Rutherford, Berry, and Mayes (2018) suggested that the best practices for treatment include family-focused approaches because these approaches to opioid addiction improve treatment outcomes for parents and improve developmental outcomes for children who have been affected by NAS as well as parents with OUD. Providing parenting support is important for parents with OUD, but there is a lack of clear procedures for how to provide adequate support. Because there is a lack of procedural remedies for providing parenting support for parents with OUD, it is likely that parents with OUD will not receive adequate support when they access services in hospitals, drug treatment centers, and welfare agencies.

In terms of historical events that make up the chronosystem for parents with OUD, individuals with OUD often have a history of exposure to home instability and unhealthy attachment (Cerdá et al., 2014; McManama O'Brien, Salas-Wright, Vaughn, & LeCloux, 2015). Unsurprisingly, some of these patterns of instability and negative parenting may be repeated by parents with their own offspring, given the intergenerational nature of parenting and trauma (Cohen, Hien, & Batchelder, 2008; Yehuda & Lehrner, 2018). Indeed, as noted earlier, parents with OUD are more likely to expose their children to negative parenting and instability, such as lack of supervision, exposure to illegal activities, and unsafe adults (Powis et al., 2000). The importance of intervention in the lives of these families is thus crucial for disrupting problematic cycles of instability and negative parenting.

ACCELERATING THE IMPACT OF SCIENCE TO ASSIST PARENTS WITH OUD

There is still more to understand about the specific contexts and challenges for parents with OUD, but evidence-based interventions exist that target factors related to OUD and parenting, including prenatal and child health promotion, child maltreatment prevention, and enhancement of the general quality of family relationships (Black et al., 1994; Greenberg & Lippold, 2013; Ingoldsby, 2010; Sandler, Schoenfelder, Wolchik, & MacKinnon, 2011). Previous reviews on OUD and parenting have called for an increase in basic research to

improve our understanding of parenting with OUD and develop additional interventions (Peisch et al., 2018); we propose that simultaneous to those efforts, steps can be taken to accelerate the pace of science by utilizing the NIH stage model. Approaches to using the stage model to accelerate the pace of science include: (1) adapting parenting interventions that have been found to be at least efficacious in stage 1 research, (2) oversampling parents with OUD in research already in stages 2–4 research to compare parenting outcomes for those with and without OUD, (3) testing interventions that have been specifically developed for parents with OUD in the community in stage 4 research, and (4) utilizing effectiveness-implementation hybrid trials (Curran, Bauer, Mittman, Pyne, & Stetler, 2012) to simultaneously evaluate effectiveness and implementation outcomes. Thus, in addition to research focused on knowledge generation related to parenting and OUD, we propose that pursuit of opportunities to identify answers to basic scientific questions within the context of program adaptation, testing, and analysis through inclusion of mediators and moderators of intervention effects for parents with OUD (Powell, 2013) can yield positive and more immediate benefits. We provide examples of how researchers could utilize the stage model to accelerate the pace of science by capitalizing on existing interventions. As noted in a review of research design considerations for parenting intervention outcome studies, advantages of using existing programs is that they have already overcome barriers that occur during the beginning stages of implementation (Powell, 2013). The examples provided here are not intended to be exhaustive, but rather to provide examples of clear and specific approaches. A summary of these approaches is provided in Figure 2.

(1) Adapting Existing Parenting Interventions

Existing parenting interventions that have been found to be efficacious and/or effective can be adapted in stage 1 research for parents with OUD. Given that many programs have been identified as effective for parents rearing children living in poverty or who are single parents, circumstances often experienced by parents with OUD (Austin & Shanahan, 2017; Skinner et al., 2012), it is likely that these interventions would also produce favorable outcomes for families with parents who have OUD. For example, pre- and post-natal home visiting programs such as Health Access Nurturing Development Services (HANDS; Williams et al., 2017) and Nurse Family Partnership (NFP; Olds, 2002) have been shown to mitigate challenges familiar to parents with OUD. Namely, these programs reduce the incidence of preterm birth (for which preterm substance use is a risk factor), increase family economic self-sufficiency, prevent child abuse and neglect, and improve school readiness (Dawley, Loch, & Bindrich, 2007; Williams et al., 2017). These upstream prevention programs could be adapted to add components related to opioid use, including best practices for medication assisted treatment, especially during the prenatal period and best practices for caring for children with NAS/NOW (Klaman et al., 2017).

Other parenting programs that could be adapted for parents with OUD include those for parents with preschool age to adolescent children. For examples, Parent Child Interaction Therapy (PCIT) has been shown to reduce negative parenting behaviors and is effective for preventing maltreatment and for improving child outcomes for children who have been maltreated (Chaffin et al., 2004; Thomas & Zimmer-Gembeck, 2007). This program may be useful for parents with OUD who are either at risk for involvement with child welfare or

involved with child welfare or more generally for parents who are receiving treatment for OUD. Similarly, Family Check-Up (FCU) for toddlers through adolescents has been found to improve parenting practices and the quality of family relationships (Dishion et al., 2014; Dishion, Nelson, & Kavanagh, 2003). FCU has also been shown to alleviate depressive symptoms for parents (Shaw, Connell, Dishion, Wilson, & Gardner, 2009), which may be especially useful for parents with OUD who often experience co-occurring depression (Brooner et al., 1997; Grattan et al., 2012). Both PCIT and FCU could be adapted for parents with OUD by integrating these programs into the current systems that parents with OUD typically interact with, including human services programs and drug treatment facilities (Taplin & Mattick, 2015). For example, PCIT and FCU could be adapted for delivery to parents of young children in residential drug treatment facilities by an on-site therapist. Utilizing therapists would require training of onsite staff to administer these programs and time allocated from the treatment program for clients to interact with these surveys. Moreover, the services provided in the context of PCIT and FCU could be tailored for parents with OUD who often have challenges with emotion regulation as a result of drug use (George, Le Moal, & Koob, 2012; Tang, Posner, Rothbart, & Volkow, 2015), especially following detoxification (Powell & Taylor, 1992; Robinson & Berridge, 2003). Adapting these existing interventions would fall under stage 1 research because the existing interventions could be adapted and modified for settings specific to parents with OUD and could be tested for feasibility and pilot tested. Subsequently, it would be ideal to test an intervention for effectiveness so that it could more rapidly move to implementation to improve outcomes for parents with OUD and their children on a larger scale. Alternatively, this type of research could occur during the exploration phase of implementation of an intervention, and rigorously tested using a hybrid design (outlined in example four below).

To advance basic scientific knowledge during program adaptation, when existing efficacious and effective programs are adapted for parents with OUD, feasibility and pilot studies can provide qualitative information about the needs and considerations for parents with OUDs and how needs may differ from those of parents without OUD who may face encounter similar challenges (e.g., high financial need, mental health instability). Moreover, in the context of efficacy and effectiveness trials when parents with OUD are included, comparisons can be made between groups of parents with and without OUD. For example, if, in feasibility testing, parents with OUD express greater concern that their adolescent will engage or has engage in substance use, during efficacy and effectiveness trials, researchers may formally assess these differences by including parental questions about child risk behaviors and may include youth self-report on substance use when assessing child outcomes after receiving treatment.

(2) Oversampling Parents with OUD in Efficacy and Effectiveness Trials

Within the context of efficacy and effectiveness trials (stages 2–4), programs that are currently undergoing trials can aid in accelerating the pace of science by oversampling parents with OUD. By oversampling parents with OUD, we can ensure that the interventions that are already being tested among parents with OUD are adequately powered to assess efficacy and effectiveness of the intervention for this group and are powered to test the potential moderating effects of OUD (Powell, 2013). The clearest avenue for this type of

research is parenting programs currently being conducted generally among parents with substance use disorders. For example, Mothering from the Inside Out (MIO) has undergone a pilot trial for mothers with OUD (Suchman et al., 2010) and two randomized clinical trials for parents with a range of substance use disorders, and testing appears to be ongoing (Suchman et al., 2017, 2011). This program provides 12 sessions with the aim of improving mother-child interaction quality among preschool aged children. By oversampling mothers with OUD during additional trials, researchers could understand whether the effects hold specifically for mothers with OUD. The program Multisystemic Therapy-Building Stronger Families (MST-BSF) is an adaptation of MST specifically for parents with substance use disorders (Schaeffer, Swenson, Tuerk, & Henggeler, 2013). The testing of this intervention is similarly ongoing (Zajac, Randall, & Swenson, 2015), however pilot results suggested that after mothers received this intervention, their youth had fewer anxiety symptoms, the mothers' drug use decreased, mothers had fewer depressive symptoms, and mothers were less likely to have additional substantiated cases of child maltreatment compared to parents who received comprehensive community treatment (Schaeffer et al., 2013). As testing continues for MST-BSF, ensuring that an adequate number of parents with OUD is included in trials will provide opportunities for comparison between parents with OUD and parents with other substance use disorders to understand whether the program effects are moderated by the type of drug use disorder a parent has.

To advance basic scientific knowledge within efficacy and effectiveness trials, assessing the mechanisms of an intervention by measuring a range of potential mechanisms and testing these within mediation models (Powell, 2013) would provide information about parents with OUD and may provide faster and more precise information about the specific needs of parents with OUD compared to parents without OUD, compared to longitudinal designs. For example, FCU has found a decrease in parental depression to be a mechanism by which child behavior improves (Shaw et al., 2009). However, a different mechanism may emerge for parents with OUD, such as an increase in parenting skills. Thus, alternative mechanisms may be identified by measuring mechanisms during efficacy and effectiveness trials. In the previous example, this would be a probable scenario because parental depression may not be as easily altered for parents with OUD given evidence that these individuals often have more severe mental health challenges than the general population (Grant et al., 2004; Hans et al., 1999; Stepp et al., 2011).

(3) Testing Existing Interventions in Effectiveness Trials

Several interventions exist specifically for parents with OUD (see Neger & Prinz, 2015; Peisch et al., 2018 for reviews). One example is Parents Under Pressure (PUP; Dawe et al., 2007), which is a manualized, home-based program delivered by therapists that includes parenting skills development and mindfulness techniques to improve parental emotion regulation and prevent substance use relapse. This program has produced a significant reduction in child abuse potential, rigid parenting attitudes, and child behavior problems at 3- and 6-month follow-up (Dawe et al., 2007). Another program for parents with OUD is the Relational Psychotherapy Mothers' Group (RPMG; Luthar & Suchman, 2012; Luthar, Suchman, & Altomare, 2007; Suchman & Luthar, 2000). RPMG is a 24-week, group-based, psychotherapy intervention which includes methadone counseling also found a reduction in

child abuse potential as well as greater involvement with children, more positive psychosocial adjustment overtime, and their children had fewer behavioral challenges compared to methadone counseling alone. These mothers also showed greater reductions in opioid use over time (Luthar & Suchman, 2000). Both PUP and RPMG have demonstrated evidence of efficacy and effectiveness. Although it would be useful to have additional evidence of their success, especially because RPMG only assessed treatment completers in the efficacy trial and used masters and doctoral level practitioners in the treatment condition and certified drug and alcohol counselors for the comparison group (Luthar & Suchman, 2000; Luthar, Suchman, & Altomare, 2007). Thus, it is uncertain if the intervention would be effective when delivered by certified drug and alcohol counselors which may be a more practical scenario in the treatment center context. Within effectiveness trials, implementation strategies and fidelity can be evaluated for feasibility and can seek to understand the mechanism of action behind the intervention (Onken et al., 2014; Powell, 2013).

To advance basic scientific knowledge within effectiveness trials for existing programs, PUP for example found that when parents received standard care, their potential for child abuse increased (Dawe & Harnett, 2007). By using multilevel linear model to compare average trajectories, the authors compared trajectories between groups and estimated the overall individual level effects for each group, which provided information on whether or not the treatment was effective and showed the possible deleterious effects of the current standard of care. Consistent with best practices for assessing outcomes for parenting interventions reviewed by Powell (2013), the use of a comparison group is best practice, allows for stronger inferences, and facilitates the translation of research to practice. Another example is a trauma-informed mindfulness intervention for parents with OUD that found that the intervention was associated with improvements in quality of parenting behaviors, especially for mothers with higher baseline adverse childhood experiences (Gannon, Mackenzie, Kaltenbach, & Abatamarco, 2017), highlighting the need to consider a parent's own adverse childhood experiences which delivering parenting interventions for parents with OUD.

(4) Effectiveness-Implementation Hybrid Designs

It has been proposed that effectiveness-implementation hybrid designs, which integrate the a priori decision to simultaneously assess effectiveness and implementation outcomes, may lead to an acceleration in intervention uptake, more effective strategies for implementation, and improve decision making regarding which interventions are implemented and how (Curran et al., 2012; Wolfenden, Williams, Wiggers, Nathan, & Yoong, 2016). We propose that effectiveness-implementation hybrid designs could be used once any of the previously described interventions are being tested for effectiveness. Researchers have begun to use effectiveness-implementation hybrid designs as a means to evaluate clinical and implementation outcomes of evidence-based programs to improve their translation into routine practice. Most previous work has been done in primary care settings. For example, the delivery of cognitive behavioral therapy (CBT) has been evaluated within effectiveness-implementation hybrid designs for web-based applications and brief, manualized CBT for veterans receiving mental health services (Cucciare et al., 2016; Cully et al., 2012). For evaluating effectiveness and implementation of parenting programs for parents with OUD, type 1 and type 2 hybrid designs are most appropriate. Type 1 hybrid designs focus primarily

on the effectiveness of interventions on specific outcomes but also simultaneously collect information program implementation. Type 2 hybrid designs compare both the effectiveness of an intervention for a given outcome and also test an implementation strategy relative to a group with a different implementation strategy to improve implementation (Wolfenden et al., 2016). To use these approaches for programs for parents with OUD, an intervention could test the effectiveness of a parenting program in a particular setting such as a drug treatment center by collecting data on improvements in parenting behaviors, while also collecting information about implementation such as how many sessions of a program were attended by participants or which intervention components were delivered and by whom (e.g., drug and alcohol counselor or mental health professional). A researcher may also ask whether a program is effective and delivered appropriately in different settings. For example, researchers could compare two different settings—such as a child welfare affiliated agency and a drug treatment facility—and measure the utility of implementation strategies and degree of fidelity while also including a control group in each setting to measure a program’s effectiveness on a set of outcomes. This design would require an adequate sample size to test the differences between the four groups, but assessing effectiveness and implementation within one study would reduce the need for multiple funding applications and would accelerate the pace of science by understanding a program’s utility in multiple settings.

POTENTIAL CHALLENGES TO ACCELERATING THE PACE OF SCIENCE FOR PARENTS WITH OUD

In addition to the strengths, there are limitations associated with the approaches we have outlined for accelerating the pace of science for parents with OUD. For example, many of the programs described (MST, NFP) that are currently being implemented in community settings use fixed resources, thus, it may be difficult to integrate samples of parents with OUD to test potential mediators specific to these individuals or to test whether the type of use disorder presented moderates any program effects (i.e., moderated mediation). Such limitations dictate a need for increased funding to make adaptations to existing programs for parents with OUD and increased funding to recruit participants into existing efficacy and effectiveness trials. Where federal funding is sparse, there may be opportunities for researchers to work in collaboration with state agencies by responding to requests for applications and proposals. By responding to state needs, academic–practitioner partnerships may form at the state level, which may help to improve the state’s ability to use data-driven decision making (Gooden, Graham, & Martin, 2014).

Moreover, there may be training gaps for researchers seeking to utilize any of these designs, but especially hybrid designs given the emergence of implementation science as a field (Bauer, Damschroder, Hagedorn, Smith, & Kilbourne, 2015). These training gaps necessitate collaboration and additional training opportunities. A related concern is one of staff and workforce training; if services are being provided through a community agency, and now the agency will be delivering a new or expanded set of services, the staff will need to be trained in this intervention model. Such training takes time and resources, as well as monitoring of adherence and fidelity. Furthermore, it may be difficult for studies already testing programs

for efficacy and effectiveness to collect additional participants with OUD because funding is typically designated prior to the start of a study and funding does not typically exist to expand recruitment efforts. Therefore, efforts to oversample for parents with OUD would have to be decided on a priori unless funding agencies provided an incentive to include additional participants. It must also be considered that individuals with OUD are likely to be misusing other substances in addition to opioids (McCabe et al., 2008). It may be necessary to consider polysubstance use in different ways to adequately evaluate intervention outcomes for parents with OUD. For example, benzodiazepine misuse and methamphetamine misuse often co-occur with opioid misuse (The Lancet, 2018). The combination of opioids and benzodiazepines is often lethal, and the combination of methamphetamine with opioids often results in different side effects which may be associated with heightened criminal activity and more severe use of both substances (McHugh et al., 2017). These two groups of individuals with OUD may require special considerations, especially during pilot and feasibility testing when adapting existing interventions.

Another challenge is sampling parents with OUD. Ideally, researchers would draw a random sample from the entire population of parents with OUD (Bornstein, Jager, & Putnick, 2013). This may be more achievable when the population of interest is parents with OUD seeking treatment, given that these individuals are more accessible and would be less concerned with the ramifications of child welfare involvement, if voluntarily seeking services. When the population is parents with OUD in general, it is likely impossible to sample from the population as a whole, in which case reporting how well the sample matches the intended population is the next best solution (Bornstein et al., 2013). Other concerns when utilizing the previously described designs include how to allow for causal inference, different types of comparison conditions, ways to assess implementation fidelity, and the different types of measures to assess outcomes. These and other design considerations are detailed elsewhere (Powell, 2013). Despite these and other limitations, however, we hope that these limitations can be translated into opportunities for advocacy so that parents with OUD are provided with the necessary supports to treat their OUD, improve their parenting skills and self-efficacy, and ultimately, improve outcomes for their children.

CONCLUSIONS

Parenting with OUD is important to address given the increasing prevalence of OUD (Haight et al., 2018) and the detrimental effects it has on health and parenting abilities. To improve the parenting practices of parents with OUD, we have identified key targets and considerations for implementation of interventions for parents with OUD and have proposed methods and interventions to move more rapidly to implementation. By proposing strategies for accelerating the pace of science, we have aimed to provide viable options for adapting, re-examining, and testing interventions for effectiveness so that these can be promptly disseminated to improve the lives of parents with OUD, and their children, who are in immediate need for support.

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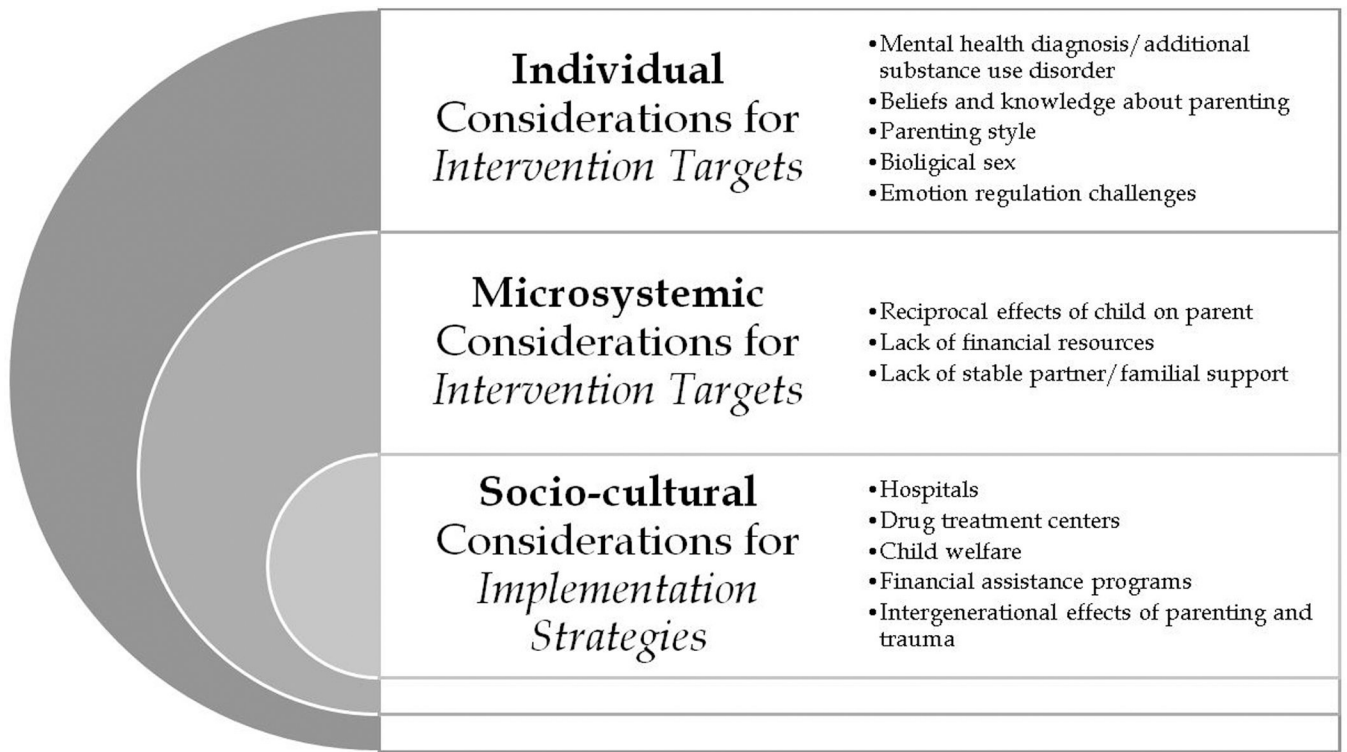


Figure 1. Considerations for intervention targets and implementation strategies guided by Brofenbrenner’s ecological theory.

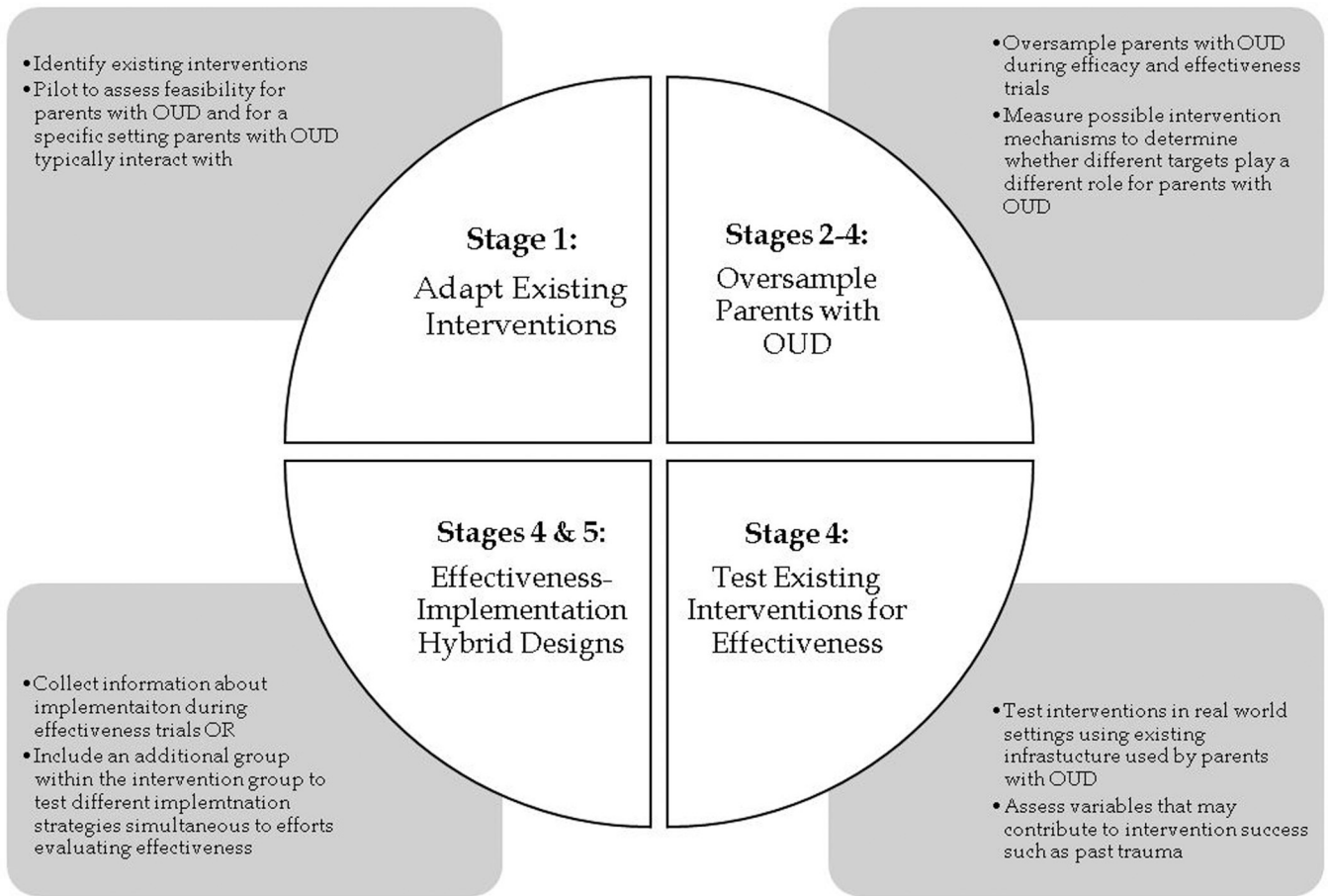


Figure 2. Strategies to accelerate the pace of science using the NIH stage model.