Analyzing optimism and opioid misuse among Florida justice-involved children

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Abstract

Aim: Adolescents in the criminal justice system, called justice-involved children (JIC), are particularly vulnerable in the modern opioid misuse (OM) epidemic. After released, relapse and overdose occur at higher rates than the general population. The current study assesses optimism and likelihood of past-six-month consumption of non-prescription or illicit opioids among JIC.

Methods: The study examines a sample of 79,960 JIC from the Florida Department of Juvenile Justice. Multivariate logistic regression was employed, controlling for gender, race, family income, age, history of mental problems, history of depression, and county of residence were.

Results: JIC who reported very low optimism on the final screen were over 9 times more likely report past-six-month OM compared to those with high optimism while adjusting for covariates.

Conclusions: Further research is needed to understand the potential for optimism to serve as a protective factor. Optimism can be developed, and therefore can possibly be incorporated to design novel interventions or integrated into empirically validated treatment programs to precipitate uptake.

Introduction

Opioid Misuse

The opioid misuse (OM) epidemic compels attention to justice-involved children (JIC).

OM refers to consuming illicit opioids and/or prescription opioids non-medically [1]. Users are progressively funneled into criminal justice system, especially as they shift from prescription opioids to heroin and other illicit opioids [2]. Substance abuse prevalence rates have been observed as high as 80% in JIC [3,4]. After released from detention facilities, relapse and overdose occur at higher rates than the general population [5]. Identifying predictors of OM in JIC can provide useful information concerning the etiology of opioid related overdose and death.

In 2016, the number of overdose deaths involving OM (including prescription opioids and illegal opioids such as heroin and illicitly manufactured fentanyl) was 5 times higher than in 1999. On average, 115 Americans die every day from an opioid overdose [6]. Justice-involved populations are at higher risk of opioid use disorder, overdose, and OM related death [5]. To reduce harm among the population in the criminal justice system, researchers must uncover factors that increase the likelihood of OM initiation in JIC.

Optimism

Optimism may be a key factor that affects adolescent OM initiation and trajectory in JIC. There was substantial research on optimism in the context of health. A widely adopted conceptualization of optimism was dispositional optimism, which refers to a disposition that represents the extent to which people have positive, confident expectations about their own future outcomes [7]. Some data support the perspective that optimism and pessimism represent opposite ends of a single dimension

[8], while other evidence suggest that they are distinct constructs with differing relationships to various phenomena [9]. However, herein, optimism was employed synonymously with hope, aspirations and future orientation; and hopelessness was conceptualized as an extreme degree of low optimism. The overwhelming preponderance of evidence shows that optimism was linked to positive health and behavioral outcomes ranging from healthy development, healthy aging, to lower mortality risk among adults and adolescents [10,11]. Several studies found that optimism among adolescents was a protective factor that buffered the effects of childhood trauma, disadvantage, and other risk factors [12,13].

Optimism and Substance Abuse

There was scarce research that has directly tested the relationship between optimism and OM among adolescents, and less has examined JIC. However, compelling evidence indicates that a higher level of optimism was linked to lower levels of substance abuse among all adolescents as well as JIC [12,14-19]. In a longitudinal study of 1,354 JIC with high levels of substance abuse, Brooks and colleagues (2018) found significant bidirectional relationships between future orientation and all substance use outcomes (tobacco, marijuana, hard drugs, and alcohol), with higher levels of future orientation resulting in less future substance abuse.

The mechanisms by which low optimism is linked to a greater risk of OM may be that optimism: 1) has a direct effect on the neuroendocrine system and on immune responses, and 2) an indirect effect on health outcomes by promoting protective health behaviors, adaptive coping strategies and enhancing positive mood [20]. Evidence suggests that optimistic disposition potentiates endogenous pain inhibition across diverse ethnic backgrounds [21]. Greater optimism has been shown to be a significant moderator of the relationship between pain and daily prescription opioid use in adolescents with sickle cell disease, indicating that adolescents who were more optimistic were more accurate in matching their opioid use to their pain severity [18]. While higher optimism has been typically linked to positive outcomes [7,20,22,23], there was a "dark side" of optimism, such as unrealistic optimism and optimistic bias [24-26], that could potentially increase the likelihood of OM and the adverse outcomes related to OM. Optimistic bias is phenomenon that refers to when an individual believes his or her personal risk for a particular outcome is lower than for others in a similar risk group [26]. In a qualitative study of young adults in New York City, Frank, *et al.* [27] found that people who misused prescription opioids instead of heroin often perceived their use as being safer with a lower risk of overdose, even though the majority had a history of one or more overdoses. Likewise, Wilder, *et al.* [28] found that 70% of veterans on chronic opioid medication underestimated their risk for opioid overdose, even among those who were treated with methadone or buprenorphine for opioid use disorder.

The Current Study

There were limited studies that examine the relationship between optimism and OM among adolescents, and the literature review found only a single study that analyzed optimism and substance abuse among JIC [14]. The aim of the current study was to test whether levels of optimism were significantly associated with OM among JIC. Drawing empirical evidence, this study hypothesizes that JIC with lower levels of optimism will have a higher likelihood of OM. To test this hypothesis, the study leverages statewide data from the Florida Department of Juvenile Justice (FLDJJ). The FLDJJ sample was large (over 80,000 JIC), diverse and represents the third largest juvenile justice population in United States. Other known explanations of adolescent OM were considered: gender, race, age, family income, history of mental health problems, history of depression, and county of residence. This study was the first to test the possible association between optimism levels and OM among JIC.

Methods

Data

FLDJJ collects data on all youth who were arrested using a comprehensive assessment, the Positive Achievement Change Tool (PACT), and case management process [29]. The PACT was administered by trained personnel who conduct semistructured interviews using data collection software that guides all aspects of data collection. The software includes open-ended questions, an interview guide, the PACT manual and coding techniques. FLDJJ administers subsequent PACT assessments to monitor progress and improvement, and determine which of their programs are making the greatest impact in reducing recidivism. See Early, *et al.* [30] for thoroughly evaluation of the validity and reliability of the PACT. This report includes 80,441 JIC in the FLDJJ PACT dataset; <1% (n=481) of the total cases were omitted due to missing data on SU, resulting in a final dataset of 79,960 individuals.

Population

The population of 79,960 JIC represented all minors who entered the FLDJJ from 2004 to 2015, completed the Full PACT assessment, reached the age of 18 by year 2015, and had data on the current SU question. Nearly 38.3 % were non-Latinx White (n=30,591), 45.6% of subjects were non-Latinx Black or African American (n=36,443), 15.7% were Latinx (n=12,536), and 0.5% were another race (n=390). Roughly 21.9% of the sample were female (n= 17,497) and the mean age in 2007 was 14.

Measures

Opioid misuse: The construct current opioid misuse, abbreviated as OM, referred to using opioid prescription opioids non-medically and/or illicit opioids in the past six months. OM was operationalized via a dichotomous measure that reported whether or not the youth reported nonmedical or illicit opioids. The response items were (0) "none" or (1) "opioids, heroin, or other opioids". The data sources included self-reported data collected during the intake interview and official documents (such as arrests for OM or diagnosis of opioid use disorder).

Optimism: Optimism referred to the degree of hope, confidence, and/or aspirations in regard to one's own future. It was operationalized by a 4-item ordinal measure with higher numeric values representing lower optimism. The response items were: 0= high aspirations, sense of purpose, committed to better life; 1= normal aspirations, some sense of purpose or plan for a better life, 2= low aspirations, little sense of purpose or plan for a better life; 3= low aspirations, little sense of purpose or plan for a better life; or 4= believes nothing matters, expects to be dead soon." Optimism at first screen refers to the initial PACT assessment completed at intake usually after the first arrest. Optimism at final Screen refers to the last PACT assessment as of 2015, usually administered at the conclusion of an FLDJJ program or subsequent arrest.

Control variables

The study adjusted for known predictors of OM, which included race, gender, family income, age, history of mental diagnoses, history of depression, and county of residence. Gender was operationalized by a self-reported dichotomous measure (0= *male*, 1= *female*). Race and ethnicity were measured via a four-item nominal variable (0 =White, 1 = Black, 2 = Latinx, or 3 = other race or ethnicity). The term Latinx was used instead of Hispanic or Latina/o as a genderneutral alternative that is more inclusive of diverse gender identifications. Family income was measured via a four-item ordinal variable reporting the combined annual income of the youth and family. Response options were (0) under $15,000, (1) from $15,000 to $34,999, (2) from $35,000 to $49999, and (3) $50,000 and above. Age was operationalized via a continuous variable ranging from 18 to 26. Age was determined by Date of Birth in 2015, the cut-point for the youth to reach the age of 18 to be included in the sample.

History of mental health diagnosis was measured by a dichotomous variable reporting lifetime mental health diagnosis at intake. Response items were (0) no history of mental health diagnosis or (1) diagnosed with mental health problems. History of depression was measured by a four-item categorical variable reporting lifetime depression and anxiety at intake. Response items were (0) none, or no history of depression, (1) occasional, (2) consistent, or (3) impairment due to depression and anxiety. Residing county was measured via a 68 item categorical variable reporting the county in which the juvenile current lived.

Response options include the 67 counties in Florida and an option for out of state. The county data was not reported in the tables.

Analytical procedures

Data analysis was conducted using STATA, version 13 SE [13]. A complete case analysis was appropriate given that there were minimal missing data (<1%), missing data was Missing Completely At Random (MCAR) and the sample size was large. Demographic data were summarized using descriptive statistics. A chi-square test of independence was performed to compare whether there was a significant association between categorical variables and OM. An independent t-test was conducted to compare the means of the interval variable age for users versus nonusers. Multivariate logistic regression was used to calculate adjusted odds ratios (AORs) and 95% confidence intervals, while controlling for gender, race, family income, age, history of mental problems, history of depression, and county of residence were. The predicted probability and the predictive marginal log odds were estimated using the STATA margins procedures to estimate and graphically display the results. The Bayesian Information Criterion was used to determine adequate model fit. The study was approved by the Institutional Review Boards at the University of Florida and the FLDJJ.

Results

Univariate

Among the sample of 79,960 JIC in the FLDJJ system, 2.7% (2,137) reported past-sixmonth OM. Nearly 14% were at the highest level of optimism, 55% reported normal optimism, 30% had low optimism, and 1.1% reported the lowest level of optimism. Most JIC in the FLDJJ sample resided in the counties of Dade (11.3%) and Broward (8.2%).

Bivariate

JIC in FLDJJ who reported past six-month OM were more likely to have normal optimism at first screen (50%) but low optimism at final screen (50%), be males (68%), be White (81%), slightly younger, have an annual family income between $15,000 and $34,999 (48%), have no history of mental health diagnoses (68%), have none (38%) or occasional anxiety (38%) and reside in the counties of Pasco (8.3%), Pinellas (7.7%), and Palm Beach (7.2%) in Florida. The mean age of current users was 14. See Table 1 for complete descriptive statistics/ univariate analysis and bivariate analyses.

Multivariate

Table 2 displays the results of the multivariate logistic regression model estimating the association between optimism at first screen and final screen and likelihood of past-six-month OM while controlling for gender, race, age, household income, history of mental health diagnoses, history of depression, and residing county. In Model 1, analyzing baseline optimism, JIC who reported normal optimism were nearly twice as likely to report past-six-month OM (AOR: 1.78) compared to JIC with normal optimism. Those with low optimism were 3.5 times more likely (AOR: 3.48), and very low optimism were 4 times more likely report past-six-month OM (AOR: 3.97). There was a difference of 228.22 in the Bayesian Information Criterion between the two models, providing very strong support for Model 2, which analyzing optimism levels on the final screen. Therefore, the results and discussion in this study focused on Model 2.

Compared to those with high optimism, JIC who on the final screen reported: normal optimism were 2.4 times more likely (AOR: 2.44); low optimism were nearly 6 times more likely (AOR: 5.69), and

Table 1. Bivariate Analysis of All Variables in the Study and Past-Six-Month Opioid Misuse

	No Opioid Misuse		Opioid Misuse		Total	
	n	%	n	%	n	%
Optimism at First Screen						
High	13,197	17	175	8	13,372	17
Normal	45,709	59	1,066	50	46,775	59
Low	18,376	24	863	40	19,239	24
Very Low	541	1	33	2	574	1
Optimism at Final Screen						
High	10,763	14	95	4	10,858	14
Normal	43,443	56	904	42	44,347	56
Low	22,781	29	1,075	50	23,856	30
Very Low	836	1	63	3	899	1
Gender						
Male	61,006	78	1,457	68	62,463	78
Female	16,817	22	680	32	17,497	22
Race						
White	28,868	37	1,723	81	30,591	38
Black	36,266	47	177	8	36,443	46
Latinx	12,318	16	218	10	12,536	16
other	371	1	19	1	390	1
Age in 2007+ (Range=10-18 years)	14.14 (2.22)		13.90 (2.10)		14.13 (2.22)	
Family Income						
Under $15,000	20,248	26	467	22	20,715	26
From $15,000 to $34,999	40,864	53	1,019	48	41,883	52
From $35,000 to $49,999	11,445	15	397	19	11,842	15
$50000 & over	5,266	7	254	12	5,520	7
History of Mental Health Diagnosis						
None	65,019	84	1,450	68	66,469	83
Lifetime Diagnoses	12,804	17	687	32	13,491	17
History of Depression						
None	49,812	64	821	38	50,633	63
Occasional	21,176	27	810	38	21,986	28
Consistent	5,837	8	410	19	6,247	8
Impairment	998	1	96	5	1,094	1

Note: Results from the chi-square tests revealed that all categorical variables, including county of residence (not displayed) were statistically significant with a p value less than 0.001. "+" symbol indicates an interval variable, age. Mean was reported with standard deviation in parentheses. The results of the t-test indicate that age was statistically significant with a p value less than 0.001.

very low optimism were over 9 times more likely report past-six-month OM (AOR: 9.24). The odds ratios of OM for each level of optimism at first and final screen are graphically displayed in Figure 1.

All control variables in Model 2 were significantly associated with current OM, except history of mental health diagnoses and certain counties of residence (county of residence was not interpreted in the multivariate models and omitted in the tables). Females had a 42% increased likelihood of OM than males. Compared to Whites, Blacks were 91% less likely and Latinx were 65% less likely–which translates into Whites being 10 times more likely to report past-six-month OM than Blacks and nearly 3 times as likely as Latinx. A one-year increase in age was associated with a 4% decrease in chances of current OM. Family income levels above $35,000 were associated with a 23% to 53% higher likelihood of OM compared to incomes below $15,000. Compared to JIC with no history of depression, those with occasional depression had a 60% increased likelihood of OM, those with consistent depression were more than twice as likely, and those with impairment due to depression were 2.5 times more likely to report pastsix-month OM.

Table 2. Logistic Regression Estimating Past-Six-Month Opioid Misuse

	Model 1		Model 2	
	AOR	CI	AOR	CI
Optimism at First Screen (Ref=High)				
Normal	1.76***	[1.50,2.08]		
Low	3.48***	[2.94,4.12]		
Very Low	3.97***	[2.66,5.91]		
Optimism at Final Screen (Ref=High)				
Normal			2.44***	[1.97,3.02]
Low			5.69***	[4.59,7.06]
Very Low			9.24***	[6.57,13.00]
Gender (Ref=Male)				
Female	1.38***	[1.25,1.52]	1.42***	[1.29,1.56]
Race (Ref=White)				
Black	0.10***	[0.08,0.11]	0.09***	[0.08,0.11]
Latinx	0.34***	[0.30,0.40]	0.35***	[0.30,0.40]
other	0.95	[0.59,1.52]	0.96	[0.60,1.53]
Age in 2007	0.96***	[0.94,0.98]	0.96***	[0.94,0.98]
Family Income (Ref=Under $15,000)				
From $15000 to $34999	1.06	[0.95,1.19]	1.08	[0.96,1.21]
From $35000 to $49999	1.19*	[1.03,1.36]	1.23**	[1.07,1.42]
$50000 & over	1.42***	[1.21,1.67]	1.53***	[1.30,1.80]
Mental Health Diagnoses (Ref=None)				
Lifetime Mental Health Diagnoses	1.11*	[1.00,1.24]	1.08	[0.97,1.20]
History of Depression (Ref=None)				
Occasional	1.64***	[1.48,1.82]	1.61***	[1.45,1.79]
Consistent	2.27***	[1.98,2.60]	2.18***	[1.90,2.50]
Impairment	2.63***	[2.07,3.33]	2.49***	[1.96,3.16]
Constant	0.03***	[0.02,0.04]	0.02***	[0.01,0.03]
Observations	79960		79960	

Note: AOR= Adjusted odds ratios. 95% confidence intervals (CI) in brackets; * p < 0.05, ** p < 0.01, *** p < 0.001
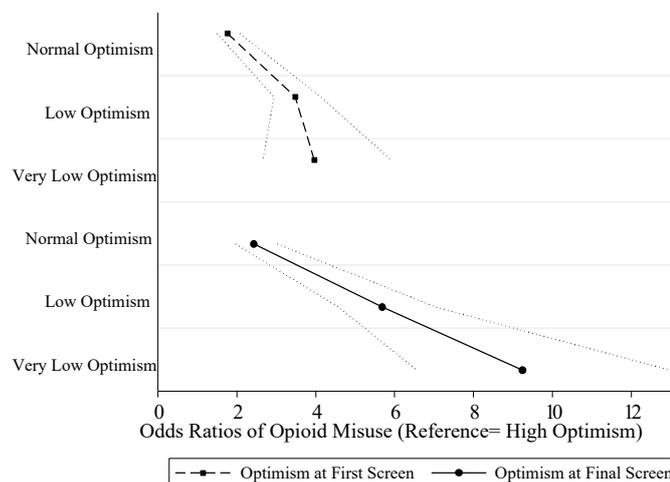

Figure 1. The Odds Ratios of the Association between Optimism and Past-Six-Month Opioid Misuse Controlling for Sociodemographic and Mental Health Factors

Discussion

The challenges that underlie justice-involvement and OM are multifaceted and interconnected, however evidence found herein indicates that optimism may be a uniquely significant protective factor. In this cross sectional analysis, optimism was the most impactful factor in relation to OM. Nearly a third of the sample, over 20,000 children, had low optimism – low aspirations and little sense of purpose or plans for a better life— and were 5 times more likely to consume illicit opioids and/or prescription opioids non-medically in the past six months than

those with high optimism –high aspirations, sense of purpose, and commitment to a better life. Nearly 900 JIC had the lowest degree of optimism, reporting that they believed nothing mattered and expected to be dead soon. These JIC were 8 times more likely to misuse opioids in past six months. These findings aligned with the multitude of empirical research showing that greater optimism was linked to less substance abuse [14,15,17].

Limitations

The study had limitations that provide context for interpretation. The JIC in FLDJJ may not represent all JIC in the United States. Nationally representative datasets can provide generalizable findings. Due to the cross-sectional data, the temporal sequence or directionality between optimism and OM cannot be determined. Longitudinal data can resolve these issues. Another key limitation was the reliance on youth self-report in the PACT assessment, particularly for optimism and OM. The methodological limitation of self-report delinquency measures are well known [31]. Instruments that have empirically verified inter-rater reliability and test-retest reliability can strengthen this vein of research.

Diverse categories of opioids were collapsed under a single umbrella. Disintegrating these different types of opioids in future research to define unique use patterns can provide useful insights. Likewise, optimism was used as an umbrella construct that included various terms that may represent distinct concepts. Fragmenting catchall concepts of optimism may uncover important nuances needed for effective interventions. These limitations should be addressed in future research.

Implications

Despite the limitations, the study advances the research on an unstudied health disparity population, JIC, contributes to the literature on the initiation of OM in the critical moment of a contemporary epidemic, and submits a potentially impactful protective factor. As stakeholders scramble in search of immediate solutions for the rapid increase in heroin, prescription opioid, and synthetic fentanyl related overdose fatalities, this study found compelling implications for prevention and treatment of OM for justice-involved populations. Evidence shows that optimism can be taught and developed and interventions that build optimism have had success [32]. Optimism can possibly play a key role in future solutions to the OM epidemic, or simply be integrated into empirically validated treatment programs to precipitate uptake [33]. Research on the predictors of OM among JIC must be developed further to translate these findings into interventions. Longitudinal designs are needed to determine the directionality between optimism and OM in JIC. Whether optimism has a direct or interactive effect, as suggested by Geers, *et al.* [34], must established.

Overall, there was an alarming deficit of research on juveniles in the criminal justice system, particularly in regard to substance abuse. Effective solutions require comprehensive evidence. In addition, the terminology must be evolved such at it humanizes rather than stigmatizing the children in the criminal justice system. The overwhelming majority of JIC enter the justice system due to trauma exposure, socioeconomic disadvantage, mental health problems, disproportionate minority contact, the criminalization of mental illness and related factors [3,35]. In that regard, the term "justice-involved children" was encouraged rather than delinquents, offenders, youth or other terms that dehumanize them or distract from the fact that they were children in need of childcare services.

Conclusion

The study examined optimism and discussed implications for prevention and treatment of OM in the contemporary moment of a national crisis. Low levels of optimism were the most impactful predictor of OM observed in the FLDJJ data. Those with the lowest degrees of optimism were 5 to 8 times more likely to consume illicit opioids and/or prescription opioids non-medically. The bright-side of these findings was that optimism can be developed and incorporated to design novel interventions or integrated into empirically validated treatment programs to precipitate uptake [32,33].

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