EXAMINING THE RELATIONSHIP BETWEEN PERSISTENCE IN ATTENDANCE IN AN AFTERSCHOOL PROGRAM AND AN EARLY WARNING INDEX FOR DROPOUT

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School districts constantly struggle to find solutions to address the high school dropout problem. Literature supports the need to identify and intervene with these students earlier and in more systemic ways. The purpose of this study was to conduct a longitudinal examination of the relationship between sustained afterschool participation and the host district’s early warning index (EWI) associated with school dropout. Data included 65,341 students participating in an urban school district’s after school program from school years 2000-2001 through 2011-2012. The district serves more than 80,000 students annually. Data represented students in Pre-Kindergarten through Grade 12, and length of participation ranged from 1 through 12 years. Results indicated that student risk increased over time and that persistent participation in afterschool programming had a significant relationship with student individual growth trajectories. Slower growth rates, as evidenced through successive models, supported students being positively impacted by program participation. Additionally, participation was more meaningful if students persisted, as noted in the lower EWI rates, as compared to students who attended less consistently.
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CHAPTER 1
INTRODUCTION

More than 20 years ago, Fine (1992) challenged the stereotypical perceptions of why students dropped out of school. Fine brought to light the role that school policies can play in pushing students out of school and widened the view that school dropout was more than just bad, unmotivated, or academically challenged students. To this day, researchers are still identifying and examining factors that contribute to student dropout and searching for interventions that decrease dropout and increase school completion or graduation rates. Fine provided a critical examination of the politics of an urban high school and how school policies can affect student graduation and dropout rates in public schools. By examining the systemic issues within public education, Fine paved the way for dropout to be seen from an ecological systems perspective and removed the stereotypical blame at the student level. Examining dropouts from an ecological systems perspective questions risk factors commonly used to identify the student. Instead, the roles students, parents, schools and districts play in the lives of student are examined which leads to a more complex understanding of the situation of dropouts and successful completers.

Researchers suggested that the reasons students drop out of school result from ongoing failure, retention, school policies, and being of age to finally leave the system (Bowers, 2010; Bradshaw, O’Brennan, & McNeely, 2008; Hickman, Bartholomew, Mathwig, & Heinrich, 2008). Additionally, Bowers (2010) pointed out the need to intervene earlier in a student’s academic career if dropout prevention is to work effectively. Research studies identifying indicators that predict students at risk for
dropping out of school generally included four key indicators: (a) failing core academic courses, (b) excessive absenteeism, (c) failure to be promoted to the next grade level, and (d) being disengaged in the classroom (Allensworth & Easton, 2005; Balfanz & Herzog, 2005; Neild & Blafanz, 2006).

Because dropout is hard to predict, Kennelly and Monrad (2007) indicated that “the first step toward an effective dropout prevention strategy involves tracking and analyzing basic data in which students are showing early warning signs of dropping out” (p. 1). Using the indicators found in literature, school districts are now developing early warning systems that identify students at risk of dropping out and providing much needed intervention. Despite early identification capabilities, Schargel and Smink (2001) related that most reform or intervention efforts fail to succeed due to being episodic and not systemic and addressing symptoms rather than causes.

In the 1997 book All Kids Are Our Kids, Peter Benson provided an excellent overview of the “deficit thinking” approach for focusing “too exclusively on reducing or eliminating individual risks and problems” (p. 16). The persistent focus on the deficit or risk-oriented model continues to prevail as the trend in education and most prevention or intervention programs continue to address symptoms rather than prolonged efforts in keeping students on a more positive path. Episodic programs, those that stop and start, address a multitude of symptoms and exist across all levels of the educational system today. The prevailing trend was clarified by Goleman (1995) in the book Emotional Intelligence:

Over the last decade or so “wars” have been proclaimed, in turn, on teenage pregnancy, dropping out, drugs, and most recently violence. The trouble with
such campaigns, though, is that they come too late, after the targeted problem has reached epidemic proportions and taken firm root in the lives of the young. They are crisis intervention, the equivalent of solving a problem by sending an ambulance to the rescue rather than giving an inoculation that would ward off the disease in the first place. Instead of more such “wars,” what we need is to follow the logic of prevention, offering our children the skills for facing life that will increase their chances of avoiding any and all of these fates. (p. 256)

Furthermore, current programs generally address a single issue, do not offer a sufficient array of enriching or challenging activities, and are typically isolated from other programmatic endeavors even when offered at the same school (Carnegie Council on Adolescent Development, 1992). In other words, programs are not systemic. Benson (1997) believed that programs are crucial and need reinforcement, but these should supplement individuals’ commitments of caring and be invested with youth both in and outside of these programs to provide the continuity that youth need in their lives. Caring adults who interact with students on multiple levels or within multiple contexts increase the likelihood that programs are inter-connected or systemic.

When researchers look for interventions to alleviate problem behavior, improve academic achievement, classroom management, student-teacher relationship, or the school community, it is rarely in the direction of afterschool programs. However, Durlak and Weissberg (2007) found that afterschool programs show promise in mitigating behavioral problems during the school day, and improving school community, student-teacher relationships, and academic performance. In addition, Schargel and Smink (2001) identified out-of-school enhancement as one of the basic core strategies that
have “the greatest power to make a significant impact on the school dropout problem” (p. 77).

Scope of the Problem

Fort Worth experienced double digit increases in criminal activity in the 1980s and for 2 years had the highest crime rate in the nation (Fort Worth Police Department, 2013). As part of this overall crime rate, the city experienced high rates of juvenile crime as outlined in Figure 1 (Puzzanchera & Kang, 2013). In 1995, the city established the Crime Control Prevention District (CCPD) through an election and a half-cent sales tax generated revenue to fund crime prevention and intervention initiatives (Fort Worth Police Department, 2013). At this same time, the Fort Worth Independent School District (FWISD), like most urban districts across the country, struggled with increasing dropout rates (Texas Education Agency, 1999, 2001a, 2001b, 2001c, 2001d, 2002a, 2002b, 2003a, 2003b, 2004a, 2004b, 2005a, 2005b, 2006a, 2006b, 2007a, 2007b, 2008a, 2008b, 2009a, 2009b, 2010b, 2010c, 2011a, 2011b, 2012a, 2012b, 2013a, 2013c).

![Figure 1. Total juvenile arrests for persons under 18 years of age in Tarrant County, Texas from 1994 through 2010.](image-url)
In 1998, the City of Fort Worth (CFW) and FWISD convened a joint task force to discuss ways in which the two entities could collaborate to address the related issues of juvenile crime and school dropout, resulting in the jointly funded (CCPD and FWISD) Fort Worth After School program (FWAS; King, 2001). Creating FWAS was not the only measure taken to address school dropout and juvenile crime; however, it was one of the key strategies. Creation of the program was based on prevailing youth development literature and the need to address that time period when youth were most likely to engage in or be victims of crime (Carnegie Council on Adolescent Development, 1992), the hours between 3:00 PM and 6:00 PM. In addition to promoting safety during these critical hours, the task force provided youth with opportunity to engage in structured, adult supervised activities to promote a variety of academic and social outcomes. Opportunities to provide additional academic support would also be a strategy to address the dropout issue.

The annual dropout rate measures the percentage of students who drop out of Texas public schools in a single school year. To measure how many beginning ninth graders drop out before completing high school, the longitudinal dropout rate is used. (Texas Education Agency, 2013b, "4. What is the annual dropout rate?")

While the annual dropout rate might be perceived as acceptable, it is the dropout rate reported by districts on an annual basis but does not account for all students who leave a school district. However, the longitudinal rate includes every student who enrolled in Grade 9 in a given year and tracks that student through Grade 12 (Table 1).
### Table 1

**FWISD and State Annual and Longitudinal Dropout Rates 1997-1998 to 2011-2012**

<table>
<thead>
<tr>
<th>School Year</th>
<th>FWISD Annual Dropout Rate (7-12)</th>
<th>Longitudinal Rate</th>
<th>FWISD Annual Dropout Rate (7-12)</th>
<th>Texas Longitudinal Rate</th>
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<tbody>
<tr>
<td>1997-1998</td>
<td>2.5</td>
<td>14.5</td>
<td>1.6</td>
<td>8.9</td>
</tr>
<tr>
<td>1998-1999</td>
<td>4.3</td>
<td>17.2</td>
<td>1.6</td>
<td>8.5</td>
</tr>
<tr>
<td>1999-2000</td>
<td>2.7</td>
<td>17.4</td>
<td>1.3</td>
<td>7.2</td>
</tr>
<tr>
<td>2000-2001</td>
<td>2.8</td>
<td>17.7</td>
<td>1.0</td>
<td>6.2</td>
</tr>
<tr>
<td>2001-2002</td>
<td>1.7</td>
<td>12.7</td>
<td>0.9</td>
<td>5.6</td>
</tr>
<tr>
<td>2002-2003</td>
<td>1.7</td>
<td>10.8</td>
<td>0.9</td>
<td>4.9</td>
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<tr>
<td>2003-2004</td>
<td>1.2</td>
<td>8.3</td>
<td>0.9</td>
<td>3.9</td>
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<tr>
<td>2004-2005</td>
<td>1.2</td>
<td>9.0</td>
<td>0.9</td>
<td>4.3</td>
</tr>
<tr>
<td>2005-2006</td>
<td>3.7</td>
<td>14.8</td>
<td>2.6</td>
<td>8.8</td>
</tr>
<tr>
<td>2006-2007</td>
<td>4.3</td>
<td>20.8</td>
<td>2.7</td>
<td>11.4</td>
</tr>
<tr>
<td>2007-2008</td>
<td>3.2</td>
<td>15.1</td>
<td>2.2</td>
<td>10.5</td>
</tr>
<tr>
<td>2008-2009</td>
<td>3.8</td>
<td>17.2</td>
<td>2.0</td>
<td>9.4</td>
</tr>
<tr>
<td>2009-2010</td>
<td>2.8</td>
<td>14.0</td>
<td>1.7</td>
<td>7.3</td>
</tr>
<tr>
<td>2010-2011</td>
<td>3.0</td>
<td>14.3</td>
<td>1.6</td>
<td>6.8</td>
</tr>
<tr>
<td>2011-2012</td>
<td>3.2</td>
<td>15.1</td>
<td>1.7</td>
<td>6.3</td>
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Early warning systems using indicators associated with student dropout began gaining momentum between 2005-2008 and FWISD created their system in 2009. Using the work of Jerald (2006) and others (Balfanz, Allensworth, & Jerald, 2008; Heppen & Therriault, 2008), FWISD created an early warning system based on historical data of students who dropped out of the district between 2005-2006 and 2007-2008. Upon completion, the system was focused on identification of four critical indicators: core course failure, absenteeism, discipline referrals, and federally defined
at-risk indicators. While the system does not predict dropout, it generates a daily weighted index that identifies students with excessive absences and/or discipline referrals, failing core course grades, and students meeting multiple at-risk criteria to allow the district an opportunity to intervene.

While the FWAS program is not a dropout prevention or intervention program, it is a systemic program that targets youth in the FWISD. As a long-term program embedded within the school district, its purpose is to improve student attitudes toward school, increase academic outcomes, reduce discipline referrals, and provide a safe place where students are neither victims of or perpetrators of criminal acts. The program offers a wide array of activities from academic assistance to fine arts, is staffed by school day teachers and community based youth serving agencies with the assumption that students participating will not develop and/or risk factors associated with dropout or that these risk factors could potentially be reduced through persistent participation in after school programs.

The school district, school board, CFW, as well as the CCPD are very interested in the long-term effect of the FWAS Program on juvenile crime and school dropout. Although the numbers of juvenile crimes and dropouts have decreased since the inception of the program, the ongoing evaluation of the program has not included analysis of the relationship between persistent afterschool participation and those factors associated with dropout, specifically, the district’s early warning index (EWI). This study examined that relationship.
Purpose

The purpose of this study was to conduct a longitudinal examination of the relationship between sustained afterschool participation and the district’s EWI associated with school dropout in FWISD in Fort Worth Texas.

Research Questions

1. In what way does the EWI change across time?
2. What is the relationship between persistent participation in afterschool programming and changes in the EWI over time?
3. What is the relationship between program participation and tenure, gender, and ethnicity?

Hypotheses

Twelve years of evaluation of the FWAS program indicated multiple academic and social benefits from participation in the FWAS program (Watts, Witt, & King, 2008; Witt & King, 2001, 2004, 2006, 2007, 2008, 2009, 2010; Witt, King, & Arce-Agans, 2003; Witt, King, & Cronan, 2004; Witt, King, & Lee, 2002; Witt, King, & Montandoni, 2003; Witt, King, Oh, & Brown, 2005). Therefore, the hypothesis for this study was that participation in afterschool programs over time mediates the influence of risk factors on a student’s educational pathway, as measured by the EWI:

1. Students’ EWI will change across time.
   a. Null Hypothesis: The EWI does not change over time.
2. Students’ EWI will remain constant or decrease over time as a result of persistent afterschool participation.
   a. Null Hypothesis: Afterschool participation will have no effect on the EWI.
3. Factors such as participation rate and program tenure will affect the direction and amount of change in the EWI across time.
   a. Null Hypothesis: There will be no differences in the EWI among students who participate at different rates.

4. Factors such as gender and ethnicity will affect the direction and amount of change in the EWI across time.
   a. Null Hypothesis: There will be no differences in the EWI among males or females or between students of different ethnic backgrounds.

Significance of Study

Fine (1991) set the stage for educators to look beyond the bad student definition of dropout and recognize the role that schools play in creating dropouts. In addition, Hickman et al. (2008) found that the pathway for dropping out begins as early as Kindergarten and that early intervention is key to reversing deviations from the graduation path. “For no child to be left behind, the educational trajectory of youth struggling to succeed in school must be redirected and schools are expected to play a significant role in the process of tipping the balance” (Sinclair, Christenson, Lehr, & Anderson, 2003, p. 30). To redirect the educational trajectory of students, prevention programs must show reduction in those areas where students struggle to stay on track and ultimately assist students through graduation. Programs must be more than episodic stop gaps that address symptoms; they must address the root causes, remove them, and prevent them from recurring (Schargel & Smink, 2001; Smink & Schargel, 2004).
FWAS is an example of a systemic program. Based on the need to address high juvenile crime and the dropout rates in Fort Worth, Texas, CFW and FWISD convened a joint task force to study alternatives for providing after school programming at FWISD school sites (King, 2001). Using survey data, focus groups, and an inventory of existing services, the task force presented findings to the CFW City Council and the Board of Education of the FWISD. The CFW and FWISD understood that addressing these issues would take more than additional police officers on streets and an intervention program targeting disengaged students. These findings led the CFW and FWISD to embark on a joint venture with both public and district funding to create FWAS, beginning in the 2000-2001 school year and operating at 52 schools. The program targeted high-risk, elementary-aged students in neighborhood schools with high rates of juvenile crime.

Initially in 2000, the FWAS program primarily served elementary schools. Additional funding through the 21st Century Community Learning Center grants enabled the program to expand to 94 campuses serving all 40 middle schools and 14 of the 15 high schools within the district by the 2012-2013 school year. Because the program spanned all grade levels, many students had the opportunity to remain engaged in the program from the early grades through graduation. The opportunity to remain engaged in a structured, adult supervised program, receiving crucial academic and enrichment activities, provided the potential to mediate student educational pathways and facilitate critical transitions such as the transition from elementary to middle school and from eighth to ninth grade. Extracurricular activities in middle school and high school drew
interested students away from afterschool programming; however, the program was an option for all FWISD students.

By providing less formal, non-competitive activities that aligned with students’ interests and skills, the afterschool program provided an avenue for students who might not otherwise engage with opportunities to participate in enriching, academic oriented activities. In addition, homework assistance and subject specific tutoring provided students with access to additional academic supports sometimes required by school staff and/or parents. Initially designed to address juvenile crime and dropout rates, FWAS has become a program that addresses root causes, such as unsupervised youth in unstructured time with opportunity to get into trouble and students struggling academically. The program removes and prevents issues from recurring by providing a safe, structured, and adult supervised program to assist students academically and provide an array of enrichment activities.

Between 2000-2012, 64,351 students participated in the FWAS program with individual student participation ranging from 1 to 12 years. As participants in the program, students received academic assistance (tutoring or homework help), academic enrichment, recreation or physical enrichment, fine arts, service learning, and community service for at least 3 hours per day and 4 to 5 days weekly. FWAS programming also took place on some Saturdays and during the summer at some schools. Because the program was offered at multiple grade levels, throughout the programs history, it was possible for students to participate in the program from Kindergarten (or Pre-Kindergarten) through Grade 12. Additionally, programs were
staffed by school day teachers, community-based youth serving agencies, and engaged parents throughout the program year.

During each year, evaluation played a key role in tracking participation, program implementation, student outcomes, and the perceptions of key stakeholders (students, parents, program staff, program supervisors, classroom teachers, and principals). Participation in the program has been associated with multiple positive student outcomes including improved school attendance, higher passing rates on state tests, improved attitude toward school, greater feelings of safety, and improved classroom behavior and performance (Granado, King, Witt, Gracia, & Grover, 2012; Granado, King, Witt, Garcia, & Rutherford, 2012; Granado, King, Witt, Garcia, & Stolz, 2012; Granado, King, Witt, & Watkins, 2012; King, Witt, Garcia, & Beltram, 2011; King, Witt, Garcia, & Grover, 2011; King, Witt, Rusher, Mosely, Willis, Garcia, & Cantu, 2013; King, Witt, Rusher, Mosely, Willis, Garcia, & Rutherford, 2013; King, Witt, Rusher, Mosely, Willis, Garcia, & Stolz, 2013; King, Witt, Rusher, Mosely, Willis, & Watkins, 2013; Watts et al., 2008; Witt & King, 2001, 2004, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013; Witt, King, & Arce-Agans, 2003; Witt, King, & Cronan, 2004; Witt, King, & Montandoni, 2003; Witt, King, Oh, et al., 2005). In addition to program outcomes, FWAS program participants in middle and high school have shown significantly higher ratings in their attitudes toward school than their non-participating peers, especially in the areas of teacher quality, social environment, administration, physical environment, and parent support (King & Granado, 2010).

Year-to-year results in the ongoing FWAS evaluation as well as afterschool research literature support the premise that afterschool programs can provide academic
support for students. Afterschool research links participation in programs to a variety of student outcomes such as academic achievement, improved behavior, and a host of other outcomes. However, a longitudinal study examining whether or not persistent participation by individual students prevents or reduces those risk factors associated with school dropout is missing from the literature.

This study examined the relationship between afterschool participation persistence across 12 years of EWI scores designed to identify areas of student risk from school entry (Kindergarten) to exit (12th grade). Because this early warning system provided multiple indicators that identify problems on individual student pathways across Grades K to 12, this analysis provided the best avenue for exploring whether a relationship between persistent participation in afterschool programming played and students’ pathways through school exists. The significance of this study was its response to Fine’s (1991) challenge to troubled school districts confronted with high dropout, crime, and unengaged learners in the form of the FWAS program and the relationship of it to the EWI. The FWAS met Fine’s challenge and sought to approach the drop out issue in a positive, direct manner by changing the community approach and employing an EWI. The value of this study was the examination of the relationship between the persistence of attending FWAS and the EWI and added to the literature and fostered the theory initiated by Fine in 1991.

Definition of Terms

The terms defined in this section were operationalized in this study.

Afterschool program. For the purposes of this study, an afterschool program is a program that takes place outside of the regular school day, generally between the hours
of 3:00 PM and 6:30 PM and sometimes before school between the hours of 7:30 AM and 9:00 AM at a school location. Out-of-school time is sometimes used to define this type of programming.

At-risk rate. The at-risk rate (ARR) is a computed score representing the total number of at-risk indicators that a student possesses out of the 13 Texas Education Agency’s (2010a) at-risk indicators in the FWISD’s early warning system.

At-risk student. The at-risk student is defined by the Texas Education Agency (2010a) as a student who has one or more of the following characteristics:

A student at-risk of dropping out of school includes each student who is under 21 years of age and who:

- Is in prekindergarten, kindergarten, or Grade 1, 2, or 3 and did not perform satisfactorily on a readiness test or assessment instrument administered during the current school year;
- Is in Grade 7, 8, 9, 10, 11, or 12 and did not maintain an average equivalent to 70 on a scale of 100 in two or more subjects in the foundation curriculum during a semester in the preceding or current school year or is not maintaining such an average in two or more subjects in the foundation curriculum in the current semester;
- Was not advanced from one grade level to the next for one or more school years;
- Did not perform satisfactorily on an assessment instrument administered to the student under TEC Subchapter B, Chapter 39, and who has not in the previous or current school year subsequently performed on that instrument or
another appropriate instrument at a level equal to at least 110 percent of the level of satisfactory performance on that instrument;

- Is pregnant or is a parent;
- Has been placed in an alternative education program in accordance with TEC §37.006 during the preceding or current school year;
- Has been expelled in accordance with TEC §37.007 during the preceding or current school year;
- Is currently on parole, probation, deferred prosecution, or other conditional release;
- Was previously reported through the Public Education Information Management System (PEIMS) to have dropped out of school;
- Is a student of limited English proficiency, as defined by TEC §29.052;
- Is in the custody or care of the Department of Protective and Regulatory Services or has, during the current school year, been referred to the department by a school official, officer of the juvenile court, or law enforcement official;
- Is homeless, as defined NCLB, Title X, Part C, Section 725(2), the term “homeless children and youths”, and its subsequent amendments; or
- Resided in the preceding school year or resides in the current school year in a residential placement facility in the district, including a detention facility, substance abuse treatment facility, emergency shelter, psychiatric hospital, halfway house, or foster group home. (pp. 1-2)
Core course failure rate. The core course failure rate (CCFR) is a computed score representing a student’s passing rate for core courses such as math, science, English, reading, and social studies in the FWISD’s early warning system.

Dropout. A dropout is defined as a school leaver or a student who does not remain in school through graduation.

Early warning index. The FWISD’s early warning system generates an overall score, known as the EWI, used to identify students most at risk of dropout based on attendance, course failure, discipline referrals, and total at-risk factors. EWI is calculated daily for all students (Grades PK-12). For the purpose of this study, the EWI score was calculated to represent the entire school year.

Early warning system. A system designed to provide data essential to the identification of students at risk of school dropout.

Ethnicity. For the purpose of this study, ethnicity is a student’s or family’s identification of the ancestral or culture group with whom they identify and includes African American, Hispanic, White, or Other.

Fort Worth After School. FWAS is the afterschool program offered by the FWISD. The program has been in place since the 2000-2001 school year across multiple campuses within the district. The program operates 2 to 3 hours after school for 5 days a week, and at some schools 1 hour before school starts for 5 days a week. Programming at each campus includes a variety of activities in the following categories: academic assistance (tutoring or homework help), academic enrichment, recreation, fine arts, service learning or community service, physical activity, and family engagement. Teachers or collaborating youth serving agencies operate the program at
the campuses with the support of campuses’ administrations, and a department within the district provides oversight for the program across all campuses.

*School absence rate.* The school absence rate (SAR) is a computed score representing the students’ rate of absenteeism from school in the FWISD’s early warning system.

*Student discipline rate.* The student discipline rate (SDR) is a computed score representing the discipline referrals received by a student in the FWISD’s early warning system.
CHAPTER 2

LITERATURE REVIEW

The literature review includes multiple considerations of dropout, after school programs, and results of intervention. Literature related to dropout, dropout prediction, and afterschool programs provide contextual support to the study. Dropout literature as it relates to dropout prediction and the development of early warning systems provide an overview of current practices used to predict factors associated with subsequent dropout, and how these systems provide data necessary for early intervention. Literature on dropout prevention and intervention best practices, help illustrate the need for systemic, district wide practices to effect system-wide change. Finally, a review of afterschool programs and prior research on afterschool program outcomes, including suggested directions for future studies, support the systemic nature of programs.

Defining Dropout

For decades prior to and since the inception of No Child Left Behind, research is fraught with the continued debate over and deliberation on high school graduation, completion, and dropout rates (Sunderman, Kim, & Orfield, 2005). While this debate persists, findings continue to suggest that students drop out at alarming rates. Recently Dynarski et al. (2008) reported that 500,000 students drop out of high school each year. When Fine (1991) published her book most of the literature on dropouts was still focusing on only student factors. Students who dropped out were characterized as unmotivated, discipline problems, substance abusers, or just unable to perform academically. Fine provided an avenue for examining the role that schools play through
district policies and everyday procedures that allow students to be pushed out of school or to fall through the cracks.

One of the ways that students fall through the cracks is the varying definitions of dropout rates. In the 2006-2007 school year, Texas adopted the dropout calculation method used by the National Center for Education Statistics (Chapman, Laird, & KewalRamani, 2010). There are four measures used by NCES to assess current dropout status: event dropout rate, status dropout rate, status completion rate, and averaged freshman graduation rate (Cataldi, Laird, & KewalRamani, 2009). Cataldi et al. (2009) defined each of the measures:

The event dropout rate estimates the percentage of high school students who left high school between the beginning of one school year and the beginning of the next without earning a high school diploma or its equivalent (e.g., a GED)...Event dropout rates can be used to track annual changes in the dropout behavior of students in the U.S. school system.

The status dropout rate reports the percentage of individuals in a given age range who are not in school and have not earned a high school diploma or equivalency credential...and focuses on an overall age group as opposed to individuals in the U.S. school system, so it can be used to study general population issues.

The status completion rate indicates the percentage of individuals in a given age range who are not in high school and who have earned a high school diploma or equivalency credential, irrespective of when the credential was
earned…and focuses on an overall age group as opposed to individuals in the U.S. school system, so it can be used to study general population issues.

The averaged freshman graduation rate estimates the proportion of public high school freshmen who graduate with a regular diploma 4 years after starting 9th grade…and focuses on public high school students as opposed to all high school students or the general population and is designed to provide an estimate of on-time graduation from high school. Thus, it provides a measure of the extent to which public high schools are graduating students within the expected period of 4 years. (pp. 1-2)

While the NCES definitions standardized understanding of dropout and graduation rates across the country, the formula does not account for the way in which states or even individual districts create or implement policies or procedures that affect students (Smith, 2012). Smith (2012) related that the state of Texas ranked fourth in 2010-2011 for 4-year high school graduation rates in the United States. While Smith commended the state for working hard to raise graduation rates, Smith pointed out that the state has a system of codes for school leavers allowing schools to mask students who might otherwise be labeled as dropouts. Districts within the state can code a student as returning to home country, homeschooling, or other code to exclude the student from the graduation rate calculation. This is just one type of policy or procedure used to do what Fine (1991) referred to as pushing students out of school to keep district graduation rates at high levels.

Regardless of varying definitions and issues with state, district, and school policies; students continue to disappear from schools. The literature focuses on
identifying those factors that predict which students are most likely to drop out of school. In addition, the development of systematic ways of identifying these students using early warning systems is growing each year.

**Dropout Prediction**

The book *Framing Dropouts* (Fine, 1991) provided a critical examination of the politics of an urban high school and how school policies can impact student graduation and dropout rates in public schools. The book led to other research examining students’ academic pathways through school. Hickman et al. (2008), Bowers (2010), Bradshaw et al. (2008), and Christie, Jolivette, and Nelson (2007) reported that dropping out is a process and not an event. These authors pointed out that students drop out of school based on a series of ongoing factors that include failure, retention, school policies, and being of age to finally leave the system rather than based on an event with a singular reason.

While predicting dropouts can be hit or miss in some instances (Bridgeland, Dilulio, & Morison, 2006; Schargel & Smink, 2001), some students who dropout never display outward risk signs. For instance, a student may suddenly drop out to support the family due to family accident or illness of a parent. That event notwithstanding, research identifying indicators that predict students at risk for dropping out of school have generally included four key indicators: failing core academic courses, excessive absenteeism, failure to be promoted to the next grade level, and being disengaged in the classroom (Allensworth & Easton, 2005; Neild & Balfanz, 2006; Neild, Balfanz, & Herzog, 2007). The Texas Education Agency (2010a) defined a student at-risk of dropping out as meeting the criteria outlined in Chapter 1.
In the last several years, Christle et al. (2007), Knesting (2008), Neild and Balfanz (2006), and Zvoch (2006) examined school-level factors related to student dropout. Findings included multiple factors that positively correlated with student dropout retention rate: SES, law violation rate, suspension rate, and board violation rate (Christle et al., 2007). Knesting (2008) identified in a qualitative study four school-level factors related to student persistence which included schools needed to listen, project caring, understand the school’s role in dropout prevention, and understand students’ roles in dropout prevention. Neild and Balfanz (2006) examined the role of student retention in school dropout. Zvoch (2006) found that school organization and schools’ social context interactions were significant predictors of dropout suggesting that school climate affects the choice to dropout. In addition, adult-child relationships or lack thereof have also been identified as mediators or dropout predictors (Englund, Egeland, & Collins, 2008).

A large number of studies included individual- or student-level factors that predict dropout (Allensworth & Easton, 2007; Belfanz, Herzog, & Philadelphia Education Fund, 2006; Bowers, 2010; Hickman et al., 2008; Lessard et al., 2008; Neild & Balfanz, 2006; Neild, Stoner-Eby, & Furstenberg, 2008; Stearns & Glennie, 2006; Stearns, Moller, Blau, & Potochnick, 2007). The individual predictors included the four persistent, key indicators of failure of core academic courses or grades, excessive absenteeism, retention, and being disengaged in the classroom (discipline, motivation, etc.). These researchers also found the predictors of socioeconomic status, grade level, gender, and ethnicity utilized in most models actually represented limited roles in predicting subsequent student dropout.
Two recent studies focused on identifying indicators throughout the educational pathway of the student (Bowers, 2010; Hickman et al., 2008) showed how these predictors manifest throughout students’ educational pathways and how these predictors inform prevention and intervention efforts aimed at reducing the number of students who will eventually drop out of school. Hickman et al. (2008) examined the differences in the developmental pathways of dropouts and school graduates and provides evidence that graduates and dropouts differ on key indicators as early as Kindergarten. Hickman et al. did not employ longitudinal analyses to examine these differences over time. They, instead, used multiple $t$ tests to compare a cohort of students over time. Hick et al. found that the differences on key indicators (course failure, absenteeism, etc.) between graduates and dropouts changed, depending on grade level, and continued until students dropped out or graduated.

Bowers (2010), on the other hand, conducted a longitudinal analysis based solely on the use of teacher-reported grades calculated into GPA and retention to predict student dropout. Both Hickman et al. (2008) and Bowers found significant results relating predictors of dropout risk to specific points in time (grade levels) over the course of a student’s educational pathway. These studies supported the importance of early identification of at risk status and efforts to intervene with programs that address risk factors early. In addition, Bridgeland, Dilulio, and Morrison (2006) and Lessard et al. (2008) reinforced the need to include students, parents, and school administrators in the development of policies and programs that address struggling students.

Similar to Bower’s article, Hickman et al. (2008) found that differences in dropouts and graduates exist as early as Kindergarten, starting with school attendance...
and growing to include student engagement, grades, and standardized test scores.

Understanding that this gap exists between dropouts and graduates from the time they start school supports the need to use a system that identifies students at risk from Kindergarten through graduation and for educators to apply appropriate interventions throughout students’ pathways through school.

**Early Warning Systems**

Many research-based strategies to address dropout have been established and one of the key strategies is the importance of early identification. Based on the dropout literature related above, wealth of information is available to help schools identify students most likely to drop out. Much of the literature points to information that schools could gather as early as the primary grades and provides the basis for many early warning systems. Several studies have examined early warning systems and the data necessary for effective systems (Balfanz et al., 2008; Balfanz, Neild, & Herzog, 2007; Jerald, 2006; Neild et al., 2007). Of these, Jerald (2006) pointed the following out:

Building an effective and efficient early warning data system will require a *two-phase process*: Phase I—Research: Conducting a cohort-based, longitudinal study aimed at identifying the most effective and efficient risk factors for a given school system, uncovering patterns in how those risk factors play out for students over time, and assessing how to measure the impact of schools. Phase 2—Development: Leveraging the knowledge gained in Phase I to create an electronic data system to inform intervention efforts. (p. 19)

Early warning systems must enable educators to track students early in the education pathway to address early predictors. Hickman et al. (2008) identified
predictors starting as early as Kindergarten plus specific indicators occurring in Grades 4, 6, 8, 9, and 11. Early warning systems should provide the data necessary to effectively identify struggling students at all levels. However, typical systems, like the one recommended by the National High School Center (Heppen & Therriault, 2008), only start tracking students in the ninth grade. If, as the literature suggests, there are differences between students who dropout and those who persist as early as elementary school, then most early warning systems start too late to inform school staff about students who could benefit from early intervention or prevention efforts.

Dropout Prevention and Intervention

In addition to tracking whether students veer off the path as soon as they begin their education, it is necessary that prevention or intervention programs are available immediately. As stated in the introduction, the persistent focus on the deficit or risk-oriented model continues to be the prevailing trend in education based on government funding of programs for at-risk youth. Because this at-risk approach is still widely followed, most prevention or intervention programs continue to address symptoms rather than producing prolonged efforts to guide students on a more positive path toward graduation.

Hoyle and Collier (2006) conducted a study in 10 urban school districts to determine strategies used in dropout prevention. Findings included 38 different strategies the most common of which included punitive measures and the least common of which were instructional intervention in the early grades. Districts with more engaged superintendents or chief executive officers were more likely to have specific or more detailed plans than those with leaders who exhibited less engagement. Overall,
Hoyle and Collier concluded that school policies or lack thereof continue to be reflected in the number of dropouts in those districts.

Research on intervention and prevention programs targeting students at risk of dropping out has yielded mixed results (Larson, 2007; Lever et al., 2004; Ream & Rumberger, 2008; Robledo Montecel, Cortez, & Cortez, 2004; Somers & Piliawsky, 2004). Many of these intervention programs are intensive and indicate positive effects in attitude, engagement, character development, and grades. Ream and Rumberger (2008) spoke to the necessity of providing programs that address social capital and student engagement. Schargel and Smink (2001) related that most reform or intervention efforts fail to succeed for three reasons: reforms are episodic, address symptoms rather than causes, and are not systemic. The programs are based on an at-risk approach, addressing students already experiencing symptoms rather than proactive efforts to guide students to graduation.

When researchers look for interventions to alleviate problem behaviors and improve academic achievement, classroom management, student-teacher relationships, or the school community, it is rarely at afterschool programs. However, afterschool programs show promise in mitigating behavioral problems during the school day as well as in improving school community, student-teacher relationships, and academic performance (Durlak & Weissberg, 2007). Additionally, Schargel and Smink (2001) began to identify the potential of quality after school programs as the type of sustained program necessary for impacting those risk factors associated with negative outcomes.
Afterschool Programs

In the last decade, afterschool programs have moved from an after-thought to the forefront in schools, parents, and communities across the country. What used to be seen as a school level, community, or a parent issue is now at the center of national education policy debate (Kane, 2004). At the foundation of this move was the Carnegie Council on Adolescent Development (1992) report “A Matter of Time: Risk and Opportunity in the Out-of-School Hours” that changed the way afterschool hours were viewed. As afterschool and out-of-school time funding and programming has grown, evaluations of these efforts increased. A bi-product of federal and state funding, research and reports about afterschool programs have proliferated considerably in the last 20 years. These reports have contributed to a body of knowledge about the numerous benefits of afterschool programs.

Positive Outcomes Related to Safety

The Carnegie Council on Adolescent Development (1992) found that approximately 40% of an adolescent’s time is discretionary and that a student’s time was “spent alone, with peers or in some cases with adults who may exert negative influences or exploit them” (p. 28). Carnegie Council on Adolescent Development also found that few students, especially those in low-income or rural communities, had access to adult supervised or enriching activities.

The Carnegie Council on Adolescent Development (1992) established that more and more youth were latch-key as more women had to work to support the family. The increase in the number of working mothers meant that more and more students were home alone afterschool and unsupervised by adults. Further research established that afterschool hours are a time when youth are unsupervised and likely to get into more
trouble or participate in unsafe activities (Kahne et al., 2001). Out-of-school programs grew out of a need provide safe havens for youth likely to be home alone for the purpose of mitigating crime and victimization and curbing participation in risky activities (Halpern, 2002, 2003; Kahne et al., 2001; Kane, 2004; Miller, 2003; After-School Corporation, 1999; United States Conference of Mayors, 2003). The initial question of safety stems from the research that established need for afterschool programs. One of the main reasons afterschool became important during the 1990s was the effort to curb juvenile crime and mitigate participation in the drug and alcohol use, cigarette use, and sexual activities known to occur most frequently between the hours of 3:00 PM and 6:00 PM (Bartko, 2005; Miller, 2003).

There are two schools of thought on how afterschool programs provide a safer environment. One view supports that afterschool programs are beneficial for the above reasons, and the other supports afterschool programming as beneficial from a youth development standpoint (Kahne et al., 2001). In evaluations of these programs, students have reported feeling safer in afterschool programs and in the program than they do in their neighborhood (Witt & King, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013; Witt, King, Oh, et al., 2005). Also students not in these programs reported being more likely to get into trouble.

Positive Academic Outcomes

As afterschool programs have moved from community sites to school-based programs, attention to extended learning opportunities has increased (Frerking, 2007). Frerking (2007) outlined how programming has moved away from leisure and toward an extended school day approach as programming moved into schools. This movement
has increased the research into potential academic outcomes associated with afterschool participation.

Academically, afterschool programs are tied to more consistent homework completion and higher grades (Kane, 2004) as well as significant positive effects of out-of-school time on student achievement in both reading and math, especially for low-achieving or at-risk students (Lauer et al., 2003). In addition, Lauer et al. (2003) found that program strategies did not have to focus on academic activities to have positive effects on academic achievement. Students participating in afterschool programs perform better academically than students who do not participate, and school improvement has been tied to homework completion in afterschool programs (Cosden, Morrison, Albanese, & Macias, 2001; Mahoney, Lord, & Carryl, 2005). Most researchers reported no significant effects on students’ achievement scores after 1 year of participation but found improvement in math and reading after 2 years of participation (Kane, 2004; Lauer et al., 2003; Witt & King, 2006). Most noticeably, achievement was conditional upon participation during the school year being evaluated (Witt & King, 2006). In general, students who participate in extracurricular activities show more academic achievement than students who do not (Miller, 2003). In addition, Halpern (2003) believed “at their best, after school programs respond to individuality, attend to children’s point of view, and encourage their sense of ‘voice.’ They are responsive to children’s interests and put children in active roles as learners” (p. 116).

Positive Family Outcomes

Afterschool programs contribute much more than safety and academic improvement to youth, and students benefit in other ways by engaging families in their
children’s educations. Kakli, Kreider, Buck, and Ross (2005) suggested that engaging families in out-of-school programs improved program out-comes, adult-child relationships, and family involvement in schooling. Kane’s (2004) results on the study of evaluations found that parents of participants were more likely to attend parent-teacher meetings (e.g., PTA, PTO), afterschool events, and open houses. This finding was supported by King’s (2011) experience as noted in a comparison of Fort Worth After School (FWAS) parents and non-FWAS parents on the school district’s annual parent survey. Afterschool programs were also found to connect youth to adult role models and mentors (Miller, 2003).

In addition to connecting youth to adults and mentors and connecting families to schools, Miller (2003) purported that afterschool programs aid children in long-term competence and success by providing opportunities for student exploration and teaching life skills. Hall, Israel, and Schortt (2004) reported that teenage students in programs in Chicago, Boston, and Denver had opportunities to develop or improve job skills through various youth apprenticeship programs and also cited that many programs offer students a chance to get involved in the community through the provision of service to others. Afterschool programs contribute to positive behavior, the After-School Corporation (1999) found that children who spend time in after school programs are better behaved and more respectful to others. And finally, in light of increasing obesity, the Afterschool Alliance (2003) reported that afterschool programs play an important role in promoting healthy lifestyles for youth through engagement in physical activities.

Researchers of afterschool programs also supported relationships as key to development for resilient youth (Brown, D’Emidio-Caston, & Benard, 2001; Orenstein &
American Association of University Women, 1994). Increased pressure surrounding school testing, student achievement, and on-time graduation has created additional pressure on school communities. It is easy to see that some or all of these relationships might be missing from our more structured, hurried school day. According to Brown et al., relationship plays a significant role in students’ engagement in schools:

When educators facilitate young people’s own interests and strengths in learning, students discover and develop their own innate interests and strengths.

Educators who are “plugged in” know that a key to resilience education is their own authentic contact and relationship to their students. (p. 40)

Brown et al. further discussed the idea of authentic contact, by being oneself in relationship with others, and with sustained contact, relationship and resilience occurs. Relationship is about acknowledging voices; all of the voices should be heard, including the voices of teachers, students, and parents.

The key was knowing the children’s family cultures through ongoing, meaningful involvement in their communities in order that “students” real-life experiences are legitimized as they become part of the “official curriculum.” . . . These culturally relevant teachers had close relationships not only with their students but also with the students’ families and communities. (Ladson-Billings as cited in Allen, 2007, p. 42)

Summary

The literature has supported that afterschool programs matter. Programs engage students in alternative activities and offer students a chance to explore interests and receive academic assistance. Students benefit from mentoring and improved
relationships with adults. The promise of afterschool programs providing safe places for students to improve academically and socially suggests that these programs have the ability to enhance student engagement, mediate risk, and perhaps prevent the accrual of risk factors that ultimately lead to dropout. Research on afterschool programs has provided an incredible wealth of information for afterschool service providers, schools, and interested policy-makers; however, a significant gap in afterschool research exists.

Miller (2003) reiterated the problem with this gap being related to the lack of scientifically based studies linking afterschool participation to academic achievement. The nature of afterschool and other youth development or even extracurricular and co-curricular activities limits the number of students available for control groups. Miller addressed two critical areas that affect the ability of researchers to answer questions regarding afterschool outcomes. First, Miller wrote:

Evaluating the effects of afterschool programs is much more complicated than it first appears...how does one select a control or comparison group? Since all youth are doing something after school, it is difficult to differentiate the effects of a particular program or activity from the effects of program or activities in which “control” or “comparison” group members are involved. When it comes to out-of-school time, there is no such thing as a “no treatment” group. (p. 88)

Second Miller added:

Because children (and their families) self-select into programs, selection bias must be taken into account. Differences in children may simply be due to pre-existing differences, e.g., if higher-performing children are more likely to attend the program. If program choice varies by socioeconomic status, family structure
or ethnicity, differences among children may be due to these characteristics rather than the program being studied. (p. 88)

Due to these two obstacles (control or comparison group and differences in children), a longitudinal study observing individual student growth trajectories over time with students who self-selected (or family selected) into afterschool programming offered insight on the preventative nature of afterschool programs for mediating risk and resulting in more positive academic trajectories for students. Prior to this study, no significant, scientifically based studies linked the effects of persistent afterschool participation in dropout prevention or in reduction of risk factors such as reduced core course failure, reduced absenteeism, and reduced discipline incidents associated with subsequent dropout.
CHAPTER 3

METHOD

The purpose of this study was to conduct a longitudinal examination of the relationship between sustained afterschool participation and the early warning index (EWI) tool associated with school dropout in the Fort Worth Independent School District (FWISD) in Fort Worth, Texas.

Research Questions

1. In what way does the EWI change across time?
2. What is the relationship between persistent participation in afterschool programming and changes in the EWI over time?
3. What is the relationship between program participation and tenure, gender, and ethnicity?

Hypotheses

Twelve years of evaluation of the Fort Worth After School (FWAS) program (Watts et al., 2008; Witt & King, 2001, 2004, 2006, 2007, 2008, 2009, 2010; Witt, King, & Arce-Agans, 2003; Witt et al., 2004; Witt et al., 2002; Witt, King, & Montandoni, 2003; Witt et al., 2005) indicated multiple academic and social benefits from participation in the FWAS program. Therefore, the current study hypothesized that participation in afterschool programs over time would mediate the influence of risk factors on a student’s educational pathway, as measured by the EWI:

1. Students’ EWI will change across time.
   a. Null Hypothesis: The EWI does not change over time.
2. Students’ EWI will remain constant or decrease over time as a result of persistent afterschool participation.
   a. Null Hypothesis: Afterschool participation will have no effect on the EWI.

3. Factors such as participation rate and program tenure will affect the direction and amount of change in the EWI across time.
   a. Null Hypothesis: There will be no differences in the EWI among students who participate at different rates.

4. Factors such gender, ethnicity, and age at first start will affect the direction and amount of change in the EWI across time.
   a. Null Hypothesis: There will be no differences in the EWI among males or females, between students of different ethnic backgrounds, or students starting at different grade levels.

Setting

Based on the need to address high juvenile crime and the dropout rates in Fort Worth, Texas, the City of Fort Worth (CFW) and the Fort Worth Independent School District (FWISD) convened a joint task force to study alternatives for providing after school programming at FWISD school sites (King, 2001). Using survey data, focus groups, and an inventory of existing services, the task force presented findings to the Fort Worth City Council and the FWISD Board of Education. The CFW and FWISD understood that addressing these issues would take more than additional police officers on streets and an intervention program targeting disengaged students. These findings led the CFW and FWISD to embark on a joint venture with both public and district
funding to create the FWAS program, beginning in the 2000-2001 school year and operating at 52 schools. The program targeted high-risk, elementary aged students in neighborhood schools with high rates of juvenile crime.

Initially, the FWAS program primarily served elementary schools, but additional funding through the 21st Century Community Learning Center grants enabled the program to expand to 94 campuses serving all middle schools (40) and 14 of the 15 high schools within the district by 2012-2013. Because the program spanned all grade levels, many students had the opportunity to remain engaged in the program from the early grades through graduation. The opportunity to remain engaged in a structured, adult supervised program providing crucial academic and enrichment activities generated the potential to mediate students’ educational pathways and impact critical transitions such as the transitions from elementary to middle school and eighth grade to ninth grade. While extracurricular activities in middle school and high school might draw interested students away from afterschool programming, the program was an available option for all students. By providing less formal, non-competitive activities designed to align to students' interests and skills, the afterschool program provided an avenue for students who might not otherwise engage and an opportunity to participate in enriching, academic oriented activities. In addition, homework assistance and subject specific tutoring provided students with access to additional academic supports sometimes required by school staff and/or parents.

Programs operated from September through May of each program year between the hours of 3:00 PM to 6:00 PM or 6:30 PM at most campuses. Some middle schools who began classes at 9:20 AM offered FWAS programs for an hour before school from
8:00 AM to 9:00 AM. Programs receiving 21st Century Community Learning Center funding also operated a minimum of 2 weeks during the summer months, usually in July. Programs were site-based and either operated by school staff or by a community based organization running the program on site. Programs could be staffed by teachers, non-certified school day staff, community based agency staff (degree and non-degree), as well as volunteers from a variety of settings.

Programming included academic tutoring or homework assistance, academic enrichment (science, math, reading, cultural), physical enrichment, fine arts (music, drama, dance, painting, ceramics, jewelry making, photography, etc.), community service, service learning, college and career readiness, computer classes, youth development (leadership, health and nutrition, social/emotional skills), and family engagement activities. Students rotated through various activities throughout the after school hours. Staff scheduled younger students into activities to expose them to a variety of experiences. Older students chose activities aligned to their interests. Tutoring was required in some instances to support those students experiencing academic difficulty, but students were encouraged to participate in enrichment upon the completion of the tutoring period, which generally lasted 40 minutes to 1 hour.

Design

The method used to examine the relationship between after school programs and the EWI was longitudinal panel study. According to Singer and Willett (2003), longitudinal studies should answer two important questions: “1) how does the outcome change over time? and 2) can we predict differences in these changes?” (p. 9). Singer and Willett also suggested three important features when using a longitudinal method:
“1) three or more waves of data, 2) an outcome whose values change systematically over time, and 3) a sensible metric for clocking time” (p. 9). While Level 1 data can provide within-individual change over time (i.e., change is examined by observing the EWI over the last 12 years), Level 2 variables provide a way of explaining differences in these changes between individuals. The design included a multilevel analysis of students’ EWI scores over time and the relationship between afterschool program persistence and student-level variables on individual student growth trajectories. The next two sections outline the population as well as the variables and coding schema used in the study.

Data

The study included data collected from two sources within Fort Worth Independent School District from 2000 to 2012. The first data were collected from ongoing evaluation reports of the FWAS program between the school years of 2000-2001 through 2011-2012 and included only FWAS program participation data. The second data were obtained from district enrollment, attendance, grades, discipline, and at-risk records from the 2000-2001 school year through the 2011-2012 school year.

FWAS participation data for all participants were collected each year and maintained in a master file from year-to-year. Student participation in the program ranged from 3,014 students in 52 locations in Year 1 to 18,446 students in 94 locations in Year 12. The first 4 years of the program served students in elementary and some middle schools. In 2004-2005, programming expanded to include 22 middle schools and 11 high schools. To create the final sample, data from each year were compiled into a single file, students were matched using a unique ID and compared to district
enrollment files to verify enrollment in FWISD schools. Academic data were matched to each student for each year enrolled in the district. Data for some participants did not match school enrollment records and were deleted from the final file. An EWI score was calculated for each student for each year. The final sample resulted in 64,351 unique individuals who participated in the FWAS program at some time between 2000 and 2012. The sample was 50.1% female, 59.0% Hispanic, 30.3% African American, 8.5% White, and 2.2% other ethnicities. Table 2 outlines the number of program sites, enrolled students, and grade levels served during each program year.

Table 2

*Program Enrollment and Grade Levels Served 2000-01 to 2011-12*

<table>
<thead>
<tr>
<th>Program Year</th>
<th>Program Sites</th>
<th>Enrolled Students</th>
<th>Grade Levels Served</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000-2001</td>
<td>52</td>
<td>3,014</td>
<td>Pre-Kindergarten - Grade 8</td>
</tr>
<tr>
<td>2001-2002</td>
<td>52</td>
<td>4,681</td>
<td>Pre-Kindergarten - Grade 8</td>
</tr>
<tr>
<td>2002-2003</td>
<td>56</td>
<td>4,546</td>
<td>Pre-Kindergarten - Grade 8</td>
</tr>
<tr>
<td>2003-2004</td>
<td>59</td>
<td>7,988</td>
<td>Pre-Kindergarten - Grade 8</td>
</tr>
<tr>
<td>2004-2005</td>
<td>65</td>
<td>10,804</td>
<td>Pre-Kindergarten - Grade 12</td>
</tr>
<tr>
<td>2005-2006</td>
<td>69</td>
<td>12,076</td>
<td>Pre-Kindergarten - Grade 12</td>
</tr>
<tr>
<td>2006-2007</td>
<td>74</td>
<td>13,854</td>
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</tr>
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<td>2007-2008</td>
<td>74</td>
<td>13,973</td>
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</tr>
<tr>
<td>2008-2009</td>
<td>84</td>
<td>14,800</td>
<td>Pre-Kindergarten - Grade 12</td>
</tr>
<tr>
<td>2009-2010</td>
<td>85</td>
<td>16,826</td>
<td>Pre-Kindergarten - Grade 12</td>
</tr>
<tr>
<td>2010-2011</td>
<td>85</td>
<td>16,199</td>
<td>Pre-Kindergarten - Grade 12</td>
</tr>
<tr>
<td>2011-2012</td>
<td>94</td>
<td>18,446</td>
<td>Pre-Kindergarten - Grade 12</td>
</tr>
</tbody>
</table>
Variables

Dependent Variables

One of the main considerations in longitudinal research is ensuring that the dependent variable is comparable over time (Chapman, Laird, Ifill, & KewalRamani, 2011; Heck & Thomas, 2009; Shefy et al., 2005; Singer & Willett, 2003). The EWI created by the researcher, in collaboration with others in the FWISD encompassed the multitude of variables related to dropout. The EWI functioned as a dashboard indicator to monitor student academic performance continuously at all grade levels on a daily basis. The calculation used for this score required data including core course enrollments and grades, student attendance records, discipline referral records, and the 13 at-risk criteria outlined in Chapter 1 for each participant from first year of participation through the 2011-2012 program year.

**EWI.** Deconstruction of the elements in the EWI lent additional support to ensure the index measured data reliably for each year in the study. The FWISD dropout prevention early warning system yields a weighted score index to identify and rank the students most at risk and in need of intervention. The EWI is composed of four calculated scores: core course failure rate (CCFR), student absence rate (SAR), student discipline referral rate (SDR), and at-risk rate (ARR).

**Core course failure rate.** To determine the core course failure rate (CCFR), the number of core courses per semester and grades for each 6 weeks were collected. A class is considered core if it is math, reading, English language arts, science, or social studies. Students in the district are graded on an A (90-100), B (80-89), C (70-79), and F (any grade less than 70) scale. A passing grade for any course is 70 and above, and less than 70 is considered failing.
The pass/fail nature of the CCFR, as opposed to the use of students’ grade averages, reduced the likelihood of individual teacher bias (grading philosophies/techniques/subjectivity) that could create subtle point differences in grades over the years of the study. The CCFR was determined by dividing the number of failed core courses by the number of enrolled core courses. The CCFR can generate a minimum score of 0.0, indicating no core courses failed, through a maximum of 1.0, indicating student has failed all courses.

**Student absence rate.** Students’ days absent and total days enrolled were collected for each student for each school year from each student’s entry year for the program until the final year in the study. Student absence rate (SAR) was calculated by dividing the number of absences by the number of days enrolled. The rate can generate a minimum score of 0.0, indicating no absences, through a maximum score of 1.0, indicating that the student was absent every day.

**Student discipline rate.** Student discipline referrals and number of days enrolled were collected for each student for each school year from each student’s entry year for the program until the final year of the study. Student discipline referral rate (SDR) was calculated by dividing the number of referrals by the number of days in school. The rate can generate a minimum score of 0.0, indicating the student has no referrals, with no upper limit maximum, even though it is possible in extreme situations for a student to receive more referrals than days in school. No student in the sample had a score near or greater than 1.0. A higher SDR score indicated increased behavioral issues for that student.
At risk rate. The 13 state at risk indicators, seen in Table 3, were used to establish the student at-risk rate (ARR). A master file defining a student’s at-risk status is compiled each year. If a student meets any of the selected indicators, a Y is placed under the corresponding indicator. The number of indicators is tallied to get a student’s total number of identified risk factors. The ARR was calculated by dividing the total number of identified risk factors by the 13 possible risk factors. The rate can have a minimum score of 0.0, indicating no at-risk factors, and a maximum score of 1.0, indicating child is designated at-risk on all state indicators.

The final EWI is calculated using the following formula: \( EWI = (CCFR \times 0.35) + (SAR \times 0.35) + (SDR \times 0.15) + (ARR \times 0.15) \) and has a minimum score of 0.0 (no dropout potential) and a maximum score of 1.0 (highest dropout potential). The weights assigned in the final formula were based on the ability of the individual item to predict subsequent dropout. CCFR and ARR were the most predictive followed by SDR and ARR having less predictive ability. The function of the EWI is not to predict dropouts, but to identify the students exhibiting the risk factors known to be precursors to dropping out. If a student fails core courses, misses school repeatedly, or experiences a large number of discipline referrals, the EWI can be used to identify this student so that staff can intervene immediately.
Table 3

Texas Education Agency (2010a) Defined At-risk Student Criteria

<table>
<thead>
<tr>
<th>A student at risk of dropping out of school includes each student who is under 21 years of age and who:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. is in prekindergarten, kindergarten or grade 1, 2, or 3 and did not perform satisfactorily on a readiness test or assessment instrument administered during the current school year;</td>
</tr>
<tr>
<td>2. is in grade 7, 8, 9, 10, 11, or 12 and did not maintain an average equivalent to 70 on a scale of 100 in two or more subjects in the foundation curriculum during a semester in the preceding or current school year or is not maintaining such an average in two or more subjects in the foundation curriculum in the current semester;</td>
</tr>
<tr>
<td>3. was not advanced from one grade level to the next for one or more school years;</td>
</tr>
<tr>
<td>4. did not perform satisfactorily on an assessment instrument administered to the student under Subchapter B, Chapter 39, and who has not in the previous or current school year subsequently performed on that instrument or another appropriate instrument at a level equal to at least 110 percent of the level of satisfactory performance on that instrument;</td>
</tr>
<tr>
<td>5. is pregnant or is a parent;</td>
</tr>
<tr>
<td>6. has been placed in an alternative education program in accordance with Section 37.006 during the preceding or current school year;</td>
</tr>
<tr>
<td>7. has been expelled in accordance with Section 37.007 during the preceding or current school year;</td>
</tr>
<tr>
<td>8. is currently on parole, probation, deferred prosecution, or other conditional release;</td>
</tr>
<tr>
<td>9. was previously reported through the Public Education Information Management System (PEIMS) to have dropped out of school;</td>
</tr>
<tr>
<td>10. is a student of limited English proficiency, as defined by Section 29.052;</td>
</tr>
<tr>
<td>11. is in the custody or care of the Department of Protective and Regulatory Services or has, during the current school year, been referred to the department by a school official, officer of the juvenile court, or law enforcement official;</td>
</tr>
<tr>
<td>12. is homeless, as defined by 42 U.S.C. Section 11302, and its subsequent amendments; or</td>
</tr>
<tr>
<td>13. resided in the preceding school year or resides in the current school year in a residential placement facility in the district, including a detention facility, substance abuse treatment facility, emergency shelter, psychiatric hospital, halfway house, or foster group home.</td>
</tr>
</tbody>
</table>

The EWI results in a score between 0 and 1, but for ease in interpretation, the final score was multiplied by 100 so that the resulting scores ranged between 0 and 100. Using the EWI as the dependent variable for academic performance provided the study with stable measure that could be calculated consistently across multiple years. In addition, the measure indicated whether a student stayed on a positive academic trajectory (maintaining a 0 or low score) or experienced increased risk over time (i.e., student became more at risk or declined in academic performance).
Development of the EWI employed academic and dropout data from the two school years of 2007-2008 and 2008-2009. To test the resulting composite index, data were subjected to logistic regression (OR = 1279.21, with 95% CI [1043.92, 1567.52]), indicating that students with an EWI score were more likely to dropout than students who did not. The model predicted 89.8% of the responses correctly and had a Cox & Snell $R^2$ of .075 and a Nagelkerke $R^2$ of .154. Finally, a mean comparison of EWI scores between dropouts ($M = 0.19$, $SD = 0.14$) and non-dropouts ($M = 0.08$, $SD = 0.09$) showed dropouts to have statistically significantly higher EWIs than their non-dropout peers ($t = 83.77$, $df = 61742$, $p < 0.001$).

Level 1 Variables

*Independent variables.* Students had varying waves of data based on program entry and continued enrollment in the school district. The year in which a student entered FWAS was considered Year 1, and each subsequent year was designated Years 2 through 12. Table 4 provides the number of waves of data per student. For example, 13,423 students had one wave of data; 9,427 had two waves of data; 8,821 students had at least three waves of data. A total of 361 students had all 12 waves of data. Student demographic data (gender and ethnicity) were included.
Table 4
Participants Varying Waves of Data Based on Initial Year of Participation

<table>
<thead>
<tr>
<th>Wave n</th>
<th>Student n</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>13,423</td>
</tr>
<tr>
<td>2</td>
<td>9,427</td>
</tr>
<tr>
<td>3</td>
<td>8,821</td>
</tr>
<tr>
<td>4</td>
<td>6,874</td>
</tr>
<tr>
<td>5</td>
<td>7,212</td>
</tr>
<tr>
<td>6</td>
<td>6,118</td>
</tr>
<tr>
<td>7</td>
<td>4,533</td>
</tr>
<tr>
<td>8</td>
<td>3,306</td>
</tr>
<tr>
<td>9</td>
<td>2,269</td>
</tr>
<tr>
<td>10</td>
<td>1,313</td>
</tr>
<tr>
<td>11</td>
<td>694</td>
</tr>
<tr>
<td>12</td>
<td>361</td>
</tr>
<tr>
<td>Total Participants</td>
<td>64,351</td>
</tr>
</tbody>
</table>
a school without a program) or based on involvement in other activities and responsibilities (e.g., athletics, employment, family responsibilities, etc.). During the first year a student participated in FWAS, afterschool participation was coded as FWAS = 1, for each subsequent year, a student could be enrolled (FWAS = 1) or not enrolled (FWAS = 0), thus the time-varying label.

Afterschool participation by year interaction. A student could participate in the program in multiple years, ranging from 1 (the initial year in the program) to 12 (enrolled during all measurement years). To account for this, an interaction term was calculated by multiplying FWAS enrollment by Year (FWAS*Year). This interaction is a time-varying covariate and was included on Level 1 to allow participation (FWAS) to vary across years.

Days per year. Students participated in the program varying days per year, ranging from 0 days (FWAS = 0) to 190 days. To account for these individual rates of participation and to examine the relationship between days of participation and the EWI, an interaction term was calculated by multiplying the number of days participated by the number of years. This interaction was a time-varying covariate and included as a Level 1 variable to allow the rate of participation to vary across years.

Level 2 Variables

Variables such as student demographic data and other programmatic variables were Level 2 variables because they did not change over time. Level 2 predictor variables were used to examine whether individual student-level variables of gender, ethnicity, and age at FWAS start created different growth trajectories between students. Gender was coded 1 = female and 0 = male. Ethnicity was defined in three variables:
Black (1 = *Black*, 0 = *Not Black*), Hispanic (1 = *Hispanic*, 0 = *Not Hispanic*), and White (1 = *White*, 0 = *Not White*). Students who were not Black, Hispanic, or White were coded “0” in each variable. Age at first start was coded by the grade level during which the student began participating in the program. If the student began in Elementary School (Grades PK to 5), the label Early was coded 1 = yes, 0 = no. If the student began in Middle School (Grades 6 to 8), the label Middle was coded 1 = yes, 0 = no. Students who began the program in high school (Grades 9 to 12) were coded in both Early and Middle as 0 = no.

**Analyses**

Data were first subjected to univariate analyses to examine the quality of the variables used in the initial model and ensure that model assumptions were met. Once data were deemed appropriate, nested hierarchical longitudinal modeling was used to determine the effect of participation in FWAS on the EWI over time. Longitudinal models examine change within individuals over time, and the varying nature of student participation in FWAS over time warranted the inclusion of time varying predictors within the model. Multiple growth models were used to examine individual students’ EWI changes over time and the relationship between FWAS program persistence on this change. All models are defined in Table 5.
Table 5

*Data were subjected to the following HLM Models*

<table>
<thead>
<tr>
<th>Model</th>
<th>Mixed Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1: Unconditional Means Model</td>
<td>$EWI100 = B00 + r0 + e$</td>
</tr>
<tr>
<td>Model 2: Unconditional Growth Model</td>
<td>$EWI100 = B00 + B10^{<em>}\text{YEAR} + r0 + r1^{</em>}\text{YEAR} + e$</td>
</tr>
<tr>
<td>Model 3: Growth Model with Afterschool</td>
<td>$EWI100 = B00 + B10^{<em>}\text{Year} + B20^{</em>}\text{FWAS} + r0 + r1^{<em>}\text{YEAR} + r2^{</em>}\text{FWAS} + e$</td>
</tr>
<tr>
<td>Model 4: Growth Model with Afterschool and Interaction Effect</td>
<td>$EWI100 = B00 + B10^{<em>}\text{YEAR} + B20^{</em>}\text{FWAS} + B30^{<em>}\text{FWASYEAR} + r0 + r1^{</em>}\text{YEAR} + r2^{<em>}\text{FWAS} + r3^{</em>}\text{FWASYEAR} + e$</td>
</tr>
<tr>
<td>Model 5: Growth Model with Afterschool, Interaction Effect, and Participation Interaction Effect</td>
<td>$EWI100 = B00 + B10^{<em>}\text{YEAR} + B20^{</em>}\text{FWAS} + B30^{<em>}\text{FWASYEAR} + B40^{</em>}\text{DAYYEAR} + r0 + r1^{<em>}\text{YEAR} + r2^{</em>}\text{FWAS} + r3^{<em>}\text{FWASYEAR} + r4^{</em>}\text{DAYYEAR} + e$</td>
</tr>
<tr>
<td>Model 6: Growth Model with Afterschool, Interaction Effect, Participation Interaction Effect, and demographic data at Level 2</td>
<td>$EWI100 = B00 + B01^{<em>}\text{FEMALE} + B02^{</em>}\text{BLACK} + B03^{<em>}\text{HISPANIC} + B04^{</em>}\text{WHITE} + B05^{<em>}\text{EARLY} + B06^{</em>}\text{MIDDLE} + B10^{<em>}\text{YEAR} + B11^{</em>}\text{FEMALE}^{<em>}\text{YEAR} + B12^{</em>}\text{BLACK}^{<em>}\text{YEAR} + B13^{</em>}\text{HISPANIC}^{<em>}\text{YEAR} + B14^{</em>}\text{WHITE}^{<em>}\text{YEAR} + B15^{</em>}\text{EARLY}^{<em>}\text{YEAR} + B16^{</em>}\text{MIDDLE}^{<em>}\text{YEAR} + B20^{</em>}\text{FWAS} + B21^{<em>}\text{FEMALE}^{</em>}\text{FWAS} + B22^{<em>}\text{BLACK}^{</em>}\text{FWAS} + B23^{<em>}\text{HISPANIC}^{</em>}\text{FWAS} + B24^{<em>}\text{WHITE}^{</em>}\text{FWAS} + B25^{<em>}\text{EARLY}^{</em>}\text{FWAS} + B26^{<em>}\text{MIDDLE}^{</em>}\text{FWAS} + B30^{<em>}\text{FWASYEAR} + B31^{</em>}\text{FEMALE}^{<em>}\text{FWASYEAR} + B32^{</em>}\text{BLACK}^{<em>}\text{FWASYEAR} + B33^{</em>}\text{HISPANIC}^{<em>}\text{FWASYEAR} + B34^{</em>}\text{WHITE}^{<em>}\text{FWASYEAR} + B35^{</em>}\text{EARLY}^{<em>}\text{FWASYEAR} + B36^{</em>}\text{MIDDLE}^{<em>}\text{FWASYEAR} + B40^{</em>}\text{DAYYEAR} + B41^{<em>}\text{FEMALE}^{</em>}\text{DAYYEAR} + B42^{<em>}\text{BLACK}^{</em>}\text{DAYYEAR} + B43^{<em>}\text{HISPANIC}^{</em>}\text{DAYYEAR} + B44^{<em>}\text{WHITE}^{</em>}\text{DAYYEAR} + B45^{<em>}\text{EARLY}^{</em>}\text{DAYYEAR} + B46^{<em>}\text{MIDDLE}^{</em>}\text{DAYYEAR} + r0 + r1^{<em>}\text{YEAR} + r2^{</em>}\text{FWAS} + r3^{<em>}\text{FWASYEAR} + r4^{</em>}\text{DAYYEAR} + e$</td>
</tr>
</tbody>
</table>
CHAPTER 4

RESULTS

An examination of the relationship between persistent afterschool participation in Fort Worth After School (FWAS) and students’ Early Warning Index (EWI) required the use of methods that could take into account the time-varying nature of participation in terms of year and days per year and could utilize a dependent variable that remained constant across time. The following were the research questions:

1. In what way does the EWI change across time?

2. What is the relationship between persistent participation in afterschool programming and changes in the EWI over time?

3. What is the relationship between program participation and tenure, gender and ethnicity?

It was hypothesized that persistent performance in FWAS’ afterschool activities would result in a stable EWI (i.e., no increase). Results of HLM analyses presented in the following tables and figures were used to examine how the EWI changed over time and how persistent afterschool participation and demographic variables related to this change.

Question 1: Addressing the EWI Changing Over Time

Model 1

Model 1 addressed Question 1 about how the EWI changed across time. Before modeling the EWI, Model 1 fit the unconditional means model to the EWI data. The fixed effects $\gamma_{00}$ estimated the outcome’s grand mean across all years and all students. With a statistically significant grand mean of $\gamma_{00} = 6.749$ ($t = 258.833$, $df = 64,342$, $p <$
0.001), it was confirmed that the average EWI of the average participant was greater than zero. Therefore, the null hypothesis that students do not differ was rejected (Table 6). Random effects indicated a within-person variance of 46.49; the estimated between-person variance was 28.12. The intraclass correlation coefficient (ICC) indicated that 37.7% of the variation in the EWI was attributable to differences among participants. It was concluded that the average student’s EWI varied and that students’ EWI scores varied from each other.

Table 6

*Fixed Effects Estimates and Variance-Covariance Estimates for Unconditional Means Model and Unconditional Growth Model of the Predictors of the EWI*

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Model 1</th>
<th>Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept (Initial status)</td>
<td>$\gamma_{00}$</td>
<td>6.749*** (0.026)</td>
</tr>
<tr>
<td>Level 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year (rate of change)</td>
<td>$\gamma_{10}$</td>
<td>1.102*** (0.010)</td>
</tr>
<tr>
<td>Deviance</td>
<td>1,826,978.009</td>
<td>1,788,128.430</td>
</tr>
<tr>
<td>Number of estimated</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>parameters</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variance-Covariance</td>
<td>$\chi^2$</td>
<td>38,849.579</td>
</tr>
<tr>
<td>Components test</td>
<td>$df$</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>$\rho$</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Reliability Estimates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>$\gamma_0$</td>
<td>0.643</td>
</tr>
<tr>
<td>Year</td>
<td>$\gamma_1$</td>
<td></td>
</tr>
</tbody>
</table>

Model 2

Model 2 explained the change in students’ initial EWI over time and addressed Question 1. Model 2 was the unconditional growth model and the estimated mean intercept ($\gamma_{00}$), and mean growth rate ($\gamma_{10}$) were 3.726 and 1.102, respectively. This
indicated that the mean EWI score upon program entry was estimated to be 3.73 and increased by 1.10 per year over the 12 years, on average (Figure 2). The mean intercept \((t = 122.326, df = 64,342, p < 0.001)\) and mean growth rate \((t = 106.214, df = 64,342, p < 0.001)\) were statistically significant, indicating that both parameters described the students’ mean growth trajectories and that the EWI changed over time (Figure 2). In addition, statistically significant differences were found in estimates for the variances of individual growth parameters indicating that students’ EWIs varied statistically significantly at entry into the program \((\sigma_0^2 = 22.161, X^2 = 74760.519, df = 50919, p < 0.001)\). The scores changed at different rates over time \((\sigma_1^2 = 1.974, X^2 = 96732.733, df = 50919, p < 0.001)\), suggesting statistically significant variance in the students’ rates of change, and the predictors of this change could be explored.

\[
y = 1.102x + 3.726
\]

**Figure 2.** Graphical representation of the unconditional growth model of the EWI across 12 years.
Question 2: How Persistent Participation in Afterschool Programming Affects the EWI over Time

Model 3

To answer the second research question, Model 3 included a dichotomous predictor of afterschool participation in FWAS as a time-varying predictor in Level 1. Results indicated an increase in the estimated mean intercept ($\gamma_{00} = 4.193$), and a slight decrease in the mean growth rate ($\gamma_{10} = 1.007$). In addition to these estimates, the students who participated in FWAS showed a growth rate that was -0.446 lower per year of participation, on average. The statistically significant negative growth rate indicated that students who continued to participate in FWAS after their initial year experienced a slower growth rate in the EWI than students who participated for fewer years.

Individual growth parameters in Model 3 indicated statistically significant variance in students' EWIs upon program entry ($\sigma_0^2 = 30.832$, $X^2 = 51947.099$, $df = 37347$, $p < 0.001$) and in growth rate over time ($\sigma_1^2 = 1.656$, $X^2 = 68124.568$, $df = 37347$, $p < 0.001$). This statistically significant variance indicated participation had a significant effect on the growth rate of the EWI. The model supported the addition of a predictor that allows participation to vary across time.

Model 4

After the initial year in the program (Year 1) for each student, participation varied. Some students remained in the program while others participated sporadically over time. Some students left the program and did not return. Other students left the program and returned off and on over subsequent years. To account for the variation in participation, Model 4 included the addition of an interaction term (afterschool by year,
as explained in Chapter 3) to allow the predictor *afterschool participation* to vary across time. Because participation varied from year to year for the students, the addition of this variable accounted for that variation.

Model 4 showed a decrease in the estimated mean intercept ($\gamma_{00} = 2.837$), an increase in the mean growth rate per year ($\gamma_{10} = 1.350$), a positive slope for afterschool participation ($\gamma_{20} = 1.521$), and a negative slope for the afterschool by year interaction effect ($\gamma_{30} = -0.613$). The statistically significant negative growth rate indicated that students who persisted in FWAS attendance experienced a greater deceleration in EWI growth rate than students who participated for fewer years in FWAS (Figure 3). This deceleration resulted in flatter growth trajectories for students who persisted than for the growth trajectories experienced by students who discontinued participation earlier.

Model 4 individual growth parameters indicated a statistically significant variance in students’ EWIs upon program entry ($\sigma_0^2 = 44.797$, $X^2 = 28994.790$, $df = 19359$, $p < 0.001$), in growth rate over time ($\sigma_1^2 = 2.858$, $X^2 = 37521.444$, $df = 19359$, $p < 0.001$), in FWAS’ growth rate ($\sigma_2^2 = 10.917$, $X^2 = 21794.682$, $df = 19359$, $p < 0.001$), and in the growth rate of the interaction effect ($\sigma_3^2 = 0.946$, $X^2 = 21872.104$, $df = 19359$, $p < 0.001$). Persistent participation was two-fold: year-to-year and days of participation per year. This relationship with the addition of another time varying covariate was supported by Model 4 results (Figure 3).
Figure 3. Graphical representation of the EWI for students who leave after Year 1 and for students who persist.

Model 5

Model 5 included the addition of participation rate into the model (days per year). Results indicated relatively little change in the EWI mean intercept ($\gamma_{00} = 2.868$) and the mean growth rate per year ($\gamma_{10} = 1.355$). Change did occur in the mean growth rate for FWAS which decreased ($\gamma_{20} = 1.613$) and in the afterschool by year growth rate which decreased ($\gamma_{30} = -0.441$). The introduction of the afterschool days per year predictor indicated that the EWI growth rate for students who persisted decreased at an additional $\gamma_{40} = -0.005$ per day. Figure 4 depicts the average growth for students who leave after Year 1, students who persist (regardless of days per year), students who persist with an average of 30 days per year, students who participate at 60 days per year, students who participate at 90 days per year, and students who participate at 120 per year. The results in the figure highlight the importance of the number of days of participation each year that the student persists in the program.
Figure 4. Graphical representation of the EWI for differing participation rates as defined by days per year.

Question 3: The Relationship Between Program Participation and Tenure, Gender, and Ethnicity via Model 6

This question was answered with a single sixth model. Model 6 incorporated student demographic variables of gender and ethnicity as well as the students’ grade level at initial participation (elementary, middle, or high school) at Level 2. Model 6 displayed statistically significant differences in the intercept (i.e., female students EWI mean intercept was statistically significantly lower than the EWI mean intercept for male students) and in some individual slopes. However, fit statistics did not indicate a better fit ($X^2 = 4,610.516$, $df = 0$, $p > 0.05$). Because the addition of demographic variables did not improve the model, the simpler model was retained (Table 7).
Findings indicated that student risk, on average, increased over time supporting the premise that student risk of dropout builds. Additionally, persistence in FWAS had a statistically significant relationship with student individual growth trajectories. Slower growth rates, as evidenced through successive models, supported students experiencing a positive impact from program participation and participation being more meaningful if students persisted, as noted in the lower EWI rates as compared to students who attended less consistently. Afterschool programs show promise in meeting Fine’s call to arms for schools and school districts to create alternative ways to address school dropout.
CHAPTER 5
DISCUSSION

More than 20 years ago, Fine (1991) exposed aspects of student dropout that forced school districts and communities to understand that dropout was not the result of bad, unmotivated students but the result of school policies and everyday practices that helped students out the school door. These findings and a host of other research and reports on juvenile crime, dropout, youth development, alcohol and drug abuse, and teen pregnancy led to the subsequent focusing on the need to provide programs in which youth would be in safe, supervised by adults, and involved in structured activities. Afterschool programs were born out of this need, and research over the years has supported the host of positive outcomes that are due to student involvement in these programs.

The City of Fort Worth (CFW) and Fort Worth Independent School District (FWISD) created a task force to address dropout and juvenile crime rates. The task force researched best practices and developed a solution to the problem, with the creation of the Fort Worth After School (FWAS) program. The program was designed to provide students with a safe place during high crime hours (3:00 PM to 6:00 PM daily) and to assist them by offering academic assistance and a variety of enrichment programs, and ultimately prevent the risk associated with dropout and juvenile crime.

To address whether FWAS met the ultimate goal, this study examined the relationship of afterschool persistence on the early warning index (EWI). Using longitudinal hierarchical linear modeling to examine individual growth trajectories of
students participating in the afterschool program over the first 12 years of program implementation, the study sought to answer three main questions:

1. In what way does the EWI change across time?
2. What is the relationship between persistent participation in afterschool programming and changes in the EWI over time?
3. What is the relationship between program participation and tenure, gender, and ethnicity?

The summary of results follows.

How the EWI Changes Over Time

Dropout researchers found that the reasons students drop out of school are the culmination of a set of factors such as ongoing failure, retention, school policies, and being of age to finally leave the system (Bowers, 2010; Bradshaw et al., 2008; Christie et al., 2007; Hickman et al., 2008). In this same vein of research, the best predictors of dropout included course failure, absences, discipline referrals, and other social emotional factors (Balfanz, Fox, Bridgeland, & McNaught, 2009; Balfanz & Legters, 2004; Bowers, 2010; Cataldi et al., 2009; Chapman, Laird, Ifill, et al., 2011; Chapman, Laird, & KewalRamani, 2010; Daynarski et al., 2008; Fine, 1991; Heppen & Therriault, 2008; Hickman et al., 2008; Jerald, 2006; Knesting, 2008; Neild et al., 2008; Stearns & Glennie, 2006; Stearns et al., 2007; Zvoch, 2006). Therefore, the best course for identifying students on the path to dropout was to assess students’ risk through ongoing monitoring of data. For FWISD, the EWI has been used as the indicator to determine student risk. Based on the assumption that students accrue risk through ongoing
failure, retention, etc., the EWI score increases as students are at more risk by exhibiting course failure, absenteeism, discipline referrals, etc.

The initial part of the analysis, Models 1 and 2 examined individual student growth trajectories over 12 years and indicated that the EWI increased over time. On average, students have an initial EWI of 3.73 that increases at a rate of 1.10 per year, supporting the notion that students are more likely during each year of enrollment to fail core courses, have more absences, receive more discipline referrals, and accrue more risk overall. These changes support the findings seen in most achievement studies. Student educational pathways begin to deviate across time. Some students remain on a positive trajectory while other students begin to experience failure and for some to the point of eventual dropout (Allensworth & Easton, 2007; Hickman et al., 2008). These results rejected the null hypothesis that students’ EWI scores do not change and allowed for looking at predictors, specifically FWAS, as a programmatic intervention that could affect individual student growth trajectories.

How Participation in Afterschool Programming Affects Change in EWI Over Time

The first model indicated, on average, that student EWI scores increased over time suggesting if a prevention program works, risk should not occur or increase. A student participating in an afterschool program should not accrue the same risk as a student who is not in an afterschool program. Therefore, Model 3 used the same data for signs of decreased scores or evidence that participating in FWAS accrued risk at a lower or slower rate. The addition of the afterschool participation variable to the model led to EWI being statistically significantly lower for participating students than for not participating students. In conclusion, afterschool participation positively affects EWI
change by negatively affecting the increase in risk. Results indicated that a student started, on average, with an EWI of 4.19 and a growth rate of 1.01. Participants in FWAS had EWI significantly lower scores (-0.446) than non-participants across the 12 years. In sum, participation matters but the model could not show how persistence was related to the risk growth rate.

To observe how participation persistence related to change in the EWI over time, an interaction effect (afterschool by year) was included in Model 4. After the addition of the interaction effect, results indicated that students who persisted in the program for multiple years had growth rates that decelerated across time. The model indicated that students who persisted over multiple years did not accrue risk (i.e., did not experience EWI growth) at the same rate as students who left the program after the initial year. Students who persist do no fail core courses, miss school, or receive discipline referrals at the same rate as students who leave school. Thus, persistent participation in FWAS for multiple years was more important to reducing EWI than a single year of participation.

Finally, Model 5 provided additional support for the importance of regular attendance in afterschool programs. Although no set standard for how long a student should participate in a given year to acquire benefits from participation has been determined, researchers have indicated that participation needs to be of sufficient length to meet the set objectives (Lauver & Little, 2005; Simpkins, Ripke, Huston, & Eccles, 2005; Weiss, Little, & Bouffard, 2005). This regular attendance standard is part of most studies of afterschool outcomes. Because the students’ average EWI growth rate decreased at a statistically significant rate of -0.441 per year and of -0.005 per day
of attendance, this finding supported previous literature indicating that attendance matters. Overall, students who participated in FWAS for multiple years and higher numbers of days per year acquired risk at a statistically significantly lower rate than students who did not participate in FWAS.

Program Participation’s Importance for Students of Diverse Backgrounds at First Participation

Model 6 included the addition of student-level variables as Level 2 data for examining gender, ethnicity, and grade level at first participation on the EWI growth trajectory. Goodness of fit indices required the retention of Model 5 and the exclusion of Model 6. These results indicated that gender, ethnicity, and grade level of first participation made little difference in the relationship between afterschool participation and the growth rate of the EWI score. More simply, FWAS program participation’s effect on the EWI benefitted all students and was less affected by individual student-level characteristics.

Implications and limitations

Ten years ago, Miller (2003) provided a thorough overview of the role that afterschool programs have in promoting positive student outcomes. Miller outlined current literature, studies on outcomes, and reflected on the current issues and future directions of research in the field. Miller noted the lack of experimental or quasi-experimental studies due to the nature of afterschool programming. Many researchers struggle to find control or comparison groups because it is nearly impossible to examine what students not involved in afterschool programming do during the afterschool hours. Some students might not attend an afterschool program at school, but this lack of
afterschool program attendance does not indicate that they are not otherwise involved in extracurricular or other productive after school activities.

The difficulty of finding a group of students who do “nothing” afterschool is significant because people working in youth development programs or in schools understand that most students engage in some type of activity afterschool. Whether the non-participating in afterschool program students hang out with friends, shop at the mall, play video games, participate in clubs or sports, attend dance or athletic programs, attend other youth development programs (e.g., YMCA, Girl Scouts, Boy Scouts, Boys/Girls Club, or job), they are involved or engaged in something. In addition to the issue of control groups, Miller (2003) also pointed out that sampling has other limitations in that students who self-select into the afterschool program are higher performers already. Many believe that these self-selecting students are more highly engaged in the first place which is why performance is better.

A key element in answering the questions posed in this study was choosing a method of analysis that could address the two key issues that researchers face when examining the effects of afterschool participation on student outcomes (control or comparison group and perceived self-selection bias). Duckworth, Tsukayama, and May (2010) used longitudinal hierarchical linear modeling (HLM) with time-varying covariates, and the participants served as their own controls, eliminating any between-individual conflicts that could have limited the ability to establish a causal relationship. In addition, Duckworth et al. illustrated that a causal model could be established between self-control and academic performance through the use of repeated measures of both predictors and outcomes. One other aspect of Duckworth et al.’s findings lends
credibility to the findings of this study. The use of a composite measure for self-control as the dependent variable is not unlike the use of the EWI as a composite measure of academic performance.

Examining individual growth trajectories eliminates the need for an independent comparison group because each student serving as his or her own control. Each of the 64,351 students used in the study were participants for Year 1, whether through self-selection or parent selection, controlling for the perceived self-selection bias. Students entered the program at various grade levels and came in and out of the program in varying patterns throughout the 12 years based on program availability and interest. Regardless of how the student started or persisted, the results of this study were designed to determine if participation (whether for 1 or 100 days) kept that student on a positive academic trajectory or minimized those risk factors associated with potential dropout, at the very least.

The benefit of modeling individual growth trajectories is the ability to examine the relationship of program persistence on an individual’s risk as opposed to comparing participants to non-participants. Modeling individual growth trajectories allowed for examining each student’s performance over time and the impact of participation and persistence on each student’s performance. Results indicated that the individual growth trajectories were different, but on average, afterschool participation and persistence mediated the amount of risk that students gain over time. When students were in the program, they experienced less risk at each point of measurement.

Lower EWI scores meant that when students were participating they were experiencing less failure, fewer absences, fewer discipline referrals, and essentially
performing better. The promise of afterschool programming reducing risk continues to be based on the premise that it provides opportunities for students who otherwise would not have access to enriching activities. Programs like FWAS provide fine arts, community service, service learning, fitness, culinary, robotics, and other science activities that connect classroom learning to real world applications. FWAS provides additional assistance to academically struggling students via staff who assist students with homework or deliver additional instruction in core subjects. While not all students remain engaged in an afterschool program over time, those who do benefit from their experiences.

Recommendations for Further Research

Based on the results of the study, the decision of the CFW and FWISD to create and continue to fund the FWAS program has been beneficial. Students have had the opportunity to participate multiple years in the program and maintained more positive academic trajectories than students who discontinued participation after 1 year. Unfortunately for programs like FWAS, decreased funding and changes in funding at the federal level will have implications for these local programs’ continued successes.

Federal funds have been set aside specifically for the creation of out-of-school learning programs and can now be used by states and local education agencies for extended-day learning if the state applies for a waiver. Specifically, states have flexibility under the Elementary and Secondary Education Act of 1965 to request a waiver of ESEA sections 4201(b)(1)(A) and 4204(b)(2)(A) requiring community learning centers to carry out program activities during non-school hours or periods when school
is not in session (i.e., before school, after school, weekends, or during summer recess; U.S. Department of Education, 2013).

Essentially, the funds set aside specifically to support afterschool programs can be used by the state and local education agencies to extend the instructional day. As schools struggle to meet adequate yearly progress requirements, the stress put on administrators, teachers, and students makes it hard for school districts to resist applying for additional dollars to extend the school day, regardless of the fact that existing programs are in place. It is more important than ever that researchers conduct more rigorous evaluations and analyses of existing afterschool program data to reduce the likelihood of school districts cutting funding to successful programs that enhance academic success.

While the findings suggested that students who persist maintain a more positive academic trajectory, the following questions should be addressed in future studies to provide additional insight into how afterschool programs address specific student needs and result in improved academic performance:

1. Are there differences in afterschool program availability or quality that lead some students to persist and others to leave programs?
2. Are students who attend afterschool programs that employ more classroom teachers more likely to maintain a positive academic trajectory than students who attend programs staffed by non-certified teachers?
3. Are there particular types of afterschool activities that lead students to persist or enhance students’ academic abilities?
4. Are students who persist in afterschool programs more likely to graduate than students who do not persist?

Conclusion

FWISD and CFW chose proactively to address juvenile crime and dropout in the city. While it may not have been in direct response to Michelle Fine’s 1991 book *Framing Dropouts*, FWAS was used to respond to the premise that schools and communities need to address dropout risk factors earlier and in a more positive manner. The FWAS efforts have been rewarding. The findings indicate that available programming and student persistence result in a statistically significant relationship between increased program participation reducing the development of risk. Slower growth rates, as evidenced through successive models, support the notion that students are positively impacted by program participation which is more meaningful if students persist over time. Based on these results, it is evident that FWAS leaders have been good stewards of the money received from FWISD, CFW, and grant funds.
REFERENCES


