

THE PENNSYLVANIA STATE UNIVERSITY
SCHREYER HONORS COLLEGE

DEPARTMENT OF HUMAN DEVELOPMENT AND FAMILY STUDIES

COSTS TO IMPLEMENT A 3-CONDITION, SUBSTANCE USE AND SEXUAL RISK
PREVENTION PROGRAM IN CAPE TOWN, SOUTH AFRICA

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SPRING 2015

A thesis
submitted in partial fulfillment
of the requirements
for baccalaureate degrees
in Economics and Human Development and Family Studies
with honors in Human Development and Family Studies

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ABSTRACT

Human service prevention programs are critical for mitigating risk factors in populations that are put at a disadvantage due to circumstance. In the Province of the Western Cape, South Africa, HealthWise South Africa: Life Skills for Young Adults is an intervention program geared toward minimizing risky sexual behaviors, HIV/AIDS transmission, and substance use by teaching them how to use their free time in healthy ways, coping skills, relationship skills, and knowledge about using substances and avoiding risky sexual behavior. A previous HealthWise randomized controlled trial (HW1) provided insight into the effectiveness of the intervention. The next study about HealthWise (HW2) focused on ways to help teachers teach the curriculum with implementation fidelity using three experimental conditions hypothesized to promote implementation fidelity, and study which of the conditions proved to be most effective. This thesis examines the costs and inputs associated with implementing HW2 as well as the costs association with implementing the three experimental conditions in isolation and combination, using data from the 2012 academic year. The analysis utilizes a six-step social cost analysis framework. The results point to both the importance and difficulty of monitoring expenditures in human service interventions. Despite these limitations, the cost per learner of HW2, in all of its varying degrees of intensity, is low enough that an even larger-scale of dissemination would be a low-cost (and potentially high-yield) prevention program in South Africa and elsewhere. Final considerations are made regarding the usefulness of the results as they appear and how they can be built upon in future analyses determining multi-year costs as well as effectiveness.

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Acknowledgements

I would like to first send a sincere thanks to the two people with whom I have worked most closely on this project: Dr. Linda Caldwell and Dr. Damon Jones. Weekly meetings with DJ were instrumental in learning about all that goes into cost analyses and ultimately completing this thesis. Working with Linda taught me so much about what it means to work on a meaningful intervention program, like HealthWise: South Africa, and provided unceasing support in guiding me in the right direction throughout the researching and writing processes. This project was a blessing, and I am so happy that I had the opportunity to work on it.

I'd also like to thank the rest of the HealthWise Team for offering help with information and general writing advice. Mojdeh Motamedi was especially helpful with making sure that I got the correct sample sizes, and Dr. Edward Smith helped Dr. Jones and me to make those final decisions about getting to the per-learner costs. Additionally, the team in South Africa, namely Joachim Jacobs, for compiling all of the raw cost data and implementation reports.

I would also like to thank my honors advisers, Dr. Lisa Gatzke-Kopp and Dr. Charles Geier, for being there to provide resources, recommendations, and guidance.

To the 3 German PhD students who invented Mendeley--I could never have managed all of my citations without your innovation. Thank you.

Finally, I send a HUGE thank you goes to my parents for just about everything. They raised me to work hard, pushed me to re-apply to Schreyer after I did not get in the first time, and made it possible for me to receive this top-notch education. I could not have done ANY of this without them.

Chapter 1

Introduction

Prevention services aimed at promoting healthy development through the adolescent period are of paramount importance in high-risk areas. Resource inequality puts youth at a substantial disadvantage as low socioeconomic status (SES) leads to poorer outcomes in school achievement, physical health, emotional and behavioral problems, vocational success, delinquency, substance abuse, mental health, and other key domains (Brooks-Gunn & Duncan, 1997; Werner, 1993).

Abundant research has been conducted in this domain on the efficacy of prevention programs in mitigating these risks. Some target risk factors, while others focus on developing or creating protective factors; they all seek to increase the likelihood of positive outcomes for those receiving treatment. Regardless of the aim, however, it is important to determine the most efficient way to deliver these programs in order to yield the most positive results.

In the field of prevention research, scholars have only recently begun to measure program inputs against participant outcomes for these programs in order to determine the usefulness of either particular elements of a program or the entire program itself. Without careful study of what resources are required to effectively administer an intervention these programs become difficult to monitor, improve, and expand.

Cost analyses of resources have therefore become a key element of high quality prevention programs. Primarily, they enable researchers to understand where the bulk of their assets are being allocated and how to increase effectiveness; secondarily they enable policy

makers to choose which programs to fund, and aid programs themselves in generalizing more effortlessly to other at-risk demographics.

Purpose

The current analysis arises out of the HealthWise South Africa: Life Skills for Young Adults (HW) prevention program (discussed in detail later). After almost ten years of working with high-risk adolescents in schools in the Western Cape, the team recognized the need to understand factors that might enhance the teaching of the program with fidelity to the way the program was designed to be taught. To do this, they secured a grant from the National Institute on Drug Abuse (NIDA) to conduct a study using a factorial design involving 56 schools in the Western Cape (the study will be referred to as HW2). At the same time, they sought to simultaneously conduct a thorough cost analysis of inputs. The main hypotheses in HW2 were based on understanding three evidence-based, experimental conditions that were administered in isolation and in combination across the sample to study how they enhance implementation fidelity and positive outcomes. This thesis focuses on determining the full social cost of HW2 for 2012 using the Foster et al. 2012 framework to understand the per-student (students will henceforth be referred to as learners) cost for each group receiving the enhancement conditions in isolation and in combination.

Why the Cape Town Area?

In the outer regions of Cape Town, South Africa, youth face a crisis of considerable resource handicap. In 2012, it was estimated that South Africa ranked fourth internationally in HIV/AIDS adult prevalence rate, as 17.9% of the population was diagnosed with this costly, highly stigmatized affliction (CIA, 2012). The Province of the Western Cape specifically faces a vast number of social issues, stemming from poverty, unemployment, and youth boredom, that

include gang violence, crime, dysfunctional families, and substance abuse (Western Cape Government, 2012). Additionally, the low socioeconomic status of many families serves as a serious hindrance in breaking the cycle of poverty. In 2011, the percentage households in the Western Cape earning less than ZAR 1600 per month (approximately 200 USD) amounted to 38.8% (CityofCapeTown, 2012). It should be noted that exchange rates are taken from 2012 averages (approximately 8 USD = ZAR 1) since that is the year upon which this study focuses, but they have changed considerably since then due to rising inflation (in 2015, 12 USD = almost ZAR 12) (X-rates, 2012). And a 2011 census indicated that less than 30% of people in the Western Cape completed grade 12 (Statistics South Africa, 2011).

Though rife with abundance of human service needs, the government takes a relatively progressive approach to meeting these needs, especially when compared with most other countries in Africa. Regrettably, finances and manpower limit government programs in the province of the Western Cape in their ability to serve the vast need that exists. Fortunately, the universities in this area possess a vested interest in serving their local communities and have taken an interest in filling gaps that exist in meeting the needs of the people.

HealthWise South Africa: Life Skills for Young Adults

In 2002, the University of the Western Cape, the University of Cape Town and The Pennsylvania State University teamed up to pilot HealthWise South Africa: Life Skills for Young Adults in the Metro South and Metro East Education Districts of the Cape Town Province. Administered in select, high-risk high schools, the educational prevention program was aimed at reducing risky behaviors related to unsafe sexual activity and substance use by replacing them with positive leisure activities and coping skills. The baseline version of the program, before enhancement conditions are added, involves a two-year curriculum that involves

12 lessons for grade 9 learners, and 6 lessons for grade 8 learners (the 2012 cost data only provide information regarding grade 8). HW teachers undergo a standard half-day training session before beginning the school year.

When administered effectively—utilizing theoretical modeling, wide-ranging teaching styles, appropriate dosage, healthy relationship building, sociocultural sensitivity, measurement of outcomes, and competent staff—such prevention programs can alter the trajectory of youth development in a positive way (Nation et al., 2003).

One of the main challenges for these types of programs is securing funding. Program directors must be conscientious when seeking out funding from government agencies and foundations due to the great need and limited budgets; through economic financial analysis, they can highlight the short-run and long-run payoffs of healthy outcomes with subsequent decreased burden on budgets that would otherwise go to welfare programs, correctional facilities, and non-preventive medical care. In addition to salaries and costs of supplies, economic cost analyses take time, forgone opportunities, and other latent costs into consideration. These measures serve to reveal all that goes into making a prevention program operate.

Though these analyses require careful, in-depth study, they prove to serve as a beneficial asset to any program. Any team member involved can look to see the inputs required to properly run the program; program managers can analyze these records to see where costs can be reduced; potential donors or grantors can look to see that funds are being responsibly allocated; governments can require this documentation to minimize corruption and misuse of public resources.

As mentioned in the purpose, the HW team recognized this need to keep track of their costs, both for the sake of the present program, as well as for the sake of expanding it to serve a

wider range of learners in the future. HW began a second phase of implementation in 2011 with a second grant from NIDA. This grant included a number of new components that would increase effectiveness, reach more learners, and conduct an economic cost analysis. In this new research study, three enhancement (experimental) conditions were added: enhanced teacher training; support, structure, and supervision; and enhanced school environment. Due to the fact that the focus of this paper is on resource inputs, the detailed demographic characteristics of the sample will not be discussed.

The grant specifies “the analysis will provide information to MSED [Metro South Educational District] with regard to the costs of each condition individually and in combination” (HealthWise, 2011). Following the submission of the grant proposal, the Metro East Education district was added to the sample. As stated earlier, the conditions referred to above were added to the program for the second phase of implementation to increase fidelity to the program, and in turn, the effectiveness of it.

Experimental Conditions

The three enhancement conditions chosen were built upon research concerning school-based interventions indicating that the elements upon which each condition focuses improve the quality of the program’s implementation, fidelity, and outcomes (Dusenbury, 2003): enhanced teacher training (ETT), support, structure, and supervision (SSS), and enhanced school environment (ESE). Based upon a randomized control trial approach, some of the 56 schools receive these conditions in isolation, some receive them in combination, some receive all conditions, and some receive none at all. This design enables those investigating learner outcomes to incorporate a factorial design and subsequent advance Type 2 Translational research that will help study differences in outcomes between the three conditions (Caldwell et al., 2012;

HealthWise, 2011). In addition to implementing these changes, the HW team was charged with the task of tracking the costs involved in administering these enhancement conditions in order to give school administrators a clear idea of the costs involved with proper execution of the program, and better inform future implementations of this program.

Enhanced Teacher Training

The enhanced teacher training condition focuses on increasing fidelity to the program by having more well-trained teachers. The initial intention was that ETT would be disseminated among treatment groups via an extended, three-day training session, followed by another two-day session held four months later that would focus on teaching specific lessons. The condition ended up being administered more informally, as clusters of EET teachers met with the HW ETT officer to satisfy enhanced training aims.

Support, Structure, and Supervision

The support, structure, and supervision condition focuses on fostering an ongoing, supportive relationship between the HW2 SSS support staff and the instructors in charge of teaching the curriculum. In addition to the open line of communication between teachers and HW staff, they are also given a more detailed outline of how and when the lessons should be administered and logs aimed at improving effectiveness and fidelity (HealthWise, 2013b).

Enhanced School Environment

The Enhanced School Environment condition focuses on bringing about additional reinforcement of HW lessons in the schools receiving this condition. The points of emphasis for this condition includes the following: “community awareness and development; risk reduction amongst youth; [promotion of] positive healthy leisure activities” (HealthWise, 2013a). These goals are accomplished via various partnerships with South African human service providers

who put on assorted school-wide activities, assemblies, and workshops. In addition to that, HW posters are given to these schools to serve as a tool that reinforces individual topics addressed throughout the program curriculum.

The initiation of these experimental conditions provides a unique opportunity to look at the baseline HW2 intervention and compare its costs (and later, outcomes) with the program when it has one or more of these enhancements added. A more holistic, future analysis will see if there is any synergistic effect that comes from a particular combination of conditions or if one stands alone as the most cost effective.

Summary

My analysis of HW2 considers all elements of this program, as it balances qualitative information about implementation with the quantitative data provided in order to produce a holistic, representative estimation of cost per learner in each treatment group and for the entire HW2 program. Following this introduction, I will review the literature on the importance of valuing prevention programs and designing them using a population-wide dissemination in order to maximize positive outcomes. I will then outline my methodology and results, and finish with a discussion of the limitations and implications of the conclusions.

Ultimately, this thesis will answer the questions: what is the cost of HW2 in its unenhanced form? And what is the average marginal cost to add each condition to this general intervention? In doing so, this analysis will make way for future studies to analyze costs across a number of cohorts, conduct a cost effectiveness analysis, considering the value-added of each condition, and dictate even wider, more efficient dissemination of HW to the populations who need it most.

Chapter 2

Literature Review

In working to analyze and interpret the costs of HW2's different elements, it is valuable to first take time to review current literature on prevention programs and their costs. The HW team provides direct costs for the period of interest to this thesis, but to understand how to allocate those costs goes beyond straightforward categorization and summation. The program's specific design, on top of its theoretical background puts forth a need to take more into consideration than the overt costs provided, as well as a need to carefully consider how to get from a total for the entire program, to a per learner cost by treatment group. This review of literature aims at understanding current research and best practices concerning the value of prevention programs and of population-wide dissemination, as they can provide perspective on why a cost analysis of HW2 serves as a great asset in further improving this program.

The Value of Prevention Programs

The basic aim of any prevention program is to ensure that a building up of strong protective factors mitigates vulnerable populations' risk factors and enables them to live healthy, productive lives. These programs are of high value—not just to the immediate beneficiaries, but also to the broader society. Studies have attempted to estimate the long-term savings of such programs when the population of interest is at risk for poor school performance, substance use, and delinquency, which is similar to the population of interest in HW. Savings to society can potentially come from reduced time on welfare or in jail, decreased duration of unemployment,

lower medical costs, and increased tax revenues (Cohen, 1998; Dawley, Loch, & Bindrich, 2015).

Of course, not all prevention programs yield intended cost-saving, long-term, positive outcomes. A wide-ranging review of prevention literature across risk factors relevant to the HW targets (substance abuse, risky sexual behavior, school failure, and juvenile delinquency and violence) identified the key components of an effective prevention program (Nation et al., 2003). HW, in its commitment to evidence-based practices, complies with [most, if not all,] criteria listed. Among the many benchmarks, the most salient with regards to HW were theory driven, socioculturally relevant, and outcome evaluation. In being theory driven, HW based its curriculum upon prevention science, ecological systems theory, and positive youth development from the very beginning, and built upon that model when choosing enhancement conditions based upon further research in boosting implementation, fidelity, and outcomes (Caldwell, Baldwin, Walls, & Smith, 2004; Dusenbury, 2003). HW also began with a strong commitment to be socioculturally relevant to the targeted population. The program accomplished this principle and has maintained it in two different ways. HW began as a partnership between the Pennsylvania State University, The University of the Western Cape, and the University of Cape Town, and has maintained a partnership with those institutions so as not to lose touch with the cultural and demographic needs of the population served (Wegner, Flisher, Caldwell, Vergnani, & Smith, 2008). Additionally, HW's targeted outcomes of increasing positive leisure behavior and interpersonal skills, while minimizing risky sexual behaviors and substance use have been recognized as clear needs in the Western Cape, as mentioned in the introduction. Finally, HW's dedication to outcome evaluation has been apparent throughout its 15-year history, as the team has yielded statistically significant decreases in risk behaviors, while still remaining responsive

to the needs of teachers and learners (Caldwell, Baldwin, et al., 2004; Caldwell et al., 2012; Caldwell, Smith, et al., 2004; Smith, 2015)

By employing evidence-based principles to prevention science, HW is positively impacting the communities in which it administers services. It is clear that prevention measures are far more effective in alleviating risks for the targeted population as well as in alleviating burden for society as a whole.

Population-Wide Dissemination

Universally disseminated interventions, also referred to as primary intervention programs, are administered to an entire population (in this case, every 8th grade learner in the selected HW schools), rather than to groups or individuals who have been found to be at higher risk of negative outcomes (Marchand, Stice, Rohde, & Becker, 2011).

Primary interventions, particularly those that take place within the school setting, yield significant, positive outcomes (Lochman & Wells, 2002). Furthermore, a principle referred to as ‘Rose’s Maxim’ posits that some risk existing within a population is more costly than high risk concentrated (and contained) within a small subset of the population (Rose 1981, cited in Jones, 2015). This idea applies to HW2 due to the fact that it does not discriminate between higher and lower risk learners, but rather, is administered to all grade 8 and 9 learners in HW2 schools. Furthermore, since this population on the whole experiences substantial risk factors, the program should yield significant positive outcomes if administered effectively.

An additional support for population-wide dissemination suggests that including a mixed level of risk within a sample, rather than simply targeting those who are at highest risk, minimizes the risk of unintended iatrogenic effects (i.e., deviancy training) (Dishion, McCord, & Poulin, 1999; Smith, 2015).

Cost Analyses

The value of prevention programs administered as primary interventions has clearly been proven through extensive social science analysis. When disseminated using evidence-based practices, individuals partaking in these programs experience improved outcomes. However, improved outcomes are not a sufficient condition for governments or other fund-granting organizations.

Not only are they valuable for those who are responsible for managing a program, but cost analyses also signal to potential investors that the leadership is cognizant of how they are allocating their funds. Additional benefits include making way for the possibility of a cost effectiveness analysis and replicating the program in other areas.

HIV/AIDS Cost Analyses in South Africa

Current health-oriented prevention programs in South Africa are positioned towards HIV/AIDS prevention in adults. They distribute condoms, provide peer education to prostitutes, promote blood safety, diagnose STDs early and educate about how to prevent spreading them, counseling and testing services, and minimize mother-to-child transition (Creese, Floyd, Alban, & Guinness, 2002). In fact, analyses have proven their cost effectiveness across a number of HIV/AIDS prevention studies.

While these measures are highly valuable to a population with such high prevalence of HIV/AIDS, the targeted populations highlight the fact that sexually adults are not fully educated on how their risky behaviors can negatively affect their long-term health and well-being. Therefore, prevention programs that are widely disseminated across entire school-aged populations, like HW, can potentially yield even higher cost-effectiveness rates, as is reinforced in the Rose's Maxim Principle as well other research highlighted in this chapter (Rose 1981,

cited in Jones, 2015). That being said, data are limited in this dimension due to the difficulty of monitoring costs on an intervention that involves the time of teachers and the long-term tracking of outcomes, especially compared with the more tangible costs associated with providing birth control or other medication to adults or tracking participants for a limited time when only measuring transmission from mother to child (Creese et al., 2002).

However, the fact that HW does not easily lend itself to clear-cut measures of costs does not make HW less important. In fact, the evident lack of cost analysis on this type of program strengthens the need for such research to be conducted. The Western Cape, and areas facing similar social issues, could benefit from a framework that enables them to see where human service budgets can most effectively allocate their resources, particularly when it comes to a problem as severe as HIV/AIDS.

Summary

Building upon research in this field, the next three chapters seek to contribute to prevention research further by filling existing gaps. Drawing from evidence-based practices, this analysis will become a valuable asset—not just for the HW team, but also for this growing cost analysis field within prevention research.

Chapter 3

Methods

Determining the costs associated with HW2 involves understanding what each element in each condition requires. Additionally, it requires making sure that costs have been appropriately allocated between the basic program, research costs, and each of the three experimental enhancement conditions, so that we can ultimately understand what the marginal cost is to add each condition on a per-learner basis.

Cost Analysis Framework

In approaching this examination, a cost estimate methodology was taken from a prevention framework that outlines key considerations that must be made in conducting a comprehensive analysis (Foster, Porter, Ayers, Kaplan, & Sandler, 2007). Prior studies have successfully utilized this framework in assessing the costs of their prevention programs, which have made way for them to conduct further effectiveness analyses (Crowley, Jones, Greenberg, Feinberg, & Spoth, 2012; Jones, Feinberg, & Hostetler, 2014). Foster et al. (2007) outlines each step of the cost estimation model in the following way:

Step 1: Clearly stating the intervention for which the costs are estimated

Step 2: Establishing the perspective and scope of the study

Step 3: Identifying program inputs

Step 4: Measuring their use

Step 5: Valuing those inputs

Step 6: Conducting a sensitivity analysis (p. 263)

The list does not necessarily lend itself to the constraints of the typical social science academic paper so the structure of the paper will not follow headings proceeding step-by-step. Nevertheless, I will systematically address the key components of this framework in order to holistically understand the costs of HW2 for grade 8 learners.

The Program

Step one was addressed in the Chapter 1 in the introduction of the program of interest: HealthWise South Africa: Life Skills for Young Adults. As stated, within this context, HW2 cost data will be analyzed for grade 8 learners in 2012 (N = 12,782) and results will take the three conditions in isolation and in combination, as well as the non-enhanced inputs of the program, into consideration in order to yield a per-learner cost for each treatment group. Information regarding the size of each treatment group by school, classroom, and learner is outlined in Table 1, along with the specific relationships between treatment group and condition(s) received (HealthWise, 2011, 2012c, 2012d).

Table 1. Treatment Groups

Treatment Group	ETT	SSS	ESE	# of Learners
1	Yes	Yes	Yes	1508
2	Yes	Yes	No	1611
3	Yes	No	Yes	1536
4	Yes	No	No	1590
5	No	Yes	Yes	1647
6	No	Yes	No	1633
7	No	No	Yes	1788
8	No	No	No	1469

In establishing the perspective and scope for step two, decisions had to be made about which approach would most accurately represent the resource expenditures on HW2 for 2012.

The Perspective

A cost analysis requires that researchers choose a perspective through which the study will be observed and assessed. Some choose to look through the lens of the participant, while others choose to take the perspective of a funding agency (Foster & Jones, 2006; Foster et al., 2007). This particular analysis will utilize the societal perspective, which considers not only the participants and potential funding agencies, but also takes into account opportunity costs, long-term savings, and other economic considerations for society (Foster et al., 2007). The advantage of the societal perspective is that it accounts for a vast array of possibilities beyond the present implementation of the program. The difficulty in estimating cost from this perspective lies in the fact that values can become relatively imprecise when attempting to calculate current and future latent elements that play into the far-reaching effects of HW. However, this perspective will yield a greater understanding of the direct and indirect costs of HW2's increasingly complex and widely disseminated structure, benefitting the HW team as well as other constituents with a stake in this program.

The Scope

The scope of the program refers to the boundary that is set between what will and what will not be included into the analysis (Foster et al., 2007). Because the ultimate goals of analyzing the costs of HW2 are to maximize effectiveness and eventually generalize the program to more populations, I will be focusing on the costs associated with implementation of HW, and its unobserved costs and the price of foregone opportunity. Therefore, research costs will be dropped from the analysis after they are reported early on in Chapter 4: Results, since HW is not intended to come out of a university setting as a research project. Direct implementation costs include training sessions for educators, transport, classroom materials, etc. (these inputs will be

covered in greater detail in the results section and can also be found in Appendix A).

Additionally, Chapter 5: Discussion will address costs that should be considered, but not explicitly measured, in order to account for what may not be captured in the final totals. Those who wish to replicate HW2 should take all of these pieces into account, while the HW team should carefully consider them to see what is necessary and where efficiency can be increased.

Identification of Program Inputs

Program inputs were identified using two methods of evaluation. The first method involved analyzing quantitative documentation of cost from the HW team in South Africa; the second method involved examining existing research articles and other HealthWise documents for qualitative information about inputs. The value of doing both a quantitative and a qualitative analysis lies in the fact that understanding both sides can inform us about features that may not have been accounted for, and to understand latent costs like time, donations, and opportunity cost.

Qualitative Analysis.

For the qualitative analysis, the documents composed in different capacities around 2012, the year of interest, by all HealthWise team members were all analyzed in an effort to ensure that no costs had been left out of the analysis. Some were officially published documents, while others were internal reports that retrospectively reviewed HW2 implementation in 2012 (Caldwell et al., 2012; Caldwell, Smith, et al., 2004; HealthWise, 2011, 2013a, 2013b, 2013c; Smith, 2015).

This exercise was especially helpful in enabling a critical assessment of the analysis's sensitivity analysis and limitations, which will be discussed in the conclusion.

Quantitative Analysis.

The South African team tracked and documented personnel and non-personnel costs for 2012 (HealthWise, 2012a, 2012b). From those spreadsheets, inputs were categorized by Research, Intervention, Enhanced Teacher Training (ETT), Enhanced School Environment (ESE), and Structured Supervision and Support (SSS). Inputs were further categorized by function, using the following classifications: conference, consent forms, event, intervention supplies, meetings, personnel, recording equipment, research equipment, speaker, telecommunication, training, and transport. Further notation of inputs can be found in Appendix A. The analysis of these documents was paired with a synthesis of sample data that yielded final estimates for how many learners were part of the sample (HealthWise, 2012c, 2012d). In the instance that any of the numbers did not make sense, communication was conducted between the Penn State team and the South African team to ensure that mistakes were resolved.

Determining the Program Costs

Following the identification of program inputs, the task of answering the research question itself arose: what are the per-learner costs associated with implementation of HW in its baseline form, and with its enhancement conditions, in isolation and in combination?

We began by working to synthesize the non-personnel costs to the point where we understood how much each of the categories cost (Research, Intervention, ETT, ESE, and SSS). From there we broke down each category to analyze the distribution of cost between functions (HealthWise, 2012a).

One special circumstance that arose was that costs for ETT were not specifically noted due to the change in implementation, which was alluded to in the Chapter 1. Following

consultation with a program director and another HW team member, costs were estimated by using a 1.35x multiplier on cost categories relevant to the condition.

The, personnel costs were divided up between functions according to a breakdown of time spent in each of the program's domains for each employee during 2012, using estimates provided by the HW team in South Africa (HealthWise, 2012b).

Additionally, grants typically allocate funds towards an overhead cost when they are awarded to universities (also referred to as "indirects"). These funds are meant to cover costs that are not explicitly charged to the program, but are critical to the success of it. They can include research equipment, meeting spaces, etc. The NIDA grant that funded HW2 specified that an 8% overhead should be awarded to the University of the Western Cape so that cost was added on to the final total.

Once an understanding of the costs was realized, the next step was to understand how much the program would cost for each group receiving in intervention in its varying sets of enhancement condition allocation.

The final step of was to determine the cost per learner for each treatment group. This involved incorporating sample data alongside overall HW2 program costs. The decision was made to use the average class size per school, since unpredictable absenteeism makes it difficult to get a true sense of how many students should be included for each group.

This methodology, guided by the Foster et al. (2007) framework, yields results that show what the average baseline cost of the intervention, along with average marginal costs for each enhancement condition.

Chapter 4

Results

Combining my qualitative and quantitative analyses, a full picture of the costs associated with the components of HW2 emerged. In total, ZAR 689,204.18 was spent on implementing HW2 for grade 8 learners in 2012 (total excludes research costs). This chapter will provide all relevant totals along with an explanation of what resources go into which component of the program. For the purposes of converting into USD terms, the average conversion rate for 2012 can be used: ZAR 8.21 = USD 1 (X-Rates, 2012).

Totals

Beginning with overall totals for each component of the program, the breakdown went as depicted in Table 2 (HealthWise, 2012a, 2012b). The types of costs identified in Table 2 will be explained subsequently.

Table 2. Overall Totals

Type	Cost	Percentage
Research	ZAR 1,278,334.13	62%
General Intervention	ZAR 321,124.37	16%
ETT	ZAR 69,358.89	3%
SSS	ZAR 132,465.31	6%
ESE	ZAR 115,203.45	6%
Overhead	ZAR 153,318.89	7%
Total	ZAR 2,069,805.04	100%

From this point forward, however, research costs will be dropped from the analysis since they do not serve as a necessary component of the program itself, but rather as a tool the HW team uses to gauge progress and effectiveness

From there, costs can be seen broken down to a personnel vs. non-personnel comparison (see Table 3: HealthWise, 2012a, 2012b):

Table 3. Personnel and Non-Personnel Costs

Type	Personnel		Non-Personnel	
General Intervention	ZAR	55,693.30	ZAR	265,431.07
ETT	ZAR	50,669.98	ZAR	18,688.91
SSS	ZAR	90,053.00	ZAR	42,412.31
ESE	ZAR	96,032.91	ZAR	19,170.54
Total	ZAR	292,449.19	ZAR	345,702.83

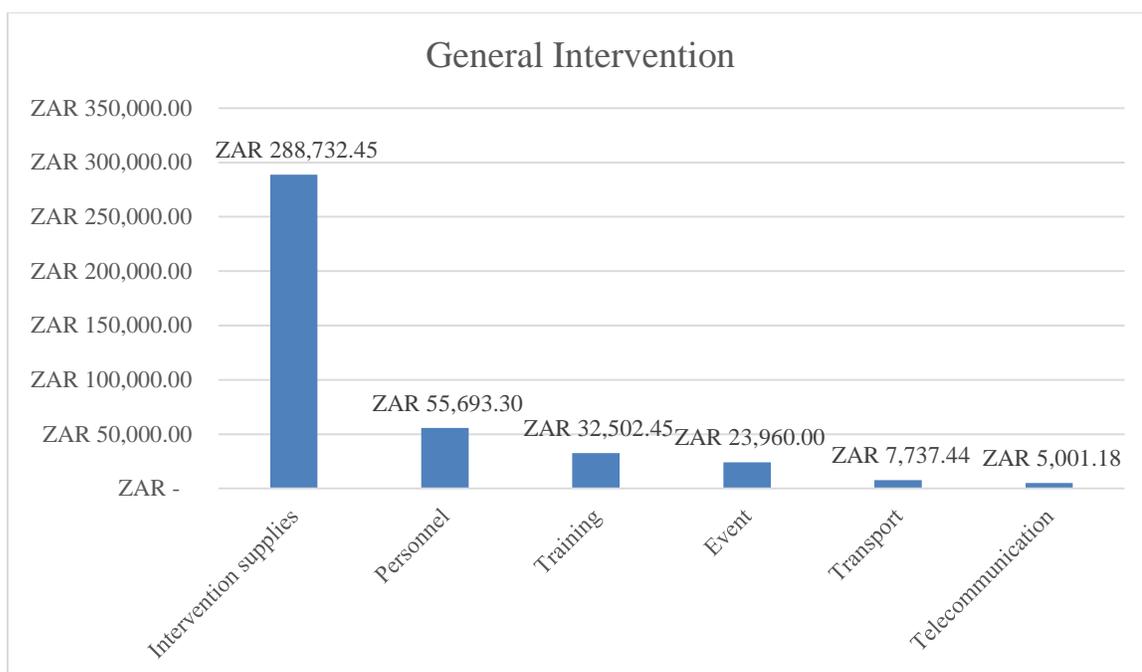
General Intervention

The general intervention, independent of any enhancement condition or research costs, includes many different elements, which account for 50% of the total cost before overhead.

The first major element is the standard (not enhanced) training of teachers. This standard training lasts a half-day and prepares educators to teach the HW curriculum. A second element under the general intervention, which comprised the majority of the cost, is the intervention materials, which include workbooks used by learners and instruction manuals for educators. Personnel proves to be a large proportion, followed by telecommunication and transport costs, which all serve a critical role for the South African HW team, as these enable them to manage all of the different schools implementing the program in addition to communicating with the HW team at The Pennsylvania State University. Finally, there were costs associated with hosting an end of the year banquet celebrating the hard work of educators who taught the HW2 curriculum.

The following graph (Figure 1) demonstrates the breakdown of this experimental condition (HealthWise, 2012a, 2012b). The next section focuses on condition costs that were designed to potentially enhance quality delivery of the of the HW curriculum.

Figure 1. General Intervention Cost Breakdown



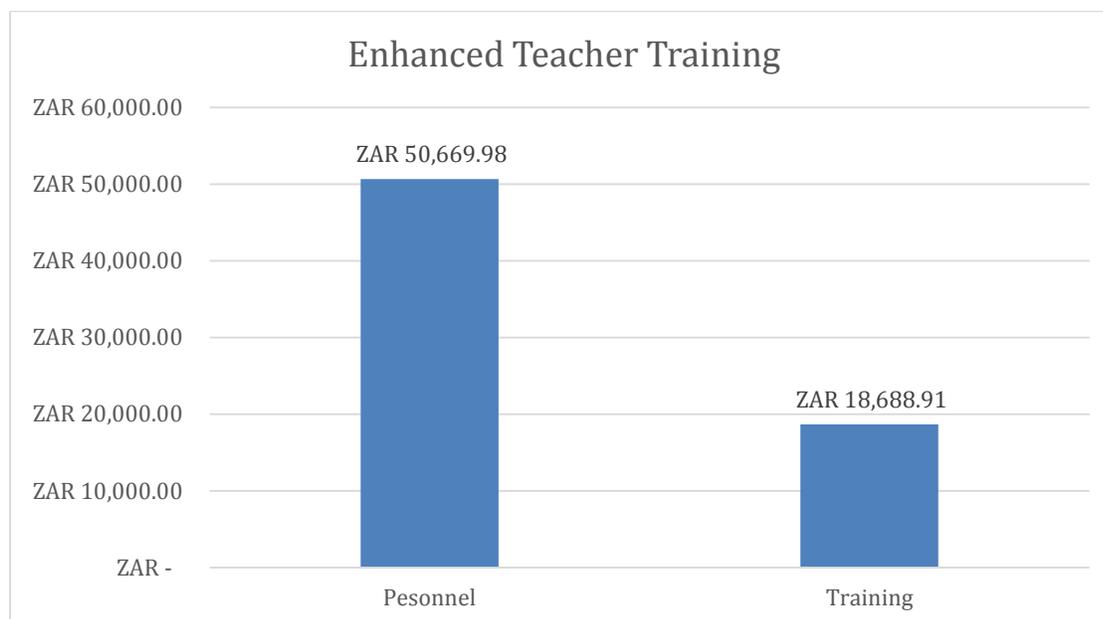
Enhanced Teacher Training

The ETT condition, utilized as a way to enhance fidelity and outcomes of the general HW intervention, accounted for 11% of the total cost before overhead. As noted in Chapter 1, ETT was implemented differently than the HW team had initially intended. In practice, it was comprised of more individualized and small group training than large group training as intended. This necessitated greater hours of personnel time.

ETT costs were not directly reported. As a result there was an estimated multiplier of 1.35 on both the training and personnel categories from the general intervention totals for these categories that estimated the approximate amount spent on implementing this condition. The training was administered by a HW staff member, who traveled to different schools receiving that condition at a time that was most convenient for a group of HW educators. The analysis also accounts for estimation that this training took approximately 1 hour of each educator's time, and values according to the average teacher wage rate per hour in South Africa. This enhanced

training was designed to help educators more effectively teach lessons and deal with problems that could potentially arise in implementation. The following graph (Figure 2) demonstrates the breakdown of this experimental condition (HealthWise, 2012a, 2012b).

Figure 2. ETT Cost Breakdown



Support, Structure, and Supervision

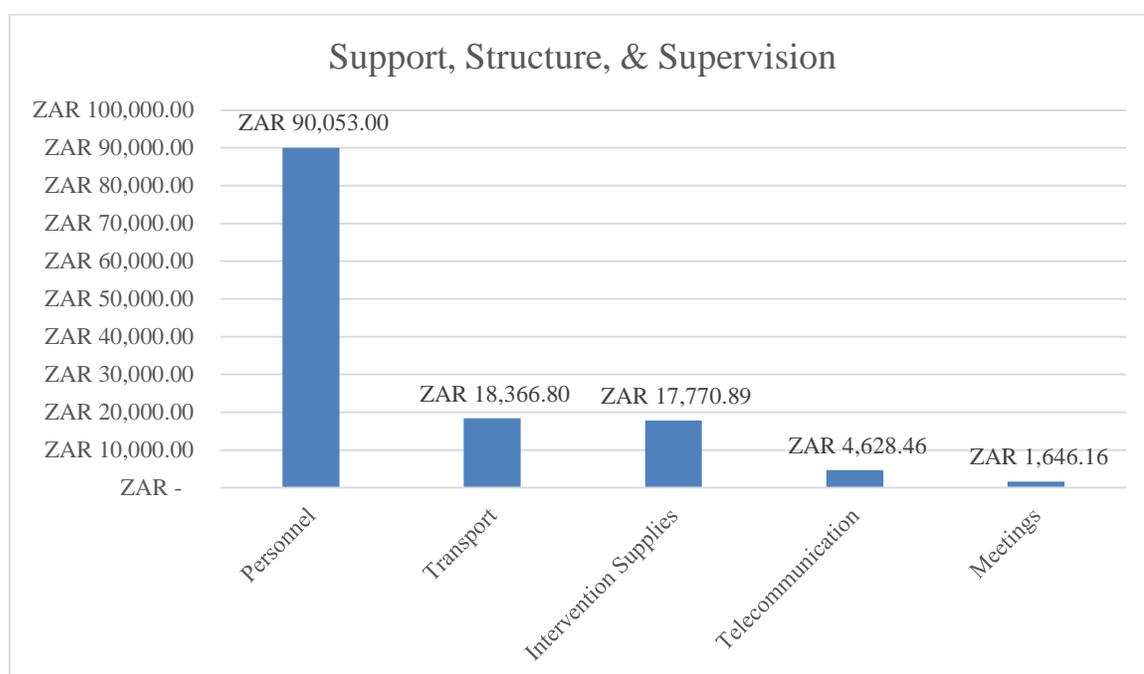
The SSS condition, utilized as a way to enhance fidelity and outcomes of the general HW intervention, accounted for 21% of the total cost before overhead.

Personnel took up the largest portion of this category; the condition prescribed that the individual who was hired as the SSS Officer remain in frequent contact with the HW2 educators in order to provide extra encouragement and assistance, hoping to increase fidelity and effectiveness. The personnel costs closely tie into the transport and telecommunication costs because of the in-person and over-the-phone communication that occurred between HW2 educators and staff (HealthWise, 2013b).

The intervention supplies consisted of reports that educators were asked to fill out throughout the academic year, which monitored their progress with HW2, and what they thought could be done to improve how they were teaching. HW2 staff used this information to work with the educators to do better moving forward.

The following graph demonstrates the breakdown of this experimental condition (HealthWise, 2012a, 2012b).

Figure 3. SSS Cost Breakdown



Enhanced School Environment

The ESE condition, utilized as a way to enhance fidelity and outcomes of the general HW intervention, accounted for 21% of the total cost before overhead.

In a similar way to the SSS condition, personnel costs took up the largest portion of ESE costs. The ESE Officer was responsible for assemblies and other programs that would reinforce

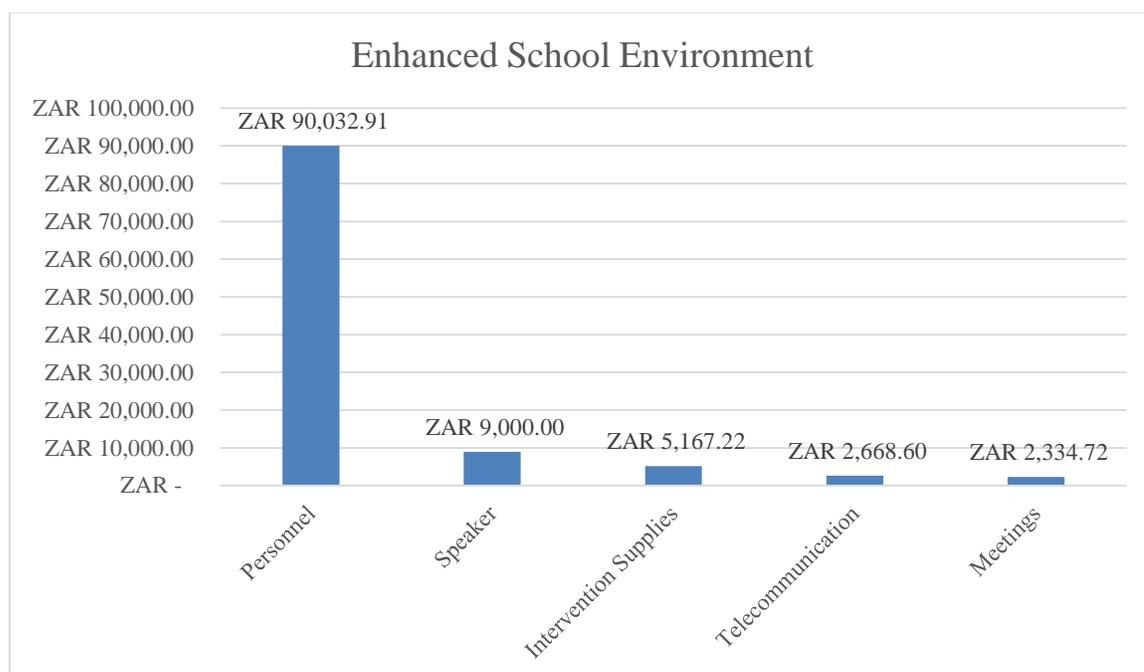
the HW curriculum. Telecommunication and transport tie in closely with personnel due to the logistics involved in executing these responsibilities.

Intervention supplies primarily consisted of posters that demonstrated that these schools had HW2 (fostering a sense of pride in having HW2), and prevention strategies related to HW2 that learners could adopt. Posters contain an added benefit, as they are available for an entire ESE school's population to read and potentially benefit from. However, this analysis limits itself to the direct costs to provide HW2 to grade 8 learners. The speaker cost is related to certain schools that had a speaker come in and reinforce principles taught throughout the HW curriculum. Special ESE activities put on by HW2, like Art Competition, Resource Roadshow, and I <3 My Community Workshop, pulled resources from both the intervention supplies category as well as the meetings category (HealthWise, 2013a)

It should also be noted that some key components are not included in the cost data by design. The ESE condition is intended to attract beneficial non-profits to the HW2 schools to provide services that reinforce the HW2 curriculum. As a result, external program costs have not been accounted for. However, it is important to be aware that the number of external programs that come to these schools range from 2-15 in number, and include programs like: University of the Western Cape's HIV/AIDS Programme, Sporting Codes, Love Life, and Grassroots (HealthWise, 2013a).

The following graph (Figure 4) demonstrates the breakdown of this experimental condition (HealthWise, 2012a, 2012b).

Figure 4. ESE Cost Breakdown



Per-Learner Analysis of Cost

As stated, the ultimate purpose of this analysis is to understand what the per-learner cost is for the general intervention and for the marginal cost of adding each condition. The first step was to understand what the per-learner cost is for the addition of each of the 8 treatment groups. Table 4 demonstrates these costs in total for each treatment group and what the per-learner cost in each condition was, including overhead and excluding research (HealthWise, 2012a, 2012b, 2012c, 2012d).

Table 4. Treatment Group Totals

Treatment Group	Conditions	# of Learners	Total Cost	Per-Learner Cost
1	ETT, SSS, ESE	1508	ZAR 118,621.82	ZAR 78.66
2	ETT, SSS	1611	ZAR 94,935.15	ZAR 58.93
3	ETT, ESE	1536	ZAR 86,252.38	ZAR 56.15
4	ETT	1590	ZAR 58,312.57	ZAR 36.67
5	SSS, ETT	1647	ZAR 122,297.89	ZAR 74.25
6	SSS	1633	ZAR 90,086.09	ZAR 55.17
7	ESE	1788	ZAR 90,908.62	ZAR 50.84
8	none	1469	ZAR 50,407.54	ZAR 34.31

For as valuable as the table above is for understanding the resources necessary to implement HW2, the analysis could not stop there. Weighing all of these costs from above to arrive at an average marginal cost per learner acted as a final critical step in giving a picture of the mean costs associated with the 2012 grade 8 costs of HW2 (HealthWise, 2012a, 2012b, 2012c, 2012d; X-Rates, 2012).

Table 5. Average Marginal Costs Per-Learner

	Average Marginal Cost (ZAR)		Average Marginal Cost (USD)	
General Intervention	ZAR	29.30	USD	2.37
ETT	ZAR	9.50	USD	0.77
ESE	ZAR	19.20	USD	1.55
SSS	ZAR	22.36	USD	1.81

*Using the average 2012 ZAR to USD conversion rate

This average marginal cost is a critical last step because it represents the amount HW2 can expect to spend on each learner—whether they want to give 10 learners only the general intervention ESE, or 1,000 learners all three conditions on top of the general intervention. By compiling totals across the treatment groups, with their varying sample sizes, these marginal costs represent the best estimate of the program’s costs for grade 8 learners in 2012.

In looking at these values, it is interesting to note that adding the ESE and SSS costs, respectively, amount to approximately two-thirds of administering the baseline version of the program, while ETT only amounts to one-third. Knowing this, it will be interesting to see how effective each condition proves, and whether the resources invested in administration of them proves to be worth the investment; and, when seeing how much it is in USD terms, how minor these costs truly are.

The final chapter will conclude with the final step of the Foster et al. (2007) cost analysis—the sensitivity analysis—and provide a discussion regarding the limitations and implications of the results presented in this chapter.

Chapter 5

Discussion

The numbers presented in Chapter 4 represent the best estimations of HW2's cost per learner in each core component of the program during 2012 for grade 8 learners. Yet, there is more to discuss regarding the limitations and implications of this research.

Sensitivity Analysis

The final step in the cost analysis model is a sensitivity analysis (Foster et al., 2007). A cost analysis can only do so much to truly capture all of the day-to-day expenses incurred by the various HW staff members, teachers, and learners. Therefore, the sensitivity analysis serves to account for the degree of variation one should expect from the means presented. Though this will be a relatively informal sensitivity analysis, it will describe which decisions made in the costing process that could have been done differently to yield slightly different outcomes.

Weights

One decision that was made in bringing costs from an overall program cost to a per-learner cost was to divide the full cost by learner. This process could have potentially involved a weighing by school, classroom, or educator before coming to the final per-learner cost. Any one of these methods could have been justified depending upon the approach and the way in which we looked at how resources were distributed. Ultimately, the numbers yielded from any of these different approaches would not vary substantially, but a more in-depth sensitivity analysis would give a clearer understanding of the degree of variation.

Overhead

In other implementations of the program, overhead, which was explained in Chapter 3, could have been greater or less than the 8% used. This number was used because it was specified by the NIDA grant, but in other disseminations of this program, different sources of funding could specify other rates, or even none at all if it is run through a non-university setting.

ETT

The decision to choose a 35% multiplier for estimating ETT could have varied by a considerable amount, bearing in mind that the costs for implementing this condition were not provided for this analysis by the HW South Africa. It was chosen as a result of consultation with program directors as well as other HW staff. Regardless, these numbers, when combined with the rest of the program costs, only represent a relatively small expenditure. This was the first year for which costs were analyzed for HW2 so perhaps the coming years will provide better data on how much ETT truly cost to implement.

A clearer picture will emerge once more data can be studied across years, incorporating both grades 8 and 9. For now, a mention of the more sensitive items in the analysis is sufficient. Later analyses will certainly provide a more precise idea of the expected variation.

Limitations

Due to the fact that cost analyses are an imprecise science, reliant upon activity reports and monitoring of day-to-day operations, some limitations presented themselves throughout this analysis.

Sample Size

The most glaring limitation lies in the fact that data are not available to analyze the costs associated with a full cohort from grade 8 to grade 9 in this 2012 data. This limitation will be

remedied, as the HW team in South Africa intends to send records of expenditure for 2013 and beyond, but with the limitations of this thesis deadline, including those years is impossible.

Between-School Variation

This analysis included 56 schools, which were all located in resource-poor areas within the Metro South and Metro East Education Districts. That being said, variations in size, educator quality, etc., naturally arise out of these circumstances. This is important to consider because the HW2 resources devoted to each treatment group, and in turn, each school vary considerably. The final marginal costs represent the averages, but one cannot assume that they will hold true under different sample size conditions. Additionally, educators may make more or less use of their enhancement conditions, choosing to seek out more time and resources from the HW staff regarding the level of quality with which they administer the lessons. All of these varying circumstances are accounted for in using average students per classroom, educator ratings, school ratings, and other quality control measures, which will become more useful in seeing cost effectiveness.

Domestic HW Team

The HW team working from Penn State was not incorporated into this analysis. Though the expenses incurred by the domestic team are not substantial, they did contribute to some portion of the management and administration of HW2. Since the cost data were compiled by the South African HW team, and for the sake of limiting the analysis to what was specifically done in South Africa, fractions of salaries, telecommunication, travel, and other costs were not calculated. This is only a limitation in the sense that some of the value added to the program came from the US HW team.

External Interventions (ESE)

As discussed throughout this analysis, the ESE condition incorporates an element of external programs, which did not impose any cost on the HW budget. Some of the schools receiving this condition had as many as 15 external interventions reinforcing the HW curriculum in some way.

Opportunity Cost

Though it is not necessarily a limitation, opportunity cost is also something that should be considered. Opportunity cost was not accounted for in most sections (except for ETT estimates) of this analysis due to the fact that these numbers would have been negligible. In saying opportunity cost, I am referring to the foregone time teachers spent on administering the HW2 curriculum, perhaps in participating in training, preparing to teach specific lessons, or filling out forms that monitored their progress (particularly for schools receiving the SSS condition). However, this cost is most likely offset by the mandate in South Africa that teachers are required to teach a “Life Orientation Curriculum” in grades 8 and 9 anyway, so HW2 may serve to decrease the burden of planning their own lessons

Implications and Future Directions

Despite some limitations, this analysis gives an idea of how much it cost to implement HW2 for grade 8 learners in 2012. 12,782 students received the experimental conditions in varying combinations on top of the basic curriculum. This analysis provides a model, serving the first step in a long-term study of HW2 costs that will yield benefits for HW and others.

Additionally, this analysis has proven that this cost per-learner is well within reasonable expenditure on prevention, especially when considering the long-run savings in healthcare, the justice system, welfare programs, and mental health services.

As future cohorts are studied, information about the startup costs associated with new conditions and adding more schools will be pinpointed and a narrower picture of how much HW2 costs over time will emerge.

The present analysis provides that model for narrowing down the costs of future years more precisely, and sets the stage for ultimately conducting a cost effectiveness analysis. If results in these futures studies prove to be favorable, HW2, and programs like it, can secure more additional and expanded to serve high-risk populations in South Africa and across the world.

Appendix A

Qualitative Summary of Inputs

Table 6. Qualitative Summary of Inputs

Condition	Category	Line Item
Basic Intervention	Event	End of the Year Dinner <ul style="list-style-type: none"> • Bouquets and flower arrangements Catering for educators • Décor rental for dinner event • Venue rental
	Intervention Supplies	Educator Training <ul style="list-style-type: none"> • Printing educator material Learner workbooks
	Personnel	
	Telecommunication	General Telephone Costs <ul style="list-style-type: none"> • HealthWise (Penn State) • Joachim Jacobs
	Training	Educator Training <ul style="list-style-type: none"> • Program pens <ul style="list-style-type: none"> ○ Elevated D • Promotional Clothing <ul style="list-style-type: none"> ○ Promotional wear ○ The Embroi • Refreshments for educator training • Stationery for basic training Leadership Training
	Transport	Curriculum implementation <ul style="list-style-type: none"> • Millennium • XL Milleni Management costs <ul style="list-style-type: none"> • Joachim Jacobs
Enhanced Teacher Training	Personnel	
	Training	Educator Training
	Intervention Supplies	Evaluation checklist

Structure, Support, and Supervision		Poster printing
	Meetings	Refreshments
	Personnel	SSS Officer
	Telecommunication Costs	1 st , 2 nd , and 3 rd term HealthWise (Penn State)
	Transport	Evans I
Enhanced School Environment	Intervention Supplies	Display Boards for Schools Printing of Materials Vinyl Labels
	Meetings	Refreshments for ESE Interventions
	Personnel	ESE Officer
	Telecommunication	1 st , 2 nd , and 3 rd term HealthWise (Penn State)
Research	Conference	Flights Hotel Accommodations Registration Fees Subsistence
	Consent Forms	Consent Forms
	Personnel	Data Collection Coordinator Data Collection Assistants
	Research Equipment	Cables and extension cords Computer printers External hard drives Memory cards Multimedia Netbooks Storage Video Cameras
	Telecommunication	HealthWise (Penn State) Joachim Jacobs
	Transport	Adonis H.

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Academic Vita

Mary Claire Doyle
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Education

The Pennsylvania State University, University Park, PA August 2011 – May 2015
Bachelor of Science in Economics
Bachelor of Science in Human Development & Family Studies
Minor in Business in the Liberal Arts
The Schreyer Honors College

Work Experience

Intern, Allegheny County Department of Human Services Summer 2014

- Conducted 8 record reviews and site visits on group, prevention, foster care, rehabilitation, and in-home services
- Made 15+ site visits to agencies administering rehabilitation treatment, prevention services, in-home therapy, and group home care to assess for child safety and contract compliance
- Performed a full evaluation on a struggling organization, which included personnel interviews, client interviews, financial inquiry, program observation, and recommendations, and presented findings to supervisors in a formal business report format
- Composed 3 notification letters to inform providers of upcoming changes in policy
- Presented on new county initiatives via PowerPoint to an audience of 10+, which included upper-level management

Teaching Assistant, HDFS 229, HDFS 429, & ECON 463 August 2013 – May 2015

- Recorded classroom activity, held office hours and graded students' exams and assignments for HD FS 229: Child Development, HD FS 429: Advanced Child Development, and ECON 463: Economic Demography

Intern, Ronald McDonald House Charities of Pittsburgh Summer 2012

- Created framework for Lilli's Happy Pad project— conducted research, calculated budget, contacted vendors, drafted guidelines, and generated proposal for program that buys iPads, which can be rented by families during their stay
- Communicated with potential donors regarding financial support of upcoming events
- Composed 2 successful grants (\$5,000 each) to fund Happy Pad Project

Tutor, Morgan Academic Support Center For Student Athletes May 2013 – January 2014

- Tutored student-athletes on a weekly basis in Macroeconomic Principles and Adolescent Development

Organization Involvement

President & Vice President, Newman Catholic Student Organization August 2011 – May 2015

- Led a board of 16 individuals in planning meetings, events, etc. for a club of 100+ members
- Manage attendance at club events and analyze data to increase participation and satisfaction for both general meetings and special events
- Design and facilitate meetings 2-3 member meetings per semester, integrating PowerPoint's with games and small group activities to present different topics
- Plan activities, meals, and logistics for annual two-day Fall Retreat, attended by 30 students
- Develop a weekly meeting curriculum for a year-long Bible study for 10 – 15 students

Alumni Relations Chair, Penn State Project Haiti August 2012 – May 2015

- Traveled to Haiti in order to assess needs, interact with local residents and communicate with program directors, March 2013
- Composed monthly alumni newsletters including fundraising updates, upcoming events, and meeting summaries
- Organized annual fundraising mail campaign for our partner organizations in Haiti— 200+ letters sent to organization's alumni, 300+ letters sent to family and friends of membership, and 75+ thank you letters sent
- Fundraised year-round through spaghetti dinners, face painting, bake sales generating approximately \$15,000 annually

Consultant, Students Consulting Non-Profit Organizations September 2014 – May 2015

- Worked on a team of 5 with a local non-profit, Center for Amazon Community Ecology (CACE), to prioritize the needs of the organization and create a statement of work
- Provided a Business Model Canvas, a list of potential clients and partners, and social media guide in order to raise funds for and awareness of CACE