

USING A SOCIAL ECOLOGICAL FRAMEWORK TO UNDERSTAND HEALTHY
RELATIONSHIPS AND UNINTENDED PREGNANCY RISK AMONG YOUTH IN
RURAL COMMUNITIES AND YOUTH ENGAGED IN SYSTEMS

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DEDICATION

I am incredibly grateful to my family, friends, and my two doggie sons (Rocco and Ralph) for their help on my journey. I dedicate this work to my loving husband, Brian. His strong physical and emotional support has made this dissertation possible. I love him dearly and cannot express how much his commitment and support have meant to me.

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Teresa Marie Imburgia

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Nearly 75% of adolescent pregnancies are unintended, putting those adolescents at risk for long-term physical, social, and mental health outcomes. Youth who live in rural areas and youth with system involvement are at increased risk of unplanned pregnancies and births. We used the social ecological framework to investigate the following known risks for unplanned pregnancies: early sexual onset, contraception non-use, and dating violence. First, we examined the behaviors and attitudes associated with early sexual onset and the intention to delay sex in rural middle school youth. Being older, having less agency for sexual refusal, system involvement, and more parent communication were associated with having sex and planning to have sex. This highlights the importance of early, comprehensive, and trauma-informed pregnancy prevention programs for younger adolescents. Second, we examined the impact of positive youth development (PYD) on the use of effective contraceptives for sexually active youth who are system involved. Only 13.9% used condoms alone and 41.5% hormonal contraception (+/- condoms) in the past three months. Multivariate ordinal logistic regression revealed that older age, female gender, and higher PYD skills were associated with the use of more effective contraceptives. The final study identified risk and protective factors for perpetration and victimization of dating violence among youth with system involvement. We observed high rates of dating violence across all participants, and gender differences in perpetration and victimization. Using Poisson regression models, both perpetration and

victimization were related to higher levels of trauma, lower healthy relationship scores, having recent sex, and being a sexual minority. These studies indicate a need for early delivery of pregnancy prevention programs and services for higher risk youth that are trauma informed, sexually inclusive, and promote PYD and healthy relationships.

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LIST OF ABBREVIATIONS

95% CI: 95% confidence interval

ACEs: Adverse Childhood Experiences

CDC: Centers for Disease Control and Prevention

Dual involvement: Youth with a history of child welfare involvement and juvenile justice involvement

HIV: Human Immunodeficiency Virus

OR: Odds ratio

P: Probability value

p-value: Probability value

PYD: Positive youth development

Ref.: Referent category

RR: Relative risk

SD: Standard deviation

Sexual minority: Any youth who identified as transgender or not heterosexual

System involvement: Youth with a history of child welfare involvement or youth with a history of juvenile justice involvement

U.S.: United States

YRBS: Youth Risk Behavior Survey

CHAPTER 1

OVERALL INTRODUCTION

Unintended adolescent pregnancy is a public health problem identified by the Centers for Disease Control and Prevention (CDC) and Healthy People 2030 [1, 2]. Rural youth and youth with a history of child welfare and juvenile justice involvement are at high-risk for unintended pregnancies and are in need of new strategies to better deliver pregnancy prevention programs [3-6]. This dissertation seeks to provide data using the Social Ecological Model to investigate known risks for unplanned pregnancies. We describe the burden of unintended pregnancy for youths in rural areas and youths involved in systems. We know that these populations are at increased risk of unintended pregnancy and birth. Yet, little has been done to determine if evidenced-based interventions, tested in the general population, translate well to these populations and do they identify approaches that would make pregnancy prevention programs more successful.

1.1 Adolescent Pregnancy

Nearly 75% of adolescent pregnancies are unintended [7]. Unintended pregnancy puts the pregnant adolescent (and any children resulting from the pregnancy) at risk for long-term physical, social, and mental health outcomes, including higher risk of birth related complications, postpartum depression, stress, and suicidal ideation compared to peers who were not mothers [8-11]. Not only do adolescents suffer more than adults from unintended pregnancy, adolescents are also burdened with barriers to contraceptive services, transportation, and cost [12].

The 2019 pregnancy rate was 29.4 per 1,000 for youth aged 15-19 [13]. The 2020 birth rate was 15.4 per 1,000 for youth aged 15-19 [14]. Although adolescent birth rates have fallen over the past 30 years, the U.S. continues to have one of the highest adolescent birth rates among high-income countries, up to four times higher than similar high-income countries [15]. Adolescents from rural areas and adolescents with a history of system involvement are at high risk for unintended pregnancies and births [6, 16, 17]. One objective of Healthy People 2030 is to reduce pregnancies among adolescent females [2]. With the growing elimination of secondary prevention measures such as abortion care, that an estimated 50% of teens use [18], we need to seek approaches for more effective primary pregnancy prevention using appropriate programs for these high-risk groups.

1.2 Youth in Rural Populations

More than four million adolescents live in rural areas [19]. Adolescent birth rates are high in rural settings, with an estimated 7.8 additional adolescent births per 1,000 females aged 15 to 19 years compared to urban counties [16]. Additionally, the decline in birth rates was significantly slower in rural counties (-15.1%) than urban counties (-24.4%) [16]. According to the CDC, from 2007 through 2015, the teen birth rate per 1,000 was highest in rural counties at 30.9 births compared to 18.9 births in urban areas and 24.3 births in medium and small urban counties [4]. In Indiana, the fifteen counties with the highest birth rates are all rural [20]. Moreover, rural counties in the U.S. have less access to primary care, where the primary care physician to population ratio is 46.9% in rural counties compared to 60.6% in urban counties [16].

Youth in rural areas have few opportunities to receive sexual health education and services [16, 21]. Many of the sexual health education programs and interventions were developed for adolescents in metropolitan areas and may not be as effective in rural areas [22]. Adolescent pregnancy in rural areas is highly stigmatizing from community members and clinicians, which can lead to teens' discomfort in utilizing healthcare services [23, 24].

1.3 Youth with System Involvement History

Youth with a history of system involvement include youth who have been involved in child welfare systems and youth who have been in the juvenile justice system through arrest or detainment. In the U.S., the most recent estimates indicate there were 391,098 children in foster care in 2021 [25] and 447,119 youth under 18 arrested in 2019 [26].

1.4 Social Ecological Model

The Social Ecological Model is a theory-based framework for identifying and addressing the social determinants of health at multiple levels [27]. First developed by Urie Bronfenbrenner in the 1970s and formalized as the theory in the 1980s, it was illustrated by nesting circles that place the individual in the center surrounded by various systems [28]. Our adaptation of the model can be seen in Figure 1.1. The strongest influences lie in the systems closest to the individual and their microsystem (friends, family). The outer most environmental system exerts both negative and positive interactive forces on the individual [28]. The Social Ecological Model is a useful approach when investigating a range of factors that influence health and will be utilized throughout the chapters [27]. Adolescents are complex, and influences on behavior come

from multiple levels of the framework, the interpersonal (oneself), the intrapersonal (family, friends, partners), and environmental (system-involvement and trauma). In terms of pregnancy prevention work, we can organize the different factors in this model.

Intrapersonal factors can include skills, knowledge, attitudes, sexual orientation, gender, and positive youth development. Interpersonal factors can include social support, peer influence, family influence, and support. Environmental factors can include funding and resources available to youths, infrastructure, poverty, and system involvement.[27, 29]. Organizing these known factors aids in the identification of novel factors and the implementation of prevention measures. Interventions for behavior change are most effective when they target multiple levels [30].

1.5 Unintended Pregnancy in High Need Populations

Early sexual onset, non-use of contraceptives, and dating violence have all been linked to unintended pregnancies. We have identified gaps in the literature when seeking to identify other factors associated with the mechanisms that can reduce unintended pregnancies for the high-risk populations of rural youths and youths in systems, and we need to determine whether the factors reported previously are also important for these same high-risk populations. Out of the 48 studies reviewed by the HHS Teen Pregnancy Prevention Evidence Review 2016-2022, only three programs targeted rural youths [31] and two programs targeted youths with a history of system involvement. These populations are difficult to reach and recruit into studies. In rural areas, social, cultural, and religious influences can discourage participation in public sex education and research [32]. For example, research on high-risk sexual behaviors of rural adolescents have not been studied to the same extent as urban adolescents, in part due to difficulty in receiving

permission to conduct and evaluate pregnancy prevention programs in rural schools [33]. For youth with a history of system involvement, child welfare policies, access to services, instability in living placements, and residential and juvenile facility policies are all barriers to implementation and research of pregnancy prevention programs [5, 34]. Although barriers at facilities provide additional protections to these populations, they may deter researchers from working with them. Those that do must allow for extra time, considerations, and approval from multiple bodies [35].

Early sexual onset is associated with unintended adolescent pregnancies. Those that have earlier sexual debut are exposed to the risk over a longer time, are less likely to use contraception, have more sexual partners, and engage in higher sexual risk behaviors such as using substances prior to sex and having concurrent sexual partners [36, 37]. Data on early sexual onset in rural settings are either over 10 years old or take place in low to middle-income countries. The most recent examination of rural early sexual onset was in 2009, and they only collected data from 225 ninth grade students.

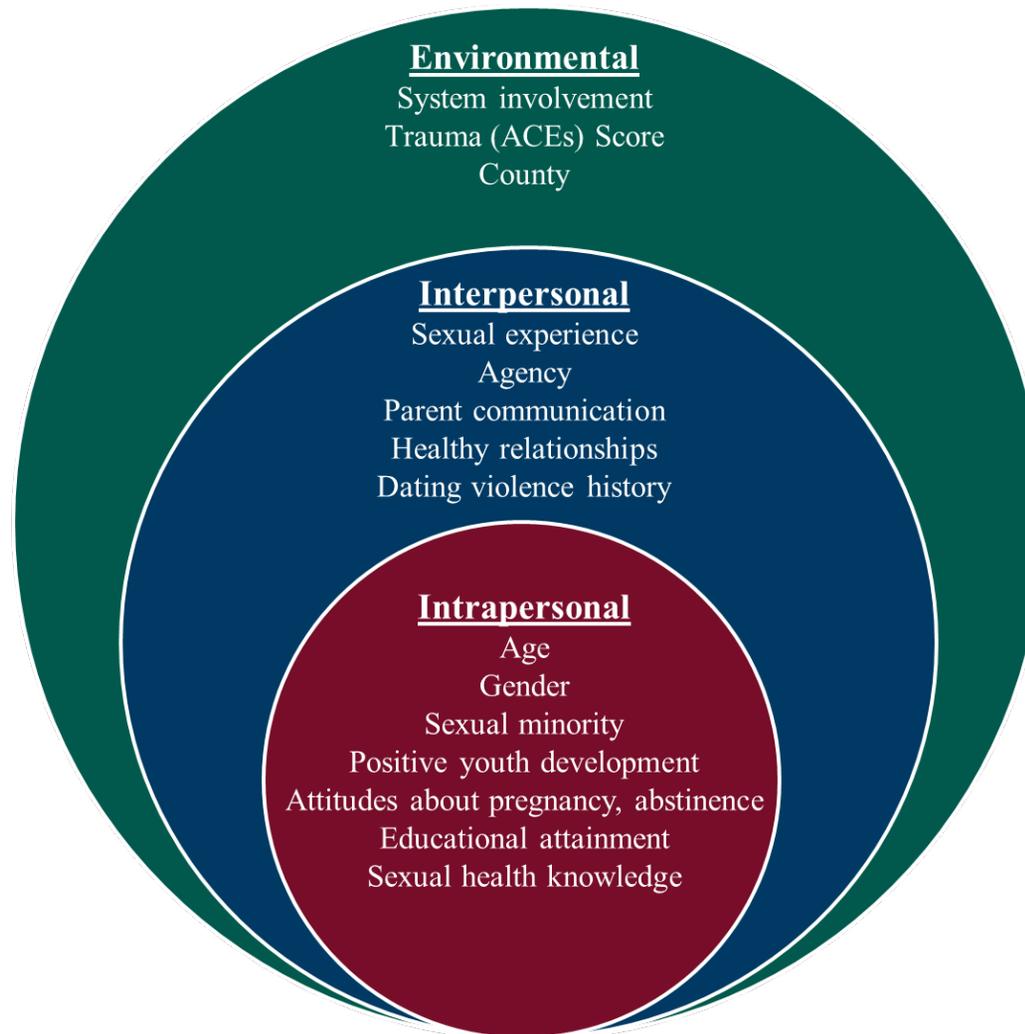
Contraception is an effective approach to prevent unwanted pregnancy [38], yet youths involved in systems have lower rates of contraceptive use compared with the general adolescent population [39]. Hormonal contraceptives are very effective ranging in failure rates from less than 1% to 7% with typical use. Male condoms have a typical-use failure rate of 13%, and internal female condoms have a typical-use failure rate of 21% [40]. There is a critical need to find successful approaches to increase the rate of effective contraception for sexually active youths involved in systems.

Dating violence affects millions of adolescents in the U.S. and is on the rise with 2021 national data estimating 11% of youth age 14-18 experienced sexual violence in the

past year and 8.5% experienced physical dating violence in the past year [41]. For pregnancy capable persons, dating violence can negatively impact the ability to negotiate condom use [42] and increase the risk for unplanned pregnancy [43]. Effective methods are needed to reduce dating violence in populations with high rates of both dating violence and unintended pregnancy, such as those where the youths are system involved.

We use data from a university and community-based partnership between IU School of Medicine Faculty and Health Care Education & Training, who provide sexual health education to both rural youth and youth with a history of system involvement to investigate mechanisms to reduce unintended pregnancy in these two populations that are hard to reach and are understudied. This body of work presented in this dissertation aims to provide informative strategies to reduce known causes of unintended pregnancies: early sexual onset, non-use of contraceptives, and dating violence in adolescents at high-risk for unintended pregnancies.

Figure 1.1. Social Ecological Model



CHAPTER 2

BEHAVIORS AND ATTITUDES ASSOCIATED WITH EARLY SEXUAL ONSET AND DELAYING SEX IN RURAL MIDDLE SCHOOL YOUTH

2.1 Introduction

2.1.1 Early Sexual Onset

Sexual behavior is common during middle to late adolescence and is considered a part of normal development [44, 45]. During early adolescence, however, sexual intercourse is less common, often coerced [46], and is associated with poor health outcomes [47]. The 2021 Youth Risk Behavior Survey (YRBS), a set of surveys sponsored by the Centers for Disease Control and Prevention (CDC) for students in 9th-12th grades found that 3.2% of students nationally and 1.4% of students in Indiana had initiated sexual intercourse before age 13 [48]. Early sexual onset, however, can typically be defined as having sex prior to an age range between 13 and 15 [37, 48, 49] and can lead to poor health outcomes, such as unplanned pregnancy, sexually transmitted infections, and depression [50-53]. Those that have their first sexual experience at younger ages have more sexual partners and more unprotected sex [54-56].

Research has identified several factors related to early sexual onset in a variety of settings and samples. Cross-sectional studies have identified gender, the inability to negotiate safer sex, poor academic performance, lower knowledge of the possible risk outcomes of sex as factors associated with early sexual onset [47]. However, many of these studies tend to survey youth at older ages and not directly at the time which they are making these decisions, introducing recall bias. In the recent meta-analysis of cohort studies related to early sexual onset, the authors found that adolescent substance use,

aggression and conduct disorders, family attachment, school achievement, family living situation, and maternal education as important risk factors associated with early sexual onset [52].

2.1.2 Attitudes

Attitudes, particularly those related to gender, sexual and relationship behaviors, and family contexts, may be important to sexual behavior and decision-making around the initiation of sexual behavior [45, 57]. Specifically, beliefs about abstinence and sexual agency (the ability to say “no” or “yes” to sex) contribute to the intention to delay sexual initiation [57].

2.1.3 Trauma

Experiencing trauma as a youth can have negative lasting consequences throughout the life course [58]. Multiple studies have demonstrated the relationship between a higher number of Adverse Childhood Experiences (ACEs) and early sexual onset [59-61]. For example, system involvement at the child welfare and juvenile justice level are both identified in the ACEs checklist and have been associated with early sexual onset [62, 63].

2.1.4 Rural Populations

Rural youth are particularly at risk for unintended pregnancy, and, nationally, birth rates are high in rural settings. According to the CDC, from 2007 through 2015, the teen birth rate per 1,000 was highest in rural counties at 30.9 births compared to 18.9 births in urban areas and 24.3 births in medium and small urban counties [4]. Later national data in 2017-2018 revealed an additional 7.8 births per 1,000 females ages 15-19

years in rural compared to urban counties [16]. Similar to national data, the 15 counties with the highest birth rates in Indiana are all rural [20].

While many studies have examined factors associated with early sexual onset, there is less research on rural communities in the United States. The two longitudinal studies identifying factors related to early sexual onset in 2006 and 2008 were either nationally representative or in larger cities respectively [64, 65]. Studies that focus on rural settings are typically performed in low to middle-income countries [66-68]. One study performed collected data from 225 ninth grade students in rural counties in the southern United States from 2006-2009. They identified lower religiosity, lower social connectedness, and lower parental monitoring, which were associated with early sexual onset [69]. Data are lacking for U.S. based rural populations, and we need to seek factors across multiple levels of adolescents' behavior influence.

2.1.5 Social Ecological Model

Social Ecological Model is used frequently in studies that identify the risk factors related to early sexual onset [30, 47, 70]. The framework is a useful approach when investigating a range of factors that influence health and will be utilized throughout these papers. Adolescent behavior is influenced by multiple levels of the framework, the interpersonal (oneself), the intrapersonal (family, friends, partners), environmental (system-involvement and trauma). Effective interventions are frequently multilevel [3]. Organizing factors in this framework can aid in how we deliver future interventions for rural populations. The primary objective of this study is to identify the intrapersonal, interpersonal, and environmental factors related to early sexual onset and the intention to

have or delay sex in the future for youth in rural middle schools at the time when these decisions are being made.

2.2 Methods

2.2.1 Study Population

Surveys for this cross-sectional study were administered to middle school youth in a health class before the implementation of an evidence-based sex education program, Making a Difference [71], in years 2016-2019. These baseline data came from a federally funded, teen pregnancy prevention implementation project to Health Care Education and Training, Inc. serving rural middle school students in 12 Indiana counties with high rates of Hepatitis C and HIV. Students could be in 6th, 7th, or 8th grades, depending upon when the school chose to offer the programming. The program was implemented by three different partner agencies. Participants were nested in schools and by partner agencies who delivered the intervention. This project was determined to be exempt as quality improvement by the Indiana University Institutional Review Board. De-identified surveys were collected on paper forms and then entered into a REDCap database. All youths were invited to fill out the pre-program survey, and they were instructed they could opt out at any time.

2.2.2 Survey Measures

Survey measures included required federal performance measures as well as key goals and objectives related to adolescent pregnancy prevention for the communities they served. The procedure has been described in detail by Ott, et al [72]. Details about each survey measure are provided in Table 2.1. The three outcome measures included whether the youth had ever had sex (*Have you ever had sexual intercourse?*), whether they

planned to abstain until the end of high school, and whether they planned to have sex in the next six months. Both ever having sex and planning to abstain until the end of high school were yes/no items. Planning to have sex in the next six months was collected on a Likert type scale (no definitely not, no probably, yes probably, yes definitely). The survey included sociodemographic information (age, grade, gender, race, ethnicity), attitudes about abstinence [73], baseline knowledge about sexual topics, agency to refuse sex, dating violence items, parent-child communication scale about sex and relationships [74], and youth system involvement with child welfare and juvenile justice.

2.2.3 Statistical Analyses

Of the 7,825 youth that completed the survey, 6,263 (80%) answered the question whether they had ever had sex, 6,462 (82.5%) answered the question regarding the intention to abstain until the end of high school, and 6,566 (83.9%) answered the intention to have sex over the next six months. For the binary outcome variables, ever had sex and plan to abstain until the end of high school, we used chi-square and t-tests to examine bivariate associations between the binary outcome and sociodemographic, attitude, knowledge, agency, and communication measures. We additionally tested interactions with gender for each of the predictor measures. Interaction terms were created and tested in bivariate analysis with each outcome variable. Both predictor measures were entered into step one and the interaction term was entered with predictor variables at step two. We found no significant interactions with gender, so both genders were analyzed together. Then, logistic regression was used to examine the associations between all factors significant at the bivariate level and outcome of interest. For the ordinal outcome variable, intention to have sex in the next six months, multi-level ordinal

logistic regression was used to model the differences in the bivariate and multivariate analyses of all factors significant at the bivariate level with a general linear modeling approach to adjust standard errors for clustering of students from the same partner agencies. We did not include race in the final multivariable models as this population was mostly White (76.1%), and race was not significant in any of the multivariable models when tested. We also removed the physical dating violence measure due to its impact on the models' fit. It was not significant in any of the multivariable models. The need for nesting at the partner agency level was investigated for each model using unconditional mixed effects models. We used a threshold of the ICC greater than .05. The models for ever had sex (ICC=0.14) and the intent to have sex in the next six months (ICC=.073) were adjusted for partner agency. All analyses were performed in SPSS Version: 28.0.1.1 [75] and STATA 17 [76].

2.3 Results

The sample consisted of 7,825 adolescents with a mean age of 12.7 (SD=0.9) years ranging from 10-15 years old. The respondents were nearly evenly split between female and male (49.9% and 48.7%, respectively) and 1.0% identified as non-cisgender. Overall sample characteristics and bivariate analyses are provided in Table 2.2. The sample was 76.1% White, 12.3% more than one race, 3% Black or African American, 1.8% other, 1.5% Hispanic and/or Latin, 1.2% unknown, 0.5% Asian or South Asian, and 0.3% Native American/Alaskan Native/American Indian. A small proportion had a history of child welfare involvement (5.4%) and juvenile justice involvement (4.5%).

For the first outcome, a total of 396 (5.1%) adolescents reported that they had ever had sex. Multi-level logistic regression adjusted for partner agency and all other

variables in the model (Table 2.3) revealed that ever having sex was associated with being older (OR=1.16, 95% CI: 1.05-1.28), less positive attitudes towards abstinence (OR=0.70, 95% CI: 0.67-0.74), less agency for sexual refusal (OR=0.79, 95% CI: 0.72-0.86), having a history of child welfare involvement (OR=2.36, 95% CI: 1.57-3.53), having a history of juvenile justice involvement (OR=5.63, 95% CI: 3.86-8.21), and more frequent parent communication about sex (OR=1.31, 95% CI: 1.19-1.44).

For the second outcome, 5,462 (69.8%) adolescents planned to abstain until the end of high school. Controlling for all variables in the model, logistic regression indicated that adolescents who planned to abstain from sex until the end of high school (Table 2.4) were younger (OR=0.81, 95% CI: 0.75-0.88), had more positive attitudes towards abstinence (OR=7.44, 95% CI: 6.44-8.54), higher sexual knowledge scores (OR=1.14, 95% CI: 1.05-1.24), better agency for sexual refusal (OR=1.20, 95% CI: 1.14-1.27), and more communication with parents about relationships (OR=1.04, 95% CI: 1.00-1.07). Not planning to abstain until the end of high school was associated with more parent communication about sex (OR=0.87, 95% CI: 0.83-0.92) and juvenile justice involvement (OR=0.67, 95% CI: 0.49-0.91).

For the final outcome using all participants regardless of sexual activity, 5,520 (71.8%) responded they would definitely not have sex in the next six months, 1,557 (20.3%) responded probably no, 456 (5.9%) responded probably yes, and 153 (2.0%) responded definitely yes. Multi-level ordinal regression adjusted for partner agency and all other variables in the model (Table 2.5) found that being older (OR=1.10, 95% CI: 1.05-1.16), male (OR=1.87, 95% CI: 1.64-2.14), higher sexual knowledge (OR=1.13, 95% CI: 1.04-1.22), more frequent parent communication about sex (OR=1.21, 95% CI:

1.15-1.27), history of child welfare involvement (OR=1.42, 95% CI: 1.11-1.83), and a history of juvenile justice involvement (OR=2.03, 95% CI: 1.56-2.64) were associated with a higher likelihood of planning to have sex in the next six months. More positive attitudes about abstinence (OR=0.65, 95% CI: 0.64-0.67) and higher agency for sexual refusal (OR=0.76, 95% CI: 0.72-0.80) were associated with a lower likelihood of planning to have sex in the next six months.

2.4 Discussion

Middle school youth from rural counties had a 5.1% rate of early sexual onset before age 16. While we are unable to compare this to national samples collected in high school, our sample was younger, comprised of mostly 12- and 13-year-olds. However, 24.8% of 15-year olds had reported sex compared to earlier Add Health data waves 1, 3, and 4, where 16.6% reported sex before age 16 [37]. Our data were collected from youth closer to the event, potentially increasing accuracy in the measurements of attitudes, knowledge, and behaviors, and informing sexuality education programs for middle school youth. Older age was associated with ever having sex and the intention to have sex in the future indicating a need for early interventions. Integrating these programs are particularly important, because there have been declines in formal sexuality education in rural areas [77]. Our data support the need for additional strategic interventions for rural youth in middle schools. We identified factors important to the delivery of pregnancy prevention programs along with modifiable risk and protective factors on which to intervene.

Gender was associated with the intention to have sex or delay in the future, but not associated with ever having sex. While males were more likely to intend to have sex

in the future, there was no difference in the likelihood of already having sex. More masculine values have been associated with both outcomes in previous literature [78], pointing to early adolescence as an important time for prevention efforts focused on young men.

We also identified that the trauma of being involved in child welfare and juvenile justice impacted both past behavior and future intention regarding sex. Our data highlight the need for trauma-informed approaches to comprehensive sex education. Juvenile justice involvement in our study was one of the highest predictors of sexual onset. Our research supports the recommendations by the American Academy of Pediatrics statement on the importance of access to comprehensive and trauma-informed sex education [79].

Within the modifiable factors, attitudes within the rural landscape may hinder the opportunity for full comprehensive messaging to reach youth. However, we found that those with more positive attitudes around the idea of abstinence were less likely to have had sex and more likely to intend to delay sex. These attitudes may be important target goals for early adolescents and are modifiable. However, for older adolescents, it has not been shown to be sufficient to prevent unprotected sex. Masters et al. found that youth who do not consider abstinence and sexual activity as opposing constructs may prevent sexual activity, but those intentions may make them less equipped to use contraception or condoms at their first sexual intercourse [80]. Thus, it is important to provide early abstinence teaching alongside of the other components of comprehensive sex education, such as condom and contraception use.

Along with attitudes to modify, our data suggest that building skills around sexual agency may be effective in delaying sexual onset. Higher agency for sexual refusal was associated with never having sex and the intention to delay sex in the future. Agency and refusal skills have been effective components of sex education in middle schools, but the study was in urban areas [81]. Our research supports the need of agency and refusal skills before high school in rural communities that are also high-risk.

Parent communication about sex and relationships varied in our study. While more parent communication about sex was associated with ever having sex and the intent to have sex in the future, more parent communication about relationship was associated with the intention to delay sex until the end of high school. This outcome is difficult to interpret because of the cross-sectional nature of the data. We do not know when these conversations took place in relationship to sexual onset – it may have been after parents found out that their early adolescent had had sex. Conversations happening after the fact are supported by existing observational data. A longitudinal study following parents and their youth found that the conversation about sexual topics rarely occurred before the adolescents' sexual debut [82]. Future research will need to examine not just the content, but the timing of parent communication about sex and onset of sex.

Parent communication about relationships may represent a good starting point for parents to engage in sexual behaviors and health conversations. Adolescents are more likely to delay sexual initiation when they communicate with their parents about sex [83]. However, those conversations might be more beneficial with education on how to tailor those conversations and when to have them [84]. Sex education programs for the parents of youth and pediatric visits may be opportunistic times to engage with parents on the

importance of talking to their youth about sex and healthy relationships before they engage in sexual activities [85, 86].

This study fills gaps in the research about the sexual behaviors and intentions of middle school youth in rural settings of a Midwest state in the U.S. However, we are limited by its cross-sectional design. The intentions to abstain were only the intentions at the time of data collection, and although we are not able to know if those intentions held over time, we captured the attitudes and behaviors of youth when these decisions are being made. We are limited by recall bias, as the behavior cannot be ethically observed. Most studies that have investigated the validity of adolescent self-report on sexual behaviors have had imperfect but satisfactory reliability [87-90]. We were also limited by how much we could ask the youth, as this was implemented in schools, only allowing questions on a front and back side sheet of paper. Schools in rural settings restricted survey content and space capacity on paper forms.

Overall, our study identifies important risk factors and provides modifiable factors to inform the sparse research to date, on pregnancy prevention with younger samples from rural populations from the U.S. Our focus on rural areas is in response to the high teen birth rates in rural counties compared to urban counties [4, 16, 20]. Additionally, a study of females from the National Survey of Family Growth, found that rural women experienced first sex earlier compared with urban women [91]. Our findings highlight the importance of comprehensive, trauma-informed sex education for youth before high school, the need to engage parents early, the benefit of talking about sexual agency and consent, and the importance of attitudes and the behaviors associated with abstinence.

Table 2.1. Details of the survey measures and scales used in bivariate and multivariable models

Scale name	Number of items (range)	Cronbach's alpha	Answer options	Example item
Positive attitude about abstinence	5 (5-20)	0.74	4-point scale from strongly disagree to strongly agree	It is important for me not to have sex before I get married.
Sexual health knowledge score	4	N/A	True/False	You can get pregnant by having sex once without using a condom or other birth control.
Agency for sexual refusal	2 (2-8)	0.60	4-point scale from strongly disagree to strongly agree	I feel confident in saying "no" to sex.
Believe that physical violence is ok	1 (1-4)	N/A	4-point scale from strongly disagree to strongly agree	Hitting, pushing, kicking, and throwing things at each other is normal in dating relationships.
Parent communication about sex	4 (4-12)	0.76	3-point scale never, once or twice, many times	How often have you talked to your parents/caregivers about sex?
Parent communication about relationships	7 (7-21)	0.82	3-point scale never, once or twice, many times	How often have you talked to your parents/caregivers about healthy relationships or dating?

Table 2.2. Demographic and bivariate analysis by ever had sex, plan to abstain until the end of high school, and intention to have sex in the next six months among 7,825 adolescents

Variable	Total Sample mean (SD) or n, %	Had Sex mean (SD) or n, %	Never had sex mean (SD) or n, %	P	Plan to abstain until the end of high school mean (SD) or n, %	Do not plan to abstain until the end of high school mean (SD) or n, %	P	Plan to have sex in the next 6 months OR (95% CI)
<i>Intrapersonal</i>								
Age, in years, <i>Range (10-15)</i>	12.72 (0.87)	13.27 (0.89)	12.68 (0.86)	*	12.64 (0.86)	12.93 (0.87)	*	1.82 (1.72, 1.93)
Grade				*			*	
6th	1670, 21.6%	31, 7.9%	1562, 22.8%		1301, 24.1%	297, 14.6%		ref.
7th	4122, 53.4%	203, 51.9%	3616, 52.9%		2830, 52.4%	1140, 56.1%		3.23 (2.74, 3.80)
8th	1930, 25.0%	157, 40.2%	1660, 24.3%		1271, 23.5%	595, 29.3%		4.37 (3.67, 5.21)
Gender				*			*	
Female	3807, 49.9%	232, 58.9%	3548, 47.8%		2996, 55.0%	782, 38.0%		0.39 (0.35, 0.43)
Male	3903, 48.7%	152, 38.6%	3294, 51.4%		2404, 44.1%	1248, 60.7%		ref.
Other	80, 1.0%	10, 2.5%	56, 0.8%		52, 1.0%	26, 1.3%		1.87 (1.21, 2.88)
Race				*			*	
White or Caucasian	5952, 76.1%	254, 64.1%	5375, 77.7%		4270, 78.2%	1485, 71.9%		ref.
Native American/Alaska Native/ American Indian	253, 3.2%	22, 5.6%	203, 2.9%		162, 3.0%	84, 4.1%		1.71 (1.32, 2.21)
Native Hawaiian/Other Pacific Islander	25, 0.3%	22, 5.6%	203, 2.9%		16, 0.3%	8, 0.4%		1.50 (0.68, 3.32)
Black or African American	238, 3.0%	21, 5.3%	191, 2.8%		128, 2.3%	92, 4.5%		2.47 (1.90, 1.73)
Asian or South Asian	41, 0.5%	1, 0.3%	37, 0.5%		30, 0.5%	6, 0.3%		0.79 (0.36, 1.73)
Other	145, 1.8%	8, 2.0%	124, 1.8%		102, 1.9%	40, 1.9%		1.24 (0.88, 1.77)
Latin	114, 1.5%	8, 2.0%	96, 1.4%		74, 1.4%	27, 1.3%		0.85 (0.55, 1.34)
More than one race	964, 12.3%	69, 17.4%	799, 11.6%		620, 11.4%	309, 15.0%		1.43 (1.24, 1.65)
Unknown/Not reported	93, 1.2%	6, 1.5%	75, 1.1%		60, 1.1%	15, 0.7%		0.73 (0.43, 1.24)
Positive attitude about abstinence <i>5 items, Range 5-20 $\alpha=0.74$</i>	11.47 (2.84)	11.47 (2.84)	15.91 (2.77)	*	3.30 (0.49)	2.63 (0.59)	*	0.57 (0.56, 0.59)
Sex Knowledge, <i>4 items, Range 0-4</i>	3.36 (0.89)	3.30 (0.90)	3.37 (0.88)	*	3.41 (0.85)	3.28 (0.91)	*	1.01 (0.96, 1.07)
<i>Interpersonal</i>								
Agency for sexual refusal <i>2 items, Range 2-8, $\alpha=0.60$</i>	6.76 (1.36)	5.79 (1.58)	6.86 (1.30)	*	7.01 (1.21)	6.13 (1.49)	*	0.58 (0.56, 0.60)

Variable	Total Sample mean (SD) or n, %	Had Sex mean (SD) or n, %	Never had sex mean (SD) or n, %	P	Plan to abstain until the end of high school mean (SD) or n, %	Do not plan to abstain until the end of high school mean (SD) or n, %	P	Plan to have sex in the next 6 months OR (95% CI)
Believe physical violence is ok <i>1 item, Range 1-4</i>	1.41 (0.68)	1.57 (0.85)	1.39 (0.65)	*	1.37 (0.64)	1.48 (0.75)	*	1.26 (1.21, 1.39)
Believe checking partner's cell is ok <i>1 item, Range 1-4</i>	2.03 (0.89)	2.33 (1.09)	2.00 (0.88)	*	2.96 (0.86)	2.18 (0.98)	*	1.52 (1.44, 1.60)
Parent communication on sex <i>4 items, Range 4-12, $\alpha=0.76$</i>	5.89 (1.99)	7.61 (2.57)	5.76 (1.88)	*	5.70 (1.82)	6.36 (2.29)	*	1.27 (1.24, 1.31)
Parent communication on relationships <i>7 items, Range 7-21, $\alpha=0.82$</i> <i>Environmental</i>	11.75 (3.51)	13.48 (3.92)	11.62 (3.45)	*	11.67 (3.43)	12.04 (3.70)	*	1.08 (1.07, 1.10)
History of child welfare involvement				*			*	
Yes	416, 5.4%	64, 16.4%	304, 4.4%		250, 4.6%	158, 7.8%		2.10 (1.72, 2.54)
No	7307, 94.6%	326, 83.6%	6537, 95.6%		5161, 95.4%	1876, 92.2%		ref.
History of juvenile justice involvement				*			*	
Yes	348, 4.5%	109, 27.5%	166, 2.4%		124, 2.3%	209, 10.2%		7.80 (6.32, 9.62)
No	7422, 95.5%	287, 72.5%	6714, 97.6%		5311, 97.7%	1843, 89.8%		ref.
Rurality				*			*	
Rural	2325, 29.7%	110, 27.8%	2061, 29.8%		1663, 30.5%	590, 28.6%		1.09 (0.94, 1.22)
Rural with larger towns	4474, 57.2%	218, 55.1%	4001, 57.9%		3196, 58.5%	1123, 54.4%		ref.
Urban/suburban	1026, 13.1%	68, 17.2%	854, 12.4%		603, 11.0%	353, 17.1%		1.69 (1.47, 1.95)
Median county income (in thousands)	57.17 (6.36)	56.23 (6.59)	57.26 (6.36)	*	57.51 (6.37)	56.47 (6.24)	*	0.98 (0.97, 0.99)
Outcomes								
Ever had sex								
Yes	396, 5.1%							
No	6916, 94.6%							
Plan to have sex in the next 6 months	1.38 (0.69)							
No, definitely not	5520, 71.8%							
No, probably not	1557, 20.3%							
Yes, probably	456, 5.9%							
Yes, definitely	153, 2.0%							
Plan to abstain until end of high school								
Yes	5462, 69.8%							
No	2066, 27.4%							

Table 2.3. Logistic regression analysis of the associations between risk factors and ever having sex among 6,318 adolescents

Factors ^a	n or range ^b	OR1 (95% CI) ^c	OR2 (95% CI) ^d
Age in years	10 – 15	1.52 (1.34, 1.72)	1.16 (1.05, 1.28)
Gender			
Male	3,039	1.63 (1.32, 2.02)	0.79 (0.59, 1.06)
Female	3,279	ref.	ref.
Positive attitude towards abstinence	5 – 20	0.67 (0.64, 0.39)	0.70 (0.67, 0.74)
Higher sexual knowledge	0 – 4	0.89 (0.79, 0.99)	1.03 (0.87, 1.22)
Better agency for sexual refusal	2 – 8	0.63 (0.59, 0.67)	0.79 (0.72, 0.86)
More parent communication about sex	4 – 12	1.42 (1.36, 1.48)	1.31 (1.19, 1.44)
More parent communication about relationships	7 – 21	1.13 (1.11, 1.17)	0.97 (0.91, 1.03)
History of child welfare involvement			
Yes	303	4.02 (3.00, 5.40)	2.36 (1.57, 3.53)
No	6,015	ref.	ref.
History of juvenile justice involvement			
Yes	212	14.68 (11.18, 19.29)	5.63 (3.86, 8.21)
No	6,106	ref.	ref.
Median county income (in thousands)	45.79 – 65.84	0.97 (0.95, 0.99)	1.10 (0.97, 1.02)

^a All factors were analyzed as continuous variables except gender, history of child welfare involvement, and history of juvenile justice involvement.

^b n for categorical variables and range for continuous variables.

^c Adjusted for partner agency.

^d Adjusted for partner agency and all other factors listed in Table 2.3.

Table 2.4. Logistic regression analysis of the associations between risk factors and planning to abstain from sex until the end of high school among 6,522 adolescents

Factors ^a	n or range ^b	Crude (95% CI)	Adjusted (95% CI) ^c
Age in years	10 – 15	0.68 (0.64, 0.72)	0.81 (0.75, 0.88)
Gender			
Male	3,150	0.50 (0.45, 0.56)	0.77 (0.67, 0.89)
Female	3,372	ref.	ref.
Positive attitude towards abstinence	5 – 20	9.87 (8.74, 11.15)	7.44 (6.44, 8.54)
Higher sexual knowledge	0 – 4	1.18 (1.11, 1.25)	1.14 (1.05, 1.24)
Better agency for sexual refusal	2 – 8	1.59 (1.53, 1.66)	1.20 (1.14, 1.27)
More parent communication about sex	4 – 12	0.86 (0.83, 0.88)	0.87 (0.83, 0.92)
More parent communication about relationships	7 – 21	0.97 (0.96, 0.99)	1.04 (1.00, 1.07)
History of child welfare involvement			
Yes	343	0.56 (0.47, 0.71)	0.83 (0.63, 1.09)
No	6,179	ref.	ref.
History of juvenile justice involvement			
Yes	264	0.21 (0.16, 0.26)	0.67 (0.49, 0.91)
No	6,258	ref.	ref.
Median county income (in thousands)	45.79 – 65.84	1.00 (1.00, 1.00)	1.00 (1.00, 1.00)

^a All factors were analyzed as continuous variables except gender, history of child welfare involvement, and history of juvenile justice involvement.

^b n for categorical variables and range for continuous variables.

^c Adjusted for all other factors listed in Table 2.4.

Table 2.5. Ordinal regression analysis of the associations between risk factors and intending to have sex in the next six months among 6,622 adolescents

Factors ^a	n or range ^b	OR1 (95% CI) ^c	OR2 (95% CI) ^d
Age in years	10 – 15	1.21 (1.15, 1.28)	1.10 (1.05, 1.16)
Gender			
Male	3,211	2.60 (2.34, 2.89)	1.87 (1.64, 2.14)
Female	3,411	ref.	ref.
Positive attitude towards abstinence	5 – 20	0.06 (0.05, 0.07)	0.65 (0.64, 0.67)
Higher sexual knowledge	0 – 4	0.99 (0.93, 1.05)	1.13 (1.04, 1.22)
Better agency for sexual refusal	2 – 8	0.58 (0.56, 0.60)	0.76 (0.72, 0.80)
More parent communication about sex	4 – 12	1.26 (1.23, 1.29)	1.21 (1.15, 1.27)
More parent communication about relationships	7 – 21	1.07 (1.05, 1.09)	1.00 (0.97, 1.03)
History of child welfare involvement			
Yes	340	1.97 (1.62, 2.40)	1.42 (1.11, 1.83)
No	6,282	ref.	ref.
History of juvenile justice involvement			
Yes	259	7.26 (5.88, 8.96)	2.03 (1.56, 2.64)
No	6,363	ref.	ref.
Median county income (in thousands)	45.79 – 65.84	0.97 (0.97, 0.99)	0.99 (0.98, 1.00)

^a All factors were analyzed as continuous variables except gender, history of child welfare involvement, and history of juvenile justice involvement.

^b n for categorical variables and range for continuous variables.

^c Adjusted for partner agency.

^d Adjusted for partner agency and all other factors listed in Table 2.5.

CHAPTER 3

THE IMPACT OF YOUTH DEVELOPMENT ON CONTRACEPTIVE USE FOR SEXUALLY ACTIVE YOUTH INVOLVED IN SYSTEMS

3.1 Introduction

Contraception is an effective approach to prevent unwanted pregnancy [38]. In 2019, the Youth Risk Behavior Survey reported that 89.7% of sexually active high school students used birth control the last time they had sex, but only 8% used the most effective types [92]. Older age, having less than four lifetime partners, and having less than two recent partners were associated with more effective contraceptive methods [92]. A 2018 study found that of 178 sexually active youth in child welfare, only 59.1% used contraceptives in the three months prior to the survey [34].

Youth involved in systems, specifically juvenile justice and child welfare, are at increased risk of unplanned pregnancy. Nearly half of females in child welfare have a child by age 19, and 23% of males have fathered a child compared to only 7% for teens 15-19 overall [6, 93]. In addition to having higher rates of parenthood, those in child welfare were also less likely to use contraception [5]. Similar to foster youth, juvenile offenders have high rates for being pregnant (9%) and fathering a child (14%) compared to 12-20 year olds not involved in systems [17].

There were an estimated 447,119 youth under 18 arrested in 2019 [26] and 391,098 children in foster care in 2021 [25]. Youths in these populations initiate sex earlier, have more sex partners, and have lower rates of contraceptive use compared with the general adolescent population [39]. Once pregnant, they are more likely to deliver that pregnancy [94]. There is a strong need to understand ways to reduce the burden of

pregnancy and births for youth involved in systems. This population is historically hard to reach due to multiple issues such as child welfare policies, access to services, instability in living placements, and juvenile facility policies [5].

Positive youth development (PYD) has been used as a tool to approach these marginalized populations [95, 96]. PYD is defined by the Office of Population Affairs as an “intentional, pro-social approach that engages youth within their communities, schools, organizations, peer groups, and families in a manner that is productive and constructive; recognizes, utilizes, and enhances young people’s strengths; and promotes positive outcomes for young people by providing opportunities, fostering positive relationships, and furnishing the support needed to build on their leadership strength” [97]. PYD follows the Social Ecological Model to engage the youth at the intrapersonal, interpersonal, and environmental levels. Evidence suggest that PYD can positively influence youth behaviors, particularly when working with vulnerable youth and those in child welfare [96, 98]. PYD does not primarily target narrow problems to be solved, such as pregnancy and contraceptive use, but develops assets that youth practice to make decisions about their life. We know that contraceptives prevent pregnancy and those in systems use less contraception, but gaps exist in the literature on what factors can increase the use of contraception for this population. The primary aim of this study is to examine how PYD impacts the use of birth control in a high-risk sample of youth and determine what other attitudes and behaviors influence that use.

3.2 Methods

3.2.1 Study Population

This study utilized data collected from surveys of 1,916 youths aged 12-21 from 2015-2019 prior to the delivery of an evidence-based adolescent pregnancy prevention and youth development program. Indiana Proud and Connected Teens (IN-PACT) aimed to provide evidence-based sexual health education to adolescents in child welfare agencies and juvenile corrections. Surveys were completed on paper and uploaded into a REDCap database by the evaluation staff, separate from the intervention facilitators. Four curriculums were delivered from 2015-2019 to 158 different cohorts of youth ranging from 2 to 31 attendees. This analysis focused on the 597 youth (36.8% of total population) that had a history of system involvement and were sexually active within the last three months. Categorization of youth into those with system involvement came from cohorts delivered at child welfare group settings, juvenile correctional facilities, anyone who answered that they lived with a foster parent, and anyone who answered yes to ever being arrested or detained. This project was determined to be exempt by the Indiana University Institutional Review Board.

3.2.2 Outcome Measure

Youth were asked in the past three months, which birth control method(s) did you or your sexual partner use. The select all that apply list included none, withdrawal, condoms, dental dams, emergency contraception, birth control shot, birth control patch, birth control ring, birth control pills, IUD or intrauterine device, implant, and other. Those that responded none only and/or withdraw only were classified as none, those that responded condoms or dental dams only were classified into condoms only, and all others

were classified as hormonal or hormonal and condom use. The ordinal outcome increases protection from unintended pregnancy in each category, with hormonal or hormonal with condoms considered the most effective form of contraception.

3.2.3 Independent Measures

Independent measures included demographics (age, gender, sexual minority), pregnancy attitudes scale [99] (5-items, Range=5-25, $\alpha=.856$, example item: *If you or your partner got pregnant, it would be embarrassing for your family*), positive youth development skills [100] (23-items, Range=23-144, $\alpha=.938$, example item: *I try to see the other person's point of view*) whether the youth thought they were very likely to graduate high school, type of system involvement, and Adverse Childhood Experiences [101] (ACEs, 0-8 events). The youth development skills measure is a composite score of four Likert-type scales with five answer options: decision making (5-items, Range=5-25, $\alpha=.859$, example item: *When you have a decision to make, how often would you say you looked for information to help understand a problem*), goal setting (4-items, Range=4-20, $\alpha=.898$, example item: *When setting a goal, how often would you say you looked at the steps needed to achieve the goal*), future vision (8-items, Range=8-40, $\alpha=.882$, example item: *I believe I can influence how my life will turn out*), and communication skills (6-items, Range=6-30, $\alpha=.862$, example item: *When I talk to others, I organize my thoughts in my head before speaking*).

3.2.3 Analyses

Sample characteristics and measures were examined by gender and in bivariate analyses by the ordinal birth control use outcome measure. The need for nesting at the cohort level was investigated for the model using unconditional mixed effects models.

We used a threshold of the ICC greater than .05. The model was then adjusted for the cohort level (ICC=0.067). Interactions by gender were tested for each of the predictor measures. Interaction terms were created and tested in both bivariate and multivariate with the predictor and interaction term. We found no interactions, and both genders were analyzed together. Race was not included in the analysis as this population is overrepresented by youth of color (68.8%), and it was not significant at either the bivariate or multivariate levels.

All variables in bivariate analyses were included in a multi-level multivariable ordinal logistic regression to identify key attitudes, barriers, and behaviors that are associated with more effective types of contraceptive use. Due to high co-linearity between trauma items, only the ACEs score was used in the birth control use analyses. All analyses were performed in SPSS Version: 28.0.1.1 [75] and STATA 17 [76].

3.3 Results

The sample consisted of 597 youth who had a history of involvement with either child welfare (51.1%) or juvenile justice (86.8%), in which 33.3% were involved with both. The mean age was 16.09 (SD=1.39), 50.8% were female, and 49.2% were male. A majority of the sample used some type of contraception in the last three months (13.9% used condom only and 41.5% used hormonal method or hormonal and condoms), and 44.6% did not use any contraception in the last three months. Many identified as a sexual minority (32.6%), and the majority (59.3%) thought they were very likely to graduate high school. In bivariate analysis by gender (Table 3.1), contraception use, sexual diversity, more negative attitudes towards pregnancy, being involved with child welfare,

and being in both systems were more likely in females ($p < .05$). Males had a higher proportion of those in juvenile justice involvement ($p < .001$).

Bivariate analyses of contraceptive use by the independent measures are presented in Table 3.2. In a multivariable model (Table 3.3), adjusted for cohort and all other variables in the model, older age (OR=1.20, 95% CI: 1.05-1.38), being female (OR=3.21, 95% CI: 2.05-5.03), and more positive youth development skills (OR=1.02, 95% CI: 1.01-1.03) were associated with more effective methods of birth control. That is, for every one-year increase in age, the odds of using a higher level of birth control increased by 20% (using a condom over no method and using hormonal or hormonal and condoms over using only condoms). And for every one-point difference on the PYD scale, the odds of using a higher level of birth control increase by 3%. Being a sexual minority, belief they would graduate high school, having a negative attitude towards pregnancy, and ACE score were not associated with birth control use.

3.4 Discussion

Contraceptive use in our sample was only 55.4% compared to national samples of sexually active high school students at 89.7% [92] and is consistent with other studies examining the prevalence of contraceptive use for youth involved in systems [34]. Youth in our sample had a high frequency of trauma (3.85 ACEs) compared to a 2020 national sample of youth, where 77.7% had an ACE score less than 3 [102]. Older age, being a female, and PYD were associated with the use of more effective contraception. This study provides key insights about PYD's impact on contraceptive use for a population that is at an elevated risk of pregnancy and early parenthood. PYD tools can be an

effective pathway to promote the skills needed for adolescents to make appropriate decisions about contraceptive use.

Positive youth development was significantly related to more effective contraceptive use in our sample. A review of PYD's impact on risky sexual behaviors in general adolescents found that PYD programs can promote adolescent sexual and reproductive health, but more research is needed to provide more specific characteristics [103]. However, in that review, none of the samples focused on high-risk youth involved in systems who could benefit from PYD skills [95]. Use of PYD tools in this population have the potential to expand to other decision making around sexual health and overall well-being over the life course [96].

Our study included males, a particular interest and recommendation by the Office of Population Affairs [104]. Although females in our study were more likely to use more effective contraception, there were no interactions between gender and other predictors suggesting that PYD exerts a similar effect. Decisions and actions around effective contraception should not be gendered, and little is known about effective approaches for engaging males in the prevention of unintended adolescent pregnancies [105]. Partners are frequently involved in contraceptive decisions, specifically around condoms and contraceptives, and pregnancy-capable young people frequently list partners as an important component of their contraceptive decision-making [106, 107]. We found positive youth development skills can be an effective tool for all genders in giving youth and their partners the skills they need to make better decisions around contraception.

We can make inferences about contraceptive use for youth with a history of system involvement; however, there are some limitations to our work. First, this was a

cross-sectional study where predictability of factors cannot be determined. Second, we are limited by recall bias, but studies have shown satisfactory reliability of adolescent self-report of sexual behavior [87-90]. Orr et al tested self-reported sex behavior diaries against biological STI screening. They found that only 7.0% had inconsistent responses, where a respondent reported no sex, but had a positive STI. When they recoded the variable using three different questions asking about sex (number of partners, number of sexual interactions, and sex behaviors), none had inconsistent reporting [87]. Last, the results of the present study are subject to sampling bias. Our sample included only facilities and child welfare community groups that were willing to participate, which reduces the extrapolation of our obtained results to the general population of adolescents. This study also had notable strengths. While no differences were identified by race and ethnicity, the findings from this study represent a diverse population of adolescents. People identifying as sexual and gender minorities are also represented in this analysis. Furthermore, this study fills important gaps in knowledge around PYD's impact on contraception use for adolescents who have a history of system involvement. Access to contraceptive care is essential, but rarely offered to youth in residential facilities [31]. Additional tools are needed for youth involved in systems as they have high trauma, mental health concerns, and typically a history of abuse or neglect.

Table 3.1. Demographic and bivariate analysis by gender among 597 sexually active adolescents who have a history of system involvement

Variables	Total n=597 ^a n,% or mean(SD)	Females n=300 n,% or mean(SD)	Males n=290 n,% or mean(SD)	p-value
<i>Contraception Use</i>				
None	266, 44.6%	110, 36.7%	155, 53.4%	<.001
Condom only	83, 13.9%	29, 9.7%	51, 17.6%	
Hormonal/hormonal & condom	248, 41.5%	161, 53.6%	84, 29.0%	
<i>Demographics</i>				
Age, in years, Range 12-20	16.09 (1.39)	15.84 (1.39)	16.34 (1.30)	<.001
Gender				
Female	300, 50.8%			
Male	290, 49.2%			
Sexual minority ^b				
Yes	188, 32.6%	161, 53.3%	25, 8.9%	<.001
No	389, 67.4%	130, 44.7%	255, 91.1%	
Race				
White (non-Hispanic)	183, 31.2%	112, 37.8%	69, 24.4%	<.001
Black/African American	154, 26.3%	49, 16.6%	104, 36.7%	
Hispanic/Latino	110, 18.8%	66, 22.3%	42, 14.8%	
Multiple Races	126, 21.5%	66, 22.3%	59, 20.8%	
Other Race	13, 2.2%	3, 1.0%	9, 3.2%	
Very likely to graduate high school				
Yes	349, 59.3%	184, 62.2%	160, 55.9%	.428
No	240, 40.7%	112, 37.8%	126, 44.1%	
Negative attitude towards pregnancy 5-items, Range=5-25, α =.856	12.9 (5.10)	13.3 (5.00)	12.37 (5.11)	.025

Variables	Total n=597 ^a n,% or mean(SD)	Females n=300 n,% or mean(SD)	Males n=290 n,% or mean(SD)	p-value
<i>Positive youth development skills</i>				
Decision making 5-items, Range=5-25, $\alpha=.859$	16.18 (4.39)	16.31 (3.97)	16.08 (4.77)	.525
Goal setting 4-items, Range=4-20, $\alpha=.898$	14.53 (3.96)	14.65 (3.72)	14.47 (4.15)	.723
Future vision 8-items, Range=8-40, $\alpha=.882$	31.37 (6.74)	31.59 (6.36)	31.12 (7.17)	.400
Communication 6-items, Range=6-30, $\alpha=.862$	21.46 (5.11)	21.59 (4.80)	21.42 (5.40)	.678
<i>Trauma</i>				
Child welfare involvement				
Yes	287, 51.1%	191, 67.0%	94, 34.7%	<.001
No	275, 48.9%	94, 33.0%	177, 65.3%	
Juvenile justice involvement				
Yes	507, 86.8%	235, 81.3%	266, 92.4%	<.001
No	77, 13.2%	54, 18.7%	22, 7.6%	
Dual involvement				
Yes	197, 33.3%	126, 42.0%	70, 24.1%	<.001
No	400, 66.7%	220, 58.0%	174, 75.9%	
ACEs ^c	3.85 (2.38)	4.43 (2.23)	3.23 (2.36)	<.001

^a 7 subjects missing gender.

^b Sexual minority=any youth who identified as transgender or not straight.

^c ACEs= Number of Adverse Childhood Experiences.

Table 3.2. Frequency and bivariate analyses of birth control use in the past three months for 597 sexually active adolescents with a history of system involvement

Factors ^a	No use n=266	Condom use n=83	Hormonal/Hormonal & condom use n=248	Crude OR (95% CI)
<i>Demographics</i>				
Age, in years, Range 12-20	16.09 (1.39)	15.84 (1.39)	16.34 (1.3)	1.16 (1.04, 1.30)
Gender				
Female	110, 41.5%	29, 36.7%	161, 65.7%	2.35 (1.72, 3.21)
Male	155, 58.5%	51, 63.7%	84, 34.3%	ref.
Sexual minority ^b				
Yes	78, 30.8%	24, 29.6%	86, 35.4%	1.20 (0.86, 1.67)
No	175, 69.2%	57, 70.4%	157, 64.6%	ref.
Very likely to graduate high school				
Yes	136, 51.9%	57, 69.5%	156, 63.7%	1.17 (0.10, 1.36)
No	126, 48.1%	25, 30.5%	89, 33.3%	ref.
Positive youth development skills 23-items, Range=23-115, $\alpha=.938$	80.44 (16.67)	85.22 (17.10)	86.29 (16.25)	1.02 (1.01, 1.03)
Negative attitude towards pregnancy 5-items, Range=5-25, $\alpha=.856$	12.9 (5.1)	13.3 (5.0)	12.37 (5.11)	1.03 (0.10, 1.06)
<i>Trauma</i>				
ACEs Score, Range 0-8 ^c	3.85 (2.38)	4.43 (2.23)	3.23 (2.36)	1.09 (1.02, 1.16)

^a All factors were analyzed as continuous variables except gender, sexual minority, and likelihood to graduate high school.

^b Sexual minority=any youth who identified as transgender or not straight.

^c ACEs= Number of Adverse Childhood Experiences.

Table 3.3. Ordinal logistic regression adjusted at the cohort level examining factors associated with more effective contraceptive methods for 557 sexually active adolescents with a history of system involvement

Factor ^a	n or range ^b	OR1 (95% CI) ^c	OR2 (95% CI) ^d
Age	12 – 20	1.20 (1.06, 1.36)	1.20 (1.05, 1.38)
Gender			
Female	283	2.54 (1.77, 3.65)	3.21 (2.05, 5.01)
Male	274	ref.	ref.
Sexual minority ^e			
Yes	180	1.17 (0.82, 1.67)	0.66 (0.43, 1.02)
No	377	ref.	ref.
Very likely to graduate high school			
Yes	330	1.57 (1.13, 2.18)	1.32 (0.92, 1.90)
No	227	ref.	ref.
More positive youth development skills	23 – 115	1.02 (1.01, 1.03)	1.02 (1.01, 1.03)
Negative attitude towards pregnancy	5 – 25	1.02 (0.99, 1.06)	1.03 (0.99, 1.07)
ACEs Score ^f	0 – 8	1.08 (1.01, 1.16)	1.04 (0.97, 1.12)

^a All factors were analyzed as continuous variables except gender, sexual minority, and likelihood to graduate high school.

^b n for categorical variables and range for continuous variables.

^c Adjusted for cohort.

^d Adjusted for cohort and all other factors listed in Table 3.3.

^e Sexual minority=any youth who identified as transgender or not straight.

^f ACEs=Number of Adverse Childhood Experiences.

CHAPTER 4

RISK AND PROTECTIVE FACTORS ASSOCIATED WITH THE PERPETRATION AND VICTIMIZATION OF DATING VIOLENCE AMONG YOUTH WITH A HISTORY OF SYSTEM INVOLVEMENT

4.1 Introduction

Youth dating violence affects millions of young people in the U.S., and can take place in person, online, or through technology [108]. Youth dating violence is on the rise, with youths at the highest risk [41, 109, 110]. The 2021 Youth Risk Behavior Survey (YRBS) estimated that 11% of youths, 14-18 years were victimized by sexual violence by anyone in the previous year (10.2% for females and 6.7% for males) and 8.5% were victimized by physical dating violence in the previous year (15.3% for females and 4.0% for males) [111]. Dating violence has been associated with poor mental health outcomes (like depression, anxiety, and suicidality) and in sexual risk behaviors, such as not using condoms and having multiple partners, and in substance use [112, 113]. In addition, for pregnancy capable persons, dating violence can negatively impact the ability to negotiate condom use [42] and increase the risk for unplanned pregnancy [43].

Youth dating violence, also called “dating violence,” is perpetrating or being victimized by physical violence, sexual violence, psychological aggression, or stalking. Prevalence of dating violence is hard to capture due to the variations in how researchers collect and categorize different types of dating violence [41, 114-116]. Behaviors included in dating violence can be categorized by who does what (e.g., perpetration, victimization), and by the type of behavior (physical violence, controlling behaviors), and overall (any experience of dating violence). Among 14,190 high school students in 2014,

20.2% reported perpetration and 33.4% reported any dating violence in the last 12 months [117]. Data from 6,390 U.S. youths, reported a 27.7% rate of dating abuse victimization in the past 12 months [118]. A 2016 meta-analysis reported results from 96 studies for youths aged 13 to 18 finding a 20% lifetime prevalence rate of overall physical dating violence, a female perpetration rate of 25%, a male victimization rate of 13%, and a female and male victimization rate of 21% [41]. Additionally, most of these outcomes are asked about lifetime or in the past year.

Identified risk factors are typically described in the Social Ecological Model of intrapersonal, interpersonal, and environmental factors [43, 119, 120]. Risk factors for dating violence fall across all domains of the Social Ecological Model, including younger age, female gender, male gender, low healthy relationship attitudes, risky sexual behaviors (such as multiple partners and non-use of condoms), being a sexual minority, history of depression, delinquency, and the experience of traumatic events or life stressors [43, 114, 115, 121, 122]. Gender is stratified in many studies involving youths as results on gender are inconsistent [115]. Some studies identify a higher risk for dating violence for female adolescents while others identify a higher risk for male adolescents [43, 115, 122]. There are also significant gender differences in what risk factors are associated with dating violence for females and males. Domestic violence had a stronger association with physical abuse in females than in males [115]. In addition, sexual minority youths are at an increased risk for dating violence [123].

Differences also emerge in the perpetration and victimization of dating violence. The strongest risk markers for perpetration are victimization, approval of violence, risky sexual behaviors, alcohol use, depression and delinquency [121]. Victimization, on the

other hand, is strongly associated with maltreatment (sexual and psychological abuse, neglect, witnessing domestic violence, and physical abuse) [115]. In general population samples, aggressive family dynamics impact both perpetration and victimization [124]. With these differences, using both perpetration and victimization can provide insights on what drives each and where similarities lie. While research on youth dating violence is extensive, there are very limited studies that focus on youths with a history of system involvement.

Youth involved in systems, specifically those with a history of juvenile justice involvement, those with a history of child welfare involvement and those with dual involvement (juvenile justice and child welfare), are at an increased risk of dating violence [121, 125, 126]. Typically, the system status is an independent factor in analyses, and few studies focus on these populations specifically with regard to dating violence [121, 126, 127]. There are a small number of studies that focus on dating violence among youth involved in the child welfare [125, 126] or juvenile justice systems [113, 128-130]. In studies of youth with child welfare involvement, exposure to family violence, types of abuse and neglect, ACEs, and placement stability are related to youth dating violence. Each of these studies are comprised of youth with open cases in child welfare, leaving out an important subpopulation who had past experience with the child welfare system in their lives. Studies of youths with open cases have focused on victimization where most are conducted with female participants. A 2009 study of females involved in the juvenile justice system found that dating violence was associated with early sexual onset, unwillingness of initial sexual experience, drug use, and low self-efficacy about preventing youth dating violence [128].

Youths with involvement in both child welfare and juvenile justice are particularly vulnerable in that they both share risk factors of those in juvenile justice and child welfare, and these risk factors tend to be greater in number and complexity. These youths with dual system involvement have higher rates of mental health needs, substance use, and education related challenges compared to those with only one system of care [131]. We do not know about the effect of different types of system involvement on dating violence.

There is a need for more research to identify risk and protective factors of dating violence for youth in systems [122, 132]. There is less known about dating violence among youth in systems, and there are few evidence-based interventions designed for these youth, in large part because of challenges in access to youths in systems, in collecting and sharing data across systems, and in cross-system collaboration [131]. The objective of this study is to identify risk and protective factors for recent perpetration and victimization of dating violence by gender for youth with a history of system involvement, with the long-term goal of informing interventions tailored to meet the needs of this population of adolescents.

4.2 Methods

4.2.1 Study Population

This study included a sample of youth with any type of system involvement. A total of 1,916 surveys were collected from youths aged 12-21, surveyed between 2015 and 2019 prior to the delivery of an evidence-based adolescent pregnancy prevention program. Indiana Proud and Connected Teens (IN-PACT) aimed to provide evidence-based sexual health education to youth receiving services in child welfare agencies,

currently incarcerated in a juvenile justice facility, and from a high school and a community-based program serving adolescents with high rates of system involvement.

Surveys were completed on paper and uploaded into a REDCap database by the dedicated evaluation staff of the program. We included 1,430 youths (88.3% of the total population) that had a history of any type system involvement. Youth were considered child welfare involved if they were recruited from a child welfare agency or if they answered that they had ever lived with a foster parent. Youth were considered juvenile justice involved if they were recruited from a juvenile correctional facility or if they answered yes to ever being arrested or detained. Those that were both coded into child welfare and juvenile justice involved and were categorized as dual involved. All those without a history of system involvement were excluded. This project was determined to be exempt by the Indiana University Institutional Review Board.

4.2.2 Outcome Measures

Youth were asked their recent experiences of perpetration and victimization of dating violence [133, 134] in the past three months with a partner, where a partner was defined as a girlfriend, boyfriend, or sexual partner. There were six yes/no items, three measuring physical violence and controlling behaviors perpetration, and three measuring physical violence and controlling behaviors victimization. *Physical violence perpetration* included one item: hit, slapped, pushed, shoved, kicked or thrown something at a partner. *Controlling behavior perpetration* included two items: checked a partner's cell phone, email, or logged into their social media account without their permission and tried to control where a partner goes, who they see, or what they do. *Physical victimization* included one item: was hit, slapped, pushed, shoved, kicked, or had something thrown at

you by a partner. *Controlling victimization* had two items: had a partner check your cell phone, email, or log into your social media account without your permission; or had a partner try to control where you go, who you see, or what you do. Partner was defined in the questions as a girlfriend, boyfriend, or sexual partner. The two final outcomes were perpetration of dating violence and victimization of dating violence, an additive score of physical and controlling types of dating violence respectively. The range for each outcome was 0 to 3.

4.2.3 Independent Measures

Intrapersonal measures included age in years, race and ethnicity (White, Black/African American, Hispanic, multiple races, and other race), gender (female vs. male), and sexual minority status, defined as transgender or not heterosexual.

Interpersonal independent measures included a scale measuring healthy relationship attitudes [133] (Likert-type 9 item scale, Range 9-36, $\alpha=0.897$, example item: *How important is it that couples support each other?*), and partnered sexual behaviors, such as whether they had sex in the last three months. Environmental independent measures included Adverse Childhood Experiences score [101] (ACEs, Range 0-8, example item: *Lived with a parent/guardian that got divorced*), and system involvement (child welfare only, juvenile justice only, or dual involvement).

4.2.4 Statistical Analyses

Sample characteristics were examined in gender stratified bivariate analyses by the total (of three maximum possible) of perpetration items and the total (of three maximum possible) of victimization items using Poisson regression. Then age, sexual minority status, healthy relationship scale, recent sex, ACEs score, and the type of system

involvement were stratified by gender and included in four multivariate Poisson regressions modeling each perpetration and victimization by gender, estimating relative risk ratios (RR). We did not have a specific hypothesis about race or ethnicity, so did not include it in multivariable analysis, and instead only provided these data for sample description. We note that, similar to national data, in our system-involved study population, youths of color are overrepresented (63.3%). All analyses were performed using STATA 18.0 [76].

4.3 Results

The total sample consisted of 1,430 (88.3%) youths who had a history of system involvement with 18.0% in child welfare only, 51.3% in juvenile justice involvement only, and 30.7% with a history of dual system involvement (Table 4.1). A total of 410 (30.2%) reported perpetrating either physical dating violence or controlling dating behaviors in the past three months, and 560 (40.9%) reported being victims of either physical dating violence or controlling dating behaviors, where 27.2% had both perpetrated and been victimized by dating violence.

In bivariate analyses (Table 4.2), youth who were victims of physical dating violence (female RR=4.87, 95% CI: 3.97-5.97 & male RR=5.88, 95% CI: 4.61-7.51) and controlling dating behaviors (female RR=11.37, 95% CI: 8.39-15.40 & male RR=17.09, 95% CI: 11.40-25.63) were more likely to perpetrate dating violence than those who were not victims of physical or controlling dating behaviors, respectively. Youth who perpetrated physical dating violence (female RR=3.77, 95% CI: 3.18-4.46 & male RR=3.67, 95% CI: 2.97-4.50) and controlling dating behaviors (female RR=5.17, 95% CI: 4.30-6.20 & male RR=5.37, 95% CI: 4.51-6.40) were more likely to be victims of

dating violence than those who did not perpetrate physical and controlling behaviors, respectively.

4.3.1 Perpetration

For females, 231 (37.9%) reported perpetrating dating violence, and for males 175 (24.2%) reported perpetrating dating violence. In multivariable modeling (Table 4.3) adjusting for all variables in each model, perpetration of dating violence for females was associated with being a sexual minority (RR=1.33, 95% CI: 1.07-1.65), having lower healthy relationship attitudes (RR=0.97, 95% CI: 0.95-0.99), having sex in the last 3 months (RR=1.94, 95% CI: 2.36-2.41), and having a history of juvenile justice involvement only (RR=3.35, 95% CI: 2.36-4.74) and dual involvement (RR=2.23, 95% CI: 1.56-3.18) compared to those in child welfare only. Perpetration of dating violence for males was associated with having lower healthy relationship beliefs (RR=0.98, 95% CI: 0.97-1.00) and having sex in the last 3 months (RR=1.90, 95% CI: 1.47-2.47).

4.3.2 Victimization

For females, 278 (44.8%) reported being victims of dating violence. For males, 274 (38.0%) were victims of dating violence. In multivariable modeling (Table 4.3) adjusting for all variables in each model, being a victim of dating violence for females was associated with being a sexual minority (RR=1.31, 95% CI: 1.09-1.58), having lower healthy relationship beliefs (RR=0.98, 95% CI: 0.96-1.00), having sex in the last 3 months (RR=1.84, 95% CI: 1.54-2.22), more ACEs (RR=1.11, 95% CI: 1.07-1.16), and having a history of juvenile justice involvement only (RR=2.12, 95% CI: 1.63-2.76) and dual involvement (RR=1.57, 95% CI: 1.20-2.05) compared to those in child welfare only. Being a victim of dating violence for males was associated having sex in the last 3

months (RR=2.11, 95% CI: 1.75-2.54), more ACEs (RR=1.06, 95% CI: 1.02-1.10), and having a history of juvenile justice involvement only (RR=1.81, 95% CI: 1.20-2.75) compared to those in child welfare only.

4.4 Discussion

Our sample had high rates of both perpetration and victimization of dating violence compared to national samples and similar to those in high-risk samples [130]. The victimization of physical violence in our study population was 23.8% compared to 8% for the 2021 YRBS data [111]. Compared to a U.S. sample of 14,190 youths in high school who were in a relationship in the past year, our sample had higher rates of perpetration and victimization of dating violence [117]. There was large overlap between perpetration and victimization, with those who reported perpetrating also reporting victimization. Given the social desirability to not report perpetration and victimization of dating violence, the true rates of physical dating violence may be even higher. Victims of dating violence were highly likely to also be perpetrators, suggesting a possible pathway to perpetration that should be investigated in the future.

Gender differences emerged in our sample, with females being more likely to perpetrate and be victims of all types of dating violence. Being a sexual minority was associated with perpetration and victimization of dating violence for females, but not the males in our sample, contrary to what we found in the literature [135]. Sexual minority youths are disproportionally represented in child welfare and juvenile justice systems [136]. The lack of association between dating violence and sexual minority status in males may be due to our male sample being largely from the juvenile justice facilities, where we hypothesize that there is significant underreporting as not being heterosexual

and not being cisgender may affect one's safety in their environment [137]. We also found gender differences in how one's history of system involvement impacted the outcomes. Having both child welfare and juvenile justice involvement increased the risk for females for both outcomes, but not for males. The different finding between genders may be due to the disproportionate representation of males in our sample with juvenile justice involvement and females with child welfare involvement. Understanding results by gender is helpful when planning youth dating violence prevention programs for this population as the delivery of programs can be in gendered facilities. Our data suggest that curricula should be inclusive of all genders and sexual orientations.

Lower positive healthy relationship scores were related to more dating violence perpetration for both genders and victimization for females. In the evaluation of a relationship curriculum in low-income, high-risk youth, teaching healthy relationships had an impact on improving attitudes towards dating violence [138], and may also be a successful tool in a population of youth with a history of system involvement. Healthy relationships skills are modifiable and can be addressed with skills-based curricula.

Recent sex in the last three months was associated with all outcomes for both genders. In relationships where sex takes place, there is more communication and negotiations, such as consent, condom use, and contraceptive use leading to potential for conflict. Romantic relationships can take on 'higher stakes' as they increase in salience and duration leading to more opportunity for conflict, and once violence is established in a relationship, it may be difficult to stop [139].

In our sample, both males and females with higher ACEs scores had increased risks of being victims of dating violence. These findings are consistent with the results of

other research investigating different types of ACEs on the victimization of dating violence in college-aged youth, but different from their finding that ACE items were also associated with perpetration [127]. Laporte et al suggests that adolescents carry negative childhood experiences into their intimate relationships, where the risk of victimization is higher for females and perpetration is higher for males [140].

Our sample had a mean of 3.85 ACEs, indicating approaches to dating violence prevention need to be trauma-informed. Trauma-informed approaches should be guided by the principles of safety, trustworthiness, peer support, collaboration and mutuality, empowerment, voice and choice, and cultural/historical/gender issues, where the approach needs constant attention, caring awareness, sensitivity, and cultural change [141].

Our research though, is not without limitations. There is the risk of social desirability bias for questions on these sensitive topics. However, we have made the period of recall (3 months) shorter than the typical 1-year period of recall [111, 117]. Evidence suggest that shorter recall periods tended to yield more accurate reporting [142]. Second, our study was cross-sectional, and we cannot estimate causality of the outcomes. We have no information of the history of perpetration or victimization prior to this point nor do we have information about the relationship in which the violence may have happened. Although we are limited by sampling bias, since our sample was mostly recruited from residential facilities and child welfare community groups that cannot be generalized to all youths, these data are valuable in examining ways to deliver dating violence prevention to youth with system involvement, a population with high risks and needs.

Even with these limitations, there are strengths in our study that need to be highlighted. Our study fills the gaps in previous literature because it investigated risk and protective factors of both perpetration and victimization by gender for those with a history of system involvement. Our innovative approach addressed how different types of involvement influence dating violence. We drew our sample from an understudied group of youths at high-risk for dating violence, and we included a sexually diverse sample of youth. Factors that influenced the perpetration and victimization fell across the three levels of the Social Ecological Model, the intrapersonal, interpersonal, and environmental. Our research suggests that prevention programs for dating violence should be trauma-informed, should build healthy relationship skills, and should be sexually inclusive.

Table 4.1. Demographics by gender of the 1,430 youths with a history of system involvement

Factors ^a	Total (n=1430) Mean (SD) or n,%	Female (n=652, 46.5%) Mean (SD) or n,%	Male (n=749, 53.5%) Mean (SD) or n,%
Age (in years), <i>Range 12-21</i>	15.99 (1.41)	15.68 (1.44)	16.27 (1.31)
Race			
White	511, 36.7%	269, 42.6%	232, 35.7%
Black/African American	345, 24.8%	103, 16.3%	237, 32.3%
Hispanic	246, 17.7%	119, 18.8%	123, 16.8%
Multiple Races	260, 18.7%	134, 21.2%	119, 16.2%
Other Race	30, 2.2%	7, 1.1%	22, 3.0%
Sexual Minority ^b			
Yes	425, 31.1%	348, 55.9%	65, 9.0%
No	941, 68.9%	275, 44.1%	657, 91.0%
Positive Healthy Relationship Scale <i>9 items, Range 9-36, $\alpha=0.897$</i>	28.96 (6.37)	30.01 (5.22)	28.03 (7.10)
Had Sex in the Last 3 Months			
Yes	733, 51.3%	340, 52.2%	380, 49.3%
No	697, 48.7%	312, 47.9%	380, 50.7%
ACEs Score, <i>Range 0-8^c</i>	3.86 (2.36)	4.41 (2.25)	3.38 (2.34)
System Involvement			
Child Welfare Involvement Only	258, 18.0%	168, 25.8%	77, 10.3%
Juvenile Justice Involvement Only	733, 51.3%	234, 35.9%	488, 65.2%
Dual Involvement	439, 30.7%	250, 38.3%	184, 24.6%
Any Perpetration	410, 30.2%	231, 37.9%	175, 24.2%
Physical	202, 14.7%	145, 23.5%	55, 7.6%
Controlling Behaviors	357, 26.1%	195, 31.6%	159, 21.9%
Any Victimization	560, 40.9%	278, 44.8%	274, 38.0%
Physical	328, 23.8%	177, 28.5%	148, 20.3%
Controlling Behaviors	512, 37.3%	254, 40.7%	251, 34.8%

^a All factors were analyzed as categorical variables except age, healthy relationship scale, and ACEs Score.

^b Sexual Minority=any youth who identified as transgender or not heterosexual.

^c ACEs=Number of Adverse Childhood Experiences.

Table 4.2. Gender stratified bivariate analysis of perpetration of and victimization of dating violence among youths with a history of system involvement

Factors ^a	n or range ^d	Perpetration ^b (n=1,333) Crude RR (95% CI)		n or range ^d	Victimization ^c (n=1,343) Crude RR (95% CI)	
		Female (n=610)	Male (n=723)		Female (n=621)	Male (n=722)
Age (in years)	12-21	1.06 (0.99, 1.14)	1.00 (0.91, 1.10)	12-21	1.06 (0.99, 1.12)	1.05 (0.98, 1.12)
Sexual Minority ^e						
Yes	393	1.33 (1.08, 1.63)	1.09 (0.72, 1.65)	400	1.41 (1.18, 1.69)	0.71 (0.50, 1.01)
No	887	ref	ref	889	ref	ref
Positive Healthy Relationship Scale <i>9 items, $\alpha=0.897$</i>	9-36	0.97 (0.96, 0.99)	0.98 (0.97, 1.00)	9-36	0.98 (0.97, 1.00)	0.99 (0.98, 1.00)
Had Sex in the Last 3 Months						
Yes	678	1.91 (1.56, 2.35)	1.94 (1.50, 2.50)	680	1.92 (1.61, 2.29)	2.01 (1.68, 2.41)
No	655	ref	ref	663	ref	ref
ACEs Score ^f	0-8	1.03 (0.99, 1.08)	1.02 (0.97, 1.07)	0-8	1.11 (1.07, 1.16)	1.05 (1.01, 1.09)
System involvement						
Child Welfare Involvement Only	231	ref	ref	231	ref	ref
Juvenile Justice Involvement Only	694	3.08 (2.26, 4.20)	1.78 (1.08, 2.92)	696	2.09 (1.63, 2.67)	2.05 (1.41, 2.99)
Dual Involvement	408	2.07 (1.50, 2.85)	1.29 (0.74, 2.22)	416	1.61 (1.25, 2.07)	1.60 (1.06, 2.40)
Any Perpetration		-	-	400	6.92 (5.59, 8.57)	6.25 (5.20, 7.50)
Physical		-	-	197	3.77 (3.18, 4.46)	3.67 (2.97, 4.50)
Controlling Behaviors		-	-	349	5.17 (4.30, 6.20)	5.37 (4.51, 6.40)
Any Victimization	537	13.90 (9.78, 19.74)	27.15 (16.12, 45.73)			
Physical	314	4.87 (3.97, 5.97)	5.88 (4.61, 7.51)			
Controlling Behaviors	494	11.37 (8.39, 15.40)	17.09 (11.40, 25.63)			

^a All factors were analyzed as categorical variables except age, positive healthy relationship scale, and ACEs Score.

^b Perpetration was the additive score of three types of perpetration: hit, slapped, pushed, shoved, kicked, or thrown something at a partner^g; checked a partner's cell phone, email, or logged into their social media account without their permission; or tried to control where a partner goes, who they see, or what they do.

^c Victimization was the additive score of three types of victimization: was hit, slapped, pushed, shoved, kicked or had something thrown at you by a partner^g; had a partner check your cell phone, email, or log into your social media account without your permission; or had a partner try to control where you go, who you see, or what you do.

^d n for categorical variables and range for continuous variables.

^e Sexual Minority=any youth who identified as transgender or not heterosexual.

^f ACEs=Number of Adverse Childhood Experiences.

^g Partner is defined as a girlfriend, boyfriend, or sexual partner.

Table 4.3. Poisson regression stratified by gender examining factors associated with perpetration and victimization of dating violence for youths with a history of system involvement

Factor ^a	Female Perpetration ^c (n=562)			Male Perpetration ^c (n=692)		
	n or range ^b	Adjusted RR (95% CI) ^e	p-value	n or range ^b	Adjusted RR (95% CI) ^e	p-value
Age	12 – 19	1.01 (0.93, 1.09)	0.89	12 – 20	0.99 (0.90, 1.10)	0.89
Sexual Minority ^f						
Yes	319	1.33 (1.07, 1.65)	0.01	60	1.18 (0.78, 1.80)	0.43
No	243	ref		632	ref	
Positive Healthy Relationship Scale	9 – 36	0.97 (0.95, 0.99)	0.003	9 – 36	0.98 (0.97, 1.00)	0.048
Had Sex in the Last 3 Months						
Yes	298	1.94 (1.56, 2.41)	<0.0001	346	1.90 (1.47, 2.47)	<0.0001
No	264	ref		346	ref	
ACEs Score ^g	0 – 8	1.04 (0.99, 1.09)	0.09	0 – 8	11.04 (0.98, 1.10)	0.18
System Involvement						
Child Welfare Involvement Only	138	ref		59	ref	
Juvenile Justice Involvement Only	212	3.35 (2.36, 4.74)	<0.0001	461	1.63 (0.96, 2.77)	0.07
Dual Involvement	212	2.23 (1.56, 3.18)	<0.0001	172	1.11 (0.63, 1.997)	0.71
	Female Victimization ^d (n=572)			Male Victimization ^d (n=691)		
Age	12 – 19	1.00 (0.93, 1.07)	0.95	12 – 20	1.05 (0.97, 1.12)	0.22
Sexual Minority ^f						
Yes	327	1.31 (1.09, 1.58)	0.004	59	0.75 (0.52, 1.08)	0.13
No	245	ref		632	ref	
Positive Healthy Relationship Scale	9 – 36	0.98 (0.96, 1.00)	0.02	9 – 36	0.99 (0.98, 1.00)	0.09
Had Sex in the Last 3 Months						
Yes	301	1.84 (1.54, 2.22)	<0.0001	345	2.11 (1.75, 2.54)	<0.0001
No	271	ref		346	ref	
ACEs Score ^g	0 – 8	1.11 (1.07, 1.16)	<0.0001	0 – 8	1.06 (1.02, 1.10)	0.002
System Involvement						
Child Welfare Involvement Only	138	ref		59	ref	
Juvenile Justice Involvement Only	216	2.12 (1.63, 2.76)	<0.0001	459	1.81 (1.20, 2.75)	0.005
Dual Involvement	218	1.57 (1.20, 2.05)	0.001	173	1.43 (0.92, 2.22)	0.11

^a All factors were analyzed as categorical variables except age, positive healthy relationship scale, and ACEs Score.

^b n for categorical variables and range for continuous variables.

^c Perpetration was the additive score of three types of perpetration: hit, slapped, pushed, shoved, kicked, or thrown something at a partner^h; checked a partner's cell phone, email, or logged into their social media account without their permission; or tried to control where a partner goes, who they see, or what they do.

^d Victimization was the additive score of three types of victimization: was hit, slapped, pushed, shoved, kicked or had something thrown at you by a partner^h; had a partner check your cell phone, email, or log into your social media account without your permission; or had a partner try to control where you go, who you see, or what you do.

^e Factors listed were mutually adjusted.

^f Sexual Minority=any youth who identified as transgender or not heterosexual.

^g ACEs=Number of Adverse Childhood Experiences.

^h Partner is defined as a girlfriend, boyfriend, or sexual partner.

CHAPTER 5

OVERALL DISCUSSION

5.1 Reducing Adolescent Unintended Pregnancies

Adolescents are at high-risk for unintended pregnancies, and parenting at that age can be particularly difficult with unique challenges [143]. Adolescents who have a child before the age of 20 are less likely to finish high school, more likely to need public assistance, more likely to have low income as adults, and more likely to have children who face challenges like poorer education, behavioral, and health outcomes [143]. Our work in this dissertation has been to identify key strategies using the Social Ecological Model to reduce adolescent pregnancy in populations that are at very high risk of unintended pregnancies, youth from rural communities and youth with a history of system involvement [6, 16, 17, 40]. We did this by investigating three known predictors of pregnancy, early sexual onset, contraceptive use, and dating violence [37, 40, 42]. Our aim is to use our findings to inform public health pregnancy prevention programs who serve these youth in our state and nationally.

In chapter 2, we investigated early sexual onset and delaying sex in middle school rural youth. All three outcomes measured: ever had sex, the intention to abstain until the end of high school, and the intention to have sex in the next 6 months; they were all associated with age, abstinence attitudes, agency to refuse sex, parent communication about sex, and a history of juvenile justice involvement. Ever having sex and the intention to have sex in the next 6 months were associated with older age, more negative attitudes towards abstinence, lower agency for sexual refusal, more parent communication about sex, and having a history of juvenile justice involvement.

Inversely, the intention to abstain until the end of high school was associated with younger age, more positive attitudes towards abstinence, better agency to refuse sex, less parent communication about sex, and not having a history of juvenile justice involvement. These factors mapped onto the Social Ecological Model. The intrapersonal factors included age and attitudes, the interpersonal factors included agency to refuse sex and parent communication, and the environmental factor included juvenile systems involvement.

In this study, gender was not associated with a behavior that already occurred (ever had sex) but was associated with the intention of future behaviors. Being male was associated with planning to have sex in the next 6 months, and being female was associated with planning to abstain until the end of high school. These findings may be related to the traditional gender roles in rural communities [144] and the stigmatizing nature of pregnancy in those areas [24].

When we think about strategies to promote adolescents' choices and plans to abstain for middle school rural youth, we can target interventions around these factors, impacting multiple levels of the Social Ecological Model. For example, these data suggest that in the delivery of pregnancy prevention programs for middle school adolescents should be trauma-informed, build sexual agency skills, and promote the acceptance of abstinence as a behavior and not a defining of oneself.

In chapter 3, we studied the impact of positive youth development (PYD) on the use of contraception for sexually active youth with a history of system involvement. A history of child welfare involvement and juvenile justice involvement are complex systems that increase the barriers to pregnancy prevention and contraceptive use [131,

145]. In our sample, the use of contraception was low (44.6% used none) compared to national samples [92] demonstrating the need for more effective programming on pregnancy prevention for this population. We found that being older, female, and having more positive youth development skills were associated with more effective contraceptive methods.

PYD is defined as “intentional, pro-social approach that engages youth within their communities, schools, organizations, peer groups, and families in a manner that is productive and constructive; recognizes, utilizes, and enhances young people’s strengths; and promotes positive outcomes for young people by providing opportunities, fostering positive relationships, and furnishing the support needed to build on their leadership strength” [97]. In our study, PYD included skills such as decision making, goal setting, future vision, and communication. These skills have been implemented in marginalized populations [5, 95], but not measured in their ability to influence contraceptive decisions.

Our inclusion of males in this study was innovative and provided ways to improve contraceptive use for males, where little is known about effective approaches to prevent teen pregnancy [104]. We also identified a need for early prevention as those that were older were more likely to use contraception even though the entire sample had sex within 3 months of the survey. PYD follows the Social Ecological Model to engage the youth at the intrapersonal, interpersonal, and environmental levels [97]. Our data suggest we should implement developmentally appropriate PYD programs early in middle school (approximately 11-13 years of age) for both genders to promote healthy behaviors around contraception [72, 146].

In chapter 4, we explored dating violence in adolescents with a history of system involvement. Dating violence was organized into perpetration of physical and controlling behaviors and victimization of physical and controlling behaviors. The behaviors of perpetration and victimization are interdependent and should be assessed independently of one another [147]. We also stratified the analyses by gender as previous studies on the influence of gender have been inconsistent [115].

We identified high rates of both perpetration and victimization for both genders compared to a national sample [117]. Females in our sample were more likely to perpetrate and be victims of dating violence. For females, being transgender or not heterosexual was associated with higher likelihood of being a perpetrator and victim. We also found gender differences in the impact of system involvement on the outcomes. Having both child welfare and juvenile justice involvement increased the risk for females for both outcomes, but not for males. Youth who live in residential facilities are typically gendered, and these data can help better target interventions for those locations.

A higher likelihood of both perpetration and victimization for males and females was associated with recent sex and lower healthy relationship beliefs. Healthy relationships skills can be taught and practiced in at school and facilities using trauma-informed practices [148]. The identification of factors fell across all levels of the Social Ecological Model, suggesting that prevention programs for dating violence should be delivered early in middle school before relationships start, be trauma-informed, work on building healthy relationship attitudes and skills, and should be sexually inclusive.

5.2 Innovation and Public Health Impact

The studies in this dissertation represent innovative work investigating understudied, high-need populations. Studies on the topic of rural youth have focused on highlighting the problem of high birth rates, but not finding solutions in how we approach prevention programs. Youths with a history of system involvement are hard to engage and reach. There are limited studies that investigate how youth development and healthy relationships impact the risk for unintended pregnancy. Little work has been done to shift the narrative from risk to a more asset based positive youth development. Our translational work will directly inform pregnancy prevention programs in our region with our partners at HCET and be disseminated in national journals.

These data serve a critical function highlighted by the CDC, to inform interventions and resources to areas with the greatest need to improve the life opportunities of adolescents facing significant health disparities and to have the greatest effect on overall U.S. adolescent birth rates [149]. For rural youth and youth with a history of system involvement, we need to integrate pregnancy prevention across the Social Ecological Model to reduce early sexual onset, increase contraceptive use, and decrease dating violence. These integrations can help in the prevention of unintended pregnancies. At the intrapersonal level, we need to begin programs at an earlier age (ideally in middle school where youth develop healthy peer, romantic, and sexual relationship skills) [146], be inclusive of gender and sexual minorities, and build on positive youth development skills and attitudes. At the interpersonal level, we need to build healthy relationships skills, agency skills, and include caregivers in our programs. At the environmental level, we need to be trauma-informed and provide training to our

law enforcement partners on reducing youth arrests [150]. Principles of trauma-informed programs include safety, trustworthiness, peer support, collaboration and mutuality, empowerment voice and choice, and cultural/historical/gender issues. Trauma-informed programs need constant attention, caring awareness, sensitivity, and cultural change to be effective [141]. These studies indicate a need for early delivery of pregnancy prevention programs and services for higher risk youth that are trauma-informed, sexually inclusive, and promote PYD and healthy relationships.

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CURRICULUM VITAE

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Education

Doctor of Philosophy: Epidemiology, November 2023

Indiana University- Purdue University Indianapolis

Master of Public Health in Epidemiology, August 2016

Indiana University- Purdue University Indianapolis

Bachelor of Arts in Psychology and Sociology, May 2005

Indiana University Bloomington

Professional Experience

Indiana University 2009-present

Clinical Research Leader

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Clinical Research Technician

Answers & Insights Market Research 2005-2007

Project Manager

Awards

Nominated membership Science Program for Excellence in Science 2016

American Association for the advancement of Science

First Place for Population Science/Epidemiology Poster by Graduate Students 2015

Simon Cancer Center Research Day

New Investigator Award Finalist 2013

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Publications

1. Pierce BJ, Muzzey FK, Bloomquist KR, Imburgia TM. Effectiveness of Family Centered Treatment Using Propensity Score Matching: Reunification and Days in Care in Indiana Child Welfare Services. Submitted to Children and Youth Services Review. 2022;136(C) DOI: 10.1016/j.chilyouth.2022.106395
2. Enujioke SC, McBrayer K, Soe KC, Imburgia TM, Robbins C. Impact of COVID-19 on Post Graduate Medical Education and Training. BMC Medical Education. 2021 Dec;21(1):1-6
3. Imburgia TM, Shew ML, Gravitt PE, Katzenellenbogen RA. Considerations for Child Cancer Survivors and Immunocompromised Children to Prevent Secondary HPV-associated Cancers. Transplantation (2020). PMID: 32890137
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 7. Kim J, Armstrong-Richardson E, Imburgia TM, Jagers JW, Hall JA. The effects of case characteristics on teamwork in family meetings. *Child & Family Social Work*. 2018 Dec 12. DOI: 10.1111/cfs.12627
 8. Bloomquist KR, Imburgia TM, Danh M, Pierce BJ, Hall JA. Studying Process in a Title IV-E Waiver evaluation project: Interviews with regional and executive managers. *Journal of Public Child Welfare*. 2018 May 24;1-24. DOI: 10.1080/15548732.2018.1473823
 9. Ott MA, Moon J, Imburgia TM, Yang Z, Tu W, Auerswald CL. Community engagement and venue-based sampling in adolescent male STI prevention research. *Journal of Adolescent Health*. 2018 Mar 1;62(3):S58-64. PMID: 29455719
 10. Ermel A, Shew ML, Imburgia TM, Brown M, Qadadri B, Tong Y, Brown DR. Redetection of human papillomavirus 16 infections of the cervix in mid-adult life. *Papillomavirus Research*. 2018; pii: S2405-8521(17)30054-X. PMID: 29355777
 11. Hall JA, Imburgia TM, Bloomquist KR, Kim J, Armstrong-Richardson E, Danh M, Hensel DJ. Partnership for multimethod evaluation in child welfare: Title IV-E Waiver Demonstration Program. *Child Welfare Journal*. 2017;95(5).

12. Pierce BJ, Jagers JW, Bloomquist KR, Imburgia TM, Danh M, Hall JA. Utilization of Concrete Services in Child Welfare: A mixed-method analysis of a Title IV-E Waiver Demonstration Program. *Journal of Public Child Welfare*. 2017, DOI: 10.1080/15548732.2017.1377139
13. Imburgia TM, Hendrix KS, Donahue KL, Sturm LA, Zimet GD. Predictors of influenza vaccination in the U.S. among children 9-13 years of age. *Vaccine*. 2017;35(18):2338-2342. PMID: 28359619
14. Head KJ, Imburgia TM, Zimet GD, Shew ML. Women's understanding of their Pap & HPV test results: Implications for patient-provider communication. *Journal of Communication in Healthcare*. 2017;9(5):1-11. DOI: 10.1080/17538068.2017.1282085
15. Kim J, Pierce BJ, Jagers JW, Imburgia TM, Hall JA. Improving child welfare services with family team meetings: A mixed methods analysis of caseworkers' perceived Challenges. *Children and Youth Services Review*. 2016;70:261-268. DOI: 10.1016/j.chilyouth.2016.09.036
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 20. Cummings T, Zimet GD, Brown D, Tu W, Yang Z, Fortenberry JD, Shew ML. Reduction of HPV infections through vaccination among at-risk urban adolescents. *Vaccine*. 2012;30(37):5496-5499. PMID: 22188843
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Oral Presentations

1. Imburgia TM, Hensel DJ, Hunt A, Cope-Barnes D, Ott MA. Factors Associated with Contraceptive Use for Youth Involved in Systems. Oral presentation

- presented by Imburgia at the American Public Health Association Annual Meeting. Atlanta, GA, November 2023.
2. Imburgia TM, Hensel DJ, Hunt A, James R, Ott MA. Factors Associated with Sexual Initiation and Intention to Abstain in Rural Middle School Youth. Roundtable presented by Imburgia at the American Public Health Association Annual Meeting. Atlanta, GA, November 2023.
 3. Pierce BJ, Imburgia TM, Winters DE, Muzzey FK, Armstrong-Richardson E. Interventions of Indiana's IV-E Waiver Demonstration. Oral symposium led by Pierce at the Society for Social Work and Research. Washington, DC in January, 2020.
 4. Muzzey FK, Imburgia TM, Pierce BJ. Effectiveness of Family Centered Treatment Using Propensity Score Matching in the Indiana IV-E Wavier Demonstration. Oral symposium presented by Muzzey at the Society for Social Work and Research. Washington, DC in January, 2020.
 5. Imburgia TM, Armstrong-Richardson E, Winters DE, Pierce BJ. The Increase and Impact of Relative Placements on Safety, Permanency, and Well-Being during Indiana's IV-E Wavier. Oral symposium presented by Imburgia at the Society for Social Work and Research. Washington, DC in January, 2020.
 6. Winters DE, Imburgia TM, Armstrong-Richardson E, Pierce BJ. Effects of Concrete Service Spending on Stability for Youth Receiving Child Welfare Services. Oral symposium presented by Winters at the Society for Social Work and Research. Washington, DC in January, 2020.

7. Head KJ, Imburgia TM, Zimet GD, Shew ML. Women's understanding of their Pap and HPV test results: Implications for patient-provider communication. Oral platform presentation presented by Head at the 4th Biennial D.C. Health Communication Conference, Fairfax, VA, April 2017.
8. Armstrong-Richardson E, Kim J, Imburgia TM, Jagers JW, Hall JA. Relationship between systems-related indicators and connectivity among transition aged youth in foster care. Oral platform presentation presented by Armstrong-Richardson at the Society for Adolescent Health and Medicine Annual Meeting, New Orleans, LA, March 2017.
9. Hall JA, Imburgia TM, Kim J, Armstrong-Richardson E, Bloomquist KR, Danh M, Pierce BJ. Symposium: Multimethod evaluation: Title IV-E Waiver demonstration program. Oral symposium presented by Bloomquist at the Society for Social Work and Research. New Orleans, LA, January 2017.
10. Imburgia TM, Pierce, BJ, Danh M, Bloomquist KR, Hall JA. Building partnerships between evaluators and child welfare agencies through continuous quality improvement and instrument development. Oral symposium presented by Imburgia at the Society for Social Work and Research Annual Meeting. New Orleans, LA, January 2017.
11. Bloomquist KR, Imburgia TM, Pierce, BJ. Exploring the use and impact of concrete services in child welfare practice. Oral symposium presented by Bloomquist at the Society for Social Work and Research Annual Meeting. New Orleans, LA, January 2017.

12. Bloomquist KR, Danh M, Imburgia TM, Pierce BJ, Hall JA, Jagers J, Kim J. Using qualitative interviews in state-level child welfare evaluation research. Oral platform presented by Bloomquist Annual meeting of the Tenth Annual Congress of Qualitative Inquiry, University of Illinois at Urbana-Champaign, Urbana, IL, May 2016.
13. Hall JA, Cummings T, Danh M, Bloomquist KR, Pierce BJ. Symposium: Mixed methods evaluation: Title IV-E Waiver demonstration program. Oral symposium presented by Hall at the Society for Social Work and Research Annual Meeting. New Orleans, LA, January 2015.
14. Cummings T, Danh M, Bloomquist KR, Hensel D, Barton WH, Hall JA. Measuring child and adolescent well-being in the child welfare system. Oral symposium presented by Cummings at the Society for Social Work and Research Annual Meeting. New Orleans, LA, January 2015.
15. Danh M, Cummings T, Bloomquist KR, Hensel D, Barton WH, Hall JA. Family case manager perceptions of client needs and system services. Oral symposium presented by Danh at the Society for Social Work and Research Annual Meeting. New Orleans, LA, January 2015.
16. Bloomquist KR, Cummings T, Danh M, Hensel D, Barton WH, Hall JA. Regional & Executive Manager Interviews 2013 & 2014. Oral symposium presented by Bloomquist at the Society for Social Work and Research Annual Meeting. New Orleans, LA, January 2015.
17. Kasting M, Cummings T, Zimet GD, Rosenberger JG, Stupiansky NW. Lack of knowledge has consequences: HPV vaccination among young MSM. Oral

- platform presented by Kasting at the 29th International Papillomavirus Conference, Seattle, WA, August 2014.
18. Bloomquist KR, Danh M, Graham-Dotson Y, Cummings T, Barton WH, Hall JA, Turney, B. Case study analysis in child welfare evaluation research. Oral platform presented by Bloomquist Annual meeting of the Tenth Annual Congress of Qualitative Inquiry, University of Illinois at Urbana-Champaign, Urbana, IL, May 2014.
 19. Cummings T, Ott MA, Auerswald, CL. Factors influencing abstinence, anticipation, and delay of sex among adolescent boys in high-STI prevalence communities. Oral platform presented by Cummings at the Society for Adolescent Health and Medicine Annual Meeting, Atlanta, GA, March 2013.

Poster Presentations

1. Klemme, PM, Kaboi M, Imburgia TM, Pierce BJ, The Impact of COVID-19 on Emotional Health and Well-Being in School Personnel. Council on Social Work Education Annual Program Meeting, Anaheim, CA, November 2022.
2. Ashirifi GD, Imburgia TM, Pierce BJ. Child welfare case mangers perspective of unmet needs among kinship caregivers. Annual meeting of the 16th Annual Congress of Qualitative Inquiry, University of Illinois at Urbana-Champaign, Urbana, IL, May 2020.
3. Muzzey FK, Imburgia TM, Pierce BJ. Effectiveness of Family Centered Treatment Using Propensity Score Matching in a Child Welfare Setting. National Child Welfare Evaluation Summit. Washington, DC, August 2019.

4. Bloomquist KR, Kim J, Imburgia TM, Armstrong-Richardson E. Indiana's Title IV-E Waiver Evaluation Project: Mixed-method Efforts in Building Evidence, Strengthening Practice, and Informing Policy. National Child Welfare Evaluation Summit. Washington, DC in August, 2019.
5. Imburgia TM, Armstrong-Richardson E, Hensel DJ, Hall JA. Placement decisions impact on youth well-being in the foster care setting. Society for Adolescent Health and Medicine Annual Meeting, Washington, DC, March 2019.
6. Ermel A, Shew ML, Imburgia TM, Qadadri B, Tong Y, Brown DR. Association of HPV 16 DNA and anti-HPV 16 Antibodies. 32nd International Papillomavirus Conference. Sydney, Australia, October 2018.
7. Imburgia TM, Hensel DJ, Pierce BJ, Armstrong-Richardson E, Hall JA. Strategies to improve adolescents' status in caregiver substance abuse cases in the child welfare system. Society for Adolescent Health and Medicine Annual Meeting, Seattle, WA, March 2018
8. MacDonald K, Imburgia TM, Auerswald CL, Ott MA. Sexting among adolescent urban males. The Society for Adolescent Health and Medicine Annual Meeting, Seattle, WA, March 2018
9. Armstrong-Richardson E, Imburgia TM, Hall JA. Case Characteristics Influencing Difficulty Placing Child Welfare Children and Youth in Treatment Facilities. Society for Adolescent Health and Medicine Annual Meeting, Seattle, WA, March 2018
10. Imburgia TM, Hendrix K, Donahue K, Sturm L, Zimet GD. Factors associated with influenza vaccination in the U.S. among children 9-13 years of age. Society

- for Adolescent Health and Medicine Annual Meeting, New Orleans, LA, March 2017.
11. Armstrong-Richardson E, Imburgia TM, Pierce BJ, Jagers JW. The impact of youth engagement on child welfare service satisfaction. 20th National Conference on Child Abuse and Neglect. Washington, DC, August 2016.
 12. Cummings T, Hensel DJ, Danh M, Bloomquist KR, Pierce BJ, Kim J, Jagers JW, Hall JA. The difference in age: Case workers perceptions of youth in the child welfare system. Society for Adolescent Health and Medicine Annual Meeting, Washington, DC, March 2016.
 13. Shew ML, Cummings T, Ermel A, Brown DR. Episodic detection of high risk HPV 16 from adolescence to adulthood. 30th International Papillomavirus Conference. Lisbon, Portugal, September 2015.
 14. Cummings T, Ermel A, Brown DR, Shew ML. Episodic detection of high risk HPV 16. IU Simon Cancer Center Annual Cancer Research Day. Indianapolis, IN, May 2015.
 15. Cummings T, Hensel DJ, Bloomquist KR, Danh M, Pierce BJ, Hall JA. Increased use of concrete services for child welfare in Title IV-E Waiver expansions. Society for Adolescent Health and Medicine Annual Meeting, Los Angeles, CA, March 2015.
 16. Danh M, Cummings T, Bloomquist KR, Hensel DJ, Hall J, Barton WH. The Effects of child welfare cases on child well-being. Society for Adolescent Health and Medicine Annual Meeting, Austin, TX, March 2014.

17. Nagel P, Cummings T, Hansen C, Ott MA. Predictors of sexting in a university population. Society for Adolescent Health and Medicine Annual Meeting, Atlanta, GA, March 2013.
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