**Abstract Title Page**

**Title:** The long-term impact of systematic student support in elementary school: Reducing high school dropout

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**Background/Context:**

Out-of-school factors can significantly impact students' readiness to learn and thrive in school. Research spanning decades confirms that larger social structures and contexts beyond the school are critical, accounting for up to two-thirds of the variance in student achievement (Coleman et al., 1966; Rothstein, 2010; Phillips, Brooks-Gunn, Duncan, Klebanov, & Crane, 1998). These out-of-school factors can be particularly pernicious in the context of poverty. For example, poverty limits families' ability to invest in children's growth, creates pervasive stress, and exposes children to chaos and environmental contagions (Brooks-Gunn & Duncan, 1997; Dearing 2008; Evans, 2004). Many have argued that schools cannot hope to close the achievement gap without addressing out-of-school factors (Berliner 2009; Bryk, Sebring, Allensworth, Luppescu & Easton 2010).

Historically, schools have always addressed some of these factors through the work of school nurses, counselors, social workers, and psychologists, but this student support work has varied widely, without a standardized set of practices (Lean and Colucci, 2010). City Connects provides an innovative and systematic approach to addressing out-of-school barriers to achievement and thriving in school. Its approach is grounded in best practices for systematizing student support work (Marx, Wooley & Northrop 1998; Adelman & Taylor 2006) and is guided by contemporary understandings of child development (Masten 2001; Bronfenbrenner & Morris 1998; Alexander & Entwisle, 1988). Also guiding the City Connects approach is theory on schools as developmental contexts for learning to self-regulate emotions, behavior, and cognitive processes (Eccles & Roeser 2005). Schools should be most successful when they support children in ways that foster achievement motivation, a high sense of efficacy, and internalized responsibility. Given high-quality support, students are expected to develop beliefs and attitudes that promote effort and academic engagement, leading to increased academic skills and, finally, to improved achievement (Deci & Ryan, 2000; Dweck, 1999; Eccles et al, 1993; Kellaghan, Madaus & Raczek 1996). Crucially, given this theory, effective student support interventions should lead to benefits that persist even after students have left the intervention, because they strengthen beliefs and attitudes that underlie achievement.

City Connects addresses the out-of-school factors by working with every teacher in the school to identify each student's strengths and needs in academic, social-emotional, health, and family domains. City Connects staff then work with community agencies and families to deliver a tailored set of services to every child. Continuous assessment and follow up helps ensure that students' strengths and needs are being addressed through the school year.

**Purpose / Objective / Research Question / Focus of Study:**

Past research suggests that receiving City Connects in elementary school positively affects academic trajectories, both in elementary school and through the transition to middle school and early high school. Growth curve analysis showed that City Connects students have significantly greater improvement over time in report card outcomes in reading, writing, and math during elementary school than comparison students (Center for Optimized Student Support, 2010). Additionally, students enrolled in City Connects during elementary schools demonstrate higher middle school report card and statewide standardized test scores (both in English language arts and math) relative to students never enrolled in City Connects (Walsh, Madaus, Raczek et al. 2014). City Connects appears to positively impact non-cognitive academic outcomes as well: relative to peers never in City Connects, students enrolled in City Connects during elementary school have lower rates of chronic absenteeism and being held back in grade through middle and early high school grades (Center for Optimized Student Support, 2012).

The next stage of this trajectory is completing high school. Reducing high school dropout is an important policy goal, as dropout has clear, measurable, negative impacts for both individuals and broader society (De Witte & Rogge, 2013; Hanushek & Wobmann, 2007; McNeal, 1995; Strom & Boster, 2007). Though the reasons for dropping out are often multifaceted (Heers, Van Klaveren, Groot & Massen van den Brink 2011; Rumberger, 2011; Thyssen et al., 2010), there is strong evidence that dropout is correlated with elementary and middle school outcomes (Balfanz & Herzog, 2005; Balfanz, Herzog, & Mac Iver, 2007; Heppen & Therriault, 2008; Wells, Bechard, & Hamby, 1989). Given the positive treatment effect estimates on many of these early correlates of dropout, past research on City Connects suggests that one approach to reducing high school dropout may be to implement a systematic student support system in elementary schools. Unfortunately, past research could not examine this question directly because data from students who received City Connects in elementary school and had aged through high school were not made available to program evaluators until recently. With such data now available, the purpose of this study is to examine this dropout question directly: Do students exposed to City Connects during elementary school drop out of high school at a lower rate than students who were never exposed to City Connects?

**Setting:**

City Connects is currently implemented in 63 schools in Massachusetts, Ohio, and New York. The setting for this study is the Boston Public School (BPS) district, drawing on data from school years 2001-02 through 2011-12. In BPS across these years, the intervention was implemented in 12 elementary and K-8 schools in several geographic areas in the city. BPS is a high-poverty, urban school district. Across all elementary and K-8 schools in the district, about 90% are students of color, and over 90% are eligible for free or reduced-price lunch.

**Population / Participants / Subjects:**

The analytic sample consists of 2,265 City Connects and 19,979 comparison students (see analytic sample inclusion criteria in Data Collection and Analysis below). City Connects and comparison samples have similar proportions of males (~51%), English language learners (~23%), and students eligible for reduced (~3%) and free lunch (~91%). The two groups differ more in race and country of birth (foreign born) – the City Connects sample has a higher proportion of Asian students (20% vs 8%), a lower proportion of Black students (31% vs 41%), and a higher proportion of students who are foreign born (20% vs 16%). Full sample description can be found in Appendix B, Table 1.

**Intervention / Program / Practice:**

At the core of the intervention is a full-time Site Coordinator, a Masters'-trained school counselor or social worker, who: 1) collaborates with every classroom teacher to identify for each student key areas of strengths and needs across academic, social-emotional, health and family domains; 2) connects students to a tailored set of community-based support services and enrichment opportunities; 3) documents and tracks the service plan for each student; and 4) follows up to assure service delivery and assess effectiveness. The model is codified in a Practice Manual, with accompanying training and tools, including a proprietary electronic database for tracking service referral and delivery.

The City Connects theory of change is shown in Appendix B, Figure 1. As shown in the theory of change, while the implementation of student support is in elementary school, the intervention is predicted to lead to improvements in such areas as academic effort, behavior, and work habits, which in turn are expected to lead to improved academic achievement, not just in

elementary school, but after students have left City Connects and moved on to middle school, high school, and beyond.

**Research Design:**

Our outcome measure is aligned with the commonly understood definition of dropout: permanent disenrollment from school prior to completion of high school graduation requirements. The outcome variable used in this study can be considered a direct measure of dropout status and dropout timing (by grade) for each individual. This is in stark contrast to group-level proxies of dropout, such as four/five year graduation rates or cohort enrollment differences across grades, which are often used to report official dropout statistics (Rumberger, 1987) and in educational research/program evaluation (see Hammond, Linton, Smink, & Drew, 2007; ICF International, 2010). This distinction is worth noting. As Rumberger (1987) has pointed out, group-based dropout proxies are defined in manners that often need clarification because they do not always align with the common understanding of dropout. Moreover, such group-based proxies can reflect a number of extraneous factors, the most obvious of which are student transfers after 9th grade and late, but eventual, graduation from high school.

We utilize a quasi-experimental design to estimate the effect of receiving City Connects in elementary school on later high school dropout. Discrete event history analysis (i.e., hierarchical logistic regression) is used to model the log-odds of dropout over time, where time-points are nested within students. Time is captured by grade with a series of dummy variables at the repeated measures level. To account for student mobility during high school years, a series of time varying dummy variables capturing the number of high school transfers experienced by student *i* through grade *t* is also incorporated into the repeated measures level. A random intercept model is specified – the repeated measures intercept is allowed to vary as a function of student-level variables, including the treatment indictors and control variables (e.g., demographics and mobility history prior to high school). Overall, this strategy results in a non-parametric time function that yields grade-specific estimates of the log-odds of dropout for City Connects and comparison students after adjusting for demographics at the student level and mobility at both the student and repeated measures levels. We note that this model form assumes that treatment affects the log odds of dropout proportionally across each grade. We tested this assumption and found little evidence of a treatment-by-grade interaction. Consequently, the final model was reduced to the form described here.

For the purpose of estimating treatment effects by grade of initial exposure, an *initial City Connects grade* covariate is also incorporated into the student level. Use of this covariate assumes treatment effect linearity across initial exposure grades. This assumption was examined, and little evidence of a non-linear relationship was found.

Finally, we note that treatment subgroups are partially aligned with cohort year. Thus, to reduce the likelihood that historical trends bias treatment effect estimates, we account for cohort year with a series of dummy variables at the student level.

**Data Collection and Analysis:**

Longitudinal data used in this analysis are drawn from the full district dataset made available by BPS, and span school years 2001-02 through 2011-12. The analysis uses BPS high school outcome data only from students who were also enrolled in BPS during elementary school grades. The K-5 City Connects intervention began implementation in BPS during school year 2001-02. Data are analyzed for students from six cohorts: those in kindergarten in 1996-97 through 2002-03. These cohort restrictions are used because only students from these groups could potentially have enrolled in a City Connects schools prior to the end of 5th grade and also

have at least one year of high school outcome data by school year 2011-12. Additionally, the analysis is performed using data only from students who were enrolled in BPS at the start of high school. This restriction facilitates the estimation of *cumulative 9th grade cohort dropout rates* (i.e., the percentage of students from an entering 9th grade class who dropped out at any point during high school).

City Connects students are defined as those enrolled in a City Connects BPS school at any point during grades K-5. Comparison students are defined as students who were never enrolled in a City Connects school but who were enrolled in a non-City Connects BPS school at some point prior to the completion of grade 5.

**Findings / Results:**

Relative to students who were never exposed to the intervention, students enrolled in City Connects beginning in kindergarten have approximately half the odds of dropping out of high school in any given grade (OR = .502, p < .001). By transforming model coefficients into rates, then aggregating across grades 9 - 12, we find that comparison students drop out of high school at a rate of ~15.2%, while City Connects students drop out at a rate of ~8.0%. For an entering 9th grade cohort in BPS of typical size (~5000 students), this difference in rates translates into ~358 fewer dropouts over the course of high school.

Additionally, we find that earlier initial exposure to City Connects is associated with more beneficial treatment effects (OR = 1.186, p = .000). Although treatment effects decrease as initial exposure grade increases, beneficial treatment effects remain positive and statistically significant through initial exposure in grade 3. Treatment effects are no longer statistically different from zero when initial exposure occurs in grades 4 or 5.

**Conclusions:**

Preventing dropout is a challenge because students fail to complete high school for a myriad of reasons that involve factors inside and outside of schools (Heers, Van Klaveren, Groot, & Van den Brink 2011; Rumberger, 2011; Thyssen et al., 2010). Many policy efforts targeting dropout focus on the high school years, even though it is clear that the complex factors ultimately leading to dropout often manifest and influence students long before they reach high school. The results from this study provide evidence that intervening in the elementary school years can make a difference.

We hypothesize that City Connects may be able to positively affect this long-term outcome because it addresses both strengths and needs of every student not only in academics, but in behavioral/social/emotional growth, health, and family domains, and connects students to the particular supports they need during critical periods of development. Thus, the intervention provides the flexibility and robustness needed to help address the myriad of factors that affect long-term academic trajectories of students.

Limitations of this study include possible threats to internal validity. These include selection bias due to unobserved variables and possible bias in treatment estimates due to attrition resulting from City Connects or comparison students transferring out of the BPS district prior to high school entry. Additionally, generalizability may be limited to urban school districts similar to BPS, and/or resource rich-city contexts (i.e., cities in which a diverse and large variety of community service providers are available).

**Appendix A. References**

Adelman, H., & Taylor, L. (2006). *The implementation guide to student learning supports in the classroom and schoolwide: New directions for addressing barriers to learning*. Thousand Oaks, CA: Sage Publications.

Alexander, K. L., & Entwisle, D. R. (1988). Achievement in the first two years of school: Patterns and processes. *Monographs of the Society for Research in Child Development, 53*, 1-157.

Balfanz, R., & Herzog, L. (2005). Keeping middle grades students on-track to graduation: Initial analysis and implications. Presentation at the second Regional Middle Grades Symposium, Philadelphia.

Balfanz, R., Herzog, L., & Mac Iver, D. J. (2007). Preventing student disengagement and keeping students on the graduation path in urban middle-grades schools: Early identification and effective interventions. *Educational Psychologist*, *42*(4), 223-235.

Berliner, David C. (2009). *Poverty and Potential: Out-of-School Factors and School Success.* Boulder and Tempe: Education and the Public Interest Center & Education Policy Research Unit.

Bronfenbrenner, U., & Morris, P. A. (1998). The ecology of developmental processes. In W. Damon & R.M. Lerner (Eds.). *Handbook of Child Psychology: Vol 1: Theoretical Models of Human Development* (pp. 993-1028). New York: Wiley.

Brooks-Gunn, J., & Duncan, G. J. (1997). The effects of poverty on children. *The Future of Children: Children and Poverty 7*, 55-71.

Bryk, A.S., Sebring, P.B., Allensworth, E., Luppescu, S., & Easton, J. Q. (2010). *Organizing schools for improvement: Lessons from Chicago*. Chicago: Chicago University Press.

Center for Optimized Student Support. (2010). *The impact of City Connects: Annual report 2010*. Chestnut Hill, MA: Lynch School of Education, Boston College. Available: http://www.bc.edu/content/dam/files/schools/lsoe/cityconnects/pdf/CityConnects_AnnualReport_2010_web.pdf

Center for Optimized Student Support. (2012). *The impact of City Connects: Annual report 2012*. Chestnut Hill, MA: Lynch School of Education, Boston College. Available: http://www.bc.edu/content/dam/files/schools/lsoe/cityconnects/pdf/CityConnects_ProgressReport_2012.pdf

Coleman, J.S., Campbell, E.Q., Hobson, C.J., McPartland, J., Mood, A. M., Weinfeld, F. D., & York, R. L. (1966). *Equality of Educational Opportunity.* Washington, DC: U.S. Government Printing Office.

Dearing, E. (2008). The psychological costs of growing up poor. *Annals of the New York Academy of Sciences (Special Issue: Scientific Approaches to Understanding and Reducing Poverty*, S. G. Kaler & O. M. Rennert, Eds.), 1136, 324-332.

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry, 4,* 227–268.

De Witte, K., & Rogge, N. (2013). Dropout from secondary education: All's well that begins well. *European Journal of Education*, 48(1), 131-149.

Dweck, C. S. (1999). *Self-theories: Their role in motivation, personality and development.* Philadelphia: Psychology Press.

Eccles, J. S., Midgley, C., Wigfield, A., Buchanan, C. M., Reuman, D., Flanagan, C., & Mac Iver, D. (1993). Development during adolescence: the impact of stage-environment fit on young adolescents' experiences in schools and in families. *American psychologist*, *48*(2), 90.

Eccles, J. S., & Roeser, R. W. (2005). School and community influences on human development. In M. H. Bornstein & M. E. Lamb (Eds.), *Developmental science: An advanced textbook*. (5th ed., 513-556). Mahwah, NJ: Erlbaum.

Evans, G. W. (2004). The environment of childhood poverty. *American Psychologist, 59,* 77-92.

Hammond, C., Linton, D., Smink, J., & Drew, S. (2007). Dropout risk factors and exemplary programs: A technical report. *National Dropout Prevention Center/Network (NDPC/N).*

Hanushek, E., & Wobmann, L. (2007). The role of education quality in economic growth. *Policy research working paper 4122*. The World Bank.

Heers, M., Van Klaveren, C., Groot, W., & Maassen van den Brink, H. (2011). Community schools unfolded: A review of the literature. *TIER working paper series*, *12*(04), 1-36.

Heppen, J. B., & Therriault, S. B. (2008). Developing Early Warning Systems to Identify Potential High School Dropouts. Issue Brief. *National High School Center*.

ICF International. (2010). *Communities In Schools National Evaluation Five Year Summary Report*. Fairfax, VA: ICF International.

Kellaghan, T., Madaus, G.F., & Raczek, A. (1996). *The use of external examinations to improve student motivation.* Washington, DC: American Educational Research Association.

Lean, D., & Colucci, V. (2010). Barriers to Learning: The Case for Integrated Mental Health Services in Schools. New York: R&L Education.

Marx, E., Wooley, S., & Northrup, D. (1998). *Health is academic: A guide to coordinated school health programs.* New York: Teachers College Press.

Masten, A. (2001). Ordinary magic: Resilience processes in development. *American Psychologist*, *56*, 227-238.

McNeal, R.B., Jr. (1995). Extracurricular activities and high school dropouts. *Sociology of Education*. *68*(1), 62-81.

Phillips, M., Brooks-Gunn, J., Duncan, G., Klebanov, P., & Crane, J. (1998). "Family background, parenting practices, and the black–white test score gap," in C. Jencks and M. Phillips, Eds., *The Black-White Test Score Gap*. Washington, D.C.: Brookings Institution Press.

Rothstein, R. (2010, October). How to fix our schools: It's more complicated, and more work, than the Klein-Rhee 'manifesto' wants you to believe. *Economic Policy Institute Issue Brief, No. 286*.

Rumberger, R. W. (1987). High school dropouts: A review of issues and evidence. *Review of educational research*, *57*(2), 101-121.

Rumberger, R.W. (2011). *Dropping out: Why students drop out of high school and what can be done about it*. Cambridge: Harvard University Press.

Strom, R.E., & Boster, F.J. (2007). Dropping out of high school: A meta-analysis assessing the effect of messages in the home and in school. *Communication Education*, *56*(6), 433.453.

Thyssen, G. De Witte, Groot, W., & Maassen van den brink, H. (2010). The effectiveness and meaningfulness of policy measures aimed at preventing school dropout: An explorative literature review. *TIER working paper series*.

Walsh, M., Madaus, G., Raczek, A., Dearing, E., Foley, C., An, C., Lee-St. John, T., & Beaton, A. (2014). A New Model for Student-Support in High-Poverty Urban Elementary Schools: Effects of Elementary and Middle School Academic Outcomes. *American Educational Research Journal*, 51(4), 704-737.

Wells, S., Bechard, S.,& Hamby, J.V. (1989). *How to Identify At-Risk Students.* Clemson, SC: National Dropout Prevention Center.

**Appendix B.**

Table 1. Analytic Sample Characteristics

| | | Comparison | | CCNX | | Total | |
|---|---|---|---|---|---|---|---|
| | | Count | Col. % | Count | Col. % | Count | Col. % |
| | Total | 19979 | 100.0% | 2265 | 100.0% | 22244 | 100.0% |
| Cohort Year | 1996 | 3268 | 16.4% | 227 | 10.0% | 3495 | 15.7% |
| | 1997 | 3227 | 16.2% | 281 | 12.4% | 3508 | 15.8% |
| | 1998 | 3127 | 15.7% | 353 | 15.6% | 3480 | 15.6% |
| | 1999 | 2955 | 14.8% | 318 | 14.0% | 3273 | 14.7% |
| | 2000 | 3006 | 15.0% | 333 | 14.7% | 3339 | 15.0% |
| | 2001 | 2652 | 13.3% | 326 | 14.4% | 2978 | 13.4% |
| | 2002 | 1744 | 8.7% | 427 | 18.9% | 2171 | 9.8% |
| Special Education Status | non SPED | 16144 | 80.8% | 1739 | 76.8% | 17883 | 80.4% |
| | reg ed with modifications | 14 | .1% | 3 | .1% | 17 | .1% |
| | reg ed with up to 25 percent out | 1188 | 5.9% | 166 | 7.3% | 1354 | 6.1% |
| | reg ed with up to 60 percent out | 1920 | 9.6% | 267 | 11.8% | 2187 | 9.8% |
| | substantially separate | 713 | 3.6% | 90 | 4.0% | 803 | 3.6% |
| ELL | no | 15513 | 77.6% | 1719 | 75.9% | 17232 | 77.5% |
| | yes | 4466 | 22.4% | 546 | 24.1% | 5012 | 22.5% |
| Free Reduced Lunch Status | full price lunch | 1242 | 6.2% | 139 | 6.1% | 1381 | 6.2% |
| | reduced price lunch | 512 | 2.6% | 67 | 3.0% | 579 | 2.6% |
| | free lunch | 18225 | 91.2% | 2059 | 90.9% | 20284 | 91.2% |
| Gender | female | 10208 | 51.1% | 1155 | 51.0% | 11363 | 51.1% |
| | male | 9771 | 48.9% | 1110 | 49.0% | 10881 | 48.9% |
| Foreign Born | no | 16758 | 83.9% | 1809 | 79.9% | 18567 | 83.5% |
| | yes | 3221 | 16.1% | 456 | 20.1% | 3677 | 16.5% |
| Race | Black | 8118 | 40.6% | 707 | 31.2% | 8825 | 39.7% |
| | White | 2229 | 11.2% | 263 | 11.6% | 2492 | 11.2% |
| | Asian | 1671 | 8.4% | 452 | 20.0% | 2123 | 9.5% |
| | Hispanic | 7748 | 38.8% | 826 | 36.5% | 8574 | 38.5% |
| | Native American | 72 | .4% | 7 | .3% | 79 | .4% |
| | Mixed/Other | 141 | .7% | 10 | .4% | 151 | .7% |
| Elementary and Middle School Mobility (number of school transfers) | 1 | 2128 | 10.7% | 165 | 7.3% | 2293 | 10.3% |
| | 2 | 9398 | 47.0% | 949 | 41.9% | 10347 | 46.5% |
| | 3 | 5438 | 27.2% | 667 | 29.4% | 6105 | 27.4% |
| | 4 | 2073 | 10.4% | 297 | 13.1% | 2370 | 10.7% |
| | 5 | 942 | 4.7% | 187 | 8.3% | 1129 | 5.1% |

Figure 1. City Connects theory of change

| Because Optimized Student Support ... | An environment is created where... | Resulting in... |
|---|---|---|

- Implements student support as a core function of schools
- Trains staff on a codified practice
- Collaborates with each teacher to develop a uniquely tailored student support plan for every child
- Leverages both school- and community-based services and enrichment opportunities
- Partners with families to ensure service delivery
- Systematically uses data to improve practice and assess outcomes

- **Students'** strengths and needs are addressed
- **Teachers** shape instruction to meet student challenges
- **Principals** see improvements in school climate
- **Families** have a trusted person to facilitate access to supports
- **Community Providers** can better tailor and deliver services

- Significant improvements in student achievement & ability to thrive
  - Thriving: Behavior, Work Habits, & Effort
  - Academic Performance: Elementary School Grades
  - Lasting Positive Academic Effects
  - Improved Life Chances