Pueblo's Potential

How Free Child Care Breaks Down Barriers

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Executive Summary: The high price of child care forces many low-paid Coloradans to choose between their work and family. This barrier to work is especially pronounced for families with young children in Pueblo, who have lower incomes and lower levels of employment than other Coloradans. Parents work more, earn more, and are less likely to live in poverty once their children enter school (age 6). However, Pueblo's lower wages and relatively high child care costs compound the issue by dragging down employment and the incomes that come with it. Affordable or free child care could help apply the same economic benefits of school earlier in a child's life. A handful of studies have found that lower child care costs are associated with higher employment among moms with young kids, which helps to bolster families' incomes.

The Colorado Fiscal Institute's analysis has reached the same conclusions for Pueblo's families. Many of the city's most common occupations do not pay workers enough to make child care cost-effective. A worker in Pueblo would need to earn at least $14.25 an hour to cover the average hourly cost of child care, which is far above the average wage in many jobs. Female-dominated jobs, like desk clerks and housekeepers, pay even lower wages and help explain the higher percentage of unemployed female spouses in Pueblo. By offering free child care in Pueblo, lawmakers would be able to increase employment and incomes in both single-mother and two-parent households. According to CFI's model, families who receive free child care work more, earn higher incomes, and experience lower poverty rates.

Introduction

The exorbitant price of child care is often cited as a barrier keeping parents of young children from being able to work. It doesn't make much financial sense for someone to go to work for $9.00 an hour when they are paying $5.00 an hour for child care—only netting $4.00 an hour. Consequences of high child care prices include lower employment levels for parents, lower incomes and increased dependence on economic support systems. The high cost of child care restrains parents' abilities to work outside the home.

The most recent available data shows the poverty rate in Colorado is 9.6 percent.[1] In Pueblo, Colorado that rate is 17.3 percent, and the poverty rate for single parents with children under 6 is 46 percent. But those single-parent households see a drastic reduction in poverty—to 32 percent—once their children turn 6. Why? Because school provides free child care and frees up parents to work more. Two-parent Pueblo households also experience reductions in poverty when children become school-aged, with the rate falling from 16 to 10 percent.

[1] 2018 Census figures

This report explores the question: When does a parent's hourly wage make it worth paying for child care? We use Pueblo-specific wage data and child care costs to see which occupations don't pay enough to make working worthwhile, once child care is netted out.

Our research also uses a difference-in-difference model of Colorado households and an ordinary least square statistical analysis of Pueblo households using Census data to isolate the impact of having free child care. We rely on the natural experiment that is the public education system, which delivers free child care to children at age 6. By comparing the economic and labor market outcomes of parents with 5-year-olds to those same outcomes of parents with 6-year-olds in school (while controlling for other factors like educational attainment, age, sex, and industry) we are able to isolate the impact of free child care.

We find parents work more, earn more and are less likely to live in poverty once their child is 6. We then use those figures as a proxy for the economic and labor market potential that could be released if child care is provided to Pueblo parents who have children aged 2-5 at home. We find that 1,500 single parent households and 4,100 two-parent households in Pueblo could work more if child care were provided. Instead of waiting until the child turns 6, this report shows that the cost of providing child care to obtain those labor market benefits of those families might be worth it.

Table 1	Child Day Care Service Establishments	December 2019 Employment	Total Quarterly Wages (Q4 2019)	Average Weekly Wage
Colorado	974	15,404	$ 109,415,330	$545
Pueblo	10	189	$ 1,457,133	$585
Quarterly Census of Employment and Wages from BLS 2019 Fourth Quarter				

Note: Wages earned by child care workers represent about 0.2% of the wages earned in Pueblo.

Pueblo Has More to Gain from Affordable Child Care than Other Colorado Cities

Pueblo's families are more likely to contain under- or unemployed family members and to be headed by single mothers than the rest of Colorado. Affordable child care would help parents and other members of Pueblo's families enter the workforce and work more.

Single parents in Pueblo work two hours less and earn less on average than other single parents in Coloroado. In 2018, the median income of a single parents with a child under 6 was about $19,000 in Pueblo compared to $33,000 in the rest of Colorado.

Pueblo's Single-Parent Households Have Less Income and Employment *Table 2*				
	Pueblo County		**All Other Colorado Counties**	
Household Makeup	**Youngest Children Under 6**	**All Children 6 and Up**	**Children Under 6**	**Children 6 and Up**
Median Household Income	$19,100	$39,000	$33,000	$50,000
Average Hours Worked	36	38	38	40
% of Population Employed	81%	96%	82%	92%
Source: CFI analysis of US Census Bureau ACS 2018				

The average number of children in households is slightly higher in Pueblo than the rest of Colorado.

Pueblo Families Have More Children and Need for Child Care *Table 3*		
	Pueblo County	**All Other Colorado Counties**
Average Number of Children	2.84	2.81
Average Children Under Age 6	1.45	1.38
Source: CFI analysis of US Census Bureau ACS 2018		

Households in Pueblo with children under 6 are less likely to be employed than the rest of Colorado—60 percent in Pueblo compared to 66 pecent in the rest of Colorado.

Employment Levels and Household Income of Women in Two Parent Households with Children Colorado Counties 2018 *Table 4*				
	Pueblo County		**All Other Colorado Counties**	
Household Makeup	**Child Under 6**	**All Children 6 or Over**	**Child Under 6**	**All Children 6 or Over**
Median Household Income	$61,500	$74,700	$95,300	$111,110
Average Hours Worked	32	32	35	36
% of Population Employed	60%	74%	66%	71%
Source: CFI analysis of US Census Bureau ACS 2018				

Pueblo has a higher portion of households led by single mothers than the rest of Colorado (10 percent vs. 8 percent). Married women in Pueblo are more likely to be unemployed (46 percent vs. 39 percent).

Employment and Household Characteristics Colorado Counties 2018 *Table 5*		
	Pueblo County	**All Other Colorado Counties**
Median Income	$50,000	$73,000
Households with Any Member Full Time Employed	53%	70%
Households Led by Single Mothers	10%	8%
Married Households with Unemployed Female Spouses	46%	39%
Source: CFI analysis of US Census Bureau ACS 2018		

Literature Review

Better Employment Outcomes when Child care is Cheaper

Since the late 1980s, study after study has found that lower child care costs are associated with higher employment, especially among single moms with young kids.

A growing body of econometric literature has investigated the relationship between child care costs and female labor force participation. In 1998, economists Stacy Dickert-Conlin and Scott Houser used Survey of Income and Program Participation (SIPP) data to show that reducing child care costs is associated with greater increases in employment for single mothers than for married mothers. This is supported by Han and Waldfogel's 1998 study using the same data. **Dickert-Conlin and Houser's model found that a 50 percent child care subsidy would increase the labor force participation of single parents by 2.9 percentage points**. They also found that both child care subsidies and improvements to the Earned Income Tax Credit had small effects on mothers' employment.

Drs. Rachel Connelly and Jean Kimmel investigated the relationship between AFDC recipients and child care costs in their 2003 paper. They argue that child care costs are a determinant in welfare participation, and found that there was a significant relationship between AFDC recipiency, employment of single mothers, and the price of hourly child care. **They found that the child care price elasticity of welfare recipiency varied from 1.0 to 1.9, and that the child care price elasticity of employment varied from -1.3 to -1.1.** These significant findings show that higher child care prices mean less employment, and more welfare recipiency. Policy simulations in their paper hypothesize that even if modest means-tested subsidies were made available to single mothers, increased labor force participation by women with young children could be achieved.

In 2016, researcher So Kubota hypothesized that US women's stagnating labor force participation rate was resulting in part from the increasing child care costs as a portion of income. **Kubota found that the rising cost of child care resulted in an estimated 5 percent decline in total employment of females, and 13 percent decline in the employment of mothers with children under age 5, all else constant** — suggesting that providing free child care to students earlier than 5 years old could boost employment of mothers by 5 to 13 percent.

Also in 2016, the Child care and Development Fund (CCDF) used a decade of demographic and state-level income and employment data to prove that higher expenditures on child care subsidies significantly increase the labor force participation and employment rates of low-income mothers in the U.S. **Specifically, they found a 10 percent increase per child in CCDF spending resulted in increased employment for low-income women with young children by over half of a percent.**

Dr. Taryn Morrissey's 2016 literature review on child care and labor force participation found considerable heterogeneity in U.S. studies of early child care and mother labor outcomes. Using U.S. studies since the 1990s as evidence**, she found that a 10 percent reduction in the cost of child care would lead to an increase in maternal employment as low as 0.25 percent, and as high as 11 percent.** Regardless of this disparity in impact, however, Morrissey found that a positive effect of some size was broadly evident.

In 2018, a National Women's Law Center analysis found that mothers lose $16,000 annually to the wage gap. Their report showed that mothers are paid between 52 cents and 85 cents for every dollar paid to fathers, no matter what education level the mother obtained. The National Bureau of Economic Research confirmed this finding in a 2018 paper by economists Henrik Kleven, Camille Landais, and Jakob Egholt Søgaard. **They found that the arrival of children creates a gender gap in earnings of around 20 percent in the long run, driven in roughly equal proportions by labor force participation, hours of work, and wage rates**. The proportion of gender inequality caused by the "child penalty" has increased dramatically over time, from about 40 percent in 1980 to about 80 percent in 2013. As the gender gap in employment and pay decreased in the 1980s and 1990s, largely due to workplace and higher education anti-discrimination efforts, reasons for gender discrimination in the workplace shifted. When Kleven et al. decomposed reasons for gender discrimination in employment, they found that having children made up a persistent and growing portion of discrimination between men and women over the past 30 years.

The Trump Administration published a report in 2019 that found that there were 3.8 million working-age, nondisabled parents with children under age 6 currently outside the labor force**. The report found evidence that some of these parents' labor participation was responsive to the price of child care**, and that government child care subsidies helped parents choose whether to enter or re-enter the workforce.

Welfare to Work programs

Two decades of literature have found that subsidizing child care is an essential but not always sufficient component in a parent's ability (for single mothers in particular) to return to work. Robert Lemke, Ann Witte, Magaly Queralt, and Robert Witt of the National Bureau for Economic Research found that increased funding for child care subsidies and access to full-day kindergarten made current and former welfare recipients more likely to be employed. Their analysis used Massachusetts data between 1996 and 1997 on welfare-to-work programs.

One reason for this may be long waiting lists to receive such subsidies. In 1992, Mark Berger and Dan Black published an article in MIT press that showed considerable effects of child care subsidies on the employment of unmarried, low-income mothers in Kentucky — moving from a waiting list to receive a child care subsidy to being a recipient of the subsidy increased mothers' employment by 10 percent. In Jeffrey Lyons' 1998 study, he found that one out of four North Carolina families had lost or had to quit their jobs while waiting for assistance. In Philip Cotloff's 1999 study conducted in New York City, he found that 36 percent of parents said they were either unable to work or had lost their jobs on waiting lists for quality child care.

Long-term Benefits of Early Childhood Education

Since the 1960s, a handful of groundbreaking studies found that early education results in higher educational attainment, improved physical and mental health, and better socio-economic outcomes.

Over the last 57 years, the Perry Preschool Project has provided strong evidence for the long-term benefits of early childhood education. From 1962 to 1967, the Perry Preschool Project based in Ypsilanti, Michigan provided a group of low-income Black children with an experimental, high-quality preschool program. Led by psychologist David Weikart, the experiment took 123 students with high risk factors for academic failures (including IQ scores between 70 and 85) and divided them randomly to be assigned to a high-quality preschool program at the Perry school. 58 attended the preschool, and the remaining 65

did not. The study found that, despite no changes between the experimental and control groups in IQ, there were significant gains for the experimental group in terms of educational performance and socio-emotional effects. In 2019, Nobel-prize winning economist James Heckman followed up with the participants in the Perry Preschool study, who are all now in their mid-50s. The revisiting investigation found that there were continuing long-term positive effects on program participants, including lower rates of crime and health problems and higher rates of employment, cognitive, and noncognitive skills.

In 2017, economists Jorge Garcia, James Heckman, Duncan Leaf, and Maria Prados published a study that estimates that there is a **13.7 percent rate of return to long-term investments in early childhood education, with a benefit-cost ratio of 7.3.** They arrive at this conclusion by studying the benefits and costs of two closely-related early childhood programs in North Carolina that targeted vulnerable children — the Carolina Abecedarian Project (ABC) and the Carolina Approach to Responsive Education (CARE). The investigation followed children in these programs between 8 months and 5 years of age, revisited them at ages 6-8, then revisited them again at age 35. They found significant evidence to support that quality early childhood development improves adult physical health. This is one of the only rigorous studies on the long-term "social efficiency" of early childhood education investment. Their analysis can also be used as a template for studying long-term gains of social investments.

When is Child care Worth It: Child Care Costs Compared to Wages

The rule of thumb for determining the affordability of child care is that it shouldn't be more than 10 percent of a household's budget. Child care costs that exceed 10 percent of household income lead to declining employment and wages.[2] In Colorado, studies have shown that the high cost of child care has kept it out of reach for many families. A March 2020 study showed the average cost of infant child care in Colorado exceeded the average income by 31 percent ($15,600 in costs versus $50,960 in income on average). Infant care costs are about $4,500 higher annually than public college tuition ($11,140). This puts the cost of early child care out of reach for most Coloradan parents.[3]

Instead of household income, the Colorado Fiscal Institute compares child care costs to wages. Both cheaper child care and higher wages make working more valuable. To illustrate the thought process of deciding whether to work and pay for child care or not work at all, we compare hourly child care costs to hourly wages in occupations across Colorado. We wanted to get at the central question: "Do I work this hour and pay for child care or do I not work and watch the kids instead?" We rely on 2017 Occupational Employment Statistics from the Bureau of Labor Statistics and the 2017-18 Colorado Child Care Market Rate Study prepared by the Colorado Department of Human Services Office of Early Childhood.

In 2017, child care for a child between 18 and 36 months in Pueblo costs an average of $34 per day or $4.25 per hour. ($34 per day is the average in Pueblo for a child care center, the 75th and 90th percentile child care costs are $36.60 and $53 a day respectively.) The 90th percentile child care costs would translate into $6.63 an hour which would put many more of the occupations out of reach once child care

[2] U.S. Department of Health and Human Services Administration for Children and Families, "Child care and Development Fund (CCDF) Program," *Federal Register* 81 (190) (2016): 67438–67595, available at https://www.gpo.gov/fdsys/pkg/FR-2016-09-30/pdf/2016-22986.pdf.

[3] "What to Grow Colorado's Economy? Fix the Child care Crisis" Sandra Bishop-Josef, Michael Cooke, Tom Garrett (March 2020) Available at https://strongnation.s3.amazonaws.com/documents/1120/f40c30b2-32e4-4197-97bf-cb2b8c6fd8d4.pdf?1589292162&inline;%20filename=%22Want%20to%20Grow%20Colorado%E2%80%99s%20Economy?%20Fix%20the%20Child%20Care%20Crisis.pdf%22

costs are netted out). To ensure a take-home wage of $10 an hour—the minimum wage in Colorado was $9.30 in 2017—a worker in Pueblo would need to make at least $14.25 an hour to also cover child care costs. To give this wage threshold some context, the self-sufficiency wage in Pueblo for a single parent with a preschooler is $17.60 an hour ($37,181 annually).[4] This wage threshold of $14.25 comparison figure to determine which jobs net more than roughly the minimum wage once child care costs are netted out. Table 6 examines Pueblo's wage data and asks, what portion of each jobs makes less than that $14.25 threshold.

Many of Pueblo's Jobs Don't Pay Enough to Make Child Care Worth It
2017 Occupations and Wages in Pueblo, Colorado

Table 6

Occupation	Number of Employees	10th Wage	25th Wage	Median Wage	75th Wage	90th Wage	Portion of Occupation Earning Less than Wage that Makes Working with Child Care Worth more than $10/hour*
Food Preparation and Service Workers, Including Fast Food	2,130	$9.32	$9.38	$9.51	$9.78	$10.98	100%
Cashiers	1,740	$9.31	$9.38	$10.05	$11.26	$12.52	100%
Personal Care Aides	1,340	$9.36	$9.47	$9.77	$11.12	$12.67	100%
Telemarketers	850	$9.48	$9.91	$10.66	$11.42	$11.94	100%
Maids and Housekeeping Cleaners	480	$9.36	$9.47	$9.71	$10.82	$12.17	100%
Dining Room and Cafeteria Attendants	170	$9.30	$9.31	$9.43	$9.66	$11.14	100%
Dishwashers	160	$9.37	$9.48	$9.91	$11.10	$11.85	100%
Waiters and Waitresses	1,060	$9.31	$9.38	$9.53	$9.77	$13.71	92%
Hotel, Motel, and Resort Desk Clerks	150	$9.37	$9.53	$10.72	$12.06	$14.12	91%
Cleaners of Vehicles and Equipment	120	$9.39	$9.56	$10.13	$12.12	$14.50	88%
Bus Drivers, School or Special Client	100	$9.48	$10.00	$10.99	$12.15	$14.78	87%
Home Health Aides	800	$9.37	$9.59	$10.87	$12.65	$14.75	86%
Food Preparation Workers	180	$9.43	$10.14	$11.27	$13.12	$15.50	82%
Cooks, Institution and Cafeteria	1,100	$9.40	$9.55	$11.16	$13.49	$15.60	80%
Child care Workers	200	$9.43	$9.73	$11.12	$13.27	$17.60	78%
Hosts and Hostesses, Restaurant	370	$9.39	$9.51	$9.84	$13.58	$20.79	76%
Driver/Sales Workers	320	$9.33	$9.38	$9.64	$14.90	$24.24	72%
Retail Salespersons	2,220	$9.35	$9.71	$11.33	$14.94	$21.99	70%

[4] The Self-Sufficiency Standard for Colorado 2018 available at http://www.selfsufficiencystandard.org/sites/default/files/selfsuff/docs/CO18_SSS_Web.pdf

Bill and Account Collectors	490	$9.96	$10.86	$12.53	$14.70	$18.29	70%
Janitors and Cleaners	740	$9.84	$11.06	$12.80	$14.92	$17.96	67%
TOTAL Occupations in Pueblo	**59,750**	**$9.49**	**$11.18**	**$16.83**	**$25.61**	**$37.47**	**39%**

Source: 2017 Occupational Employment Statistics Metropolitan Area Data from the Bureau of Labor Statistics
**calculated using linear interpolation between 10th, 25th, median, 75th and 90th wages to determine what portion of the occupation pays less than $14.25.*

Many of the occupations that employ the most Pueblo residents don't pay enough to make child care cost-effective. The median wage for a cashier in Pueblo was $10.05 in 2017. The $4.25 an hour cost of child care leaves the employee with $5.80 in wages—far below the minimum wage. There were 1,740 cashiers in Pueblo in 2017 and most of them were women. The median wage for a personal care aide—there are 1,340 of them in Pueblo—was only $9.77 in 2017. If a personal care aide had to pay child care costs in order to work that hour, they'd only net $5.52 an hour. Jobs in food preparation and service were some of the biggest occupations in Pueblo with 2,130 in 2017, yet the median wage for those workers was only $9.51 an hour. If that food worker had to pay $4.25 an hour for child care, they only net $5.26 an hour.

Child Care Workers in Pueblo

Table 7

	Jobs	10th Wage	25th Wage	Median Wage	75th Wage	90th Wage
All Occupations in Pueblo	59,750	$9.49	$11.18	$16.83	$25.61	$37.47
Child care Workers	200	$9.43	$9.73	$11.12	$13.27	$17.60

Source: 2017 Occupational Employment Statistics Metropolitan Area Data from the Bureau of Labor Statistics

Ironically, our analysis shows that child care workers in Pueblo struggle to find cost-effective child care. Over 86 percent of child care workers in Pueblo don't make minimum wage once the average child care costs are netted out.

There are 2,200 retail workers in Pueblo whose median wage is $11.33 in 2017. Only the highest-paid 30 percent of retails workers in Pueblo make enough to maintain at least a minimum wage after paying for child care.

Table 6 takes those same occupations and breaks them down by sex.

Many of Pueblo's jobs filled predominantly by women don't pay enough to make them worthwhile once child care costs are netted out. For example, 49 percent of total workers in Pueblo are women, while women make up just 71 percent of cashiers, 59 percent of food service workers, 94 percent of house cleaners, and 80 percent of hotel desk clerks. Of all the desk clerks in Pueblo, only 9 percent of hotel desk clerk jobs pay enough to meet the $10 threshold once child care is netted out, and 64 percent of hotel desk clerk jobs are occupied by women between the ages of 20 and 40.

The lower wages paid in female-dominated jobs reveal why a higher percentage of unemployed female spouses live in Pueblo compared to the rest of Colorado. Nearly half (46 percent) of female spouses in Pueblo are not working compared to 39 percent in the rest of Colorado.

Women Work at Many of Pueblo's Low-Wage Jobs– Making Child care for Work a Very Difficult Trade-off

Table 8

Occupation	Portion of Occupation Earning Less than Wage that makes Working with Child care Worth more than $10/hour	Portion who are Woman	Portion who are Women 20 to 40 years old
Food Preparation and Service Workers, Including Fast Food	100%	59%	26%
Cashiers	100%	71%	29%
Personal Care Aides	100%	86%	32%
Telemarketers	100%	47%	30%
Maids and Housekeeping Cleaners	100%	94%	41%
Dining Room and Cafeteria Attendants	100%	56%	18%
Dishwashers	100%	26%	8%
Waiters and Waitresses	92%	67%	46%
Hotel, Motel, and Resort Desk Clerks	91%	80%	64%
Cleaners of Vehicles and Equipment	88%	21%	12%
Bus Drivers, School or Special Client	87%	33%	4%
Home Health Aides	86%	85%	41%
Food Preparation Workers	82%	60%	33%
Cooks, Institution and Cafeteria	80%	37%	16%
Child care Workers	78%	95%	49%
Hosts and Hostesses, Restaurant, Lounge, and Coffee Shop	76%	88%	41%
Driver/Sales Workers	72%	10%	5%
Retail Salespersons	70%	54%	26%
Bill and Account Collectors	70%	72%	34%
Janitors and Cleaners	67%	38%	12%
TOTAL Occupations in Pueblo	39%	49%	22%

Source: CFI analysis of demographic data from 2018 U.S. Census PUMS data by occupational code in Colorado

Top 10 Largest Occupations Compared to Child care Costs in Colorado Cities				*Table 9*
Cities	**Occupation**	**Number of Employees in 2017**	**Median Wage**	**Portion of Occupation Earning Less than Wage that Makes Working with Child Care Worth more than $10/hour***
Boulder	Retail Salespersons	5390	$11.94	77%
	Combined Food Preparation and Serving Workers, Including Fast Food	5350	$11.00	100%
	Software Developers, Applications	4980	$49.47	0%
	Waiters and Waitresses	3590	$9.64	82%
	Business Operations Specialists, All Other	3370	$35.01	5%
	Registered Nurses	3000	$35.99	0%
	General and Operations Managers	2970	$57.13	0%
	Office Clerks, General	2910	$17.67	50%
	Cashiers	2890	$10.75	88%
	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	2780	$18.34	45%
Colorado Springs	Retail Salespersons	9370	$11.17	80%
	Cashiers	7390	$10.71	88%
	Combined Food Preparation and Serving Workers, Including Fast Food	6970	$9.69	100%
	Customer Service Representatives	6970	$13.52	65%
	Waiters and Waitresses	5900	$9.50	85%
	Registered Nurses	5800	$33.90	0%
	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	5160	$16.50	49%
	Office Clerks, General	4900	$16.38	50%
	Business Operations Specialists, All Other	4270	$36.99	2%
	General and Operations Managers	4090	$45.26	2%
Denver	Retail Salespersons	46530	$11.41	81%
	Combined Food Preparation and Serving Workers, Including Fast Food	32880	$10.40	100%
	Cashiers	30030	$10.59	100%
	Customer Service Representatives	28640	$17.55	52%
	Registered Nurses	27130	$35.04	0%
	Business Operations Specialists, All Other	26820	$36.79	1%
	Waiters and Waitresses	26420	$9.47	98%
	General and Operations Managers	24820	$56.92	3%
	Office Clerks, General	23200	$18.37	47%
	Accountants and Auditors	22930	$34.72	0%
Fort Collins	Retail Salespersons	6720	$11.13	83%

	Combined Food Preparation and Serving Workers, Including Fast Food	4410	$9.94	100%
	Cashiers	3960	$10.62	93%
	Registered Nurses	3360	$32.96	0%
	Waiters and Waitresses	3270	$9.70	71%
	Office Clerks, General	3200	$16.06	56%
	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	2600	$16.99	50%
	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	2180	$13.31	77%
	Business Operations Specialists, All Other	2150	$32.90	2%
	General and Operations Managers	2130	$40.88	12%
Grand Junction	Retail Salespersons	3060	$11.53	76%
	Registered Nurses	1870	$34.26	0%
	Combined Food Preparation and Serving Workers, Including Fast Food	1640	$9.68	100%
	Cashiers	1540	$10.33	82%
	Office Clerks, General	1330	$15.41	42%
	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	1200	$15.77	39%
	Waiters and Waitresses	1190	$9.49	100%
	Customer Service Representatives	1160	$11.58	75%
	General and Operations Managers	920	$39.19	5%
	Heavy and Tractor-Trailer Truck Drivers	910	$19.83	19%
Pueblo	Retail Salespersons	2220	$11.33	70%
	Registered Nurses	2160	$31.63	0%
	Combined Food Preparation and Serving Workers, Including Fast Food	2130	$9.51	100%
	Cashiers	1740	$10.05	100%
	Personal Care Aides	1340	$9.77	100%
	Customer Service Representatives	1320	$13.67	55%
	Waiters and Waitresses	1060	$9.53	92%
	Office Clerks, General	1040	$12.74	56%
	Stock Clerks and Order Fillers	970	$11.32	66%
	Telemarketers	850	$10.66	100%

Source: 2017 Occupational Employment Statistics Metropolitan Area Data from the Bureau of Labor Statistics
**2017-18 Colorado Child care Market Rate Study prepared by the Colorado Department of Human Services Office of Early Childhood.*
***calculated using linear interpolation between 10th, 25th, median, 75th and 90th wages to determine what portion of the occupation pays less than $14.25.*

Of the 10 most common occupations in Pueblo, four of them pay wages that are so low even the highest paid workers cannot afford child care costs. This includes cashiers, food service workers, personal care aides, and telemarketers. In Fort Collins, only one of the 10 largest occupations pays too little to make child care worth the trade-off. Even when higher-paid occupations are considered, Pueblo's registered nurses are the only ones who earn enough on average to make child care cost worth the financial tradeoff.

Theoretical Framework of Statistical Analysis

Difference-in-difference

Parents with children under 6 must make the decision of whether to work and arrange for paid child care, or not work and spend time caring for their child. Parents with children over 6 must still consider these decisions but are required by Colorado law for the child to begin school. All Colorado municipalities provide free public schooling to their citizens, and in effect, provide free child care for parents of children ages 6 and over. A recent study conducted by the Council of Economic Advisors found that affordable child care plays a large role in promoting work and raising household incomes.[5] The role that child care plays is especially important for single mothers and women in two-parent households. The Council of Economic Advisors study emphasizes these groups of parents are the most likely to reduce hours of work in response to high child care costs.

By using the age of a parent's child, we can estimate the effect of providing compulsory schooling for young children on household income, hours of work, and likelihood of employment in a similar manner to a controlled trial. By establishing a "treatment group" (parents required to send their 6-year-old children to school) and a "control group" (parents with 5-year-old children who are not guaranteed free public schooling) we can estimate the change in earnings, weekly hours of work, and likelihood of employment that is caused by the provision of free child care. In our data, we observe random samples of parents with 4-year-old children in 2017 and 5-year-old children in 2018 who we assign the control group status to. We also observe two random samples of parents with 5-year-old children in 2017 and 6-year-old children in 2018. Because these parents are required to send their children to school, we consider them the treatment group.

In order to demonstrate the effects for the groups having the most vulnerability to high child care costs, we limited the sample to single parents and married households. Among married households, we considered only the female partner in the analysis.

An essential assumption that allows us to perform this analysis is that there are no major differences in between the treatment and control groups other than the age of the parent's youngest child. We believe that the only difference between these two sets of parents is that one group (those who had 6-year-olds in 2018) was offered free child care in 2018. All other variables that might affect employment or income are assumed to have remained the same between these two groups over time and were therefore accounted for by the control group. For example, previous CFI analyses have found that English language speaking ability has a significant relationship with hourly wage. Unfortunately, there were not enough responses to this question in the ACS survey data and this variable **could not** be included in later analyses. The difference-in-difference analysis **can** and does account for this variable, however, since we can reasonably assume that English language speaking ability is constant in the control group of parents with 4- and 5-year-old children, as well as the treatment group of 5- and 6-

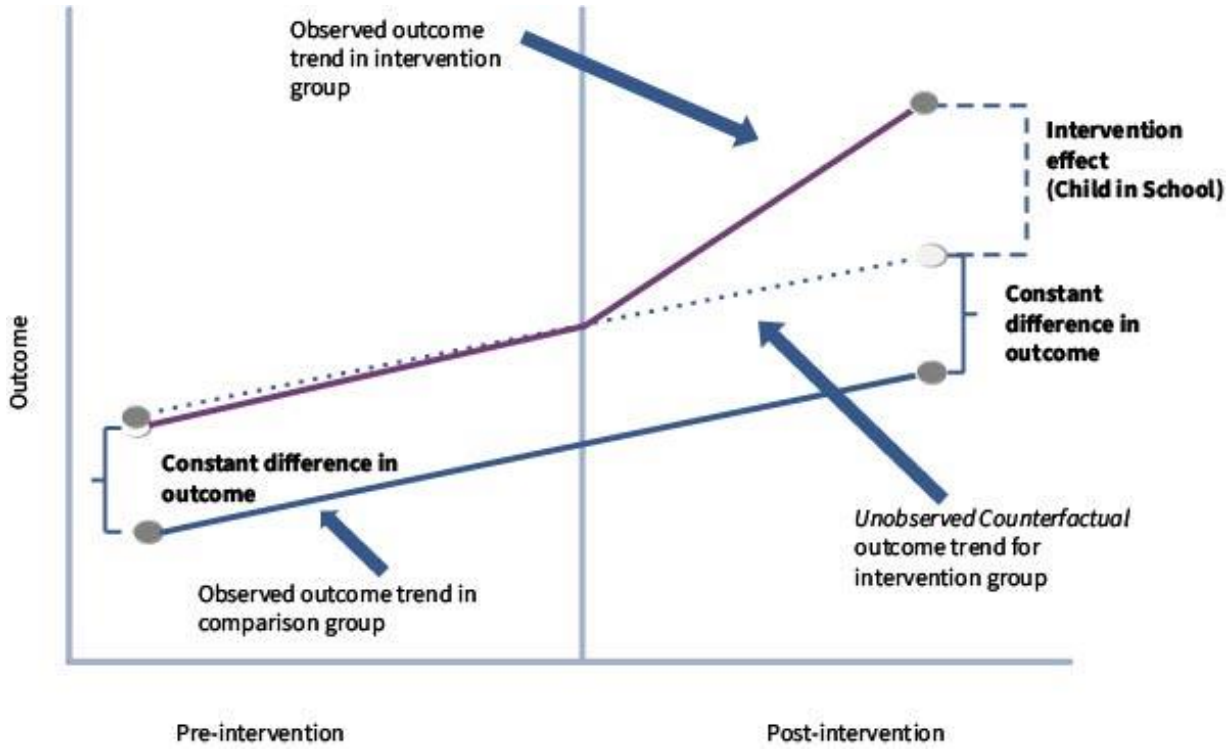
[5] *The Role of Affordable Child care in Promoting Work Outside the Home*, The Council of Economic Advisors, December 2019, available at: https://www.whitehouse.gov/wp-content/uploads/2019/12/The-Role-of-Affordable-Child-Care-in-Promoting-Work-Outside-the-Home-1.pdf.

year-old children.[6] This is to say, having a child turn 6 does not suddenly increase a parent's English language speaking ability. Since it is difficult to imagine any additional trends that would change differently over time for parents of 4- to 5-year-olds compared to parents of 5- to 6-year-olds, we believe our difference-in-difference analysis controls for the vast majority of factors that affect labor market outcomes.

The difference-in-difference analysis allows us to examine the change in economic outcomes (household income, weekly hours of work, and likelihood of employment) caused by the provision of free child care while accounting for any change in economic conditions that might also affect the outcomes we are interested in. For example, our analysis is robust to any changes in the state labor market, such as an increase in household income from changes in the tax code or change in minimum wage. Specifically, we examine the change in the outcome variables for the treatment group, minus the change in outcome variables for the control group (see "Intervention effect" in figure below).

[6] One can imagine a scenario where English language speaking ability improves for both groups, perhaps through an increased effort to provide adult English language classes. As long as the increase in English language skill applies similarly to both the control and treatment group, our analysis will still account for this effect.

Difference-in-Difference Estimation



Our difference-in-difference model specification is specifically:

$$y_{it} = \beta_0 + \beta_1 2018_t + \beta_2 SchoolAgeChild_i + \beta_3 SchoolAgeChild * 2018_{it} + \beta X_{it} + e_{it}$$

y_{it} are the economic outcome variables of interest, specifically, weekly hours of work, household income, and likelihood of employment. 2018 is an indicator for the year 2018 in the data, SchoolAgeChild is an indicator for whether an individual had a 6-year-old child in 2018, and SchoolAgedChild * 2018 identifies the treatment group in the post-treatment period, or the overall effect of having a child turn 6. X_{it} is a vector of demographic controls including age of parent, race, the presence of an older sibling in the household, and education level of the parent. e_i is a random error term.

The economic outcome, likelihood of employment, is estimated as a logistic regression, where relationships are expressed in terms of log-odds. This model is more likely to give accurate estimates for binary outcomes, however, its regression coefficients are more difficult to interpret. We will provide an explanation and simplified interpretation of the coefficients in the "Results" section.

Ordinary Least Squares (OLS)

The sample size of data collected by the US Census Bureau is large enough to conduct the difference-in-difference analysis for Colorado, but not for Pueblo. In order to examine whether our findings from this model are applicable to Pueblo, we estimate an ordinary least squares (OLS) regression. This regression analysis is less precise, but allows us to see general trends and magnitudes in the data by specifically examining the impact of having a school-aged child while accounting for the impact of other observable variables.

We similarly limited the sample to the populations most sensitive to changes in child care expenses: single parents and women in two-parent households. Our variable of interest is whether or not a parent's youngest child was aged 6-17 (and was required to be in school during working hours). We additionally account for any effects that the education, age, race, gender, and industry of the parent might have on weekly hours, household income, and likelihood of employment.

Although we can estimate whether these effects are generally consistent with our more precisely estimated difference-in-difference results, we are not able to make definitive statements about the effects for Pueblo due to the factors that might affect economic outcomes that we do not observe in the data and the imprecisely measured variables. One potential area for bias is that we may accidentally be including the effects of idiosyncratic traits that affect labor market outcomes. For example, if a parent's attitude toward working while raising their child has an effect on household income or hours worked, our estimates may not be accurate.[7] The OLS approach is also unable to specifically capture the initial effect of providing free schooling (or child care) to parents. In order to increase sample size we expand the variable that captures the effect of compulsory schooling to include all children over 5. Specifically, we include a variable to capture the effect of a parent's youngest child being age 6 to 17.

For Pueblo, our OLS regressions are estimated as:

$$y_{it} = \beta_0 + \beta_1\, \mathbf{ChildOver5}_i + \beta_2\, \mathbf{ParentEducation}_i + \beta_3\, \mathbf{Age}_i + \beta_4\, \mathbf{Black}_i + \beta_5\, \mathbf{Hispanic}_i + \beta_4\, \mathbf{OtherRace}_i + \beta_5\, \mathbf{Female}_i + \beta\, \mathbf{IndustryControls}_i + e_i$$

As before, y_{it} are the economic outcome variables of interest, specifically, weekly hours of work, household income, and likelihood of employment. ChildOver5 is an indicator for whether a parent had a child aged 6 or over. ParentEducation is the year of schooling of the parent, Age is the age of the parent, and Black, Hispanic, OtherRace, and Female represent indicator variables for these demographic characteristics of the parent. IndustryControls is a vector of binary variables for each industry listed in the data. As above, e_i is a random error term.

In the OLS specification, likelihood of employment is estimated as a linear probability model (LPM), as opposed to a logistic regression. An LPM model is more susceptible to providing inaccurate results, but has coefficients that are easier to interpret. Since our intention is to provide general indications of what the effects of free child care may be for Pueblo, rather than to provide exact and unbiased estimates, we believe an LPM model is appropriate.

[7] If the effect of attitude towards work is constant between when a parent's child ages from 4 to 5 and also constants between when a parent's child turns 5 to 6, our difference-in-difference analysis will **not** be affected by this bias.

In addition to the OLS regressions for weekly hours, household income, and likelihood of employment, we also estimated an OLS regression for hourly wage. The regression on wage is similarly designed to give an indication of how compulsory schooling affects income earners in Pueblo. The results are subject to the same shortcomings as the prior OLS regressions and cannot be as accurately estimated as the difference-in-difference analysis. Unlike the two analyses above, we attempted to broaden the sample to determine what the effects of compulsory schooling may be for a broader set of parents. Our analysis was conducted similarly for single parents but was expanded from exclusively female parents in two parent households to *all* parents of any gender in any household living situation.

As above, our variable of interest was whether or not a parent's youngest child was aged 6-17. We also include an interaction term between whether a parent had a school-aged child and gender. This term will allow us to determine whether there are any differential effects of compulsory schooling for female parents. As in the previous OLS regression, we controlled for any effects that the education, age, race, gender, and industry of the parent might have on weekly hours, household income, and likelihood of employment. In this regression can also account for the potential impact of having a grandparent in the household.

Data

To estimate these results, we use data from the American Community Survey (ACS) 2017 and 2018 Public Use Microdata files collected by the US Census Bureau. The ACS is an ongoing survey that provides vital information about the country annually. It provides representative data on employment, income, family living situations, children in households, and demographic and economic circumstances of individuals. The ACS is conducted as a random sample for individuals residing in each Public Use Microdata Area (PUMA) within a state. A PUMA is nested entirely within a state, must contain at least 100,000 people, and is composed of census tracts and counties. The primary reason PUMAs are used in analysis of ACS data is to create sufficiently large geographic areas for technical analysis that share geographic, economic, and demographic similarities.[8]

The ACS performs a random sample of individuals each year and does not track the same individual over time. To create the difference-in-difference results, we compared the random sample of parents with 4-year-olds in 2017 (and 5-year-olds in 2018) to a random sample of parents with 5-year-olds in 2017 (and 6-year-olds in 2018). Traditionally, a difference-in-difference analysis is performed with a panel data set that tracks the same individuals over two time periods. Although we use random sampling, and are not directly comparing the same parents before their child is required to attend school and after, the representativeness of the ACS data and random sampling procedures allows us to create this pseudo-panel without violating any of the assumptions required to perform the difference-in-difference analysis.

In the two sets of OLS regressions we pool 2017 and 2018 data to create a large enough sample to estimate our models. All variables were used as originally found in the survey data, with the exception of the treatment group designation and weekly hours. To determine whether a parent had a 5-year-old in 2017 and 6-year-old in 2018, we summed the total of youngest children in 2017 and 2018. If a parent's youngest child was 5 in 2017 and 6 in 2018, they were indicated as being part of the "treatment

[8] *History of the Public Use Microdata Areas (PUMAS): 1960-2000*, US Census Bureau, available at: https://www2.census.gov/geo/pdfs/reference/puma/puma_history.pdf?#.

group." Likewise, parents of 4-year-old children in 2017 and 5-year-old children in 2018 were considered part of the "control group." Weekly hours were calculated as a parent's annual wage and salary income divided by annual weeks worked and average hours per week.

Results

Difference-in-difference for Single Parents in Colorado

For single Colorado parents, the effect of providing free child care in the form of compulsory schooling increases household income by $1,819, increases the likelihood of any employment by 19.5%, and decreases the average hours worked per week by 2, after their child turned 6, relative to parents of newly 5-year-old children.[9]

These results may indicate that once parents are provided with free child care in the form of compulsory schooling, they are able to enter the workforce (as indicated by the large increase in odds of employment) but that these jobs are most likely less than 40 hours a week (as indicated by the decrease in weekly hours).

A vast majority of Colorado single parents are interested in taking these part time jobs, as a 19.5% increase in odds of employment suggests an increase from 82% employment to 97% employment, consistent with the observed levels of employment for single parents of older children in Colorado (Table 8 – for descriptive stats). This suggests that single Colorado parents want to work but are prevented from doing so by the cost of child care and responsibility of caring for their children.

[9] The coefficients from the analysis of likelihood of employment are interpreted as changes in log-odds. Mathematically, the change in log-odds is computed as e^{β}.

Employment Levels and Household Income Difference-in-difference Analysis Single Parents and Women in Two-Parent Households with Children Colorado *Table 10*						
	Single Parents			**Women in Two-Parent Households**		
	Weekly Hours (1)	**Household Income (2)**	**Likelihood of Employment (3)**	**Weekly Hours (4)**	**Household Income (5)**	**Likelihood of Employment (6)**
Treatment Group in 2018	-2.02*** (0.2243)	1,818.64*** (1,101.42)	0.1784** (0.7025)	1.44*** (0.1682)	9,002.55*** (1,148.09)	-0.105*** (0.0275)
Treatment Group	1.60*** (0.2244)	-5,972.68*** (712.99)	0.2833*** (0.0703)	-0.869*** (0.1018)	-8,329.75*** (701.16)	0.519*** (0.0167)
2018	1.63*** (0.0793)	3,005.75*** (377.44)	0.4125*** (0.0198)	0.316*** (0.0479)	6,923.02*** (313.69)	0.103*** (0.0069)
Years of Schooling	0.34*** (0.011)	3,128.84*** (50.72)	0.0615*** (0.0024)	0.363*** (0.009)	9,822.55*** (51.18)	0.151*** (0.0013)
Siblings Over Age 6	-1.22*** (0.0968)	-703.14 (469.41)	-0.444*** (0.0269)	-1.49*** (0.0717)	7,246.68*** (470.07)	-0.137*** (0.0106)
Age	-0.02*** (0.006)	1,745.83*** (28.76)	0.0181*** (0.0015)	-0.06*** (0.0043)	4,326.70*** (27.58)	0.007*** (0.0006)
Demographic Controls	Y	Y	Y	Y	Y	Y
N	72,033	82,028	81,926	306,982	431,230	430,834
R2	0.072	0.245	0.054	0.018	0.178	0.042

Difference-in-difference for Women in Two-Parent Households in Colorado

The difference-in-difference results reveal a different effect of compulsory schooling for women in two-parent households. **These parents experience increases in their average weekly hours by 1.4, a slight 10% decrease in the odds of employment, and a large boost in household income of $9,000.**

These results suggest that when married mothers are provided with free child care, they are able to work more hours in their existing jobs, perhaps going from part- to full-time status, and receive a substantial boost in household income. Married women with children under 6 only work 35 hours on average, so providing child care in the form of schooling implies that, on average, women are taking jobs where weekly hours are at least 36.4. The large increase in household income for married women represents a roughly 9% increase in average household income.

Ordinary Least Squares Regression – Pueblo

Single Parents

As stated in the Theoretical Framework section, our OLS results are performed for the same economic outcome variables as the difference-in-difference analysis but are less precisely estimated. They are instead intended to provide preliminary insight into how these effects may apply to Pueblo.

For single parents in Pueblo, weekly hours increase by 9.3 percent, household income increases by $10,000, and likelihood of employment increases by 15 percent with compulsory schooling. These results are roughly consistent with the more accurate difference-in-difference findings. They indicate that household income increases with the provision of schooling, but find the effect is much greater than for Colorado generally. The large increase in weekly hours and likelihood of employment suggest that this differential effect may be driven by single parents taking on more full-time employment, rather than part-time employment as was observed statewide. **This increase in household income represents a 52 percent increase for the average single Pueblo parent with a child under 6, from $19,100 to $29,100.**

Women in Two-Parent Households

Women in two-parent households in Pueblo also experience a large increase in household income, by $5,400, but this increase is perhaps driven by a different mechanism than in the rest of Colorado. Women in two-parent households only experience a small bump in likelihood of employment, by 3.3 percent, and weekly hours of work decrease by 1.7 hours upon having a school-aged child.

Women in two-parent households in Pueblo, similar to single parents in Colorado more generally, may be working more part-time jobs when they are given free child care. It may be the case that women in Pueblo want to work full-time while full-time jobs are unavailable in the labor market, or these workers are discriminated against in hiring processes. The inability to work as much as desired is referred to as "underemployment" and may be a driving factor in why the household income increase is not as large for married women in Pueblo as it is in Colorado more generally. Because of the limitations of the data, we are unable to account for the economic influences of particular geographies. Further studies and surveys of employers would be a worthwhile avenue to explore in answering this question.

Employment Levels and Household Income OLS Analysis Single Parents and Women in Two Parent Households Pueblo *Table 11*						
	Single Parents			**Women in Two Parent Households**		
	Weekly Hours (1)	**Household Income (2)**	**Likelihood of Employment (3)**	**Weekly Hours (4)**	**Household Income (5)**	**Likelihood of Employment (6)**
School Age Children	9.261*** (0.298)	9988.4*** (1459.7)	0.151*** (0.0136)	-1.670*** (0.254)	5427.8*** (1625.8)	0.0334*** (0.00942)
Years of Schooling	-1.412*** (0.0478)	10878.7*** (233.6)	-0.00408 (0.00258)	0.170*** (0.0410)	875.3*** (262.9)	0.0140*** (0.00143)
Age	-0.120*** (0.0148)	1059.0*** (72.57)	0.00465*** (0.000848)	-0.210*** (0.0174)	1277.2*** (111.4)	0.0274*** (0.000615)
Black	-4.995*** (0.236)	3138.5** (1153.7)	0.152*** (0.0151)	-	-	-
Hispanic	-4.953*** (0.199)	-10272.2*** (972.0)	0.101*** (0.0114)	-0.876*** (0.212)	-26031.0*** (1360.5)	-0.0688*** (0.00653)
Other Race	-4.788*** (0.524)	61711.5*** (2563.5)	0.214*** (0.0412)	14.27*** (0.726)	69217.9*** (4653.8)	-0.0157 (0.0295)
Female	-7.112*** (0.374)	13874.0*** (1828.8)	0.204*** (0.0130)	-	-	-
Industry Controls	Y	Y	Y	Y	Y	Y
N	4,336	4,336	4,336	8,643	8,643	8,292
R2	0.883	0.805	0.123	0.704	0.646	0.274

Discussion of Data Results

Given the natural experiment created by children entering school at age 6, we believe our difference-in-difference results are precisely estimated for Colorado. Our results suggest that the increase in household income is driven by the opportunity for single parents to enter the workforce (as indicated by the large increase in odds of employment) but that these are most likely part-time jobs. For female parents in two-parent households, our results suggest that when married mothers are provided with free child care they are able to work more hours in their existing jobs, perhaps going from part-time to full-time status and receiving a substantial boost in household income.

Our OLS results suggest that the magnitude of these results may be unique for Pueblo. We believe Pueblo's results are consistent with the difference-in-difference results but may indicate that full-time employment plays a larger role for Pueblo single parents, as indicated by the large increases in weekly hours worked and wages. For Pueblo women in two-parent households, wages do not increase as much as in Colorado generally, which we believe is due to a lack of increase in full-time work. Female parents in Pueblo may not have access to full-time employment opportunities and this may be limiting their ability to see gains in household income. We should also pay closer attention to whether they are may

caring for more children in their families, as Pueblo households have more children on average than Colorado generally.

Although our results are robust to many potential biases, there are two effects that suggest our results represent a lower bound to the economic benefits of free child care. One potential bias is the non-compulsory offering of kindergarten to 5-year-old children. It is possible that parents of some 5-year-old children have access to partial- or full-day kindergarten, allowing them more time to participate in the formal labor market. If this is the case, our results will be biased downwards and understate the effect of free child care on household income.

Another potential bias is that some parents of 4- and 5-year-old children may anticipate their child attending school in the coming years and want to foster their relationship with their current employer. If a parent believes that having a part-time job when a child is 4 or 5 will advance their career when their child turns 6 and they will be able to work full-time, we will be again understating the effect of free child care. In this instance, our control group would have higher earnings than parents who do not expect to receive free child care in the next year.

These biases suggest that our results represent a lower bound on the economic impacts of child care for families in Pueblo, and Colorado more generally.

Our results provide strong indications that free child care in the form of compulsory schooling leads to increased work, whether in the form of a change from part-time to full-time status or beginning a part-time job for the first time, and increases household income for all parents. A principal concern, particularly for Pueblo, is the possibility that mothers in married households are unable to find full-time work. We suggest that a fruitful area of further study would be to survey employers and married mothers with children over 6 to determine whether access to part-time jobs is limiting workers in Pueblo from reaching full employment. We also believe that a randomized controlled trial of providing free child care outside of the public school system would be worthwhile to confirm the results in an applied setting.

Pueblo's Potential with Free Child care

Our statistical analysis found that once a child of a single parent in Pueblo goes to school, the parent sees increases in their weekly work hours by 9.3 percent, their household income increases by $10,000, and their likelihood of employment increases by 15 percent. This is our proxy for the labor market outcomes we'd expect if single Pueblo parents of kids under 6 years old were also provide free child care.

There are 1,433 single-parent households in Pueblo with children aged 2-5 whose poverty rate is currently 46 percent. If all those single parents received free child care, we'd expect 200 parents would move above the poverty line and each parent would see their incomes grow by $10,000. That would be an injection of $14.3 million annually into the Pueblo economy.

For two-parent households, free child care correlates with an increase in household income of $5,200. There are 4,073 two-parent households with kids 2-5 in Pueblo. That would inject $21.2 million a year into Pueblo's economy.

To see what that injection of $35.5 million in household income would mean for Pueblo's economy, we ran that impact through our input-output economy modeling using IMPLAN. We coded the single parent $14.3 injection into households making between $10,000 and $15,000. We coded the dual-parent $21.2 million injection as household categories making $40,000 to $50,000. There are no direct jobs created under this scenario, but there are "induced" job creation as households have additional money to go out and spend at their local restaurants and shops.

A $35.5 million injection in household income in Pueblo would create 200 jobs. Our input/output model predicts the biggest industry benefiting from extra household income would be the restaurant industry, which would generate 35 jobs as those parents would spend their additional money around Pueblo.

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