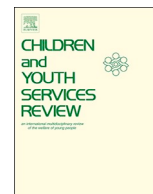




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Estimating the effects of independent living services on educational attainment and employment of foster care youth

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ABSTRACT

Transition-aged foster care youth have higher risks of adverse outcomes, notably in education and employment, than youth who do not spend time in foster care. For the purpose of assisting a successful transition of foster care youth to adulthood, states provide Independent Living Services (ILS) with federal funding support. This study aims to test ILS's effects on educational attainment and employment of foster care youth. We employ multi-state data sources: the National Youth in Transition Database (NYTD) Outcome survey, NYTD service files, and the Adoption and Foster Care Analysis and Reporting System, collected from foster youth ($N = 4206$). The dependent variables are high school completion, post-secondary education, and full-time employment measured at age 21. The independent variable is any ILS use in the following areas during the ages of 17–18: academic support, career preparation, employment or vocational training, mentoring, or education financial assistance. Propensity Score Matching was used to adjust for potential selection bias and pre-existing differences in observation data between youth who received and did not receive ILS. The weighted logistic regression analyses show that foster youth using ILS are significantly more likely to complete high school education (Odds Ratio = 1.25, $p = .03$), have a post-secondary education (Odds Ratio = 1.20, $p = .03$), and work full-time (Odds Ratio = 1.24, $p = .04$) in emerging adulthood. We discuss the gaps and challenges in current research that estimates ILS effects. The findings suggest that it is critical to fully implement these services, explore approaches for providing more complete and equitable access, and continue work that further explicates key factors in receipt and effectiveness of ILS for transition-aged youth.

1. Introduction and background

Youth who age out of the foster care system experience the transition to adulthood differently than their non-foster-care-involved peers (Berzin, Singer, & Hokanson, 2014; Courtney, Dworsky, Lee, & Raap, 2010; Fowler, Toro, & Miles, 2009). Young adults often rely on family support both financially and emotionally in emerging adulthood while they explore and develop adult identities, have post-secondary education, or enter the workforce (Arnett, 2000; Furstenberg, 2015). Youth leaving foster care face little or lower levels of supports from family. Research has shown that former foster youth who report higher levels of services and support from significant adults and peers during the transition to adulthood better navigate available resources (e.g. applying for FAFSA, registering for classes) and have better adult outcomes than their peers who report little to no social support (Hass, Allen, & Amoah, 2014; Jones, 2012; Lenz-Rashid, 2006). With limited

supports and resources, foster youth tend to be forced into independent adulthood sooner than their non-foster-care-involved peers (Avery & Freundlich, 2009; Berzin et al., 2014; Furstenberg, 2015). Transition-aged youth often experience increased risks for homelessness, low educational attainment, unemployment, substance abuse, and incarceration (Braciszewski & Stout, 2012; Courtney et al., 2010; Fowler et al., 2009; Hernandez & Naccarato, 2010).

The Chafee Foster Care Independence Program (CFCIP) was designed to support youth aging out of the foster care system to successfully transition to adulthood by providing a variety of supports, including expanded availability and utilization of independent living services (ILS). This study aims to estimate the effects of independent living services on education and employment outcomes for foster care youth, using large scale national data and propensity score matching.

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1.1. Challenges in transition to adulthood

Despite high demands for a college or specialized degree, foster youth report low rates of high school completion, and consequently, post-secondary education (Day, Riebschleger, Dworsky, Damashek, & Fogarty, 2012; Hernandez & Naccarato, 2010; Pecora, 2012). While in care, foster youth grapple with numerous barriers that lead to low educational attainment. Along with placement instability, youth in care experience frequent school changes (Pecora et al., 2005), which result in delays in enrollment, missing school records, changes in curriculum, and interruptions in school supports (Gillum, Lindsay, Murray, & Wells, 2016; Hook & Courtney, 2011). These issues often leave foster youth at a disadvantage in academic engagement and timely progress through required materials. Consequently, high school graduation rates among former foster youth are estimated to be considerably lower than their non-foster-care peers (Berzin, 2008; Courtney et al., 2010).

The majority of former foster youth report a desire to pursue post-secondary education, but very few report that they were able to enroll in or complete post-secondary education programs (Courtney et al., 2010; Pecora et al., 2005). Literature suggests that foster youth face multiple challenges that may affect their ability to participate in post-secondary education, including unstable housing, limited financial resources, scarce information on the education system and financial assistance programs, and lack of access to mentoring (Rosenberg & Kim, 2018; Casey Family Programs, 2010; Hernandez & Naccarato, 2010; Naccarato & Park, 2009). These educational outcomes are also reflected in former foster youth's employment outcomes. Previous research has found that former foster youth are less likely to be employed than their non-foster-care-involved peers (Courtney et al., 2010; Havlicek, 2011). Moreover, former foster youth report much lower average earnings than their non-foster-care-involved peers, due to underemployment or low wages (Glasmeier & Nadeau, 2017; Havlicek, 2011). Research comparing former foster youth and a national sample of similar-aged peers has found that, in comparison to their peers, foster youth's employment rates are 20% lower and their earnings are approximately 50% lower: these differences remain significant across all education levels (Okpych & Courtney, 2014). The lack of employment skills and opportunities can put former foster youth at elevated risks for life-time adverse outcomes, such as homelessness and poverty.

1.2. Independent living services for foster youth

The John H. Chafee Foster Care Independence Act (FCIA) was passed in 1999 and created the Chafee Foster Care Independence Program (CFCIP). This program provides funding to states for independent living services for youth aging out of the foster care system. FCIA introduced several expanded supports for older youth in foster care and those who are likely to age out of care. For example, FCIA doubled funds available for independent living services from \$70 million to \$140 million, which eliminated a minimum age limit for independent living service use and allowed the states to expand the eligibility option for youth aging out of care until age 21 (Fernandes-Alcantara, 2017; GAO, 2007). FCIA also extended Medicaid coverage to older foster youth and allowed states to use up to 30% of funds on room and board for former foster youth up to the age of 21 (Pergamit, McDaniel, & Hawkins, 2012). FCIA was amended in 2002 to include the Education and Training Voucher Program (ETV), which provides \$5000 toward educational costs for any youth pursuing post-secondary education or vocational training (GAO, 2007). In addition to FCIA, the Fostering Connections to Success and Increasing Adoptions Act was enacted in 2008 to extend service eligibility age to 21 (Fostering Connections Act, 2008). This legislation gives states discretion to expand services under FCIA (CFCIP and ETV funds) for the transition to adulthood for youth aged 21 and younger. While these two programs provide states with increased funding and expanded services, not all states implement services in the same manner. States are given the

option to set eligibility requirements, funding amounts, and types of services provided, often leading to significant discrepancies across states (GAO, 2007).

The key purpose of the Chafee Foster Care Independence Program (CFCIP) is to identify youth who are likely to remain in foster care until their 18th birthday and provide services for successful independent living and a smooth transition to adulthood. The services that states provide through FCIA include: academic and educational support, career preparation, financial literacy and management, housing education, health education and risk prevention, relationship skills, mentoring, and everyday living skills (Fernandes-Alcantara, 2017). These services can be implemented through a variety of agencies and program types. While the provisions of these services vary, almost all states provide some level of education and employment services for transition age youth (Fryar, Jordan, & Devooght, 2017). Recent studies with national data document that academic services are the most frequently accessed FCIA service (Fernandes-Alcantara, 2017; Okpych, 2015).

Independent Living Programs and Services (ILS thereafter) are an important component of support services for youth aging out of foster care. Empirical research has found that ILS use varies across the type of services, regions, and study samples (Courtney, Charles, Okpych, Napolitano, & Halsted, 2014; Greeson, Garcia, Kim, & Courtney, 2015; Lemon, Hines, & Merdinger, 2005; Mares, 2010; Okpych, 2015). Not all foster youth use ILS. Around two-thirds of foster youth are estimated to use them, and there are observed disparities in which youth use independent living services (Avery, 2010; Courtney, 2005; Yelick, 2017). Using a national sample of foster youth, Okpych (2015) found that Black youth are less likely to use ILS than any other racial groups, and females are significantly more likely to use ILS than male youth. His study also found higher rates of ILS use by foster youth with a disability (hearing or visual impairment, physical disability, emotional disturbance) or other medical conditions. Chor and his colleagues (2018) also identified three profiles of ILS receipt, that is, a high-service receipt, an independent living assessment and academic support receipt, and a limited service receipt. Their study pointed out that the patterns of services receipt found were associated with youth characteristics, such as gender, age, and education level.

Research has presented potential positive effects of ILS on education and employment for transition-aged foster youth (Naccarato & Delorenzo, 2008; Yelick, 2017). Foster youth who use ILS are more likely to complete high school and pursue post-secondary training and college education compared to youth who do not use it (Georgiades, 2005; Lindsey & Ahmed, 1999; Powers et al., 2012). Foster youth who use ILS also experience a much lower unemployment rate than their counterparts (Georgiades, 2005). Notwithstanding positive experiences with ILS, however, there is mixed evidence on the effects of ILS on the transition to adulthood; for instance, one study (Lindsey & Ahmed, 1999) did not find a significant difference in employment between ILS participants and non-participants. We also note that most studies had limitations because they examined the effects of ILS from a small number of programs limited to specific regions/states, a small community sample, or a sample without control or comparison groups (e.g., Naccarato & Delorenzo, 2008; Yelick, 2017). These limitations have led to challenges in investigating and generalizing ILS intervention effects, notably to the broader foster care population.

2. Methods

2.1. Data and sample

We employed data from the National Youth in Transition Database (NYTD) and the Adoption and Foster Care Analysis and Reporting System (AFCARS). The NYTD was developed by the Department of Health and Human Services under FCIA to gather data on independent living services. The purpose of the data collection is to increase efforts for development and assessment of independent living services that

help foster care youth in the transition to adulthood. AFCARS collects individual-level data on demographic and foster care characteristics provided by state and title IV-E agencies in order to monitor foster care and adoption programs and better address program and policy issues.

Under CFCIP, 50 states, the District of Columbia, and Puerto Rico report NYTD Services and Outcomes data on a regular basis. States draw NYTD Services data every six months regarding the state-provided Independent Living Services (ILS) through CFCIP and the number of youth program participants. In addition, states collect NYTD Outcomes data using a survey with foster youth that examines various outcomes such as financial and education status. The NYTD Outcomes survey is conducted with a cohort of youth biannually from the age 17. For the NYTD Outcomes survey, the first cohort includes youth who turned 17 in federal fiscal year 2011, and new cohorts have been recruited every three years since then. Accordingly, the first cohort of NYTD Outcomes data participated in baseline survey at age 17 (fiscal year 2011) and two follow-up surveys at age 19 (2013) and at age 21 (2015). The eligible population of each cohort is youth in the child welfare system within 45 days since their 17th birthday in the baseline year. The study sample comes from self-selected and non-probability sampling at baseline, and follow-up sampling methodologies vary by states ([National Data Archive on Child Abuse and Neglect \(NDACAN\), 2014](#)). Despite these methodological approaches, NYTD data documents little or a very minimal level of systematic bias at the national level ([National Data Archive on Child Abuse and Neglect \(NDACAN\), 2014](#)).

Our current study used three waves of NYTD Outcomes data (baseline wave 1 in 2011, wave 2 in 2013, and wave 3 in 2015), NYTD Services data (September 2011, March and September 2012, and March 2013), and 2011 AFCARS records. For our analyses, the study sample came from the initial foster youth cohort in the baseline survey of NYTD Outcome data who became age 17 in the fiscal year 2011. Of the initial sample, we identified those who participated in the three surveys of NYTD Outcomes and had records in 2011 AFCARS data ($N = 5380$). We excluded those who had missing data in our analysis variables obtained from NYTD Outcomes surveys and AFCARS. Missing responses were less observed in White and Hispanic youth than the other racial and ethnic groups, but there was no significant difference in missing data by sex. Therefore, we included 4206 study participants for final analysis.

2.2. Variables

2.2.1. Dependent variables

We measured positive adulthood outcomes in education and employment as reported by foster youth in NYTD Outcome wave 3 data when they were 21 years old. The first dependent variable was high school completion (0 = had neither a high school diploma nor general equivalency degree (GED), 1 = had a high school diploma or GED). The second dependent variable was post-secondary education. Youth were coded as 1 if they were currently enrolled in or had any post-secondary education after high school completion and 0 otherwise. Post-secondary education includes a vocational certificate and vocational license, or qualifications, an associate's degree, and a bachelor's degree, and higher degrees. The third dependent variable was employment status. Youth were coded as 1 if they were currently full-time employed for at least 35 h per week in one or multiple jobs, and 0 otherwise.

2.2.2. Independent variable

ILS participation was measured using administrative data of NYTD Services collected from September 2011 through March 2013 when they were approximately 17 and 18 year old. Although other services are provided through ILS, we examined participation in particular services provided by or funded by the state agency that seemed most relevant to educational and employment outcomes in the transition to adulthood: academic support, career preparation, employment or vocational programs, mentoring, or education financial assistance. We created a binary variable indicating whether youth participated in any

of those services during the time period. Academic support includes services that help high school education or GED preparation, such as academic counseling, tutoring, and assistance for a GED application, homework, and educational resources. Career preparation includes services for job seeking, application, and retention: for instance, vocational and career assessment, job placement support, and job coaching. Employment or vocational programs enhance youth's skills for a specific occupation through internships, classes, or training. Mentoring services connect youth with a screened and trained adult for regular meetings in a mentor relationship. Education and financial assistance provides monetary assistance for educational and vocational supplies, services, and payments including vouchers for education and tuition. Youth who received at least one service during the given reference period were coded as 1, and those who did not use any of those services were coded as 0. In the NYTD data, ILS refers to services funded through CFCIP. Thus, our study does not account for independent living services provided through other funding sources (i.e. state or local government).

2.2.3. Covariates

Covariates were used to take into account individual characteristics and history in foster care. In the logistic analysis estimating propensity scores (details following in 2.3. Analysis Strategy), we included race and ethnicity, sex, disability, previous experience of homelessness, reasons for removal from family, placement type, length in care, and the number of placements. Race and ethnicity of foster youth had five groups: White (reference group), Black, Hispanic, bi or multi-racial, and others including Asian, Native American, or race unable to determine. Sex was a binary variable (0 = female, 1 = male). Disability indicated whether youth was diagnosed with any type of disability, including intellectual disability, visually or hearing impaired, physically disabled, emotionally disturbed, or any other medical condition requiring special care (0 = no or not yet determined, 1 = yes). The homelessness variable captured whether youth reported any homeless experience at age 17 or earlier (0 = no, 1 = yes). Homelessness is defined as a condition with no stable place to live, and includes living in a car, on the street, or in a temporary shelter. Reasons for removal from the home of origin were coded with three binary variables: neglect (0 = no, 1 = yes), physical/sexual abuse (0 = no, 1 = yes), and other (0 = no, 1 = yes; e.g., parent's death, caregiver's alcohol/drug use, caregiver's incarceration, or inadequate housing). Types of foster care placement at the time of data collection included four categories: relative foster home, non-relative foster home (reference group in regression), group home, and others (e.g., other child care institutions, residential treatment facilities, supervised independent living). The number of placements measured how many foster care placements the foster youth had. Length of foster care indicated the total number of months the youth was placed in foster care. Race and ethnicity, sex, disability, and foster care information was obtained from the 2011 AFCARS data, and homelessness data was obtained from the NYTD Outcome baseline survey.

In the final logistic analysis with the matched sample (Models 1–3), we used a modified variable for homelessness and added three additional variables. The modified variable for homelessness employed in this analysis measured whether youth reported any homeless experience at either baseline or wave 2, that is, at any time ever around age 19 or earlier. In addition, we added three binary variables obtained from wave 2 of the NYTD Outcomes data. These variables measured adult connection, substance abuse referral, and incarceration experienced by the youth between ages 17 and 19. Adult connection indicated whether youth had a relative or parent to speak with for problem solving and advice (0 = no, 1 = yes). Substance abuse referral measured whether youth had any self-referral or referral by a professional for alcohol or drug abuse assessment or counseling (0 = no, 1 = yes). Incarceration measured whether youth had any experience in a jail, prison, or correction/juvenile facility (0 = no, 1 = yes).

2.3. Analysis strategy

The purpose of this study is to examine whether ILS participation makes a significant difference in educational attainment and employment of foster youth. Foster care youth who ever used ILS may be qualitatively different from their peers who never received the service. On observational data from a non-randomized research design such as the NYTD, the characteristics of the treatment group are often significantly different from those of the control group because study participants are not randomly assigned to each group. Propensity Score Matching (PSM) analysis minimizes selection bias and estimates accurate treatment effects (Guo & Fraser, 2014; Rosenbaum & Rubin, 1983; Rubin, 1980). Therefore, we employed a PSM analysis to account for pre-existing differences that may influence ILS participation. The analysis was conducted using the following process.

First, we created a matched study sample where treatment youth (youth who used any ILS service measured in this study) and control youth (youth who did not use any of these ILS services) share similar characteristics at baseline except for ILS participation. For this purpose, we calculated propensity scores by running a logistic regression (dependent variable = ILS use). Propensity score is a logit of predicted probability that indicates the likelihood of receiving ILS based on observed characteristics of covariates (demographic characteristics and foster care history characteristics). Youth with similar propensity scores are considered to have a statistically similar probability of using ILS. We selected covariates following previous research (Avery & Freundlich, 2009; Courtney et al., 2014; Mares, 2010; Okpych, 2015): race, sex, original reason for removal from family, foster care placement type, total months in foster care, disability status, number of foster care placements, and homelessness experience. Of various matching methods, we employed radius matching, which matched the study participants if the difference of paired propensity scores fell within a certain level (caliper) and allowed multiple participants to be matched to one participant. Rosenbaum and Rubin (1983) recommend that the caliper size be smaller than a quarter of the standard deviation of the propensity scores. For optimal matching, we employed a narrower caliper size, 0.2 of the standard deviation of propensity scores (Austin, 2011). We used propensity scores as analysis weights in all the analysis estimating the effects of ILS use on education and employment outcomes.

Second, we checked if the matching was effective to reduce pre-existing differences between foster youth who used ILS and those who did not. We compared demographic and foster care backgrounds of the two groups in the original unmatched sample and the matched sample respectively (Table 2).

Third, we examined the net effects of ILS on the outcome variables using propensity score weights in the matched sample. We ran three weighted logistic regressions on high school completion (model 1), post-secondary education (model 2), and employment (model 3). In the three models, we included three additional covariates: adult connection, substance abuse referral, and incarceration. In model 3 (outcome: employment), we limited the analysis sample to those who were not enrolled in school at the time of wave 3 data collection ($N = 2793$) because those enrolled in school (e.g., college or vocational training) would not work full time, and we also controlled for education level (high school completion).

In addition, we conducted supplemental tests to examine whether specific types of ILS were associated with each focal outcome. We categorized academic support and education financial assistance as education-related ILS and career preparation and employment/vocational training as employment-related ILS. We replaced the variable of ILS use with three variables that indicated education-related ILS, employment-related ILS, and mentoring ILS. We conducted all analyses using Stata 12 and PSMATCH2 module developed by Leuven and Sianesi (2003) for PSM analysis.

Table 1

Sample characteristics at baseline: full sample and by ILS use.

	No ILS	ILS	Full sample
Race (%)			
White	49.48	42.00	44.58
Hispanic	13.73	18.82	17.07
Black	29.54	29.89	29.77
Other	3.59	4.32	4.07
Bi/Multiracial	3.66	4.97	4.52
Sex: Male (%)	44.86	42.76	43.49
Reason of removal: Abuse (%)	25.26	22.78	23.63
Reason of removal: Neglect (%)	47.20	46.28	46.60
Reason of removal: Others (%)	73.50	62.24	66.12
Foster care placement (%)			
Relative foster home	12.49	11.79	12.03
Nonrelative foster home	40.58	49.11	46.17
Group home	16.08	14.94	15.34
Others	30.85	24.16	26.46
Total month in care	46.16	51.82	49.87
Disability (%)	41.61	44.00	43.18
Number of placement	5.47	5.92	5.77
Homeless experience before age 17 (%)	14.08	19.55	17.67
N	1449	2757	4206

Note: The results are from the original sample before matching.

3. Results

3.1. Sample characteristics

Table 1 presents sample characteristics of the unmatched original sample at baseline ($N = 4206$). The majority of youths were white (44.6%) or black (29.8%), and 56% were female. About half indicated that parent neglect was one reason for removal from the family of origin, while two thirds also reported other various reasons, such as parental incarceration or substance use. Most of the youth were in foster care with a non-relative at age 17. Average length in foster care was about 50 months with an average of 6 placements. Almost half of youth (43%) reported having at least one disability, and 18% reported being homeless at some time before age 17. When they were 17 and 18, about two thirds of youth ($n = 2757$) reported that they participated in at least one ILS service measured in this study. Categorically, 50% of youth used services for academic support, 29% did for education financial assistance, 44% for career preparation, 30% for employment or vocational training, and 25% for mentoring. Out of the five types of services, 7% of youth used all services, 13% did four services, 15% did three services, 15% did two services, and 15% did one service. Youth who used education-related ILS (academic support or education financial assistance) were 58%, while those who used employment-related ILS (career preparation or employment/vocational training) were 50%. By age 21, 82.8% of foster youth reported completing high school, and 32.5% reported some post-secondary education. Among youth who were not enrolled in school at age 21 ($n = 2793$), 30.4% were employed full-time.

Table 1 also shows sample characteristics by ILS use. As expected, we found that individual characteristics and foster care history were significantly different between those who had any ILS and their counterparts in the unmatched sample: race and ethnicity, reason for removal (others), foster care placement (others), total length of months in care, number of placements, and homelessness before age 17. Table 2 displays the detailed results comparing observed characteristics in addition to the percent of bias reduction before and after matching. In the matched sample, youth who used ILS were no longer different from those who did not use ILS. Thus, we assume that the two groups became statistically comparable on their background characteristics at baseline after matching.

Table 2
Baseline characteristics before and after propensity score matching.

Baseline characteristics		Sample	% or mean		% of Bias	% of bias reduction	t-Test	
			No ILS	ILS			t	p
Race	White	Unmatched	49.48	42.00	15.1		4.65	< 0.001
		Matched	49.48	49.72	-0.5	96.9	-0.13	0.899
	Hispanic	Unmatched	13.73	18.83	-13.8		-4.18	< 0.001
		Matched	13.73	13.08	1.8	87.1	0.52	0.605
	Black	Unmatched	29.54	29.89	-0.8		-0.24	0.814
		Matched	29.54	29.94	-0.9	-14.8	-0.24	0.813
	Other	Unmatched	3.59	4.32	-3.7		-1.14	0.256
		Matched	3.59	3.77	-0.9	75.6	-0.25	0.800
Bi/Multiracial	Unmatched	3.66	4.97	-6.5		-1.95	0.052	
	Matched	3.66	3.50	0.8	87.9	0.23	0.819	
Sex	Male	Unmatched	44.86	42.76	4.2		1.30	0.193
		Matched	44.86	44.77	0.2	95.6	0.05	0.961
Reason of removal	Abuse	Unmatched	25.26	22.78	5.8		1.80	0.072
		Matched	25.26	25.08	0.4	93	0.11	0.914
	Neglect	Unmatched	47.21	46.28	1.8		0.57	0.569
		Matched	47.21	46.69	1	43.8	0.28	0.780
	Others	Unmatched	73.50	62.24	24.3		7.38	< 0.001
		Matched	73.50	73.35	0.3	98.7	0.09	0.928
Foster care placement	Non-relative foster home	Unmatched	40.58	49.11	-17.2		-5.29	< 0.001
		Matched	40.58	40.91	-0.7	96.2	-0.18	0.858
	Relative foster home	Unmatched	12.49	11.79	2.2		0.67	0.505
		Matched	12.49	12.41	0.3	88.1	0.07	0.946
	Group home	Unmatched	16.08	14.94	3.1		0.97	0.331
		Matched	16.08	16.02	0.2	95	0.04	0.967
	Others	Unmatched	30.85	24.16	15		4.69	< 0.001
		Matched	30.85	30.66	0.4	97.2	0.11	0.914
Total month in care	Unmatched	46.16	51.82	-12.9		-3.95	< 0.001	
	Matched	46.16	45.66	1.1	91.2	0.32	0.747	
Disability	Yes	Unmatched	41.62	44.00	-4.8		-1.48	0.138
		Matched	41.62	41.44	0.4	92.4	0.10	0.922
Number of placement	Unmatched	5.47	5.92	-7.6		-2.34	0.019	
	Matched	5.47	5.47	-0.0	99.9	-0.00	0.998	
Homeless Experience	Yes	Unmatched	14.08	19.55	-14.7		-4.43	< 0.001
		Matched	14.08	14.34	-0.7	95.2	-0.20	0.838

Table 3
Logistic regressions: Independent living services (ILS) effects in the matched sample.

	Model 1 (DV: High school)		Model 2 (DV: Post-secondary education)		Model 3 (DV: employment)				
	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.			
Independent living services	1.25	*	0.13	1.20	*	0.10	1.24	*	0.13
Race									
Hispanic	1.05		0.16	1.65	***	0.21	1.42	*	0.23
Black	0.98		0.12	1.49	***	0.15	0.97		0.12
Other	0.95		0.25	1.07		0.24	1.01		0.28
Multi-racial	1.08		0.31	1.27		0.29	1.35		0.35
Sex: Male	1.01		0.11	0.73	***	0.06	1.71	***	0.19
Reason of removal: abuse	0.97		0.12	1.04		0.10	0.89		0.11
Reason of removal: neglect	0.91		0.10	0.93		0.08	0.88		0.10
Reason of removal: others	1.00		0.13	0.97	***	0.10	1.03		0.13
Foster care placement									
Relative foster home	0.88		0.16	1.12		0.14	0.94		0.16
Group home	0.55	***	0.08	0.81		0.10	0.58	**	0.09
Others	0.48	***	0.06	0.61		0.07	0.76	*	0.10
Total month in care	1.00		0.00	1.00		0.00	1.00		0.00
Disability	0.98		0.10	0.72	***	0.06	0.78	*	0.08
Number of placement	0.97	***	0.01	0.97	**	0.01	0.99		0.01
Homeless experience	0.74	**	0.08	0.91		0.09	0.90		0.11
Adult connection	1.21		0.21	1.03		0.17	1.05		0.22
Substance abuse referral	0.95		0.13	0.96		0.13	1.06		0.17
Incarceration	0.46	***	0.06	0.58	***	0.07	0.76	*	0.11
High school completion							2.04	***	0.33
Constant	7.73	***	1.94	0.62		0.14	0.24		0.07
Number of Obs.	4206			4206			2793		
Log likelihood	-1281.50			-1702.98			-1128.95		
Likelihood ratio χ^2	181.15***			177.90***			91.61***		

Note: *p ≤ .05; **p ≤ .01; ***p ≤ .001. Reference group is Whites for race and non-relative foster care for foster care placement respectively.

3.2. ILS effects on education and employment

Table 3 presents the results of weighted logistic regressions on the outcome variables after matching: high school completion (model 1), post-secondary education (model 2), and employment (model 3).

3.2.1. Model 1: high school completion

ILS was significantly associated with high school completion of foster youth, controlling for covariates. The odds of high school graduation is 0.25 times larger for ILS users than that of their peers without ILS (Odds Ratio (OR hereafter) = 1.25, $p = .03$). Several covariates were also significant predictors of high school education. Youth placed in a group home ($OR = 0.55, p < .001$) or in other foster care placements ($OR = 0.48, p < .001$) were less likely to complete high school education than youth living in a non-relative foster home. Number of placements ($OR = 0.97, p < .001$), earlier homelessness experience ($OR = 0.74, p = .01$), and incarceration ($OR = 7.73, p < .001$) were all negatively associated with high school completion.

3.2.2. Model 2: post-secondary education

Logistic regression analysis presents a significant effect of ILS on post-secondary education ($OR = 1.2, p = .03$). The odds of having post-secondary education was significantly larger for Hispanic ($OR = 1.65, p < .001$) and Black youth ($OR = 1.49, p < .001$), thanfor White youth, with all other characteristics held constant. Male youth were less likely to have a post-secondary education than female youth ($OR = 0.73, p < .001$). Youth placed in a non-relative foster home were more likely to have post-secondary education than those placed in other care settings ($OR = 0.61, p < .001$). Disability was negatively associated with post-secondary education ($OR = 0.72, p < .001$), with disabled youth being significantly less likely to complete post-secondary education than their peers. The number of care placements ($OR = 0.97, p = .004$) and incarceration ($OR = 0.58, p < .001$) were also negatively associated with post-secondary education.

3.2.3. Model 3: employment

Participation in ILS was significantly associated with full-time employment of foster youth. The odds of full-time employment for youth who received ILS was 0.24 times that of youth who did not ($p = .04$). Model 3 included education as a covariate because it was considered to be an important determinant of employment. As expected, foster youth who completed a high school education or higher were more likely to be employed full-time than those who did not finish high school ($OR = 2.04, p < .001$). Several covariates were associated with full-time employment status. Hispanics ($OR = 1.42, p = .03$), males ($OR = 1.71, p < .001$), and youth without a disability ($OR = 0.78, p = .02$) were more likely to be employed. All other conditions being equal, youth placed in a non-relative foster home were more likely to be employed than youth in a group home ($OR = 0.58, p = .001$) or other placement settings ($OR = 0.76, p = .03$).

3.3. Supplemental tests

Table 4 presents the findings of supplemental tests that collapsed the types of ILS into education, employment, and mentoring ILS. Using

education-related ILS was not a significant predictor of high school completion in model S1, but it was significantly associated with post-secondary education in model A2 ($OR = 1.23, p = .03$) and employment in model A3 ($OR = 1.39, p = .003$), while controlling for other types of ILS and covariates. In three models, neither employment-related ILS nor mentoring ILS was significantly associated with focal adult outcomes.

4. Discussion and implications

Our study findings suggest that ILS use predicts positive outcomes in emerging adulthood in terms of education and employment. ILS youth participants are significantly more likely to complete high school education, enroll in post-secondary education, and work full-time in the labor market. Our study supports the importance of education and employment services for transition-aged youth. Foster youth report education as a common obstacle for employment and financial capability in independent adulthood. Education outcomes matter in that a better job tends to come when higher education is achieved. For example, another study found that the earnings gap between foster youth and non-foster youth becomes narrower in higher education groups (Okpych & Courtney, 2014).

Analyses confirm that there are disparities in receipt of ILS among eligible foster youth. In most cases, ILS appears to be more common among youth who may have greater need (e.g., youth with disabilities, who have been in care longer, who have experienced homelessness, who are Hispanic). However, the association between type of residential placement and ILS requires additional attention and study. Previous research has found that entry into the child welfare system acts as a gateway for a wide variety of other services (Burns et al., 2004; Ehrle & Geen, 2002) and has suggested potential service-related advantages to non-relative foster care (Burns et al., 2004; Swanke, Yampolskaya, Strozier, & Armstrong, 2016). The current work shows that ILS services are strongly related to placement in non-relative foster care. Such a finding requires additional attention to ascertain the relatively low rates of ILS among youth who are placed in kinship care, group settings, or other residential placements.

The PSM models help shed light on the effects of ILS, net of these differences in likelihood of receiving such services. They demonstrate that ILS is significantly positively associated with each of the focal outcomes. These analyses also suggest that, even when groups are matched, some of the factors that influence likelihood of receiving ILS continue to be related to educational and employment outcomes. Key among these are decreased outcomes related to a youth's residential experiences (e.g., placement in group homes or "other" settings, more placement instability, homelessness, incarceration). While these settings may, themselves, be proxies for a variety of non-included differences between youth, it is also possible that ILS services need to be examined for adequacy, relevance, and provision among youth who experience complex placement histories.

We employ a rigorous method using propensity score matching (PSM) to minimize the influence of pre-existing differences in estimating ILS effects on young adult outcomes. We find methodological advantages of using PSM for empirical research with foster youth population. It is challenging to implement an experimental design with a

Table 4 Supplemental tests: independent living services (ILS) effects in the matched sample.

	Model S1 (DV: High school)		Model S2 (DV: Post-secondary education)		Model S3 (DV: employment)	
	Odds ratio	S.E.	Odds ratio	S.E.	Odds ratio	S.E.
Education-related ILS	1.14	0.13	1.23*	0.12	1.39**	0.15
Employment-related ILS	1.20	0.14	1.06	0.10	0.97	0.11
Mentoring ILS	0.92	0.11	0.83	0.08	0.93	0.10

Note: * $p \leq .05$; ** $p \leq .01$. The results of covariates are substantially consistent with the main analysis shown in Table 3 (available upon request).

large national sample of foster youth. This is particularly true for any design that would require withholding ILS services. However, the fact that fewer than half of eligible youth report receiving such services in NYTD data suggests that there may be designs for increasing access and utilization of services that could provide more rigorous scientific designs for assessing the feasibility and benefits of such increases. Naturally occurring variations by state and localities also propose possibilities for true experimental designs as well as additional potential for PSM to explore these variations and implications for youth outcomes.

In addition to overall positive effects of ILS use, the results of supplemental tests are interesting to note. When the ILS services are categorized into three areas, that is, education-related, employment-related, and mentoring-related services, our study shows that using education-related services is more prevalent than employment-related and mentoring-related services, which is consistent with previous studies (Chor et al., 2018; Okpych, 2015). More importantly, youth who received education-related services report significantly higher rates of having a post-secondary education or full-time employment than those who did not receive any education-related services, adjusting for other service use and individual characteristics. This finding suggests that receiving education-related services is beneficial for not only post-secondary education outcome but also full-time employment. It is surprising that employment-related services do not present a significant association with full-time employment outcome (Model 3 in Table 4). Nonetheless, for several reasons we do not lean toward concluding that employment-related services have no effect. The employment status was measured at one time of wave 3 (around age 21), our analysis for employment outcome limited the sample to those who were not enrolled in school, and youth in early adulthood may encounter dynamic transitions with education and career development. We urge future studies to investigate employment outcome using longitudinal data with extensive information of job seeking history and characteristics.

4.1. Limitations

Our study is not free from limitations. Readers should interpret the positive effects of ILS with caution for the following reasons. First, this study uses secondary data that include global measures of ILS services and outcomes. Therefore, analysis estimates a global effect of ILS participation but is unable to take into account specific program-related factors and ILS quality because the NYTD do not include indicators of ILS scope and nature. ILS design, content, and implementation vary across regions and states, and foster youth's experiences of ILS and outcomes may differ as a result. Relatedly, it would be worth examining what types of ILS combination, the number of ILS receipt, or sequence would lead to positive outcomes and how those ILS use patterns interact with foster care arrangements. We strongly recommend future studies address these inquiries with reliable data collected from diverse settings. Second, observed characteristics at baseline were used to create both the two groups compared in this study (ILS use group and their counterpart) and the propensity scores used in weighted analysis. It is possible that there are unobserved confounding factors that explain ILS participation of foster youth that were not captured in this study design. Similarly, we were not able to control for important predictors of education and employment, such as intelligence, motivation, or self-efficacy, due to limited data availability. Third, the NYTD data we used for our study is collected using non-probability sampling, and the data reports high attrition and missing responses. While the NYTD reported that no systematic response bias was observed (see National Data Archive on Child Abuse and Neglect (NDACAN) (2014) for details), we cannot confirm external validity so advise caution in generalizing these results. Fourth, the large sample size of NYTD data may lead to statistically significant results. Further evidence from future studies would allow us to compare and assess ILS effect size in addition to statistical results.

4.2. Policy implications and conclusions

These analyses point out the potential importance of ILS services. They also suggest a number of lines of potential concerns, policy implications, and future directions for research. First, even using a very simplistic assessment of “any” services in the specified realms, over half of the youth report receiving no ILS. This raises concerns about access and utilization of ILS across the full range of youth who are the intended recipients of such services and supports. As in many other areas of children's services, there is a substantial gap between need for services and receipt of services in the ILS realm. This apparent lack of equitable access is particularly relevant in regard to youth's placements. According to these data, youth who are living in non-kin foster care have remarkably higher receipt of ILS than youth in other residential placements. Given policy imperatives across most states to deflect youth from non-kin foster care whenever possible, it suggests that one unintended consequence of such placement approaches may be to further reduce access to independent living services. Further work needs to be done on ways to support access to ILS for youth who are involved in the child welfare system but who do not enter foster care. Other emerging work suggests that such youth are at increased risk of a range of problematic adult outcomes (Fowler, Marcal, Zhang, Day, & Landsverk, 2017).

Once differences in likelihood of receiving ILS are taken into account in analyses, it appears that youth with complex and non-family-based placement histories remain at increased risk of less positive outcomes. Therefore, there is a need to more fully understand what factors influence the observed outcomes and to potentially tailor ILS to more adequately meet the needs of subgroups of youth.

Overall, though, the result suggest the importance of providing ILS to transition-aged youth in foster care. Current analyses use rather non-specific measures of both the independent and dependent variables. Additional work that provides detailed measures on both sides of the equation would be tremendously useful. However, even with currently available observed indicators, these results suggest that ILS is significantly related to improved outcomes in three key domains (high school graduation, post-secondary education, and employment). Hence, it is critical to fully implement these services, explore approaches for providing more complete and equitable access to eligible youth, and continue work that further explicates key factors in receipt and effectiveness of ILS for transition-aged youth.

Conflicts of interest

Potential conflicts of interest do not exist in this paper.

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