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Costs to implement an effective transition-to-parenthood program for couples: Analysis of the Family Foundations program

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Abstract

The transition to parenthood involves many stressors that can have implications for the couple relationship as well as the developmental environment of the child. Scholars and policymakers have recognized the potential for interventions that can help couples navigate these stressors to improve parenting and coparenting strategies. Such evidence-based programs are scarcely available, however, and little is known about the resources necessary to carry out these programs. This study examines the costs and resources necessary to implement Family Foundations, a program that addresses the multifaceted issues facing first-time parents through a series of pre- and post-natal classes. Costs were determined using a 6-step analytic process and are based on the first implementation of the program carried out through a five-year demonstration project. This assessment demonstrates how overall costs change across years as new cohorts of families are introduced, and how cost breakdowns differ by category as needs shift from training group leaders to sustaining program services. Information from this cost analysis helps clarify how the program could be made more efficient in subsequent implementations. We also consider how results may be used in future research examining economic benefits of participation in the program.

INTRODUCTION

The transition to parenthood is one of the most crucial periods in family life. The experience of delivering and caring for a newborn can introduce stressors into the couple's relationship ranging from handling key parental and household duties to the financial concerns of raising a child. Much research has focused on the implications of this period on the couple's relationship as well as the emerging developmental environment for the child (Belsky & Kelly, 1994; Cowan & Cowan, 2000; Cox, Paley, Burchinal, & Payne, 1999). Because this life phase is often stressful for couples, many have advocated for intervention and prevention programs to help ease the transition to parenthood (Author citation removed; Cowan & Cowan, 1995; Glade, Bean, & Vira, 2005). Despite this research, programs that

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address multiple aspects of the transition process – covering effective parenting and co-parenting strategies as well as childrearing skills – are not widely available. In most communities resources are available at little or no cost to help couples prepare for the delivery process itself, such as childbirth classes run by healthcare providers for pregnant women and their partners. But fewer programs are available to assist with broader familial issues in the context of early parenthood. This could change, however, as local policy makers recognize the ease with which programs addressing such issues common to early parenting may be delivered in community settings.

An example of a program for couples transitioning to parenthood is Family Foundations. This program was designed to help couples navigate co-parenting challenges common to early parenthood through a series of eight classes bracketing the birthdate. The classes cover issues common to relationships and caring for a newborn child, including emotional self-management, conflict management, problem solving, communication, and mutual support strategies. While covering significant issues such as these, the program occurs in a way that requires minimal investment of time or resources from participating families. Given that delivery of the curriculum requires temporary classroom space within local healthcare settings, it also involves little burden from public health systems.

Given the potential program impact on key outcomes of early parenthood, relationships and child development, it is worth considering the resources required to deliver this program. It also is important to understand program costs for the sake of future economic evaluation of effects linked to participation. For instance, programs that effectively reduce the likelihood for long-term behavior problems in children could translate into large economic benefits for participants and society, even if relatively few individuals are positively affected. One study found the costs to treat one child for conduct disorder can exceed \$80,000 within adolescence, just based on use of services (Author citation removed). A study by Cohen (2004) showed that the total economic benefits for diverting just one individual from a life of crime could exceed \$2-million (Cohen, 2004). Costs associated with other aspects of early parenting relationship problems could be associated with depression, marital dissolution or even family violence (e.g., Donohue & Pincus, 2007; Max, Rice, Finkelstein, Bardwell, & Leadbetter, 2004). In view of the multiple outcomes involved and the associated costs, it is worthwhile to assess any economic aspects of programs aimed toward the challenges of early parenthood.

In this paper we assess the costs necessary to deliver Family Foundations based on the trial project. We carry out this assessment using comprehensive university budget files that include costs to implement the program to six cohorts of couples in central Pennsylvania across two sites, over a five-year period. While the program is currently being implemented elsewhere, we consider costs for the first version of the program given the detailed cost information available and the ability to assess costs across multiple years.

Background of the program

Family Foundations is structured to serve families at hospitals where pre-natal medical visits usually take place. Participants receive program services regardless of initial need (universally based); families with greater risk for problems were not the sole target. This

enables a non-stigmatizing environment for classes. Initial evaluations of Family Foundations have been promising. Studies have shown that the program has had a positive impact on all areas that the program targets: compared to a control group, program participants demonstrated improved outcomes in key domains of parental stress and depression, co-parenting and parenting quality, and child outcomes through age 3 (Author citation removed). Regarding the latter, more recent analysis has found effects on child internalizing and externalizing outcomes as well as school adjustment rated by teachers at age 6 or 7 (Author citation removed). Further details on published effects of the intervention are provided in Appendix A.

Because of the demonstrated effects on key outcomes with such potentially long-term implications, it is important to consider how effective programs such as this may be more broadly implemented. Family Foundations involves a protocol that can be readily adapted to various settings. Key aspects of the program involve the training process for group leaders, coordination by local providers for program administration, and recruitment of participants. Understanding the costs necessary for implementing this program is important for considering future implementations as well as considering potential positive impact on economically-relevant outcomes (such as child behavior problems). If the program eventually leads to costs saved by both families and society, it will be important to communicate such monetary benefits to stakeholders and potential funders. Given the impact on the important outcomes noted above, the likelihood of economic return on investment is increased especially given the relatively short timeframe of the program and delivery of services through group settings.

In order to establish a framework from which to estimate costs, we utilize a 6-step process described in prior studies (discussed further below in Methods). For a cost-analysis of a preventive project like Family Foundations, such a process can help analysts understand necessary resources and key program parameters that may vary across implementations, thus leading to variation in costs. The cost analysis must consider the key inputs necessary to carry out the program as well as the economic perspective to adopt when considering costs, i.e., how to value resources that include both line-item direct costs as well as valuing non-monetized resources such as the time required to participate (Author citation removed). This is an important consideration since certain programs may involve fewer burdens than others for participants as well as providers. Here we consider the costs of Family Foundations based on an established cost analysis process using a healthcare provider-based (funder) perspective. That is, we consider what direct costs and facilities were required of funders to deliver the program while excluding costs to the family to participate or any broader societal burden (given that the latter costs were negligible). Finally, we employ a sensitivity analysis of our costing procedures in order to determine a range of estimates that represent reasonable variation in program costs.

METHOD

Background of the intervention

The trial project of Family Foundations was carried out from 2003 through 2007 at two hospital sites within Pennsylvania, located in Harrisburg and Altoona. The participants were

89 couples (178 individuals) assigned to the intervention condition in a randomized trial of Family Foundations. To be included in the study and have the opportunity to enroll in Family Foundations, couples had to be expecting their first child, living together, heterosexual, and 18 or older at the time of recruitment. There were ten cohorts of classes held at childbirth education centers in the two hospitals (four cohorts in Altoona and six cohorts in Harrisburg). Because the numbered cohorts at the two sites received classes at approximately the same time, we consider cohorts aggregate across sites (cohorts 1–6). Costs are not broken down by site given that most resources were expended collectively and were usually not distinguishable by site. The program was developed and evaluated through Penn State University and funded through a grant from the National Institute of Mental Health.

Family Foundations is a manualized intervention.¹ Each group had a male and a female leader. Each female group leader was a childbirth educator and nurse. Male group leaders were experienced in working with families and leading groups, and included mental health and community service professionals. Classes contained only study participants, with an average group size of nine couples. Couples participated in four prenatal sessions while mothers were in their second or third trimester, and participated in four postnatal sessions when the baby was (on average) 5 months old. Childcare was provided during postnatal sessions to facilitate attendance. The couples also participated in three booster sessions when the child was two years old, so families were involved with the program for approximately 26 months total (across three years). Attendance of sessions was good; the majority of participants attended five or more sessions (66% of mothers and 63% of fathers) while a comparably small number of enrollees attended two or fewer sessions (15% of mothers; 17% of fathers). Table 1 shows what years each cohort was involved with the Family Foundations program.

Cost analysis approach

Prior studies have endorsed frameworks for characterizing costs of an intervention such as Family Foundations (e.g., Corso & Filene, 2009; Yates, 1996). This includes recommended steps program leaders can adopt to ensure that all necessary resources have been considered, correct procedures have been used and all necessary adjustments have been made (Haddix, Teutsch, & Corso, 2003). To consider costs of Family Foundations we adopted a 6-step process as described previously (Foster, Porter, Ayers, Kaplan, & Sandler, 2007), that includes the following: 1) stating the program for which costs are estimated, 2) establishing the perspective and scope of the study, 3) identifying the program inputs, 4) measuring the use of those inputs, 5) valuing the resources in dollar terms, and 6) conducting sensitivity analysis. This approach requires several decisions by the researchers that will factor into final estimates, so each step should be considered carefully. Explicitly stating the decisions and steps involved in the process enables necessary adjustments and re-framing for future assessment. This is especially useful given that such decisions while somewhat subjective can have a large influence on final cost estimates. For instance, allocation of resources shared by program implementation and research tasks (e.g., equipment such as computers

¹Readers can visit www.famfound.net for more information on the program or to obtain a copy of the manual.

used to prepare intervention materials as well as for research tasks such as data analysis) may be hard to fully determine, and based on approximations from project leaders. Attention to these decisions enables us to determine ranges of estimates that reflect such uncertainty (step 6). Important decisions such as how to handle adjustments for time are also spelled out in the framing of the cost analysis.

Estimation of the costs of Family Foundations relied on systematically maintained budget sheets with line-item details entered for the sake of future assessment of resources. Five years of university budget files covered all resources for the trial project. Files were organized by calendar year using date of expenditure. Each cost was identified for its purpose: intervention, research, both, or unknown. Resources going toward research purposes were usually clearly distinguished in budget files. Such evaluation costs included personnel time and computers for data analysis, resources for assessing and presenting statistical findings, costs for data coding and data processing, and incentive payments for participant time to complete survey and observational interviews (in addition to many other typical research costs necessary for program evaluation). Costs identified as going toward both program and research needs were divided based on input from the program developer and the project coordinator of current versions of the program. For instance, for certain administrative personnel, project leaders indicated that a minimal time went toward intervention duties (allocation set at 5% toward intervention). In general, salary and wage amounts were allocated based on job description or through project leaders' knowledge of the amount of effort toward program versus research. Salary and wage fringe amounts were allocated based on the proportion of salary dollars that went toward program delivery within each year. Also, because group leaders' roles sometimes included research-related tasks (such as completing research-related questionnaires, engaging in extra supervision in order to inform investigators of the dynamics of each group's implementation, and distributing and collecting participant feedback forms), certain group leader wages were weighted as $\frac{1}{4}$ research-oriented (this rate was set based on input from program leaders).

For other costs the breakdown for program versus research was not as readily determined through interviews with project leaders. This included both university overhead costs and costs identified as unknown. For both of these we allocated using the proportion of personnel resources (total salary dollars) that were program-oriented. This weighting strategy is based on the assumption that the percentage of personnel time necessary for intervention services is roughly proportional to other non-personnel costs that were generally used for either/both program or research purposes. Although unidentified costs may seem a troubling obstacle for achieving accurate cost estimates, we identified few costs as unknown (ranging from 1–3% of total budgets across the five years). Such costs were small by design since larger costs required more detail in budget line items.

Because this trial represented the first implementation of the program, an important aspect of this cost analysis involved identification of resources necessary for initial program development (often referred to as first-copy costs). This included resources that were necessary for producing the Family Foundations curriculum (presentation materials and procedures), group leader training strategies, and payments to consultants who helped refine the curriculum and guided video coding training. Through interviews with the program

developer we determined that roughly 80% of certain intervention expenditures in the first three years of the project went to first-copy. (In cases where resources were used for both research and intervention, the costing process involved first allocating intervention costs and then further allocating between first-copy and specific program services for that year). We note that first-copy resources were distinguished from those that would be necessary to establish the implementation effort in the first project year. Resources necessary for first-copy costs in the initial planning year of the project included personnel time, meeting expenses, supplies (e.g., DVD creators, reference books) and consultant payments. In years 2 and 3 only salary amounts from the project developer were necessary for first-copy needs.

As in any cost analysis of a program where services are spread across multiple years, adjustments for time were necessary. This is especially important given that some effects of the program may involve outcomes for the developing child. The time between intervention delivery and realization of program effects is adjusted through use of a discount rate (Bonneux & Birnie, 2001). This rate also should be used to equate costs expended across years, where costs toward later years are discounted from the original project year. That is, costs in later program years were discounted relative to prior years to reflect a smaller gap between program services and program effects. We used a moderate discount rate of 5% for our estimates to discount across three years of services for each cohort.

Because of several assumptions and decisions necessary to allocate costs, estimation of uncertainty (step 6) is an important part of our analysis. Although initial estimates relied on chosen cost 'parameters', program directors indicated the feasible range of allocation rates for first-copy costs and for other project roles. In addition to point estimates, we present ranges of program costs below in order to represent this uncertainty.

RESULTS

Defining the program and scope

The first two steps of the 6-step process for estimating program costs are important for clarifying the nature of the program for which necessary resources are subsequently determined. Step 1 involves defining the program for which we are measuring costs. We were primarily interested in determining the costs of Family Foundations as it was delivered in the two Pennsylvania communities involved in the trial rather than estimating what the costs might be in subsequent implementations without any research effort integrated into the project. Because researchers with university affiliation have been vital to the operations of the program for all investigations of study outcomes thus far, we feel it is important to consider costs based on the research setting for the project trial. Moreover, we seek to determine costs specific to the trial project for use in subsequent cost-effectiveness analysis focused on observed program effects from the trial. Relatedly, we constrained the scope of the project (step 2) to a funder perspective within a short temporal window. There are a couple of reasons why we did not choose a societal perspective (e.g., that values participant time) for estimating program resources. First, the burden for attending classes was low. Parents attended 5.5 classes on average (i.e., 11 hours) which involved a minor commitment of time and did not require absence from work or lost opportunity for other sources of income. Participants all lived within close proximity to the hospital where classes occurred,

so transportation costs were minimal. Additionally, the project provided childcare for post-natal sessions to avoid participant cost to attend classes. Consistent with this perspective, we also assumed temporal costs of the program to be bounded within the time period that services occurred. Each cohort received the bulk of program services within the first year of their involvement in the project. However, project resources were expended across three years total as follow-up/booster sessions were provided in years 2 and 3 for each cohort. We did not include estimates of necessary resources beyond the three years for which participants had contact with the program. Because of little burden for participation in the program and because most necessary costs and resources were captured through direct billing amounts, we anticipate that program costs based on a societal perspective would be close to estimates using a funder's perspective. Below we consider further the likely differences in costs across perspectives.

Determining and assessing program costs

Steps 3 and 4 involve identifying and then measuring the program inputs. Broadly these were separated into personnel and non-personnel. For the former, key personnel included the program developer/director and group leaders. The program director's role toward delivering the intervention includes various key responsibilities necessary for implementation of the program, including overseeing recruitment of eligible couples, hiring and training group leaders, preparing intervention materials for each class (binders, worksheets, videos, etc.), arranging and scheduling intervention classes, organizing program fidelity assessment (including group leader supervision and data implementation measurement), and overseeing other logistics of program classes (arranging for childcare, etc.). All resources were covered through salary and wage distributions (and fringe costs where necessary) as well as "purchased services" for childcare services. Non-personnel costs were divided into the following categories: space, supplies/equipment, travel, meetings. (Supplies/equipment included costs such as postage, telephone use, printing costs and publications). Overhead costs applied to both personnel and non-personnel and covered university expenses for university-affiliated personnel and project space. As noted, many costs were identified as research (versus program) although cost categories used in creation of budget files were the same for both program and research needs. These resource inputs were measured using university budgets with detailed descriptions of each cost (step 5). As noted, we do not present societal costs of this program, so did not measure any resources outside of those documented through university accounting. Research and intervention costs were separated using budget details and based on input from project personnel.

Details on the total program costs by project year are provided in Table 2a; per-family costs of the Family Foundations program are provided in Table 2b broken down by cohort and years enrolled. We adjusted all costs to 2008 dollars to represent roughly when the program ended, and discounted costs to the initial year of the program. As anticipated, costs were higher in earlier years as the program was established at the two sites; costs were lower for the last three cohorts (cohorts 4–6) given that training and curriculum materials costs were no longer necessary. As noted, we identified first-copy costs that occurred within the first three years of this trial. These costs were removed from intervention cost totals and do not factor into perfamily program costs. Although first-copy costs slightly exceeded the specific

intervention costs in the first year of the project trial (\$10,387 compared to \$10,105 respectively), annual program costs for this implementation exceeded first-copy costs by year 2. Overall, we estimated \$31,740 total necessary for program first-copy requirements across the first three years compared to \$51,872 spent on intervention services in those years.

Table 2b shows how costs differ by cohort based on what years the families were enrolled. Costs for the first cohort and first year of the study were higher given fewer participants (19 families) and higher necessary costs in the early years to initiate implementation. From Table 2a we show that although costs increased in years 2 and 3, many more families were receiving services including the pre- and post-natal classes delivered within the first 1–2 years of enrollment. From these numbers we could find that per family cost was \$626 in year 1, but much lower by year 3 once the program was established and more families were in the program: in year 3 the average per-family cost was \$244 (based on 89 families). (We note that while families from multiple cohorts are considered equally to calculate averages, resources would typically go more toward the more recently enrolled cohort since more program services are provided in the first year). As shown in Table 2b, the total costs to participate (averaged across cohorts) were \$779 per family, rounded to the dollar.

Table 3 shows the percentage costs by category. The breakdown of costs differed by category across program years, reflecting varying resource needs as the program became more established. For instance, amounts were higher for meeting expenses in the first three years to support necessary interaction between the program leaders and group leaders (including for training purposes). Supply costs including production of curriculum materials (e.g., videos for classes) were higher in years 2 and 3 but dropped substantially after that. Facilities costs were required for years 1 through 3 when participation rates were highest; in the last years of the project space for classes was arranged for no charge at the Harrisburg site using hospital meeting areas. Other amounts such as necessary salary for the program director were relatively constant across years (note that this salary amount is the portion necessary for the intervention component of this program; overseeing this program represented one portion of a full-time salary within the university). Necessary wages for group leaders were higher in middle years when more subjects were enrolled (due to overlap of all six cohorts).

A portion of certain cost categories went for training purposes. Costs necessary for training group leaders involved personnel time as well as travel, supplies and meeting expenses. While such costs were similar across the first three years of the project, they made up a larger percentage of overall costs in year 1 of the project (19%) compared to years 2 and 3 (13% and 8%, respectively). Training costs were minimal in year 4 and zero in year 5 when the trial was winding down. Overall, six group leaders were trained to implement classes to the participants across the five years of the project trial (four group leaders in Harrisburg for six cohorts, and two group leaders in Altoona for four cohorts). Figure 1 shows the pattern over time for key cost categories. For illustrative purposes, this figure distinguishes amounts necessary for the program director's salary as well as sub-totals for training needs across the five years (the latter including both personnel costs and meeting expenses).

Sensitivity analysis

Step 6 of the costing process involved a sensitivity analysis to evaluate uncertainty in cost estimates for this implementation of the program. For Family Foundations this involved considering both allocation assumptions (such as how much to weight first-copy costs) as well as aspects of the program likely to vary, such as university overhead costs. (We used a fixed discount rate in our cost analysis, although sensitivity analysis often involves varying discount rates as well). In order to generate a range of costs, we considered feasible alternative values for the several parameters in the cost analysis based on input from project leaders. As noted, first-copy costs toward the program were separated from costs for this specific implementation through the program developer's estimation of the degree to which certain costs involved first-copy functions. To represent the uncertainty for this estimated first-copy rate, we considered a range for weighting first-copy to be 10 percentage points higher and lower than that used for primary estimates (i.e., 70–90%). A second allocation assumption involved the amount of time that certain group leader resources were required for research-oriented tasks. A set allocation weight of 25% was used for this, although we consider an alternative feasible range of 20%–40% in the sensitivity analysis. Similarly, the amount of time assumed spent by the program director on certain tasks for this specific implementation (versus research tasks) was set at 50% for our primary estimates. Our sensitivity analysis employs an alternative range of 40–60% in case the average true proportion of time spent on the intervention was lower or higher. We also considered how different approaches for setting the overhead rate (for university-based functions) may impact costs. As noted above, primary estimates relied on university overhead being proportioned based on percentage of salary amounts that went toward intervention tasks. Alternatively, we considered using a flat rate (40%) of total intervention costs (excluding wages for non-university-based costs such as group leader wages and space costs). Based on our range of feasible allocation weights, sensitivity analysis indicates the range of program costs (per family) to be \$644 to \$915 (rounded to the dollar). This range of costs includes space costs necessary to implement the program. Because it is expected that space would be donated for many implementations of Family Foundations (given what is often available at hospital facilities for family outreach), we also present a range of costs had space costs not been necessary for the trial: \$535–\$805 per family.

DISCUSSION & LESSONS LEARNED

It is worth considering the costs necessary to implement the Family Foundations program for multiple reasons. First, the assessment provides important information for future implementation by detailing key program inputs and projected costs over time. The group leader training process and pre- and post-natal classes can be carried out in public settings such as healthcare facilities and occur over a relatively short period of time, making the program well-suited for adapting to different locales. Primary components include space and materials to hold classes and personnel to administer the program. The program director trains and oversees group leaders but also coordinates establishment and operation of the program, including recruiting participants and working with local hospital or other administrators to oversee program delivery and ensure fidelity. The eight pre- and post-natal classes require meeting space located in a convenient location, most likely within the

hospital system where childbirth occurs. Costs will vary across locations given differences in amounts necessary for classroom and meeting space as well as wage rates (which may be higher in urban settings). Personnel costs would be higher if the program was required to pay fringe amounts for more of the program staff -- for instance, if group leaders were full-time employees whose fringe was at least partly covered by funds for this program (for the trial project, group leaders were paid wages without benefits). Understanding the expected range of costs will enable program directors to communicate to local stakeholders the necessary funds for successful program delivery. Another reason for considering costs is to help inform future implementers how to increase efficiency. For instance, further analysis could determine the optimal number of couples for each class in a way that balances implementation quality with economy (we speculate on an optimal number below). Such information would be essential if considering a longer-term sustained version of the program. That is, if local policy makers were interested in implementing the program in a long-term setting it will be important to know what costs will be necessary for initiating the program, what will be necessary on an on-going basis, and what larger costs may need to be periodically re-introduced (e.g., re-training group leaders as turnover occurs). As noted, the program may also be made more efficient if classroom space can be donated.

Another reason for considering costs is to enable cost-effectiveness assessment of program outcomes. Research has demonstrated that Family Foundations has an impact on important outcomes within parenting, coparenting and child development domains (as described above). Although these outcomes are not typically monetized, they may be associated with future economic benefits. For instance, the lower rates of externalizing behavior found among young boys would decrease the likelihood for future conduct disorder and delinquency problems. Lower rates of depression among study mothers would likely lead to fewer mental health services or increase long-term productivity for participants. Ideally outcomes would be collectively monetized in order to put a dollar amount not just on program costs but also program benefits. Alternatively, an economic assessment could determine whether the program creates a cost-effective way to produce an effect that is valued by society (such as determined costs to reduce rates of externalizing problems in young children) even if the outcome is not directly linked to dollar amounts. A universal program such as Family Foundations would have a higher likelihood of being cost-effective given its relatively low cost to implement combined with effects observed for multiple family members. Finally, economic assessment of this program will also be useful for comparing cost-effectiveness results across similar interventions for young parents. Such a comparison would be worthwhile to compare programs that seek to address similar issues and lead to similar effects, but would also rely on cost analysis incorporated into the program evaluations.

Cost breakdown for the first implementation

The breakdown of costs for Family Foundations shows variation across categories and project years, most of which is intuitive. Notable from Figure 1 is that certain costs—space and wage amounts—are highest in years 2 and 3 when most subjects are involved in pre- or post-natal classes. Personnel costs represent a higher proportion of program costs in later years (exceeding 60% in years 4 and 5) versus initially (51–52% in the first three years).

This is understandable given that costs for class curriculum/supplies, meetings and other training costs are not as necessary in later years. Indeed, meeting expenses and equipment costs were zero in years 4 and 5 demonstrating certain “sunk costs” necessary to establish the program. In future implementations, such costs to establish the intervention would still be required despite the program already having been developed. For instance, project overseer personnel costs would still be higher in the first years of the implementation due to time needed to update and adapt the intervention to a new locale. In the first year of this version of the intervention, three days of training sessions (two days for pre-natal classes and one day for post-natal classes) were required to prepare group leaders as well as meetings to coordinate recruitment of couples; this was reflected through higher meeting costs in the initial year including necessary travel expenses for key personnel. Such resources would be similarly necessary for launching the program elsewhere. Moreover, for considering costs of future implementations of the program, we regard the resources necessary to establish (adapt, update, etc.) the program to be roughly equivalent to the costs required in early years for the initial version of the program. Annual costs once the program is established vary as a function of the number of families participating; particularly, the variation in wages necessary for group leaders to deliver classes is reflective of the number enrolled by year. Per-family costs in later years of the project would reflect expected costs for a longer-term program.

Another cost that varied was the amount needed for class space. While these costs represented a substantial amount of overall costs in early years (especially years 2 and 3 when they made up roughly 20–30% of overall program costs), they were unnecessary in years 4 and 5 because later cohorts were located at the Harrisburg site where space was donated in the last project years. These numbers indicate that program costs may fluctuate due to whatever intervention delivery arrangements are viable, as set up between local providers and program leaders. A societal perspective would value space costs for all program years regardless, as even donated space may be represented as an opportunity costs (Foster et al., 2003). However, given that hospitals typically provide meeting room space for programs such as this, we anticipate that funds would not always be required. We return to this issue further below when we consider an alternative analytic perspective.

Costs by cohort also varied. While many of the resources in the first three years were identified as going toward first-copy of the program, greater program costs were necessary for setting up the program within the first two years. For instance, overall costs in the second year of the program exceeded those of the third year by over 10% even though there were 14 more families involved in pre- or post-natal classes in year 3 compared to year 2 (70 versus 56 families). These costs were necessary for higher amounts going toward things such as continued training of group leaders and purchase of materials. Overall, program cost per family was highest for cohort 1 (\$1,273) and lowest for the last three cohorts in the demonstration project (\$566 on average for each cohorts 4–6).

As discussed above, in our cost analysis we adopted a funder’s perspective given the low burden to participate in the program. This perspective was sensible given that almost all necessary resources were represented through budgeted costs (supplies, personnel time, etc.). Volunteer time was not required, and space costs were included in most years of the

project. It is still important to consider how costs could differ if adopting a broader economic perspective, however. To illustrate how the average cost differs, we provide a point estimate that incorporates costs that were not required in this implementation but could have been given the value of the resources. Additional expenditures that are not represented in the above results would include space costs for all years of the project as well as travel costs for participants to attend classes. For space costs, we added amounts to year 4 of the project projected from the per-class amounts using costs from the other years of the project (and adjusted for inflation) – a total of \$1,650 for additional classroom space (for the full project). Participant travel costs were estimated using the average miles-per-gallon and gasoline costs from the study timeframe factored by the average distance for participants to the class locations and the average number of classes attended. In this alternative estimate we do not include valuation of participant time given that classes did not coincide with typical work schedules and could be considered as part of typical family planning activities for a first child. The average per-family cost after including these components is approximately \$813. This amount is close to the per-family cost based on the study's adopted perspective. As noted, this reflects the nature of the intervention (low burden on participants) as well as the fact that most costs were represented in budgets, in contrast to other programs that may rely more on volunteers and in-kind donated resources. Consideration of this perspective is still valuable since future analysis might involve accounting for a broader economic view of necessary program resources.

Despite variation in costs across years and cohorts, the costs to implement the first version of Family Foundations will approximate the costs to deliver the program in its current format. The program inputs identified here will require the same amount of resources, and costs will be similar within a range that is shaped by regional differences or arrangements. We do not anticipate the key program inputs would change significantly in what costs are required; for instance, the group leader role would not involve personnel who are volunteers or from a different wage scale than those involved in the trial program. Longer-term costs will on average be adjusted (likely lowered) as is the case with any program where the structure of the service delivery mechanism has been established. Our sensitivity analysis provides researchers with a sense of anticipated variation in costs for new implementations. While we expect that costs would fall within the ranges presented above, we next consider avenues by which future implementations of the program could introduce more efficient program delivery, potentially reducing costs for the intervention in its current format.

Considering efficiencies

Variation in amounts across cohorts suggests how program costs may be lowered as more participants are added to the project through a longer-term program and/or increased class size. As shown in Table 1, the number of participating families in later cohorts was especially low; for instance, only six couples were involved in the final cohort for the intervention trial. A larger class size would be feasible without changing the nature of the program. In fact, current program directors speculate that a class including up to 20 couples would still enable a manageable curriculum delivered by group leaders without diluting classroom interaction. The first cohort in the project trial involved 19 families across two sites (two classes led by four group leaders total), which is less than half than this

theoretically optimal amount. In order to assess the implications of class size on average costs, we determined the average program cost estimate would be roughly \$652 per family if class numbers were at maximum levels in all program years. This represents a savings of over \$120 per family from our central point estimate.

Along these lines, we also anticipate efficiencies that would be created through training group leaders. Resources for this process go mostly toward personnel time of group leader trainers and trainees. To the extent that group leaders continue their role of leading pre- and post-natal classes across multiple cohorts, training costs will be reduced. In the case of a five-year demonstration project, there was no issue with retaining group leaders across all six cohorts. While some turnover would be expected for group leaders over time, the investment toward training personnel would pay off more within a longer program lifespan. For a longer-term established program, the training process could also be made more efficient through overlap in personnel tenures. For instance, group leader trainees could attend and observe (and maybe assist) in group sessions executed by more experienced group leaders, thus combining some training with program delivery. In addition, costs may be reduced for the supervisory role in future implementations. The program developer was more involved in overseeing group leader training and activity in the trial. As the program is more established through guided procedures, this degree of supervision may not be as necessary.

Overall, costs for Family Foundations will vary across settings due to the issues discussed above; most notably, differences in arrangements for intervention space (ranging from renting space to donated space), differences in personnel rates across region, and the degree to which efficiencies are introduced as the program is more established over time and across multiple implementations. As with any program, a longer-term implementation will enable the marginal costs of added families being served to be minimal. Because the demonstration project involved a short time-frame (5 years) and required space costs that have not been necessary in subsequent implementations, the per-family costs determined here are slightly inflated. To consider this further, we examined the initial cost estimates from a second implementation of Family Foundations currently underway. The primary costs to carry out intervention classes – including program materials, training costs, wages for group leaders and other staff (i.e., baby-sitters for post-natal classes), and other supplies (such as meeting expenses) – totaled \$6,373 (2008 dollars) for one cohort. The cost for these core components translates into \$318 per family assuming maximum class size (20 families, as indicated above). This excludes important fundamental resources needed for administrative staff to establish and oversee the program or possible space costs. As discussed, the latter costs are likely to be more variable. To the degree that such costs can be minimized based on procedural arrangements among key stakeholders, the overall program costs may be reduced.

Of course, increasing efficiency of the program will increase the likelihood that the intervention is cost-effective. Regardless, considering the costs of the trial project as determined in this paper, we anticipate the program would be cost-effective due to the important family outcomes shown to be affected by participation (including program effects on maternal depression, parental and co-parental relations, and child aggression). The public

costs of family violence or lasting behavioral problems in children are likely to be substantial. As more investigation focuses on the effects of the program, future research will further examine the degree to which this program can provide a return on investment to program funders or taxpayers. As noted, such an investigation should take into account the anticipated variation around both program effects and program costs.

Certain limitations of the current cost analysis should be acknowledged. As discussed, the costs presented above are for Family Foundations within the demonstration trial project, and likely represent higher costs than would be determined once the program is more established. The costing process sometimes relied on feedback from the project leaders (second and third authors) designating whether intervention- or research-oriented. Ideally such costs are distinguished as they occur. Resources that were used for both intervention and research purposes were separated using a subjective breakdown. In certain cases, smaller costs could not be identified and were allocated using weighting strategies described above (although these unidentified costs were found to be minimal). We do not include more indirect costs in our estimates such as valuing participant time to attend classes. Including such opportunity costs would increase cost estimates. As discussed above, we feel these costs were not necessary given the low burden for participating.

Conclusion

Using a cost analysis approach such as the 6-step process employed here allows us to effectively identify all key program inputs and determine the necessary distribution of resources. A program such as Family Foundations can be made more efficient through longer-term implementation where initial establishment costs are spread across multiple classes. The group leaders play a key role in the success of this program. Once they are trained and arrangements with local providers are established, marginal costs to maintain the program and serve additional families are relatively low. This was reflected in our assessment, where costs to deliver the program declined substantially across cohorts. Our evaluation also considered how costs could be reduced through higher class sizes. It would be important, however, to ensure that increased class sizes for the program would not be detrimental to the nature of the interactions between group leaders and participants. Such investigation is left to future research.

The average costs to deliver an effective prevention program such as Family Foundations are modest when considering the demonstrated program effects on parenting, coparenting and child development outcomes. Although programs addressing these concerns are not widely available currently, policy makers may consider instituting such programs given their affordability as well as adaptability to various settings. The program involves a curriculum and protocol that could be readily implemented across healthcare settings common to communities throughout the country. We plan to do subsequent research on the cost-effectiveness of achieving program outcomes based on the first implementation of this program. If programs such as this can be determined to be both effective and cost-effective for achieving key study outcomes, there will be increased support for broader availability of programs that address the multifaceted issues accompanying early parenthood.

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Appendix A

Table A.1 provides significant effects linked to intervention participation as presented in three published studies of Family Foundations first implementation. We exclude significant effects from school-age follow-up analyses that are currently under peer-review (although summarize them in the Introduction). These results represent findings from post-test evaluation of the program at wave 2 (when the child is approximately 6- months old), wave 3 (child at age 12 months) and wave 4 (child at age 3 years). Effect sizes are presented as well as indication for statistical significance level. At waves 2 and 3, most outcomes were assessed separately by parent; thus effect sizes are separated by slashes. At wave 4, multi-level models were used. For these analyses, any moderated significant effects are indicate in parentheses; “mom” indicates program effects were moderated by parent-reporter, and “boys” indicates that program effects were moderated by the study child’s gender. Post-hoc probes determined whether these interaction effects indicated significant program effects for a sub-group (e.g., “(boys) indicates effects for boys or parents of boys only).

More detailed information can be found in published studies of these intervention effects (Author citation removed).

Table A.1

Significant intervention effects for Family Foundations by measurement wave

	<u>Wave 2</u>	<u>Wave 3</u>	<u>Wave 4</u>
<u>Parental Adjustment</u>	mom/dad	mom/dad	
Depression	.56 ^{**} /ns	--	.72 [*] (mom)
Anxiety	.38 [*] /ns	--	--
Parental Stress [^]	--	--	.16 [*]
Parental Efficacy [^]	--	--	.18 [*]
<u>Interparental Relationship</u>			
Relationship Satisfaction	--	--	.43 [*] (boys)
<u>Coparenting</u>			
Coparenting support	.35 [*] /.54 [*]	--	--
Coparenting closeness	ns/.44 [*]	--	--
Coparenting competition	--	.51 [*] /.36 ^{**}	--
Coparenting triangulation	--	.33 [*] /.28 [*]	--
Coparenting inclusion	--	.45 [*] /ns	--
Coparenting quality total	--	--	.18 [*]
<u>Parenting</u>			
Dysfunctional Parent-Child Interaction	.34 [^] /.70 [*]	--	--
Positivity (observed)	--	.34 [*] /.45 [*]	--
Negativity (observed)	--	ns/.60 [*]	--
Overreactivity	--	--	.35 [*]
Laxness	--	--	.30 [*]
Physical Punishment	--	--	.36 [*]
<u>Child outcomes</u>			
Soothability/Self-soothing	ns/.35 [*]	.46 [*]	--
Duration of Orienting	.34 [*]	--	--
CBCL-Total score	--	--	.81 [*] (boys)
CBCL-Externalizing Total	--	--	.78 [*] (boys)
CBCL-Internalizing Total	--	--	.70 [*] (boys)
CBCL-Attention/Hyperactivity	--	--	.62 [*] (boys)
CBCL-Aggression	--	--	.79 [*] (boys)
Child Social Competence	--	--	.43 [*]

Notes: Significance threshold: *= $p < .05$, **= $p < .01$, ^= $p < .10$; ns=non-significant

-- = outcome not included in study

CBCL=Child Behavior Checklist

See above summary for more information on tabled results

Biographies

Damon Jones (*Research Assistant Professor, Prevention Research Center*) joined Penn State in 2003 after receiving his Ph.D. in Quantitative Methods from Vanderbilt University's Department of Psychology and Human Development. He serves as a data analyst, project coordinator and program evaluator of family and youth behavioral interventions with an interest in applying appropriate methodology to address issues common with quasi-experimental data (such as measurement artifacts and selection bias). Another focus is examining public costs related to behavior disorders, as well as the cost effectiveness of prevention and intervention programs. Damon also serves as an instructor of applied statistical methods in Penn State's Department of Health Policy and Administration.

Mark Feinberg (*Research Professor of Health and Human Development and Senior Researcher, Prevention Research Center*) has conducted research on parent-child, coparenting, and sibling relationships for over 15 years, developed several innovative and effective programs for families, and managed several large and long-term research projects. His interests include how interventions work with multiple family members in the context of prevention trials.

Michelle Hostetler (*Research Associate, Prevention Research Center*) serves as a project coordinator for the NIH-funded Family Foundations and Siblings are Special projects. Her work has focused on prevention program implementation and evaluation, work-family issues, and family relationships. Michelle earned her B.S. in Psychology from Indiana University (Bloomington, IN), and her PhD in Human Development and Family Studies from Penn State University.

Research highlights

- We assess the costs to implement a universal intervention for couples transitioning to parenthood using a 6-step analytic process.
- Overall per-family costs are found to be moderate, suggesting the intervention may be cost-effective given studies showing effects in multiple outcome domains.
- Costs vary by category and across time, suggesting that more efficient use of resources could occur with a longer-term program.
- Using a sensitivity analysis, we determine the range of costs that would be expected for implementing this intervention in a similar setting.

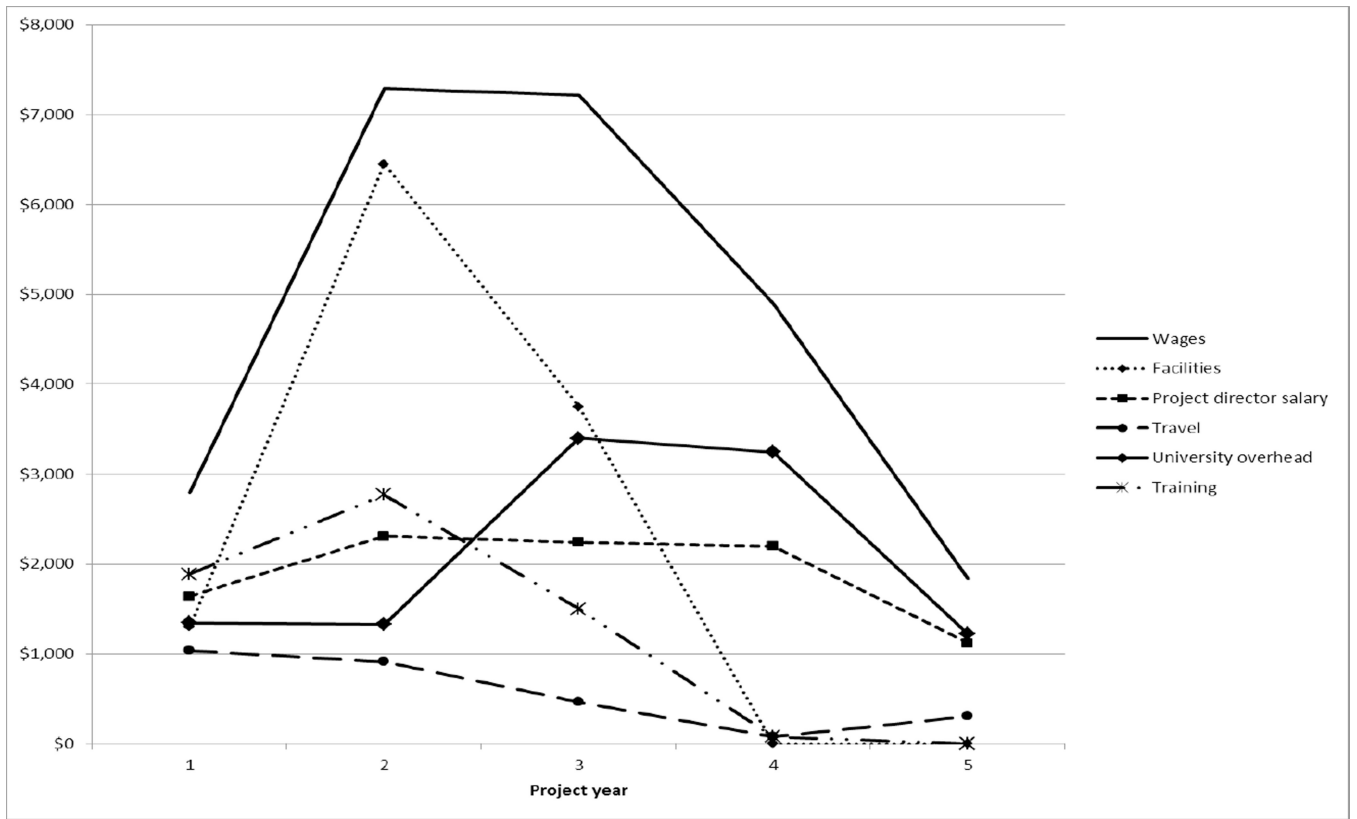


Figure 1.
Total costs (per category) by project year

Table 1

Schedule of classes by cohort for Family Foundations first implementation

Cohort	Sites involved	# couples	Dates of pre-natal classes	Dates of post-natal classes	Booster sessions
1	Altoona, Harrisburg	19	Sept.–Oct., 2003	June, 2004	Jan.–Feb., 2006
2	Altoona, Harrisburg	19	Feb., 2004	Sept.–Oct., 2004	April–June, 2006
3	Altoona, Harrisburg	18	Aug., 2004	April, 2005	Oct.–Nov., 2006
4	Altoona, Harrisburg	18	Jan.–Feb., 2005	Sept.–Oct., 2005	April–May, 2007
5	Harrisburg	9	May–June, 2005	Jan.–Feb., 2006	Sept., 2007
6	Harrisburg	6	Oct.–Nov., 2005	May–June, 2006	Dec., 2007

Table 2

a			
Total costs of Family Foundations by project year (2008 dollars; rounded)			
Project year	Total cost	% Personne (salary/wages)	# families
1	\$ 11,888	52%	19
2	\$ 25,159	50%	56
3	\$ 21,717	54%	89
4	\$ 12,929	63%	70
5	\$ 5,379	63%	33
Total	\$ 68,770		

b			
Breakdown of average costs of Family Foundations by cohort/year (2008 dollars; rounded)			
Cohort	# families	Years involved	Average per family cost
1	19	2003–2005	\$ 1,275
2, 3	37	2004–2006	\$ 849
4, 5, 6	33	2005–2007	\$ 568
All	89		\$ 779

Table 3

Family Foundations cost percentages by category across project years

	Project year (calendar year)				
	1 (2003)	2 (2004)	3 (2005)	4 (2006)	5 (2007)
Facilities	12.9%	29.1%	19.1%	0.0%	0.0%
Meeting expenses	4.0%	1.4%	1.3%	0.0%	0.0%
Salary (university personnel)	20.6%	12.8%	14.4%	22.6%	27.2%
Supplies, equipment & misc.	5.0%	7.0%	1.7%	1.1%	2.5%
Travel	10.3%	4.1%	2.4%	0.7%	6.0%
Wages (on-site personnel)	31.3%	37.6%	39.4%	40.3%	35.5%
University overhead	13.3%	6.0%	17.3%	26.7%	23.7%