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Cost Effectiveness of a School Readiness Intervention for Foster Children

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Abstract

Objective—Many young children in foster care suffer from emotional and behavior problems due to neglect and abuse. These problems can lead to difficulties in school, and functioning in school is linked to long-term health and development. Early intervention to reduce emotional and behavioral issues can help children successfully transition to school, which can improve long-term outcomes. However, communities need information on relative costs and benefits associated with programs to make informed choices. The objective of this study was to assess cost effectiveness, over 12 months, of the Kids in Transition to School (KITS) intervention compared to usual services available to children in a foster care control group (FCC).

Method—Randomized controlled trial of 192 children in foster care entering kindergarten who were randomized to KITS ($n = 102$) or FCC ($n = 90$). KITS includes school readiness groups and parent training over 4 months. Main outcomes were days free from internalizing symptoms (IFD), days free from externalizing behavior (EFD), intervention costs, public agency costs, and incremental cost effectiveness.

Results—KITS significantly increased IFD and EFD compared to FCC. Average total cost of the intervention was \$932 per family. The intervention did not significantly impact usual services. Average incremental cost effectiveness was \$64 per IFD and \$63 per EFD.

Conclusions—The cost of KITS is comparable to, or less than, similar programs, and the intervention is likely to provide significant emotional and behavioral benefits and improvements in school readiness for young children in foster care.

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Keywords

foster care; school readiness; cost effectiveness; academic achievement; social development; self-regulation

1. Introduction

Pressure to reduce costs and increasing competition for public funds are ongoing concerns across service sectors (e.g., health, education). Yet, need for these services is critically high—especially among vulnerable populations, such as children in foster care. One million children experience maltreatment in the United States each year (DeVooght, Fletcher, & Cooper, 2014), and one third of these events results in foster placement. Due to their maltreatment experiences, children in foster care are at great risk of social, emotional, and behavioral problems that can lead to multiple long-term negative outcomes (Ahrens, Garrison, & Courtney, 2014; Fang, Brown, Florence, & Mercy, 2012; Pecora et al., 2006) across development—including physical and mental health problems (Lansford et al., 2002), risky health behaviors (e.g., smoking) (Boden, Fergusson, & Horwood, 2009; Carpenter, Clyman, Davidson, & Steiner, 2001; Dregan & Gulliford, 2012; Patterson, Moniruzzaman, & Somers, 2015), school failure (Boden, Horwood, & Fergusson, 2007; Burley & Halpern, 2001), and juvenile justice involvement (Hussey, Chang, & Kotch, 2006; Yun, Ball, & Lim, 2011). These negative outcomes cause a great deal of suffering and are very expensive for health care and other public service sectors (DeVooght et al., 2014; Fang et al., 2012). It is thus crucial to find innovative and efficient ways to address foster children's risks for long-term negative outcomes.

Early childhood provides a critical window of opportunity for preventive intervention before health problems and socially risky behaviors become chronic and entrenched. Pediatric and mental health providers play an important role in caring for young children in foster care through their medical practices; however, individual providers may see few such children (Lane & Dubowitz, 2009) and may not have the resources or training to most effectively intervene.

Fortunately, there is growing recognition amongst pediatric and mental health providers that environmental and social factors contribute significantly to the physical and mental health and well-being of children (American Academy of Pediatrics, 2013). Awareness and advocacy by health providers for effective services outside the health system are beginning to generate innovative approaches to interventions for those children who are most at risk.

One approach is to have health providers collaborate with other social services providers, such as school personnel. Because school is where children spend a majority of their time, it presents an important opportunity to provide preventive services to children in foster care. Several studies have demonstrated that intensive early intervention in school is linked to better educational, health, and psychosocial outcomes—including reductions in key risk factors such as reduced likelihood of using substances, teen parenthood, and criminal activities (Reynolds, Ou, Arteaga, & White, 2011; Schweinhart et al., 2005). Overall, there is strong evidence that intensive universal early intervention for high-risk children, such as

low income children, is a sound long-term investment (Heckman, 2000; Reynolds, Magnuson, & Ou, 2006; Reynolds et al., 2011; Schweinhart et al., 2005). Programs such as the Chicago Child Parent Centers, which typically provide multiple levels of services over several years, improve manifold outcomes for participants (Reynolds et al., 2011).

However, these intensive universal programs may not be as effective for children, such as those in foster care, who face high levels of specific risks that may be different than those of other vulnerable children for several reasons. First, children in foster care move very frequently; therefore, universal programs requiring consistent attendance over longer periods of time may not be feasible. Programs of a shorter duration may increase the likelihood that children will receive the full dosage. Additionally, in order to potentially maximize the effects of shorter duration programs designed to increase school readiness skills, targeting those programs to occur close to the transition to school may also increase their efficacy (Pianta, Rimm-Kaufman, & Cox, 1999). Second, children in foster care may have more significant emotional and behavioral challenges related to their experiences of neglect and abuse than children with other risk factors (e.g., low income). For example, research has demonstrated that children with maltreatment histories may experience neural and physiological changes that are then associated with increased risk of behavioral problems (Busso et al., 2017; White et al., 2017). Although the abilities to regulate one's emotions and behaviors are increasingly being recognized as essential school readiness skills for all children (Blair & Diamond, 2008), these abilities may be particularly important for children with histories of maltreatment to subsequent school adjustment (Panlilio, Harden, & Harring, 2017). Thus, since the regulation skills of preschool children with histories of maltreatment appear to be worse than those of children who have experienced other risk factors, such as low socioeconomic status (Pears, Fisher, Bruce, Kim, & Yoerger, 2010), these children may need programming that has significant content related to emotional and behavioral regulation. Finally, related to their high rates of mobility, the caregivers of children in foster care may be less involved in their schooling than even caregivers experiencing stressors such as socioeconomic risk (Pears et al., 2010). Decades of research have highlighted the importance of a connection between caregivers and school and caregiver involvement in school in children's subsequent school adjustment and achievement (Christenson, 2004; Miedel & Reynolds, 1999; Sénéchal & LeFevre, 2002). Thus, programs that promote the involvement of caregivers in the early learning and school experiences of children with a history of maltreatment and foster care may be particularly effective for these children.

Shorter duration universal programs that include significant emotional and behavioral content and involve caregivers do exist. In particular, the Incredible Years Program (IYP) has been effective in improving social and emotional outcomes in at-risk, typically low-income, children (Edwards, Cécileachair, Bywater, Hughes, & Hutchings, 2007; O'Neill, McGilloway, Donnelly, Bywater, & Kelly, 2013; Scott et al., 2010; Webster-Stratton, Reid, & Stoolmiller, 2008). Although this program is less intense than programs such as Perry Preschool, it is still quite demanding, with biweekly 1-hour sessions lasting for about 1 year (Webster-Stratton et al., 2008). In addition, IYP does not specifically incorporate academic skill building. Young foster children may be particularly lacking in pre-academic skills, such as pre-reading and writing skills (Pears, Fisher, Heywood, & Bronz, 2007), which may

subsequently lead to greater frustration and higher stress levels in the classroom that put children at risk for poor transitions to school. Thus, previously developed programs may not be optimal for children in foster care.

The Kids in Transition to School (KITS) program is a new program specifically developed to address the complex needs of young children in foster care. KITS aims to simultaneously increase the emotional and behavioral self-regulation, social skills, and early academic skills necessary to succeed in kindergarten. Additionally, a caregiver component is targeted at increasing involvement in early learning in the home prior to the start of kindergarten and involvement in schooling once the transition has occurred. This component also includes an emphasis on positive parenting behaviors to help children learn the new skills and routines required in formal schooling.

In the randomized clinical trial (RCT) on which this study is based, the KITS program has been shown to increase self-regulatory and academic skills of children in foster care and to reduce behavioral problems in the classroom. (Pears et al., 2013; Pears, Kim, & Fisher, 2012). However, because schools typically operate on very tight budgets, it is critical to understand the cost of such programs in tandem with the benefits. In addition, recognition that such programs can benefit multiple service sectors (e.g., school, health) is critical to evaluating their value. This paper reports on the cost effectiveness of the KITS intervention in comparison to services as usual in order to increase awareness of such programs and to aid service providers in deciding which early interventions may be most valuable for children in foster care.

2. Methods

2.1. Participants

One hundred ninety-two children in foster care and their caregivers participated in this RCT (ClinicalTrials.gov Identifier: NCT00688129). At recruitment, each child had to be in nonkinship or kinship foster care in one of two counties in the Pacific Northwest, entering kindergarten in the fall, a monolingual or bilingual English speaker, and not involved in another treatment protocol closely associated with the KITS Program. Children were recruited through the local child welfare system. If a child was deemed eligible to participate, a staff member contacted the child's caseworker (considered the legal guardian while the child is in foster care) to request consent for the child to participate and then contacted the caregiver(s) to invite them to participate. For a successful recruitment, both the caseworker and caregiver(s) had to consent to participate. Because of the complexity of this multistep process, families were randomized to the KITS group or to the foster care comparison (FCC) group prior to contacting the caseworker and caregiver(s).

Of the 339 families who were eligible to participate in the study, 219 (65%) initially verbally agreed to participate (113 KITS; 106 FCC). Twenty-seven of these families (11 KITS; 16 FCC) withdrew from the study before baseline data were collected. Participant characteristics are presented in Table 1. There were no statistically significant differences between groups on demographic variables (e.g., ethnicity) at baseline (Pears et al., 2013).

Children in the FCC group did not receive the KITS intervention but continued to receive any other services for which they were eligible and that their caregivers chose to access.

2.2. Study design and procedures

Children and their caregivers participated in individual assessments—including standardized testing, questionnaires, and structured interviews—at the beginning of the summer before kindergarten (prior to intervention), at the end of the summer prior to kindergarten entry, and at the end of the kindergarten year.

2.3. Intervention protocol

The KITS intervention consists of two primary components: a 24-session school readiness group (2 hr, twice weekly in the summer; 2 hr, once weekly in the fall) focused on promoting early literacy and social–emotional skills in children and an 8-session caregiver group (2 hr, every 2 weeks) focused on promoting caregiver involvement in early literacy and school. The intervention occurred during the 2 months prior to (usually July and August) and the first months of kindergarten (September and October) for a total of 16 weeks.

The manualized school readiness group curriculum covers: *early literacy skills* (e.g., letter names), *essential social skills* (e.g., reciprocal social interaction), and *self-regulatory skills* (e.g., handling frustration). A lead teacher with an early childhood education or related degree and experience and two assistant teachers with early childhood education experience conduct the school readiness groups with 12–15 children using a manualized set of empirically based instructional and positive behavior management strategies.

The caregiver group meetings coincide with the school readiness group meeting times. Each group, led by a facilitator and a co-facilitator, uses a manualized caregiver curriculum that includes skills relevant to kindergarten transition (e.g., early literacy skills) and to promoting child self-regulation (e.g., behavior management). If the child changed placements during the course of the treatment, the new caregiver was invited to participate in the groups. The facilitator provided the information from any sessions that the new caregiver had missed in home or phone sessions.

Ninety-one percent of the children in the KITS group attended one or more school readiness sessions. The average percentage of school readiness sessions attended by all of the children in the KITS group (including the non-attenders) was 69% (Pears et al., 2013). Eighty-eight percent of caregivers received one or more sessions worth of content. The average percentage of sessions received was 61%.

2.4. Foster Care Control Group

Children in both the KITS group and the FCC group could receive any services available to them in the community that might typically include individual child psychotherapy, participation in Head Start, and services such as speech therapy. Ongoing assessment provided information on the types of services received by the children. No attempt was made to influence the type or amount of non-protocol services received by the children.

2.5. Economic analysis

This economic evaluation uses the net benefit regression method to calculate incremental benefits, incremental costs, and incremental cost effectiveness (Hoch, 2009; Stinnett & Mullahy, 1998; Willan & Lin, 2001). This method was developed to address statistical challenges associated with estimation of a cost-effectiveness ratio. The primary analysis was conducted from a public agency perspective, including costs to all public agencies serving this population (e.g., health, education). The public agency perspective can help to assess whether a new program can achieve key public agency outcomes more efficiently than currently available services. The focus of the economic evaluation is the incremental costs and benefits of the KITS intervention compared to usual services available to foster children. The general methodology recommended for economic evaluation in health and social services was followed in cost data collection (Corso & Filene, 2009; Gold, Siegel, Russell, & Weinstein, 1996).

2.6. Measures

2.6.1. Clinical outcomes—A variety of clinical outcomes have been used in economic evaluations of health and social programs. Some expert guidelines have favored the use of quality adjusted life years (QALYs) as the benefit or effect measure (Gold et al., 1996). QALYs are attractive because they ideally measure an intervention's impact on a person's overall functioning and well-being, rather than focusing narrowly on one symptom or another intermediate outcome.

However, in certain situations, QALYs may not capture intervention effects well for particular populations, such as people with mental health problem (Brazier, 2008; Dolan, 2008; Knapp & Mangalore, 2007) or young children with emotional and behavioral conditions in foster care. When QALYs are difficult to measure accurately, other key outcomes are typically used— such as depression-free days (Lave, Frank, Schulberg, & Kamlet, 1998; Lynch et al., 2011), percent of subjects who have a re-arrest (French, Fang, & Fritz, 2010), or days of stable housing (Rosenheck, Kaspro, Frisman, & Liu-Mares, 2003). Outcomes selected are typically measures used by decision makers to evaluate the performance of their programs. In the case of public agencies responsible for children in foster care, a number of different outcomes are of interest. Recent research on social determinants of health indicates that health, educational outcomes, and the ability to form positive relationships are highly intertwined. Improvements in educational outcomes, for instance, have been shown to lead to improved short- and long-term health outcomes (Reynolds et al., 2011; Webster-Stratton & Taylor, 2001). Poor mental health in childhood has been linked to ongoing difficulties, even into adulthood (Johnston, Schurer, & Shields, 2013). One approach is to address primary mechanisms that lead to poorer outcomes. Specifically, poor self-regulatory skills and poor social skills are important drivers of day-to-day difficulties experienced by young children in foster care. Further, recent research indicates that social and behavioral competence in young children predicts academic performance over and above early academic skills. Thus, social and behavioral competence may underlie the abilities to attend to and learn new skills that are then linked to long-term academic success (Raver, 2002; Zins, Bloodworth, Weissberg, & Walberg, 2004). For these reasons, the main outcomes chosen for this analysis are improvements in internalizing

symptoms and externalizing behaviors associated with self-regulatory problems and lack of social skills. In order to incorporate the amount of improvement over time, we converted data from clinical assessments to symptom-free days. Then we separately looked at two types of symptom-free days: days free from internalizing symptoms (IFD) and days free from externalizing behavior (EFD).

This approach is similar to other economic evaluations of health interventions (Edwards et al., 2007; O'Neill et al., 2013). For instance, researchers have developed a measure of depression-free days that is based on depression ratings, and incorporates varying weights for the days based on the level of symptoms (Lave et al., 1998; Lynch et al., 2011). We followed this approach and used symptom reports from caregivers on the Child Behavior Checklist/4-18 (CBCL) (Achenbach, 1991) to create days that had significant internalizing symptoms or externalizing behaviors. (This version of the CBCL was used to ensure that items would be the same across the preschool and elementary school period.) Specifically, we used the CBCL scores at each assessment point to categorize days with greater levels of internalizing or externalizing behavior. We then interpolated using quadratic weighting between the symptom-free days and those with greater symptoms to assign a value to each day in the interval. We then calculated the number of IFDs and EFDs as the number of days in the study period minus the days with significant internalizing or externalizing behavior. Similar approaches have been widely used in previous studies of depression, anxiety, and other mental health conditions (Lynch et al. 2011).

In order to calculate net benefit, clinical outcomes are valued at the decision maker's willingness to pay for an additional unit of clinical outcome. Because there is no generally agreed upon dollar value for improvements in internalizing symptoms or reductions in externalizing behavior, net benefit is calculated for a range of levels of willingness to pay for each additional IFD and EFD.

2.7. Cost Outcomes

2.7.1 Non-protocol usual care public service costs—One key component of the cost-effectiveness analysis is to measure possible cost savings that might accrue following an intervention. For instance, an early intervention program that reduces the need for school services following the intervention would potentially reduce costs to the school system in future periods. Accordingly, we measured possible cost savings that might occur related to non-protocol health and social services accessed outside of KITS. We measured potential cost savings empirically during the course of the intervention and follow-up using comprehensive profiles of usual care services that were created from a self-report survey—the Service Utilization Questionnaire—which was originally developed for earlier studies of high-risk families. Caregivers were asked to report on the child's service use across multiple sectors at each assessment point. Each service was valued using published unit costs (see Appendix for table of costs (Lynch et al., 2011; Lynch, Dickerson, Saldana, & Fisher, 2014).

2.7.2. KITS intervention costs—The total cost of KITS was estimated from clinical trial records and study staff estimates. Following guidelines for economic evaluation, we used an opportunity-cost approach to identify all resources needed to directly or indirectly deliver

the intervention. Study accounting records provided payroll costs, cost of facilities and overhead, and information on purchased goods and services. Study staff estimated time to complete each intervention task. For instance, intervention staff running group meetings reported on time to prepare, set up, and run groups. Cost of staff supervision, time to develop treatment plans for the child, and staff training were also included. Research specific costs, such as randomization, were excluded.

2.8. Data analysis

Incremental cost effectiveness was computed as the value of added clinical outcomes (IFDs, EFDs) minus the cost difference between the KITS and FCC groups. The analyses were carried out on an intention-to-treat basis. Complete clinical data on all participants and complete services data on 76.6% of participants were available. Missing data were imputed using Stata statistical software version 13.1 and multiple imputation with chained equations (Little & Rubin, 2002; Royston, 2004, 2005). Our procedures assumed that data were missing at random. We included all non-missing values at all time points and baseline demographics in the models that generated imputed estimates of outcomes. We created five imputation datasets and combined estimates such that the standard errors reflect the variability introduced by the imputation process (Little & Rubin, 2002).

The primary analysis was of total public agency costs for 12 months after randomization. The net benefit regression method (Hoch, 2009; Stinnett & Mullahy, 1998), with ordinary least squares regression analyses, was used to calculate net benefit; all analyses were adjusted for baseline characteristics (age, gender, number of placements prior to the study, and severity of maltreatment).

Following recommended guidelines (Drummond, Sculpher, Torrance, O'Brien, & Stoddart, 2005; Gold et al., 1996), we represent uncertainty in our estimates in two ways. First, we used the bootstrap observations to estimate a 95% confidence interval around the average incremental cost-effectiveness ratios and then we plotted the bootstrapped incremental cost and effect pairs to create an incremental cost-effectiveness plane (Fenwick & Byford, 2005). The incremental cost-effectiveness plane is divided into four quadrants, centered at zero. Incremental cost-effect pairs that fall into the southeast quadrant indicate that the new intervention is less costly and more effective than the alternative treatment. Incremental cost-effect pairs that fall into the northwest quadrant indicate that the new intervention is more costly and less effective than the alternative treatment. The northeast quadrant indicates that the new intervention is more costly and more effective, and the southwest quadrant indicates that the new intervention is less costly and less effective than the alternative treatment. Sometimes the bulk of incremental cost and effect pairs falls within more than one of the four quadrants, indicating that there is uncertainty about whether or not the new intervention is cost effective compared to the alternative.

A common result is that a new intervention is more costly and more effective than an alternative (Gold et al., 1996). In such a situation, a decision maker needs to know the probability that a new intervention is cost effective, compared to the alternative treatment, given the resources available to pay for the intervention. A second graphical method, the cost-effectiveness acceptability curve (Fenwick & Byford, 2005), is used to address this

situation. The cost-effectiveness acceptability curve presents the probability that a new intervention is cost effective compared to its alternative over a range of maximum dollar levels that a decision maker is willing and able to pay for an additional increment of the clinical outcome (e.g., IFD, EFD), given budgetary and other constraints.

In some situations, specific levels of willingness to pay (WTP) are indicated, for instance, in the United Kingdom they have guidelines as to how much the National Health Service will pay for an increase in health (Drummond et al., 2005). However, more generally, the purpose is to show how the probability of cost effectiveness varies over a range of levels of WTP. We included a range of WTP that represents a wide range of possible amounts a decision-maker might be willing to pay. We chose to begin at zero, because in some cases decision makers might require that an intervention is cost neutral or zero cost before they would be willing to adopt it. We empirically determined the upper level of WTP. Specifically, the cost-effectiveness acceptability curve shows flexion points that demonstrate the point at which the probability of cost effectiveness plateaus at a particular point and any level of WTP beyond this point does not significantly increase the probability of cost effectiveness. This is how we determined the top level of \$200.

3. Results

We found that the KITS participants had significantly more IFDs ($M = 310.5$ [$SD = 78.8$] vs. FCC $M = 284.5$ [$SD = 101.5$], $P = 0.016$) and significantly more EFDs ($M = 218.6$ [$SD = 102.4$] vs. FCC $M = 192.0$ [$SD = 104.6$], $P = 0.049$).

Table 2 presents the costs of KITS for a 1-year period. Total cost to run the school readiness group with 15 children was \$5,525; whereas the group for foster parents cost \$2,804. We also estimated supervision time for staff. Total supervision cost was \$2,337. Finally, we include an estimate of the annualized cost of having the staff trained by KITS expert trainers. Table 3 presents unadjusted average service use for different types of usual care services, whereas Table 4 shows the average cost for usual care and average total cost for the sum of usual care and KITS intervention costs by study arm. The cost of non-protocol usual care services was very similar between the KITS and the FCC groups, with no significant differences. The KITS intervention cost an average of \$932 per family. Total public agency costs (sum of protocol and non-protocol services costs) were significantly higher for the KITS group due to the additional cost of the KITS intervention ($P = 0.006$).

3.1. Incremental cost effectiveness

Table 5 presents the incremental costs, effects, and incremental cost-effectiveness ratios (ICERS) for each of the two main outcomes. For both outcomes, there was significant improvement in outcomes, with 26 more IFDs and 27 more EFDs during the study period. The cost per additional IFD was \$64 and cost per additional EFD was \$63.

Figure 1 presents incremental cost-effectiveness planes. Each point in the scatter plots represents an incremental cost-clinical outcome pair for a single bootstrap replication. Most observations indicated that compared to FCC, KITS had better clinical effects and higher

costs, with better outcomes and higher costs for 98.2% of IFD observations and 96.6% of EFD observations.

Figure 2 shows how the incremental cost effectiveness of KITS over FCC varies over different levels of willingness to pay for an additional outcome. For example, if a decision maker is willing to pay \$100 for an additional IFD, the probability that KITS is cost effective is 78.7%, and if a decision maker is willing to pay \$100 for an additional EFD, the probability that KITS is cost effective is 75.3%.

4. Discussion

Few studies have conducted economic evaluations of interventions aimed at improving the health and well-being of young children with emotional and behavioral problems in foster care (Bywater et al., 2011; Lee, Aos, & Miller, 2008; Zerbe et al., 2009), and none have examined the cost effectiveness of the KITS intervention. This analysis should be considered in light of other possible options for improving school readiness for young children in foster care. No studies have provided closely comparable analyses to the work reported here; however, some previous research provides somewhat similar analyses.

Several studies have conducted economic evaluations of intensive early intervention programs for young children who are at risk, typically children who are living in low income communities (Karoly, Kilburn, & Cannon, 2005; Reynolds et al., 2011; Schweinhart et al., 2005). In a recent review of intensive early intervention programs (e.g. Chicago Child-Parent Centers), Reynolds et al. (2006) concluded that these programs improve cognitive development and academic skills at school entry. Other reviews have concluded that these programs can have impacts on school success well beyond the intervention period, and that many have a long-term positive net benefit, such that investing in these programs would reduce future costs (Karoly et al., 2005).

Although these programs have many strengths, they require a significant and sustained investment by government and communities in order to be effective. Each of these programs is very intensive, often including full or at least half-day specialized services for child participants for at least one, and often multiple, years. Several also include long-term programs for parents. Most programs cost over \$10,000 per child (Reynolds et al., 2006). In contrast, KITS is a much shorter program (lasting 4 months) and requires significantly less financial investment for schools and communities, with an average cost per child of \$932. In addition, intensive early childhood programs are typically targeted broadly at low-income or at-risk youth and are not specific to children in foster care. Because foster children tend to move around much more than other groups of children, they may be less likely to benefit from these extended programs.

Other options for improving outcomes for young children in foster care are shorter, more targeted programs aimed at improving social-emotional development. Several studies have examined IYP, which has produced significant improvements in the emotional and social development of young children (Edwards et al., 2007; Scott et al., 2010; Webster-Stratton et al., 2008). Similar to the KITS program, IYP tends to be shorter in duration than the

intensive early education programs reviewed above, and IYP targets socio-emotional development. Cost of IYP ranges from about \$1,100 to \$3,800 per child (Edwards et al., 2007; Foster, Olchowski, & Webster-Stratton, 2007; O'Neill et al., 2013; Scott et al., 2010). Two studies (Edwards et al., 2007; O'Neill et al., 2013) reported cost effectiveness as cost per one-point change in child behavior scores. Each of these studies focused on children from high-risk and/or low-income areas, but neither focused on children in foster care. Two of the studies found similar results, with one reporting about \$93 per one-point reduction in child behavior score (O'Neill et al., 2013) and the other reporting a cost of \$142 per one-point reduction in child behavior score (Edwards et al., 2007).

None of these studies is directly comparable to the present study because none of the programs investigated focused on a school readiness program specifically designed for children in foster care. In addition, the clinical outcome measures used in previous studies were different in each study as well as in the present study; therefore, we are not able to replicate similar cost per one point change in behavior problems that have been reported by a few other papers (e.g., Edwards et al. 2007; O'Neill et al. 2013). These papers also are not comparable to one another because they all use different measures. Other experts have also noted this limitation in the cost-effectiveness literature and called for a common outcome (Charles, Bywater, & Edwards, 2011). For this reason we chose to use internalizing and externalizing free days as the primary outcomes in the cost-effectiveness analysis. Specifically, future studies could use the same methodology using different symptom measures, and this would allow comparisons between different study results.

However, despite the differences, our results are generally in a similar range. The two most comparable studies reported a cost of about \$100 per a one-point reduction in behavioral symptoms, compared to our results of a cost per symptom-free day of about \$64. In addition, the economic investment required for the programs is similar, with a cost per child of \$1000–\$4000 for IYP and a cost of \$932 per child for KITS.

It is important to note that the KITS program may be especially advantageous for young children in foster care because it is particularly tailored to the challenges and needs of those children. In particular, it is brief. Some other efficacious programs (Bierman et al., 2014; Brotman et al., 2013; Reynolds et al., 2011; Webster-Stratton et al., 2008) require a longer intervention period that might be less feasible for highly mobile foster children. In addition, KITS simultaneously focuses on school readiness and emotional and behavioral regulation, thus accomplishing two critical goals. Finally, unlike some previous studies that have been conducted in health care settings, the KITS program was delivered in the school setting, allowing children to practice key skills in the environment in which they will be used. Additionally, the school setting is likely more convenient and less stigmatizing for both parents and foster children.

Results of this analysis are likely conservative for several reasons. The current analysis focuses on cost in relation to improvements in emotional and behavioral outcomes (e.g., cost per symptom-free day). However, KITS has also been demonstrated to improve foundational early literacy skills, such as recognizing letter names and sounds (Pears et al., 2013). In addition, the KITS intervention may lead to an improved overall environment for all children

in the classrooms that KITS participants attend because KITS participants are less likely to be disruptive or demand excess attention (Pears et al., 2013). Foster families may also benefit from KITS because the foster child who receives KITS may be less likely to be disruptive with foster family members. Although each of these outcomes is potentially important, we know of no current technique that can combine these into a single main outcome for the cost-effectiveness analysis. Given the limitations in current methods, we believe our focus on the social and behavioral outcomes is the most parsimonious for this analysis for a number of reasons. First, as is noted above, social and behavioral competence appear to be critical to school readiness, as to future academic competence, because these skills predict long-term academic performance over and above academic skills (Raver 2002; Zins et al. 2004). In addition, although academic skill improvement is inarguably important for school readiness, it may be somewhat less relevant in a short-term cost-effectiveness study than in a longer term analysis. Specifically, in a long-term analysis through adolescence (e.g., Reynolds et al. 2011), educational outcomes—such as graduation from high school or other educational attainment measures—have direct economic implications, while this connection is less clear in the short run. Finally, our current analysis (not including the value of academic skill improvements) is thus conservative in its conclusions; therefore, we are very unlikely to have overstated the cost effectiveness of the intervention.

Another important consideration addressed in this study is the lack of information about the cost of implementing different interventions. The cost of some programs, such as Head Start, has been extensively studied (Reynolds et al., 2006). For other programs, there has been little formal economic evaluation (Bierman et al., 2014; Brotman et al., 2013; Kellam et al., 2011), and the type of evaluation varies considerably. For instance, policy researchers estimating the lifetime benefits and costs associated with alternative approaches to improving outcomes for children involved in the child welfare system have used cost estimates from secondary data or descriptions from intervention developers (Aos et al., 2011). In the current analysis, prospective data collected during the clinical trial were used to estimate the clinical and economic impact of KITS over the first years of program implementation and the intervention costs. Thus, the current analysis may provide more accurate information about the *cost of delivering the program*, which could be very useful to decision makers considering implementing the KITS program.

Our results should be considered in light of several limitations. The sample size was relatively small and had limited racial/ethnic diversity. Replication of these results with larger samples, across multiple sites, and in populations with greater ethnic/racial diversity, would provide additional valuable information. The present study was limited to 12 months of follow-up. Other researchers have found that some early intervention programs continue to have positive clinical effects over a much longer time period, (Karoly et al., 2005; Reynolds et al., 2011), suggesting that we might also see long-term reductions in use of public services beyond the study period for children in the KITS program. The focus of the economic evaluation was on the short-term incremental costs and effects of the KITS program compared to usual FCC services for a child in foster care, which is consistent with the primary aim of the KITS intervention to help improve outcomes for young foster children and is also consistent with prior economic evaluations of interventions for high-risk children (Edwards et al., 2007; O'Neill et al., 2013; Scott et al., 2010). Although this short-

term cost-effectiveness information is likely valuable to decision makers in considering alternative programs in the short run, our study does not provide empirical data on the long-term cost-effectiveness of the KITS program. A few previous studies have looked at the long-term costs and effects of general early childhood interventions (e.g., Reynolds et al. 2011). However, because it is very expensive to follow children for long periods of time, empirical long-term cost information is not available for most programs, and we know of no studies that have collected long-term cost data on any of the more recent school readiness programs that focus on social and behavioral outcomes. Another limitation concerns the possibility that costs or benefits of the KITS intervention might also accrue to others, such as the foster parents or other children in the classroom. However, the study was not designed to collect comprehensive outcome data on all possible persons who might be affected by the intervention. Finally, about 23% of participants had some type of missing data, which we imputed, and this approach may have introduced some bias.

5. Conclusions

Despite the limitations noted above, the current analysis suggests that the KITS program is a promising intervention that is likely to be cost effective compared to alternative interventions for young children in foster care. Widespread implementation will likely require significant collaboration between the education, social welfare, and health systems. Although such cooperation is challenging, progress in other areas of child welfare suggests it is possible. For example, collaboration from a variety of pediatric providers, schools, and other groups has led to the expansion of environmental prevention programs, such as in-home safety precautions (e.g., removal or locking up poisons, firearms), which have had a significant impact on child health and safety. Along similar lines, encouragement and promotion of early intervention programs, particularly for children with emotional and behavioral symptoms, could help communities to understand the critical importance of investing in early childhood as a means of promoting children's health and development. In the current context of highly constrained resources, it is also important that the costs of these programs are carefully evaluated. Our results suggest that KITS may be a good option to consider for communities seeking to improve the school readiness and well-being of children in foster care.

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Appendix

Type of Service	Unit Cost	Source of Unit Cost
Primary care doctor	69.48	OHP Medical-Dental Fee Schedule

Type of Service	Unit Cost	Source of Unit Cost
Dentist	30.72	OHP Medical-Dental Fee Schedule
Optometrist	69.11	OHP Fee-for-Service Fee Schedule
Medical specialist	110.62	OHP Medical-Dental Fee Schedule
Emergency room	140.50	OHP Medical-Dental Fee Schedule
Psychological assessment	98.65	OHP Mental Health fee schedule
Family therapist/counselor	147.99	OHP Mental Health fee schedule
Individual counseling	109.28	OHP Mental Health fee schedule
Marital/couples therapy	147.99	OHP Mental Health fee schedule
Substance use treatment	45.76	OHP Mental Health fee schedule
Group therapy	49.35	OHP Mental Health fee schedule
Parks and recreation program	30.02	Bureau of Labor Statistics
Special education evaluation	110.26	Bureau of Labor Statistics
Case management services	23.78	Bureau of Labor Statistics
Vocational assistance	15.01	Bureau of Labor Statistics
Welfare/public assistance	23.78	Bureau of Labor Statistics
Help arranging payment	15.01	Bureau of Labor Statistics
Other preschool/headstart	23.97	Bureau of Labor Statistics

Note: OHP = Oregon Health Plan.

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Highlights

- Early intervention can help foster children successfully transition to school.
- Early school success can positively affect long-term outcomes.
- Interventions for children in foster care should be cost-effective to promote uptake.
- The Kids in Transition to School Program has positive effects on children.
- Cost of the KITS Program is comparable to programs not designed for foster children.

Figure 1.
CE plane

Figure 2.
Cost effectiveness acceptability curves

Table 1

Demographic Characteristics and Descriptive Statistics of Study Variables by Treatment Group

	KITS group (<i>n</i> = 102)	FCC group (<i>n</i> = 90)
Age (years)	5.26 (0.33)	5.25 (0.35)
Male (%)	52	46
Nonkinship foster care (%)	62	61
Ethnicity (%)		
European American	55	51
Latino	30	31
African American	1	0
Native American	2	0
Pacific Islander	2	0
Mixed race	10	18

Note. FCC = Foster care comparison. Values in the parentheses represent standard deviations. There are no significant differences between groups on any of the variables.

Table 2

Total Annual Cost and Cost per Child of Running the KITS Program

Component of KITS program	Total time spent in activity (hours)	Cost of activity (U.S. \$)
KITS staff training (annualized cost) ^a		3314
School Readiness Group		
Lead teacher	72	1630
Two assistant teachers	144	2161
Clinical supervisor	16	400
Space, equipment, supplies		1334
Caregiver Group for Foster Parents		
Lead teacher	28	519
Assistant teacher	52	780
Clinical supervisor	4	100
Space, equipment, supplies		1405
KITS Supervision and Consultation		
Clinical supervisor	40	1000
Lead teacher	24	445
Assistant teachers	45	675
Space, equipment, supplies		217
Total KITS program cost for 1 year		13,980
Total cost per child (15 students per group)		932

^aCost amortized over 5 years.

Table 3

Average Service Use by Study Condition (Unadjusted)

Type of service	Percentage with use		Mean (<i>SD</i>) visits/utilization among users	
	KITS group	FCC group	KITS group	FCC group
Medical (less ER)	87.3	85.6	13.2 (6.1)	13.2 (8.0)
ER	13.7	11.1	3.7 (1.0)	4.4 (0.8)
Mental/behavioral health	70.6	67.8	31.6 (22.2)	28.0 (19.5)
School	51.0	54.4	34.1 (22.6)	37.8 (22.4)
Social work	77.5	80.0	11.7 (9.8)	12.0 (11.2)

Note. FCC = Foster care comparison.

Table 4

Average Service Cost by Study Condition (Unadjusted)

Usual care costs	Percentage with (+) cost		Mean (<i>SD</i>) cost among those with (+) cost	
	KITS group	FCC group	KITS group	FCC group
Services cost	91	90	5,289 (3,438)	5,125 (3,660)
Family costs	91	91	978 (624)	1,007 (713)
Total usual care costs ^a			6,267 (3,996)	6,132 (4,312)

Note: FCC = Foster care comparison.

^aNot statistically significant.

Table 5

Incremental Costs, Effects, and ICERS

	KITS		FCC		Incremental cost KITS- FCC (SE) ^c	Incremental effect KITS- FCC (SE) ^c	ICER (95% CI) ^c
	Adjusted mean cost (SE) ^b	Adjusted mean effect (SE) ^b	Adjusted mean cost (SE) ^b	Adjusted mean effect (SE) ^b			
IFD ^a	6,422 (220.2)	310.5 (7.81)	4,746 (161.5)	284.5 (10.7)	1,676 (608) ^{**}	26.1 (10.9) [*]	64.4 (13 – 330)
EFD ^a	6,422 (221.3)	218.6 (10.1)	4,745 (161.3)	192.0 (11.0)	1,677 (608) ^{**}	26.6 (13.5) [*]	63.1 (–304 – 533)

Note: IFD = internalizing free Days; EFD = externalizing free days. FCC = Foster care comparison

* p < .05.

** p < .01.

*** p < .001.

^aBased on CBCL *t*-score.

^bDelta-method.

^cBootstrapped standard error.