

PSYCHOTROPIC MEDICATION AND AT-RISK YOUTH: STUDYING ITS PROTECTIVE  
EFFECTS ON DELINQUENT BEHAVIOR

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by

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## **DEDICATION**

This dissertation is dedicated to all youth and adolescents who are considered at-risk, and who have been in contact with the juvenile-justice system.

## ABSTRACT

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Children witnessing violence and directly experiencing abuse and neglect are at high risk for a number of deleterious outcomes, including psychiatric disorders and involvement in the foster care and juvenile justice systems (JJS; Cuevas, Finkelhor, Shattuck, Turner, & Hamby, 2013; Sickmund & Puzzanchera, 2014). These studies emphasize the need for effective treatment programs to address the challenges facing these youth, for which an increasingly attractive option is long-term administration of psychotropic medications. Most research to date examines the utility of such medication in the short-term (Dailey, Townsend, Dysken, & Kuskowski, 2005; Loy, Merry, Hetrick, & Stasiak, 2013), but with mixed evidence as to the long-term positive gains these medications impart on reducing delinquent behaviors, including involvement in the JJS. This study sought to examine how psychotropic medication influenced total delinquent behaviors in a given year, as well as entry into the JJS, over a seven-year time period with a sample of at-risk youth. Data were taken from the National Study of Child and Adolescent Well-Being (NSCAW) database. Results indicate that, when controlling for a proxy of socioeconomic status, baseline externalizing behavior, and the child's gender and race, psychotropic medication treatment of at-risk youth did not appear to exert a protective effect on their engagement in delinquent behaviors over a seven-year time span. That is, while delinquent behaviors decreased over time, it was not due to the medication regimen of the youth. Further, psychotropic medication treatment of at-risk youth does not appear to exert a protective effect on these youths' entry into the JJS over

a seven-year time span. That is, youth who were either consistently- or inconsistently-medicated were at significantly increased risk of entry into the JJS – up to 9.3 times higher risk for consistently medicated youth – particularly within the first 20 months of the study. Further, while such risk stabilized after the two-year mark, youth who received psychotropic medication remained at higher risk than never-medicated youth, particularly if the medication regimen was consistent. Explanations, and implications of, these findings are discussed, as well as future directions for research.

**KEY WORDS:** At-risk youth, delinquency, justice-involved youth, externalizing behavior, psychotropic medication

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## CHAPTER I

### Introduction

Children witnessing violence and directly experiencing abuse and neglect are at high risk for a number of deleterious outcomes, including psychiatric disorders and involvement in the foster care and juvenile justice systems (Cuevas, Finkelhor, Shattuck, Turner, & Hamby, 2013; Sickmund & Puzzanchera, 2014). For example, Barrett, Katsiyannis, Zhang, and Zhang (2014) indicate that youth with psychiatric diagnoses who were also involved with South Carolina's Child Protective Services department (CPS) were at high-risk for future delinquent behavior and subsequent involvement in the juvenile justice system. Similarly, Cuevas, Finkelhor, Shattuck, Turner, and Hamby (2013), using juvenile data from 2008, found that youth exposed to family violence were more likely to engage in delinquent behavior. Further, Sickmund and Puzzanchera's report (2014) using juvenile data collected during 2010 suggest youth involved with CPS are more likely to exhibit delinquent behavior, and demonstrate extended involvement both within CPS and the juvenile justice system (JJS). Each of these studies emphasized the need for effective treatment programs to address the challenges facing these youths. An increasingly attractive option for health care providers is long-term administration of psychotropic medications. Although some of these medications have been shown to be effective in reducing aggressive and disruptive behavior (Schur et al., 2003), many of these compounds have not been approved for the specific uses in which they are frequently employed, and little research exists either on their long-term impact on brain and cognitive development, or their long-term side effect profile.

## **Long-term Effects of Psychotropic Medication on Adolescents**

Although there are various programs available to treat youth with behavioral difficulties, studies indicate psychotropic medication is becoming an increasingly preferential option (Duppong-Hurley et al., 2009; Osterlind, Koller & Morris, 2007). For example, Olfson, Marcus, Weissman, and Jensen (2002) examined nationally representative archival data on youth being prescribed psychotropic medication between 1987 and 1996. Their findings revealed a significant increase in the number of medicated youth over the course of a decade. A more recent example comes from Staller (2007); over a three-and-a-half-year period at an outpatient child psychiatry clinic in New York, Staller examined twenty files of youth aged five and older. All youth received psychotropic medication (e.g., stimulants, antidepressants, and antipsychotics as the most frequently cited classes), with a substantial minority receiving polypharmacy treatment. Antipsychotics were prescribed most frequently, followed by stimulants and  $\alpha$ -agonists; however, Staller indicated that youth with aggressive behavior responded best to the stimulants. Further, Staller questioned the long-term utility of atypical antipsychotics in addressing disruptive behavior in these youth, citing psychiatrists may tend toward medication as a primary treatment, rather than a secondary, or adjunct, treatment option.

Given the findings of Olfson et al. (2002) and Staller (2007), it is important to understand the long-term effects and efficacy of these medications, considering their understudied side-effect profile and limited information on effectiveness (excepting research on stimulants, Preston, O'Neal, & Talaga, 2015). dosReis et al. (2014) indicated there is a need for empirical support for the clinical rationale of long-term psychotropic use, and oversight for such high medication use to be monitored. Based on their review of

the literature, Nevels, Dehon, Alexander and Gontkovsky (2010) stress the need for more long-term safety and efficacy studies of existing medications (and newer medications) used, or planning to be used, with adolescents. For example, it is already well-documented that prolonged use of antipsychotic drugs is linked to undesirable side effects in both animal and adult studies (e.g., extra-pyramidal effects like tardive dyskinesia and metabolic dysfunction; King, 2009). Similar negative side-effects following long-term anti-psychotic medication use in adolescents may be likely, although this question is understudied. In one of the few studies on this general topic, Crismon and Argo (2009) outline the current psychotropic medications available to treat youth, and the side effects most commonly experienced. The first generation antipsychotics (e.g., haloperidol, chlorpromazine) have the most significant side-effect profiles (e.g., akathisia, electrocardiogram changes, tardive dyskinesia, etc.). They report also that, while newer generation medications can impart similar, as well as unique adverse side-effects (e.g., growth delays from long-term use, anxiety, somnolence, extreme weight gain/loss, and suicidal ideation) from first-generation medications, atypical antipsychotic medication is more likely to impart unpleasant side effects (e.g., nausea, dry mouth, constipation, etc.). In addition, Fedorowicz and Frombonne's (2005) literature review indicate that antipsychotic use among youth was associated consistently with weight gain, prolactin elevation (e.g., hyperprolactinaemia), and glucose dysregulation. Such metabolic changes, which are often irreversible, can lead to serious physical health complications. Correll and Carlson (2006) found that psychotropic medications initiate adverse metabolic and endocrine effects in youth; however, they assert that some of these

undesirable consequences could be mitigated with appropriate dosing and medication management.

Though it is rare for any medication to be completely side-effect free, the fact that psychotropic medications affect adolescents to this degree is cause for concern.

Moreover, the findings from the studies presented here utilized youth who were in the general population; hence, there exists a high likelihood that psychotropic prescription increase is more pronounced among high-risk populations (i.e., at-risk and justice-involved youth). In fact, perceptions about the use of psychotropic medication from social workers involved in CPS or juvenile justice indicate they generally perceive youth to be given high potency medication above and beyond what is considered appropriate (Moses, 2008). The essential gap in the literature for research about these matters seems particularly salient given the absence of a generally accepted protocol for administering psychiatric medication within the broad context of mental health treatment to at-risk and justice-involved youth (Desai et al., 2006; Schur et al., 2003; Steiner, Saxena, & Chang, 2003).

### **Medication of At-Risk Youth**

Despite the concerns raised about their long-term effectiveness, psychotropic medications continue to be disbursed to underserved youth with increasing frequency. Recently, children involved in CPS and the JJS have been significantly more likely to receive treatment that includes exposure to psychotropic medications (Duppong-Hurley et al., 2009), many of which have not been approved for treating children/adolescents or for the conditions/behaviors for which they have been proscribed (Crismon & Argo, 2009; Kimland, Bergman, Lindelmalm, & Böttiger, 2007). For example, dosReis et al.

(2014) examined prevalence and type of psychotropic medication prescribed to young children in foster care. Their results indicated that, while only 12% of the participants were prescribed medication, those who started either ADHD or antipsychotic medication before age six continued to take them for significantly longer than youth prescribed medication after age six. Brenner, Southerland, Burns, Wagner, and Farmer (2014) conducted a study with foster youth and found a higher prevalence rate (61%) of psychotropic medication prescription over a two-month period in foster care youth. Existing research indicates polypharmacy in at-risk and delinquent youth is increasing in frequency, despite concerns from researchers regarding the appropriateness of administering multiple medications given potential side effects on youth behavior and physical and cognitive development.

### **Psychotropic Medication and Delinquency**

The majority of literature reviewed thus far indicates that youth involved with CPS and/or JJS are more likely to be prescribed psychotropic medication, and with greater frequency than their non-CPS/JJS involved counterparts (c.f., Rubin, Matone, Huang, dosReis, Feudtner, & Localio, 2012). Yet, there is no published national data on the rates of use of psychotropic medication in detention facilities (Desai et al., 2006). However, state-level data from California, Pennsylvania, and Oregon note pharmacotherapy is not uncommon for these youth; in fact, it has increased over time (Cohen, Pfeifer, & Wallace, 2014). Duppong-Hurley et al. (2009) found that, compared to 1995, in 2004, detained youth were increasingly identified as experiencing psychopathology, as evidenced by receiving more psychiatric diagnoses, being prescribed multiple psychotropic medications and a general increase in psychotropic prescription.

Conversely, Lyons et al. (2011), found low rates of pharmacotherapy, but high rates of concomitant prescriptions among post-adjudicated youth who were taking any psychotropic medications over a 30-day span. Lyons et al. pointed out the low rate of pharmacotherapy may have been confounded by the 30-day data capturing period, opining it is likely that more psychotropic prescriptions were made past the 30-day period, and youth who were already taking medication at intake were not included in the study. More important, Lyons et al.'s findings suggest that due to the type of prescriptions most frequently seen (antidepressants and atypical antipsychotics) in addition to a substantial minority of youth in the sample being prescribed medication for sub-threshold mental health symptoms, it is likely the facility was using these medications for symptom management rather than a diagnosis.

Considering the implication of Lyons' et al.'s study, in conjunction with the knowledge that mental health diagnoses are higher in at-risk youth populations, it is important to understand the impact of psychotropic medication use on delinquent behavior. Although there are few studies specifically examining the relationship between psychotropic medication and delinquency per se, numerous investigations indicate psychotropic medication, antipsychotics in particular, are effective at reducing violent externalizing behavior. Caldwell, Maltreter, Umstead, and McCormick (2008) conducted a study in which youth with Conduct Disorder (CD) were assigned to receive either psychosocial treatment or psychosocial treatment and concomitant medication (i.e., risperidone, an antipsychotic). Their results indicated risperidone was effective, in the short-term, in reducing CD-related behavior in these youth (c.f., LeBlanc et al., 2005, who found similar outcomes with low-IQ youth with co-morbid CD). In addition,

Connor, McLaughlin, and Jeffers-Terry (2008) conducted a study on adolescents diagnosed with CD. They randomly assigned the youths to either receive quetiapine, an antipsychotic, or to receive a placebo; results from their study indicated quetiapine did reduce CD behavior, and may be an effective treatment for adolescents with CD. Finally, Reyes, Buitelaar, Toren, Augustyns, and Eerdeken (2006) examined the effectiveness of risperidone in CD adolescents over a 6-month period (i.e., longer than short-term use), and found that if the adolescents had reduced CD behaviors via the antipsychotic in the short-term, they continued to show reduced CD behaviors over the 6-month period.

Meta-analyses by Schur et al. (2003), Soller, Niranjan, and Steiner (2006) and Steiner et al. (2003), indicate the majority of evidence for the efficacy of aggression reduction comes from double-blind placebo-controlled studies involving antipsychotics in general population clinics. In addition, there is some emerging support for use of  $\beta$ -blockers,  $\alpha$ -agonists and stimulants (Schur et al., 2003; Soller, Niranjan, & Steiner, 2006; Steiner et al., 2003). More recent meta-analytic studies arrive at similar conclusions. Loy, Merry, Hetrick, and Stasiak's (2013) meta-analysis of clinical studies that used medication to alleviate disruptive behavior in adolescents found that antipsychotics were effective in the short-term in treating behavior-disordered youth. Pappadopoulos, et al. (2006) conducted a meta-analysis on randomized, placebo-controlled trials where treating youth aggression with medication was the primary objective. Results of their meta-analysis suggest that the younger the youth, and the shorter the course of medication, the more effective aggression was reduced in children with either Attention-Deficit Hyperactivity Disorder or CD.

Although these are promising results, there exist some significant limitations. First, aside from the Reyes et al. (2006) study, overall findings indicate medication efficacy in these studies is generally limited to short-term use (Loy, Merry, Hetrick, & Stasiak, 2013). Yet, psychotropic medication must be taken consistently, often over long periods of time, in order for the maximum effect to be realized, and delinquent behavior is rarely time-limited. In addition, the majority of these studies utilized behavior checklists (e.g., Aberrant Behavior Checklist, Nisonger Child Behavior Rating Form) to assess the youth's behavior. While these checklists measure aggressive behaviors, they do not generally provide specific data on the youths' involvement in antisocial or delinquent behavior, including involvement in the JJS. Also, many of the studies cited in the aforementioned reviews were conducted ten years ago, or more. Further, a meta-analysis by Sarteschi (2014) indicated that randomized-controlled trials targeting pharmacological interventions with youth diagnosed with Conduct Disorder contained numerous methodological and analytical flaws, which decreased their generalizability; ultimately, Sarteschi questioned these studies' conclusions about the effectiveness of medication for improving behavioral outcomes for these youth.

It is clear that medication rates among U.S. youth are increasing (c.f., Rubin et al., 2012), and it is likely this state of affairs is particularly salient for high-risk youth. Moreover, a relative lack of data regarding long-term usage and side-effect profiles, in conjunction with insufficient scientific rigor and conflicting findings, provide a murky picture as to the ultimate effectiveness and safety of long-term psychotropic medication in adolescents, particularly at-risk/JJS youth.

## **Current Aims**

This study seeks to determine if psychotropic medication protects at-risk youth from engaging in delinquent behavior, which includes involvement in the JJS. As mentioned above, it is well-documented in the literature that children receiving services through the child welfare/child protective services (CW/CPS) have higher rates of behavior problems, which subsequently places them at-risk for involvement with the JJS (Cuevas et al., 2014). Indeed, a significant number of youth involved in JJSs concurrently receive services through CW/CPS agencies (Cuevas et al., 2014). In addition, much of the existing literature presumes treatment of psychopathology in at-risk and delinquent youth using medication is effective in the short-term (Loy et al., 2013; Pappadopulos et al., 2006), but there is a dearth of research as to whether it protects at-risk youth from engaging in subsequent delinquent behavior over an extended period of time.

This study utilized a large, nationally representative sample drawn from the National Study of Child and Adolescent Well-Being (NSCAW), which tracked over 5,500 children identified as potential victims of abuse and neglect. The NSCAW database contains data for these youth from birth to age 16 years at five discrete time-points, and contains critical data with regards to medication usage, psychiatric diagnoses, and involvement in delinquent behavior and the JJS over time. Analyses utilized the following target variables identified within the NSCAW archival database: a dichotomous variable regarding current psychotropic medication use (*yes/no*) at each time-point; a dichotomous variable regarding psychotropic medication use since initial or most-recent contact (*yes/no*); youth self-reports of various delinquent behaviors, including contact with the JJS; and the frequency of youth contact with the JJS over time

via youth and caregiver reports. To both thoroughly address the research question and resolve differences in sampling methodology, two study aims were employed: i) to examine whether psychotropic medication use by youth enrolled in the study decreased participation in total delinquent behaviors in a given year, as reported by at-risk youth with a history of suspected child maltreatment or their caregivers and ii) to examine how psychotropic medication use by youth enrolled in the study affected at-risk youth's future involvement in the JJS as measured by both caregiver and youth self-report. These aims were evaluated in Study I and Study II, respectively. It was hypothesized that long-term psychotropic medication would reduce overall reports of delinquent acts and involvement in the juvenile justice system (studies I and II respectively).

## CHAPTER II

### General Methods

#### Participants

**National Study of Child and Adolescent Well-Being (NSCAW).** NSCAW is a nationally representative, longitudinal sample of 5,501 children and families who had contact with Child Protective Services (CPS). The NSCAW tracked the cohort for seven total years, including youth from infancy up to 16 years-old. Approval for the study was granted by the institutional review board (IRB) of the Research Triangle Institute (RTI), University of North Carolina, Rady Children's Hospital–San Diego, Tufts Medical Center, and state or county IRBs representing communities involved with the study. Face-to-face informed consent was obtained by trained field representatives. A two-stage, stratified sample design was employed for data collection (see Dowd et al., 2008 for a thorough description of study procedures). Briefly, RTI selected primary sampling units (PSUs) defined as geographic areas that encompassed the population served by a single CPS agency and tended to represent single counties. The final sample comprised 92 PSUs, representing 97 counties. The second-stage sampling identified 5,504 index children from lists of children undergoing investigation from October, 1999, through December, 2000, in PSUs, with an end sample-size of 5,501. It is important to note that certain subsets within CPS were oversampled, such as infants, sexually abused children, and children receiving CPS services in order to ensure adequate numbers for statistical analysis. Available data include first-hand reports from children, parents, and other caregivers, assessment data administered, as well as reports from caseworkers and teachers, and data from administrative records.

**Study I and II participants.** Participants for this study were selected from the larger pool of participants contained within the National Survey of Child and Adolescent Well-being (NSCAW) database. Participants (i.e., both the child and current caregiver) were selected for inclusion based on availability of multiple data time points as the child aged. In addition, selection for inclusion were based on availability of data over time across the multiple target variables (e.g., medication use and delinquent behavior data). Exclusion criteria consisted of participants younger than eight years at the time baseline measurements were obtained. Youth participants were separated into three distinct grouping variables according to the pattern of their medication use: consistent medication use since baseline; inconsistent medication use since baseline; and no medication throughout the data collection period. Youth and caregivers provided data at baseline and 12 (Wave 2), 18 (Wave 3), 36 (Wave 4), and 48 months from the Wave 4 collection (Wave 5) following their initial contact with the CPS system.

### **Procedure**

Relevant variables were identified using the codebook included with the original NSCAW datasets for each data collection point throughout the study. These variables were then extracted from each time point and merged into a separate database. Youth who were younger than 8 years of age at baseline were then removed from this dataset. Due to certain variables of interest requiring transformation in order to perform specific analyses, these data were recoded accordingly into new variables as explained below.

### **Measures**

All measures used in the current investigation resulted from the collaboration between the NSCAW Research Design Instrumentation Team and the RTI team. Unless

otherwise noted, all procedures were administered via laptop computer and using an Audio Computer-Assisted Self Interview (ACASI) program, as this program has been shown to increase response rate when interview questions probe sensitive material (e.g., sexual activity, delinquent behavior, drug use, etc.).

**NSCAW Child Instrument.** This instrument is a series of questions to be asked to young children (e.g., 4-10) using a semi-structured interview format. These questions tap each of the five theoretical constructs that comprise the research questions for the NSCAW. These questions are organized within the program by subject (e.g., health concerns, delinquency, etc.) to assist with differentiation from other subjects. To assess for delinquent behavior, questions for this instrument were adapted from an instrument utilized in the National Youth Survey (Elliot & Ageton, 1980). Briefly, this measure enquired about delinquent behaviors such as misdemeanors (e.g., stealing items valued at less than \$50, vandalism, etc.), felonies (e.g., aggravated assault, use or vending of illicit substances, etc.) as well as other behaviors considered socially unacceptable but not necessarily legally sanctioned (e.g., failure to return extra change given by cashier, making obscene telephone calls, etc.). The variable of interest for study one was the total number of delinquent acts endorsed within the past calendar year (or since the prior assessment period).

**NSCAW Young Adult Instrument.** Similar to the NSCAW Child Instrument, this instrument poses a series of questions to adolescent children (e.g., 11-16) using a semi-structured interview format. There were no notable differences regarding the structure or posing of delinquency-related questions between the Child or Young Adult Instruments. Similar to the Child Instrument, the variable of interest for study one was the

total number of delinquent acts endorsed within the past calendar year (or since the prior assessment period).

**NSCAW Current Caregiver Instrument.** This instrument is a series of questions to be asked to caregivers of the children in the study using a semi-structured interview format. Also similar to the Child and Young Adult Instruments, these questions tap each of the five theoretical constructs that comprise the research questions for the NSCAW, and are also organized within the program by subject (e.g., health concerns, delinquency, etc.). In addition, included in this instrument are two dichotomous questions regarding medication use (i.e., is the youth currently taking psychotropic medication; has the youth been taking psychotropic medication within a year of baseline or since the previous data collection point), which were of interest for these studies. Additional variables of interest from this assessment were items for which caregivers endorsed whether the youth attended court within the past calendar year (or since the last assessment period), as well as the month and year of that court date.

**The Child Behavior Checklist (CBCL).** The CBCL is part of the Achenbach System of Empirically Based Assessment, and includes a youth self-report, a parent report, and a teacher report form (Achenbach, 1991). The CBCL is used to detect emotional and behavioral problems in children ages 4-18 via parent report. It consists of 113 Likert-style response items, requiring caregivers to consider the child's behavior within the past six months. There are eight index scales for the CBCL, which can be grouped into two supra-index categories: internalizing and externalizing behavior. In addition, there are indexes that map on to certain diagnostic criteria (e.g., anxiety, mood, or oppositional/conduct disorders). For the purposes of the current study, the caregiver

report form responses were used to determine the severity of externalizing behavior at baseline, which were subsequently used as a covariate in statistical analyses.

### **Data Analysis**

In order to appropriately classify medication group, the two dichotomous variables that represented medication data (i.e., whether the child was currently taking psychotropic medication, and whether the child was taking psychotropic medication since the initial or most recent contact) were examined across all five time-points (i.e., baseline to Wave 5). Due to a large number of participants having missing data for these particular variable at Wave 5, participants who received medication (i.e., responded “yes” to either question at each time-point) at four consecutive time-points were classified as “always medicated.” Not taking this approach would have led to a significant loss of power and participants within the always medicated group. Participants who endorsed either medication question across time points in any other combination were labeled as “inconsistently medicated.” Participants who responded “no” to either medication question across all time points were labeled “never medicated.”

For Study I, the statistical program M-Plus 5.1 with maximum likelihood estimation (Muthen & Muthen, 2008) was used to address whether psychotropic medication use by youth decreased engagement in delinquent behaviors. The outcome variable was total delinquent acts completed during each time-period based on youth self-report. While traditional longitudinal models use variables at one time-point to predict variables at a subsequent time point (Farrell, Sullivan, Esposito, Meyer, & Valois, 2005), latent growth curve modeling identifies each individual as having their own growth curve parameters, which can then be used to examine both group effects and individual effects.

Such an approach is advantageous to this study in that delinquent behaviors can be examined at the group level (e.g., never, inconsistently, vs. consistently medicated). This analysis will likely provide a clearer picture of the developmental trajectories of total number of delinquent behaviors over time, and how these relate to medication use. In addition, latent growth curve modeling can also account for missing data within participants, and is more statistically robust than other techniques historically used for longitudinal data analysis.

Due to deliberate oversampling of certain populations, the NSCAW database has sampling weights, which were included in the analysis outlined above. In addition, the child's gender and ethnicity, and caregiver report of initial level of externalizing behavior (as measured by the CBCL) and caregiver education level (as a proxy for socioeconomic status) were included as covariates in this model.

For Study II, STATA 13.1 was used to examine whether medication use by youth decreased involvement in the juvenile justice system. The outcome variable (i.e., time until the occurrence of an event) was defined as the youth's first court date during enrollment in the NSCAW (i.e., 1 = first attended court during data collection, 0 = did not attend court during data collection). To address time through the study, the range was 0-96 months; youth who entered court on a particular month and date were coded according to the month range defined above and youth who never entered the court system were coded as 96 (i.e., completing 96 months of the study without entering the court system). If the caregiver endorsed the child attending court, but was unable to specify the date, the youth was coded as entering the court system at the time the data were collected at that particular time-point (i.e., if a caregiver reported the youth attended court for the first

time at the 36-month marker, then the youth was considered to have entered the court system at 36 months). In addition, caregivers who endorsed youth as having attended court up to six months prior to completing the baseline measures were coded as entering the court system at month 1. The predictor variable was medication group (never medicated, inconsistently medicated, and consistently medicated). Survival analysis was advantageous for this study because this procedure identified a time-specific estimate of youth involvement in the JJS (Heagerty & Zheng, 2005). This analytical technique also delineated the distribution of time to JJS involvement between two or more subgroups, and tested the significance of the difference between the subgroups (i.e., for this study, never, inconsistently, vs. consistently medicated). As with the analysis plan for Study I, due to deliberate oversampling of certain populations, the NSCAW database has sampling weights, which were included in the analysis outlined above.

## CHAPTER III

### Results

#### Sample Description

The final sample consisted of 2,065 youth aged eight and older whose data met inclusion criteria for this study. At baseline, 150 were prescribed psychotropic medication of some kind to address an emotional, attentional or behavioral condition. From baseline to Wave 5, the never-medicated group contained the largest number of youth ( $N = 1,751$ , 84%), followed by the inconsistently-medicated ( $N = 256$ , 12%) and consistently-medicated groups ( $N = 52$ , 2.5%). Children in the final sample averaged 11.1 years of age, and 53.8% were female. Approximately half were White/Hispanic (53%), followed by Black (31.5%), American Indian/Pacific Islander (7.7 %) and Asian (2.2%).

Regarding total delinquent acts, the average number of delinquent acts committed by youth at baseline was relatively low ( $M=4.5$ ,  $SD=5.3$ ), with the highest average occurring at Wave 2 ( $M=5.3$ ,  $SD=12.9$ ), and then dropping lower for Wave 3 ( $M=3.7$ ,  $SD=4.9$ ), Wave 4 ( $M=3.8$ ,  $SD=4.9$ ) and Wave 5 ( $M=3.1$ ,  $SD=3.2$ ). Within the time-frame of the entire study, few youth ( $N=155$ , 7.5%) entered into the JJS.

#### Study I

**Latent Growth Curve modeling.** Latent Growth Curve Modeling (LGCM) was conducted to examine the average rate of change in delinquent acts committed across the seven-year time span as predicted by medication group. Model fit was evaluated using the maximum likelihood ratio test statistic ( $\chi^2$ ) and two supplemental measures of model fit: the root mean square error of approximation (RMSEA), and the Comparative Fit Index (CFI).  $\chi^2$ , if significant, indicates poor fit. An RMSEA range below .05 and a CFI

or TLI value close to 1.0 indicate a very good fit. A value of 0.90 or greater for CFI and a value of 0.10 or less for RMSEA are considered moderate or acceptable (Bollen & Curran, 2006). The linear model had a good fit to the data,  $\chi^2(df = 19; n = 2,065) = 31.75, p = .03, CFI = .94, RMSEA = .02$ . According to the initial model, medication group exerted no effect on initial delinquent acts by youth (Mean Slope = .013,  $SE = .266, t = .049, p = .961$ ). However, the covariates of initial caregiver score of externalizing behavior ( $b = .012, SE = .003, t = 4.71, p = .000$ ) and the child's age ( $b = .068, SE = .016, t = 4.19, p = .000$ ) were significant, such that youth who were either older at the start of the study, or had higher initial externalizing scores on the CBCL were significantly more likely to have engaged in multiple delinquent acts. Over time, total delinquent acts significantly decreased (Mean Slope = .486,  $SE = .109, t = 4.46, p < .000$ ). Upon closer examination, there was no significant effect for medication group of delinquent behaviors. However, the covariate of youth's age exerted an influence on delinquent acts over time ( $b = -.027, SE = .007, t = -4.17, p = .000$ ), such that as the youth aged through the study, they were significantly less likely to engage in total delinquent behaviors per year via Child and Young Adult Instruments.

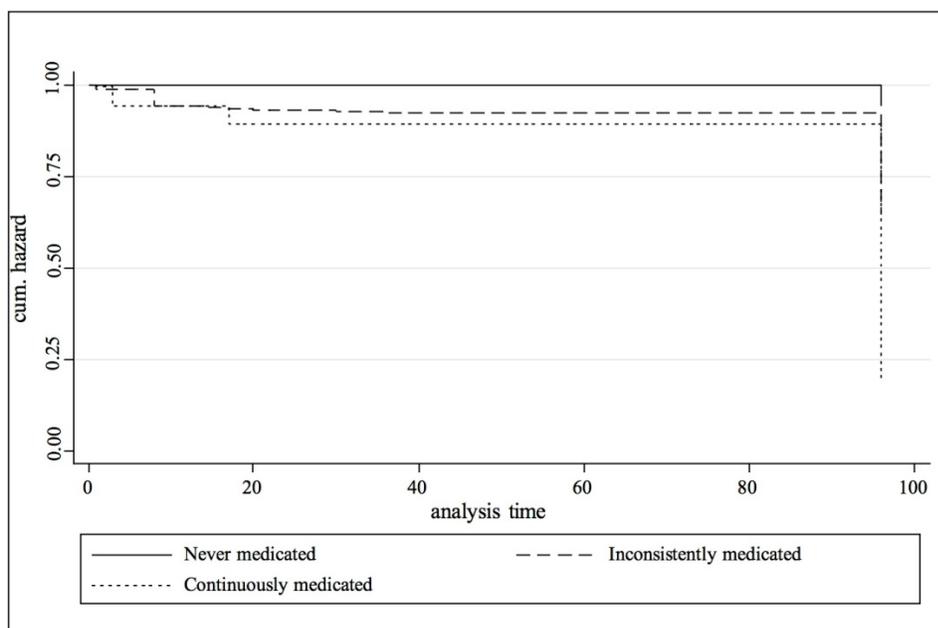
**Study I summary.** When controlling for a proxy of socioeconomic status, baseline externalizing behavior, and the child's gender and race, psychotropic medication treatment of at-risk youth did not appear to exert a protective effect on their engagement in delinquent behaviors over a seven-year time span. That is, while delinquent behaviors decreased over time, it was not due to the medication regimen of the youth. This suggests that youth who receive no medication are just as likely to engage in delinquent acts when compared to their consistently or inconsistently medicated counterparts. Further, youth

who were chronologically older at entry into the study, were more likely to have engaged in delinquent behaviors at the initial time point. However, as youth aged through the study, they tended to exhibit fewer delinquent acts over time. Such a finding, while unexpected in the context of this study, is nonetheless consistent with the literature detailing the trajectory and severity of youth delinquent behavior (Jennings & Reingle, 2012; Sickmund & Puzanchera, 2014). Further, youth who demonstrated higher externalizing behaviors at baseline were more likely to engage in delinquent behaviors at baseline; yet, such externalizing behavior did not predict continued delinquent behavior over time. This is consistent with research examining youth characteristics which contribute to delinquent behavior (Loeber & Burke, 2011).

## **Study II**

**Medication group comparison using the Kaplan-Meier estimation method and Cox Proportional Hazard models.** The Kaplan-Meier estimation method was used to compare survival curves between the three medication groups. The survival curves present the probability of youth not entering the juvenile justice system at each month during the seven-year study period. There were significant differences between the medication groups, with higher survival probability for never-medicated youth, followed by inconsistently-medicated youth (see Figure 1). The risk for entry into the JJS was highest for consistently-medicated youth as shown in Figure 1. Importantly, when compared to never-medicated youth, consistently- and inconsistently-medicated youth were more likely to become involved in the JJS early in the study period, and exhibited plateaued risk occurring approximately two years after the baseline measurements were taken. Based on the results from Study I, externalizing CBCL scores were not included as

covariates, as externalizing behaviors were not predictive of total delinquent behaviors over the seven-year time span as explained in Figure 1 below.



*Figure 1.* Survival probability of entry into the juvenile-justice system against days in study, by medication group.

The Cox proportional hazard model was used to determine the presence of statistically significant differences among the medication groups as represented by the Kaplan-Meier Estimation Method. In light of Study I's results, prior to running this model two, separate one-way ANOVAs were conducted to examine whether any significant differences existed between the medication groups regarding age and externalizing behavior at baseline. Results indicated none of the groups differed significantly in the age of these youth,  $F(2, 2027) = 11.2, p = .231$ , but did differ significantly in regards to externalizing behavior,  $F(2, 2027) = 45.9, p < .000$ , as demonstrated in Study I. Post-hoc analyses indicated the inconsistently medicated group demonstrated significantly higher externalizing scores compared to the other two groups

at baseline ( $M = 7.85, p < .000$ ), but neither consistently-medicated nor never-medicated groups differed from one another.

Results from the Cox proportional hazard model indicated that consistent medication use was a significant predictor of entry into JJS compared to the other two medication groups [ $\chi^2(1, n = 2,065) = 78.1, p < .000$ ]. The hazard ratio was significant ([Exponential (Exp)( $\beta$ )] = 9.29,  $p = .001$ ) indicating that consistently medicated youth had higher risk of entry into the JJS. Put another way, consistently medicated youth were just over 9 times (or about 29%) more likely to enter the JJS compared to either inconsistently- or never-medicated youth. Inconsistent medication use was also a significant predictor for entry into the JJS [ $\chi^2(1, n = 2,065) = 21, p < .000$ ], and demonstrated a significant hazard ratio ([Exponential (Exp)( $\beta$ )] = 4.29,  $p < .000$ ). However, it is important to note that the assumption for the Cox proportional hazard model for this group was not met [ $\chi^2(1, n = 2,065) = 9.93, p = .002$ ]; thus, no additional interpretation is provided here.

**Study II summary.** Psychotropic medication treatment of at-risk youth does not appear to exert a protective effect on these youths' entry into the JJS over a seven-year time span. That is, youth who were either consistently- or inconsistently-medicated were at significantly increased risk of entry into the JJS – up to 9.3 times higher risk for consistently medicated youth – particularly within the first 20 months of the study. Further, while such risk stabilized after the two-year mark, youth who received psychotropic medication remained at higher risk than never-medicated youth, particularly if the medication regimen was consistent. Such findings provide an interesting contrast to Dailey, Townsend, Dysken, and Kuskowski's (2005) report that, compared to

medication non-compliance, a continuous psychotropic medication regimen in Conduct and Bipolar Disorder diagnosed adolescents reduced recidivism behaviors by 80% for the 12 month duration of the study. Further, the current study's findings extend our knowledge of how medication use in the community impacts entry into the JJS (compared to recidivism) over a seven-year time frame, particularly with consistently medicated youth.

## CHAPTER IV

### Discussion

The current study sought to examine if, among a national sample of at-risk youth and adolescents, psychotropic medication use protected them from engagement in delinquent behaviors and entry into the JJS over a seven-year time period. Our findings indicate that, over the seven-year time span, psychotropic medication did not exert a protective effect on delinquent behavior (as measured by total delinquent acts at each measuring period). Further, our findings demonstrate that medicated youth (i.e., both consistently- and inconsistently-medicated groups) demonstrated highest risk of entry into the JJS over time, with the most noted risk occurring within the first two years of the study period.

While several studies have demonstrated the effectiveness of psychotropic medication reducing delinquent behaviors, these studies have not extended their findings beyond the 6-week mark (e.g., Loy et al., 2013). Moreover, very few previous investigations have examined both direct engagement in delinquent behaviors as well as specifically JJS entry. Further, the present investigation conceptualized medication use as a general intervention strategy and did not focus exclusively on medication type or class. Given these considerations, the current study provides a more ecologically valid lens through which to view the impact of community-level implementation of psychotropic medication use among a high-risk sample; and we believe provides a unique contribution to the literature in this area.

## **Explanations**

Our findings suggest psychotropic medication may not be exerting a significant protective effect on youth engagement in delinquent behavior over a seven-year time span. Although this finding runs counter to previous investigations, the present study has several key differences that may help to account for these disparate results.

Most research examining the effectiveness of psychotropic medication on externalizing and delinquent behaviors do not extend beyond the 6-week mark (e.g., Connor et al., 2008; LeBlanc et al., 2005), with only one study extending observation time to the 12-month mark (Dailey et al., 2005). Importantly, many of the studies mentioned throughout this article address the impact of specific medication (e.g., risperidone, quetiapine, methylphenidate, etc.) on externalizing or delinquent youth behaviors. The results here cannot speak to which specific classes of medication, if any, fail to protect youth from engaging in delinquent behaviors or entry into the JJS, and is a noted limitation. However, these findings are unique in that medication is conceptualized as a general intervention strategy over a several-year time span. As such, these findings suggest that closer inspection is warranted for how long-term, psychotropic medication regimens at the community level affects delinquent behavior.

There are a number of factors that should be considered when interpreting these findings, mainly youth's adherence to medication over time, their entrance into puberty, and their developmental trajectory of delinquent behavior. It is possible that these youths habituating to their medication regimen influenced the pattern of findings presented here. For example, youth who have received maintenance doses of psychiatric medication often require adjustment following the notable slowing of hepatic metabolism just prior

to the onset of puberty (Preston, et al., 2015). Considering the average age of these youth at entry was 11 years, it is possible that many of these youth received medication as they entered puberty, and if the medication was not effectively managed, its efficacy on reducing delinquent behaviors would likely be attenuated.

Similarly, the age of the youth across time must also be considered in interpreting these results. Youth with adolescent-onset offending behavior often demonstrate an increase in conduct-disordered behaviors, followed by a decrease over time (Jennings & Reingle, 2012; Sickmund & Puzanchera, 2014); although this trend is true for the results in Study I, it is important to note that the average total delinquent acts for each time-point was relatively low. Thus, one potential reason for why medication did not appear to protect this sample from engaging in delinquent acts over time is that these youths never engaged in substantial delinquent behavior to begin with. As a result, they may have created a floor-effect for the effect of medication within the context of the developmental trajectory of adolescent-onset delinquent behavior.

Another issue may be a youth's reluctance to acknowledge significant delinquency to the original study investigators. According to Sickmund and Puzanchera (2014), youth often purposefully fail to disclose the frequency of their unlawful behavior in self-report contexts. Further, there are mixed data regarding the base-rate of delinquent behavior in this population, as delinquent behavior for adolescents can be assessed via drug use, gang involvement, or physical altercations at school to name a few. Per Sickmund and Puzanchera, estimating an overall base rate for delinquency in youth is tenuous at best, given the general pattern of findings on the aforementioned delinquent behaviors converge and diverge over time. Thus, it is possible that this youth population

may be less likely to engage in delinquent behavior, or they may be less likely to acknowledge these behaviors. Either of these possibilities may have contributed to the findings presented here, but with no knowledge of a national base-rate or a specific base-rate for this type of at-risk sample, it is difficult to disentangle these possibilities.

The pattern of findings also may be attributable to adherence failure, as consistent administration is necessary in order to achieve the desired effect. In general, nonadherence is a bane to many well-designed studies measuring effectiveness, and is a clinical issue that remains to be adequately addressed (Case, 2011). If medication was inadequately administered over time, regardless of medication group, then it may have resulted in the failure for medication to exert an effect on delinquent and JJS entry behaviors.

It is possible the chaotic home environments experienced by many of these youth may have decreased medication adherence and thus contributed to the current pattern of findings. As discussed in the introduction, youth who are involved with CPS or foster care often evidence higher rates of delinquent behavior and JJS involvement compared to non-foster care/CPS youth (Barrett, Katsiyannis, Zhang, and Zhang, 2014; Alltucker, Bullis, Close, & Yovanoff, 2006); such intense and possibly frequent changes in living accommodations could influence the accuracy with which their caregivers were able to provide information for the NSCAW study, or at the very least, made medication adherence a much more difficult proposition for all study participants. Such an explanation may be plausible given that post-hoc analyses revealed no significant differences between the medication groups in regards to total delinquent behaviors over the seven-year period. However, this explanation does not adequately explain the pattern

observed within the inconsistently medicated group' of JJS entry in Study II. This group demonstrated a higher-risk of entry into the JJS compared to never-medicated youth, yet lower risk compared to the consistently-medicated group. Therefore, if consistency of medication adherence were seen as a significant contributing factor to the present findings and / or as a proxy of a more chaotic family system, one may expect the inconsistently medicated group to either demonstrate higher rates of JJS entry when compared to the consistently medicate group or at least no difference between these two groups. As a result, it appears unlikely that consistency of adherence would play a role in the current pattern of findings.

Another related issue for the current sample may be that medicated youth derive from family systems with a history of mental health or law-enforcement involvement, either of which may place these youths at higher risk for justice involvement. For example, the study by Alltucker, Bullis, Close and Yovanoff (2006) also demonstrated that youth with a family member convicted of a felony were significantly more likely to enter the JJS at an early age compared to their counterparts with no family criminal history. This may explain why the medicated groups experienced significantly increased risk of entry into the JJS compared to their never-medicated counterparts. Unfortunately, this type of information was not collected during the course of the original study, and thus we were unable to explore family background as a potential moderator of the present findings.

### **Implications**

Perhaps the most compelling finding that can be drawn from these studies is that, over a significant span of time, psychotropic medication as a general treatment did not

significantly influence at-risk youths' delinquent behaviors or entrance into the JJS. One may be tempted to conclude from the findings that medication is ineffective for these behaviors, even when holding other known influential factors constant (e.g., age, race and gender of child, etc.). However, delinquent behaviors do not occur in a vacuum. Youth who engage in these behaviors often do so for myriad reasons, which facilitate their entry into multiple interventions, including psychiatric medication. In this context, what may be most helpful for caregivers, policymakers and community-level agencies is to consider how psychiatric medication as a general tool will best help achieve reduced delinquent behaviors *in conjunction* with other available treatments. Although the current findings highlight that psychotropic medication is not a panacea for delinquency or JJS involvement, neither is any singular intervention for at-risk or justice-involved youth with severe externalizing behaviors.

Thus, caregivers should be encouraged to seek out appropriate specialists (e.g., psychologists, psychiatrists) who can adequately diagnose and refer these youths for medication treatment and continued medication management when such behaviors become apparent, ideally within the context of a larger set of services (i.e., therapeutic services, in-school accommodations, etc.). For example, according to Glisson et al. (2010), delinquent youth who received community-based interventions in multiple psychosocial areas (i.e., Multisystemic Therapy) were less likely to engage in subsequent delinquent behaviors. The medication providers, in turn, should have a responsibility to carefully monitor and adjust the youth's response to any medication prescribed. Should the youth become involved in CPS or the JJS, two important points emerge. According to a study by Cuellar, Kelleher, Kataoka, Adelsheim, and Coccozza (2008), JJS involvement

(i.e., detention stays) interrupted adolescents' ability to adhere to a consistent medication regimen; afterwards, youth were far less likely to return to a medication regimen of any form. When considering Cuellar et al.'s findings in the context of these results, it will be critical for these agencies to model appropriate continuation or initiation of medication management, and to work with these youths and their families to impress upon them the importance of adequate medication use in the context of other services. Similarly, policymakers may want to consider reviewing guidelines that speak to medication management for at-risk and justice-involved youth. Although these results cannot speak to how other potential services these youths may have received bore out an effect on these findings, as discussed below, these results can speak to the fact that psychotropic medication for these youth is simply not enough; a point which should also be communicated to caregivers, community-level agencies like CPS, and policymakers.

### **Limitations and Future Directions**

Certain, largely unavoidable, limitations must be acknowledged. First, the sample sizes of the medication groups were inherently uneven, with far more youth falling into the never-medicated group compared to either of the medicated groups. Such unevenness can promote difficulties during statistical analysis that speak to the robustness, as well as generalizability, of these findings. One example of this is the violated assumption in the Cox Regression model for the inconsistently-medicated group. Although such a violation occurs frequently in research where the data pool is quite large, or when data are not obtained from an RCT or similarly-controlled study, the generalizability of these results are necessarily limited (Stoddard, 2010).

In addition, the current study represents a secondary analysis of data that were originally collected to answer a completely different set of questions. As a result, certain information that would have helped to clarify the nature of the current findings were unavailable. The principal investigators of the NSCAW study designed the data collection to be collected in real-time and to mirror what is commonly seen in the field. While our results can speak to how medication fails to change frequency of delinquent behavior or entry into the JJS in the context of a real-world field trial, a more rigidly controlled study would be necessary to further clarify the nature and replicability of the present results. Similarly, these data were collected between 10 and 15 years prior to the current analysis, which impacts our findings' generalizability to the current at-risk youth population. However, this study is the first of its kind examining the specificity of medication as a whole influencing both delinquent behaviors and JJS involvement within the context of a longitudinal design on a national level. Future research should aim to replicate the findings presented here with an updated sample of at-risk and justice-involved youth in the context of a multi-state/national design that extends beyond a 1-year follow-up. This approach would be able to adequately assess for any longitudinal effects of medication as it influences the developmental trajectory of delinquent behaviors and JJS involvement.

It is important also to acknowledge the possibility that these results are not generalizable to all at-risk youth populations. For example, the study from which these data were drawn was specific to youth at risk for CPS involvement. As a result, a different picture may emerge if a data were gathered from a broader population of high-risk youth. Moreover, it was beyond the scope of this study to include the diagnostic

symptom score information from the CBCL. As such, corollary information that would correspond to psychiatric diagnoses of these youth were not recorded, so it is not known whether the type of diagnosis (e.g., more youth diagnosed with ADHD) exerted an influence. For example, the literature speaks to how youth with ADHD often engage in delinquent behaviors if left untreated, and that stimulant medication is effective at reducing conduct-disordered behaviors in the short term (Katzman & Sternat, 2014).

Relatedly, information regarding youth's mental health treatment was not coded and could not be accounted for in the analysis; thus it is possible that the pattern of findings discussed here may be unduly influenced by additional treatment these youths received or did not receive. However, by virtue of this sample being at-risk in nature, it is likely that this sample would be funneled into additional mental health programming to address global and individual concerns. In fact, Brenner et al.'s study (2014) found that foster-care youth who received psychotropic medication were significantly more likely to receive mental health services compared to their non-medicated counterparts, and a study by Hoffmann and Dufur (2008) demonstrated the import of school-level interventions attenuating youth involvement in the JJS. Taken together, an important next step would be to incorporate both youth psychiatric diagnoses, as well as type and extent of mental health treatment, into the research design. Doing so will be an important element of determining more precisely how medication influences delinquent behaviors in the context of specific psychiatric diagnoses, and how medication interacts with other treatment modalities to influence these conditions.

Finally, the goodness-of-fit of each psychotropic medication prescription is unknown for each participant. That is, youth may have been prescribed medication that

was designed to address symptoms unrelated to externalizing behavior problems, or which were ultimately ineffective for externalizing behavior. Because the literature notes that appropriate matching of medication class to behavioral outcomes and continuous medication monitoring as the youth matures are both integral components to achieving the desired outcome, that these factors were unknown and unable to be incorporated into the analyses significantly limits the generalizability of the present findings. Additional studies in this area of research may find important differences in youth delinquent behaviors and JJS-involvement if medication administration is carefully managed by a specialized professional.

### **Conclusion**

Youth who become involved with CPS or the JJS are at inherently higher risk for significant mental health sequelae. Psychotropic medication is proving to be an increasingly preferential option for these systems, despite continued concerns with regard to side-effects, unknown influences on long-term development, and general long-term efficacy for youth with disruptive and delinquent behavior problems. These studies presented here suggest that medication use does not appear to protect at-risk youths from engaging in delinquent behaviors or entry into the JJS over the course of a seven-year time span. Although total delinquent acts significantly decreased over time for the entire sample, medicated youth still demonstrated significantly higher risk of entry into the JJS. In fact, according to Study II, consistently medicated youth are at highest risk for entry into the JJS overall and across time, with the highest risk of entry within the first two years. Taken together, the findings from these studies indicate that long-term psychotropic medication usage in order to decrease delinquent behavior is an area that

requires further study, particularly when compared to the current literature that speaks most readily to short-term gains in reduction of delinquency using psychiatric medication.

Up to this point, the literature demonstrated a connection between medication use and its ability to reduce delinquent behavior or JJS involvement for up to 1-year. Based on the results of presented here, medication as a general treatment strategy may not be the most effective at reducing delinquency or preventing entrance into the JJS over multiple, consecutive years. It is quite possible that future studies will demonstrate efficacy for specific psychiatric medications in reducing delinquent behaviors over the long term. To this end, psychiatric medication likely will have an important role to play in the management of youth mental-health needs, delinquent behavior and JJS involvement; if future studies replicate the findings presented here, then it may not be as prominent a role as previously conceived. Until then, practitioners may want to conceptualize these findings as means for pause and careful consideration as to the utility of psychotropic medication as a singular intervention strategy. Hopefully, community practitioners will strive to ensure that these high-risk youth receive appropriate access to other treatment modalities (i.e., family and individual therapy, school-based behavioral management, and academic modifications) while future research parses out the specific elements of psychiatric medication that most effectively contribute to reduction in delinquent behavior.

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## VITA

**Natalie E. Armstrong Hoskowitz, M.A.**

### EDUCATION

**August 2011 – Present**     **Doctor of Philosophy in Clinical Psychology**

Sam Houston State University  
Huntsville, Texas

*Dissertation:* Psychotropic medication and at-risk youth: Studying its protective effects on delinquent behavior (Proposed: 06/2015)

*Thesis:* The effectiveness of Trauma-Focused Cognitive Behavioral Therapy in community settings: Evaluation of an intensive training model (Defended: 08/2013)

**2011**                    **Master of Arts in Forensic Psychology**

Marymount University  
Arlington, Virginia

**2007**                    **Bachelor of Science in Psychology & Creative Writing**

*Magna Cum Laude*  
Centre College  
Danville, Kentucky

### ACADEMIC EMPLOYMENT

Graduate Teaching Assistant, Department of Psychology, Sam Houston State University, August 2015 – Present. Responsibilities include: provide feedback on masters-level written assignments, deliver lectures, and assist with grading of class projects

Research Assistant to Adam Schmidt, Ph.D., Department of Psychology, Sam Houston State University, August 2013 – Present. Responsibilities include: manage database creation for a grant-funded project, lead research project regarding psychotropic medication use with at-risk youth

Graduate Teaching Assistant, Department of Psychology, Sam Houston State University, August 2012 – August 2013. Responsibilities include: prepare and deliver lectures, prepare laboratory exercises, administer exams and projects, provide grades, mentor students in psychology and statistics courses

Research Assistant to Lisa Kan, Ph.D., Department of Psychology, Sam Houston State University, May 2012 – August 2012. Responsibilities include: assisting with grading and lecture preparation for statistics courses, manage data entry for research regarding forensic evaluations.

Research Assistant to Brian Allen, Psy.D., Department of Psychology, Sam Houston State University, August 2011 – May 2012. Responsibilities included: program manager

to research project involving youth with traumatic stress, manage data entry and analysis preparation, assist with manuscript preparation.

## **PUBLICATIONS**

- Allen, B., & Hoskowitz, N.A. (2015). *Nontraditional trauma therapies for youth: A review and synthesis*. Austin, TX: Upbring, [White paper].
- Allen, B., & Armstrong, N. E. (2014). Trauma-Focused Cognitive-Behavioral Therapy: An overview. In Allen, B., & Kronenberg, M. (Eds.), *Treating trauma-exposed children: A casebook of evidence-based treatments*. New York: Guilford Press.
- Allen, B., Wilson, K W., & Armstrong, N. E. (2014). Changing clinicians' beliefs about treatment for children experiencing trauma: The impact of intensive training in an evidence-based, trauma-focused treatment. *Psychological Trauma: Theory, Research, Practice, and Policy*, 6, 384-389. doi: 10.1037/a0036533
- Allen, B. & Armstrong, N.E. (2014). Burden of proof: The evidence clinicians require before implementing an intervention. *Child and Adolescent Mental Health*, 19, 52-56. doi: 10.1111/camh.12005
- Molfese, V.J., Beswick, J.L., Jacobi-Vessels, J.L., Armstrong, N.E., Culver, B.L., White, J.M., Ferguson, M.C., Rudasill, K.M., Molfese, D.L. (2010). Evidence of alphabetic knowledge in writing: Connections to letter and word identification skills in preschool and kindergarten. *Reading and Writing*, 24, 133-150. doi: 10.1007/s11145-010-9265-8
- Molfese, D., Molfese, V., Rudasill, K., Molfese, P., Armstrong, N., & Starkey, G. (2010). Executive function skills of 6 to 8 year olds: Brain and behavioral evidence and implications for school achievement. *Contemporary Educational Psychology*, 35, 116-125. doi:10.1016/j.cedpsych.2010.03.004
- Armstrong, N., Losavio, M., & Keeling D. (2010). Digital system, evidence & forensics issues in correctional environments. *Fifth International Workshop on Systematic Approaches to Digital Forensic Engineering*, 141-149. doi: 10.1109/SADFE.2010.22
- Armstrong, N.E. (2009). Review of Clinical Neuropsychology in a Criminal Forensic Setting. *Developmental Neuropsychology*, 34, 801-803.

## **SELECTED PRESENTATIONS AT PROFESSIONAL MEETINGS**

- Hoskowitz, N.A., Schmidt, A., Marshall, K., Harmon, J., & Henderson, C. (March, 2016). Psychotropic medication does not decrease delinquent behaviors in at-risk youth over a five-year period. Presentation submitted to the American Psychology and Law Society Conference, Atlanta, GA.
- Laxton, K., Schmidt, A., & Hoskowitz, N.A. (2015). A culturally sensitive revision of the Sensitivity to Punishment and Sensitivity to Reward Questionnaire, Child Version (SPSRQ-C). Poster presented at the meeting of the American Psychology and Law Society, San Diego, California.

- Armstrong, N.E., Allen, B. (2013, June). The effectiveness of TF-CBT in community settings: Evaluation of an intensive training model. Paper presented at the meeting of the American Professional Society on the Abuse of Children, Las Vegas, Nevada.
- Armstrong, N. Mena, C., & Allen, B. (2012, June). Clinician perceptions of the barriers and solutions to the implementation of empirically-supported treatments for maltreated children. Paper presented at the meeting of the American Professional Society on the Abuse of Children, Chicago, Illinois.
- Armstrong, N., Fraser, T., Allen, B., Tellez, A., Wevodeau, A., Woods, C., & Percosky, A. (2012, March). Perpetrator age in retrospective reports of child sexual abuse does not influence later development of psychological problems. Poster presented at the meeting of the American Psychology and Law Society, San Juan, Puerto Rico.
- Armstrong, N., Losavio, M., & Keeling, D. (2009, May). Digital device & forensics concerns in jails, prisons and supervisory environments. Paper presented at the 4th International Workshop on Systematic Approaches to Digital Forensic Engineering (IEEE/SADFE), Oakland, California.

### **ACADEMIC AWARDS**

2016	American Psychology and Law Society, Student Travel Award \$500.00
2015	Upbring: The New Lutheran Social Services, Call for White Papers \$2,800.00
2009 – 2011	Dean's List <i>Marymount University</i>
2007	Phi Beta Kappa <i>Centre College</i>

### **PROFESSIONAL MEMBERSHIPS**

2010 – Present	American Psychological Association
2010 – Present	American Psychology and Law Society
2011 – Present	American Professional Society on the Abuse of Children
2014 – Present	Sam Houston Area Psychological Association
2014 – Present	Texas Psychological Association
2014 – Present	Association for Psychological Science