Rainbows Empirical Evaluation:

Data Analysis of Children's Communication of Feelings in

Three Programs during 2004 and 2005

Revised draft based on adjustments in children's age in typical program implementation

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Executive Summary

For the purpose of evaluation, the Rainbows program has been using the Rainbows questionnaire to evaluate children's beneficial change in communicating their feelings following a loss experience such as divorce, death, or some other loss related event. To date, however, the approach to evaluate the hypothesized beneficial change in children's perceptions of communicating their feelings has used only descriptive measures or percentages and proportions to show how participants change over time within various Rainbows programs. Although such a descriptive analysis is a fundamental approach, it is, however, equally important, to test whether the children experience statistically significant and positive change in communicating their feelings from pre-test to post-test using the Rainbows questionnaire. Toward this goal, the current analysis tested the hypothesis that children will evidence a positive mean change in their Rainbows total questionnaire scores from pre-test to post-test. The analyses utilized three different program files for years 2004 and 2005 and involved 2235 children of whom 94% had usable data.

The current findings evidence that children participating in any of the three programs show statistically significant positive change in communicating their feelings on the Rainbows questionnaire from pre-test to post-test. Examining the effect size changes based on the program membership revealed that children in the Rainbows Elementary Edition Levels 3 and 4 experienced the most amount of positive change followed by more moderate changes evidenced by children in Spectrum Levels 1 and 2, and Rainbows Elementary Edition Levels 1 and 2.

Within two of the three provided program files, children's variables of age, gender, and number of reported losses showed some interactive and slight differential effects with children's

communication of their feelings. For example, in the Rainbows Elementary Edition Levels 1 and 2, children who had reported more losses evidenced more positive change in their communication on the Rainbows questionnaire from pre-test to post-test. In the Rainbows Elementary Edition Levels 3 and 4, girls showed slightly more positive change than boys in their communication. Overall, children's post-test scores on the Rainbows questionnaire can be best explained from their pre-test scores and from their program membership. That is, children who are more reluctant to talk about their feelings at pre-test seem to show higher post-test scores and this effect implies that Rainbows is serving children in need. Children also showed different amounts of change in their communication based on whether they participated in Rainbows Elementary Editions 1 and 2, 3 and 4, or Spectrum Levels 1 and 2. The attribution of this effect is, however, difficult to explain without further information on program implementation or without the use of experimental design. It is important to note, however, that in all three program files children evidenced significant positive changes in their communication.

Lastly, the Rainbows questionnaire also demonstrates appropriate reliability and validity. It evidenced an inter-item reliability with Cronbach's alpha of .90 at post-test and .97 at pre-test. The questionnaire also demonstrates robust construct validity in that all seven questions explain about 63% of variance of one conceptual construct of children's communication of their feelings.

These findings need to be interpreted with caution as data were obtained through a non-experimental design in program implementation, and the data set represents a sample of children obtained by a non-probability method or by convenience. Future recommendations focus on using a more controlled implementation of the program with a comparison or control group of children, and including standardized and multiple measures for evaluating children's beneficial outcomes.

Change in Children's Responses Using Rainbows Questionnaire

Introduction

This report contains discussion and abbreviated statistical data addressing the examination process used to investigate the proposition that Rainbows program curriculum has a positive impact on children's communication of their feelings. This children's outcome has been selected by Rainbows program on two conceptual bases: 1. Children's communication of their feelings is affected by various factors including the experience with loss events such as divorce, death, or other types of losses; and 2. Children's ability to communicate their feelings about their experiences with losses is essential for getting appropriate support and care from their environment. The goal of Rainbows is to help children mitigate the effect of various losses by teaching them how to cope and communicate their feelings through the Rainbows provided curriculum of activities, exercises, and group discussion, and thus, strengthen their overall well-being and psychosocial functioning. The concept of children's communication of feelings has been defined and measured through the use of the Rainbows questionnaire. This scale was developed by Rainbows and consists of seven questions asking children to indicate how much they are able to communicate their feelings in different contexts. Each question is answered on a Likert-scaled response (5-point scale), in which a higher scaled response represents a more positive or favorable answer. The total summated score of the seven questions represents how individually participating children respond for the entire Rainbows questionnaire. The data are typically collected by Rainbows program staff before and after program participation, and mailed to Rainbows headquarters.

This report includes data for years of 2004 and 2005. Three distinct Rainbows files were used for this analytical examination: Rainbows Elementary Edition Levels 1 and 2 (RL12);

Rainbows Elementary Edition Levels 3 and 4 (RL34); and Spectrum Edition Levels 1 and 2 (SL). In this report, the names of these files have been abbreviated as RL12, RL34, and SL, respectively.

To understand how children might have changed or benefited by the Rainbows program, the statistical analysis examined change as demonstrated by children's responses on the Rainbows questionnaire. The analysis proceeded in several steps. The first step examined the demographic characteristics of participating children within each data file or program based on age, gender, and loss events in order to understand how each program might differ. The second step examined the change in children's scores on the Rainbows questionnaire from pre-test to post-test, or from before to after the program. In this process, the mean (average) total score on the Rainbows questionnaire for all seven questions was used in the analysis. Children's demographic characteristics for age, gender, and number of loss events were taken into consideration during this examination. The third and final step included testing the reliability and validity of the Rainbows questionnaire.

The following report is organized into three sections and each section presents research questions, analytical methods or tests used, and findings. Specifically, the first section presents the information on the characteristics of the participants in each file, or the Rainbows' program, in view of children's age, gender, and number and type of loss events experienced as recorded in the data files.

The second section presents the information on investigating the inferential concept of *change* in the participants' questionnaire responses before and after the program application using statistical procedures that examine the mean or average total questionnaire score for each

program file group over two time periods (pre – post, or Time 1 to Time 2) and take into account possible effects of children's age, gender, and loss events.

The third section presents information on the Rainbows questionnaire's reliability and validity, or psychometric properties.

The analysis proceeded with expected ethical adherence to confidentiality. A numeric code has been substituted by the program for participants' names in order to protect their confidentiality. Informed consent was obtained from all participating children's parents prior to program participation, and all children were also provided with an age appropriate assent. This evaluation and data analysis was conducted by a trained professional with prior expertise in research and program evaluation.

SECTION I

PROFILE OF PARTICIPANTS

To understand the makeup of the children in each data file, three research questions were formulated and examined.

1. What age distribution is evidenced in each file and did the three files significantly differ in the child's age?
2. What gender distribution is evidenced in each file and did the three files significantly differ in child's gender?
3. What number of loss events is evidenced in each file; what types of events do these losses represent, and did the three files significantly differ in the number of loss events that children experienced?

The findings from the analyses and tables are presented below:

Findings

Children's Age

The three data files statistically significantly differed in the average age of the child (see Table 1 below) in that file RL12 had children with the youngest average age of seven years, or the child's average age revolved around school-entry age; file RL34 had children with an average age of ten years; and file SL had children with an average age of fourteen years. Based on age, file RL 12 retains all ages for analyses but 63 (5%) cases do not provide age, and thus 95% of the data are used. File RL 34 excludes eight children because six were too young and two were too old as the program is typically delivered, and 44 cases do not provide age data. Thus, file RL 34 uses 94% of the data. File SL used 89% of the data as it excludes 12 children who were too young, or ten years and under during the program delivery. Because of these initial age distinctions, each of the program files was analyzed separately.

Children's age also determines the number of cases that were retained for all subsequent analyses. That is, 2108 (94%) cases were used in the three files: 105 (5%) cases were in file SL, 768 (36%) in RL 34, and 1235 (59%) cases were in RL 12.

Table 1 Data File Comparison by Children's Ages

Child's Age Group	Data Files		
	RL12 n (%)	**RL34 n (%)**	**SL n (%)**
4 - 6 years	303 (25%)	6 [a]	1 [a]
7 - 8 years	697 (56%)	41 (5%)	7[a]
9 - 11 years	234 (19%)	570 (75%)	4[a] 2 (2%)
12 - 14 years	1	157 (20%)	85 (80%)
15 - 16 years		2 [a]	9 (9%)
17 - 18 years			9 (9%)
Average Age for the data file based on usable cases	7.4 years *	10.5 years *	13.6 years *
Standard Deviation for age in the file	1.3 years	1.5 years	1.4 years
Number of cases with age missing	63 (5%)	44 (6%)	0
Total N cases in the original file	1298	820	117
Total N cases used for analysis	1235 (95%)	768 [a] (94%)	105 [a] (89%)

* F = 1962.264, df = 2, 2107, p = .000

[a] In RL34 file, 6 children were excluded from analysis due to young age (below 7 years) and 2 due to older age (15 years and above); in SL file 12 children were excluded from analysis due to young age (or 10 years and below).

Children's Gender

The three files showed slight differences in the proportion of boys and girls (see Table 2 below). That is, each file had slightly more than half girls as compared to boys but these differences were not statistically significant across the three files.

Table 2 File Comparison by Child's Gender

Child's Gender	Data Files		
	RL12*	**RL34***	**SL***
Boys	571 (47%)	317 (42%)	48 (46%)
Girls	636 (53%)	440 (58%)	57 (54%)
Cases with usable data	1207	757	105
Cases without usable data	91 (7%)	63 (8%)	12 (10%)
Original File Totals	1298	820	117

* Chi Square = 5.55, df =2, p = .06, Phi = .05

Children's Loss Events

Each file collected information on whether the child experienced a loss event: categorized as divorce, death, or other. The data did not specify the meaning possible for 'other'. The three files did not statistically significantly differ on the proportion ($\Pi^2 = 5.7$, df=4, p=.217) or the average number of losses per file (F = 1.3, df = 2, 2107, p =.26) (see Table 3). As can be seen in Table 3, four fifths of the children in each data file listed 1 loss event. Files RL 12 and RL 34 both listed small numbers of children who experienced two or three loss events.

Table 3 File Comparison by Children's Number of Loss Events

Number of Event Losses	Data Files		
	RL12	**RL34**	**SL**
1 Event Loss	1034 (84%)	626 (81.%)	88 (84%)
2 Event Losses	164 (13%)	113 (15%)	17 (16.%)
3 Event Losses	37 (3%)	29 (4%)	0
File N	1235	768	105

Further, the three files differ significantly although only very slightly (Chi Square = 27.88, df = 12, p = .006, Phi = .11) in the types of loss events that children encountered (see

Table 4 below). The primary difference seems to be in the distribution of death and divorce. For example, each file evidences that about half of the children experienced divorce alone as the primary loss event listed. File SL, however, evidences a greater proportion of children experiencing a death alone as the primary event listed: File SL lists 30% of the children experiencing a death loss alone while files RL 12 and 34, both list a smaller proportion of children (about 17% each).

Table 4 Comparison of Files by the Type of Loss Event Experienced by Child

Type of Events BY File Crosstabulation

			File Identification			
			1 SL file	2 RL 34 file	3 Rls 12 file	Total
Type of Events	1 Divorce	Count	45	391	632	1068
		% Type of Events	4.2%	36.6%	59.2%	100.0%
		% within File	42.9%	50.9%	51.2%	50.7%
	2 Death	Count	31	132	205	368
		% Type of Events	8.4%	35.9%	55.7%	100.0%
		% within File	29.5%	17.2%	16.6%	17.5%
	3 Divorce & Death	Count	14	69	90	173
		% Type of Events	8.1%	39.9%	52.0%	100.0%
		% within File	13.3%	9.0%	7.3%	8.2%
	4 Other	Count	12	103	197	312
		% Type of Events	3.8%	33.0%	63.1%	100.0%
		% within File	11.4%	13.4%	16.0%	14.8%
	5 Divorce & Other	Count	2	19	44	65
		% Type of Events	3.1%	29.2%	67.7%	100.0%
		% within File	1.9%	2.5%	3.6%	3.1%
	6 Death & Other	Count	1	25	30	56
		% Type of Events	1.8%	44.6%	53.6%	100.0%
		% within File	1.0%	3.3%	2.4%	2.7%
	7 Divorce, Death, & Other	Count	0	29	37	66
		% Type of Events	.0%	43.9%	56.1%	100.0%
		% within File	.0%	3.8%	3.0%	3.1%
Total		Count	105	768	1235	2108
		% Type of Events	5.0%	36.4%	58.6%	100.0%
		% within File	100.0%	100.0%	100.0%	100.0%

Chi Square = 27.88, df = 12, p = .006, Phi = .11

SECTION II

Examination of Change in Children's Responses using the Rainbows' Questionnaire

Three main research questions were formulated to test the proposition that Rainbows program application has a positive impact on children's communication of their feelings as reflected in their total score on the Rainbows questionnaire. The first evaluation question asks about the pre-post change children experienced. The second question examines the change and considers the possible influence of children's age, gender, and number of loss events. The third question considers which variables become important in examining children's post-tests scores.

Main Research Questions:

1. For each file, is there a statistically significant positive change in the total score-response on the questionnaire of the participating children?
2. Is the change in the children's pre-post total score response influenced by their age, gender, and number of loss-events?
3. In addition to program file membership and pre-test score, are variables of children's age, gender, and number of losses significant predictors of children's post-test scores?

Analytical Approach

The first set of analyses examines the concept of change in the average total score obtained on the questionnaire before and after the program application using paired t-test statistical analysis, or t-test for dependent samples. The second set of analyses examines the possible effects of children's age, gender, and loss events on the change in the total score obtained on the questionnaire using Repeated Measures of Analysis of Variance General Linear Model statistical procedure. The third step examines the percent of variance in the post-test scores that can be attributable to variance in program file membership, pre-test score, children's

characteristics of age and gender, and the number of losses, using a stepwise Multiple Regression Analysis procedure. This approach further gauges which variables are important predictors of children's responses on the Rainbow questionnaire. Alpha value of $p < .05$ denotes the statistical significance in all inferential testing. SPSS 14.0 statistical software was utilized for all analyses.

Findings

Pre-Post Change in Children's Questionnaire Reponses

Paired t-test analyses revealed that in each program file, children experienced statistically significant positive change from pre-test to post-test (see Table 5). The most amount of change is evidenced in file RL 34, where children experienced an average change of almost 18 points from pre-test to post-test. Children in file SL, on average, changed about 13 points. Children in file RL 12 changed about 6 points. Individually, all three programs evidence a mean robust statistically significant change from pre-test to post-test on the Rainbows questionnaire.

Further examination of the mean pre-tests and post-tests across the three files revealed that there were some statistically significant differences among the three files. That is, the lowest score a child can receive on the Rainbows questionnaire (using the 5-point Likert scale) is seven, while the highest point is thirty-five. Therefore, examining the pre-test scores for each file in Table 5 reveals that in all three programs, the children acknowledged having difficulties communicating their feelings. Children attending or participating in RL34 evidenced the most amount of difficulty at pre-test compared to the other two programs. The post-tests also revealed some significant differences. File RL 34 evidenced the highest mean post-test score while the file RL 12 evidenced the lowest. Repeated Measures analysis confirmed that the amount of change experienced from pre-test to post-test while controlling for pre-test difference were significantly different across the three files, and indeed, file RL 34 evidenced the most amount of change.

Table 5 Pre-Post Mean Comparison of Total Scale-Score Questionnaire Response for Each File

Statistics for Total Score on the Questionnaire	Data Files		
	RL12	**RL34**	**SL**
Pre-test Mean	9.77 [a]	7.95 [a]	9.14 [a]
Pre-test SD	(4.3)	(3.9)	(5.8)
Post-test Mean	15.81 [b]	25.52 [b]	22.21 [b]
Post-test SD	(3.6)	(5.1)	(7.1)
Mean Change	6.04	17.68	13.07
Paired t score	35.85	69.71	10.89
df	1297	767	104
Statistical significance, or p	.000	.000	.000
Effect size or Eta square, η^2	.50 [c]	.86 [c]	.53 [c]
N size	1298	768	105

[a] ($F = 43.5$, $df = 2, 2107$, $p = .000$)
[b] ($F = 1155.6$, $df = 2, 2107$, $p = .000$)
[c] (Effect size or Eta square, $\eta^2 = t^2 / t^2 + [N-1]$ by Green, S.G., & Salkind, N. J. (2003))

The findings for Repeated Measures analysis can be seen in Table 6 and Figure 1. Specifically, the Table 6 shows that Repeated Measures analysis confirms that there is a statistically significant Pillai's Trace effect for the interaction in pre-post time change of scores and the program file membership. The Post-Hoc Scheffe Multiple Comparisons further differentiated the effects in all three data files. Plots in Figure 1 show that file RL12 had the lowest change followed by file SL. The file RL34 had the most change in scores from pre-test to post-test on the Rainbows questionnaire. These effects are also substantiated by the effects sizes in Table 5, showing strong effect for File RL 34, and more moderate effects for the other two files.

Table 6 Repeated Measures Change in Children Responses By Three Files

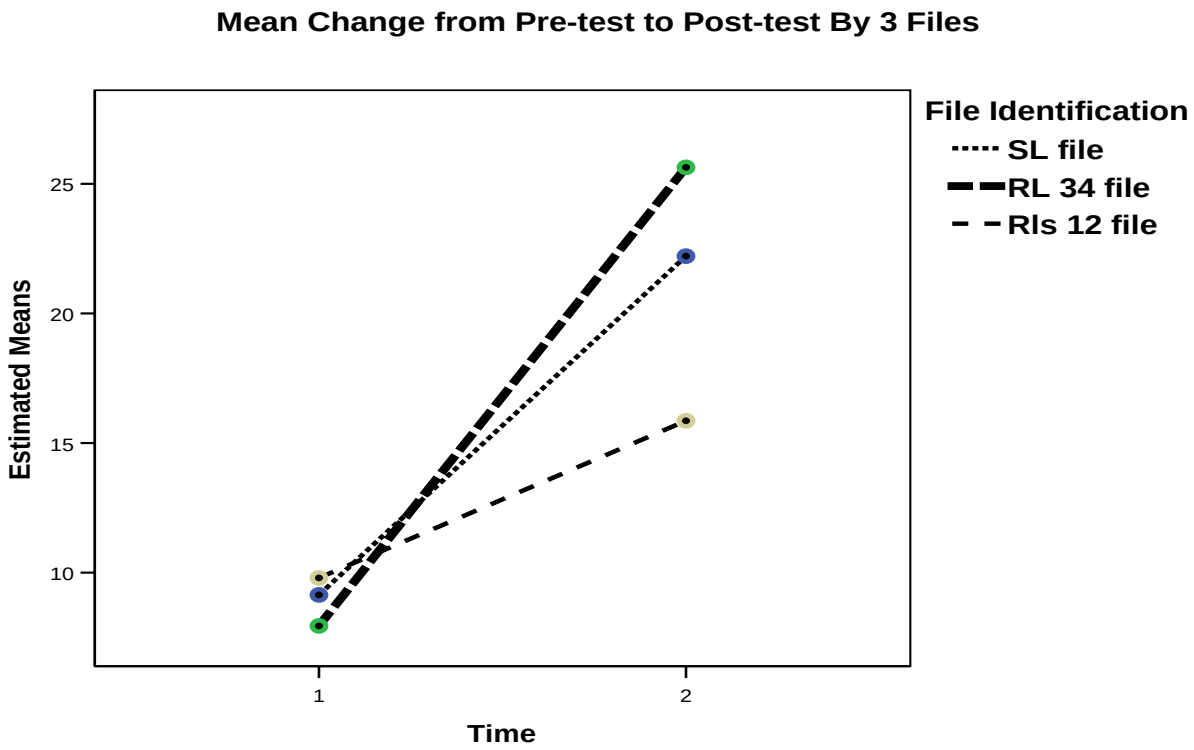
Multivariate Tests[b]

Effect		Value	F	Hypothesis df	Sig.	Partial Eta Squared
Time	Pillai's Trace	.539	2461.0[a]	1.000	.000	.539
	Wilks' Lambda	.461	2461.0[a]	1.000	.000	.539
	Hotelling's Trace	1.169	2461.0[a]	1.000	.000	.539
	Roy's Largest Root	1.169	2461.0[a]	1.000	.000	.539
Time * file	Pillai's Trace	.394	683.23[a]	2.000	.000	.394
	Wilks' Lambda	.606	683.23[a]	2.000	.000	.394
	Hotelling's Trace	.649	683.23[a]	2.000	.000	.394
	Roy's Largest Root	.649	683.23[a]	2.000	.000	.394

a. Exact statistic

b.
Design: Intercept+file
Within Subjects Design: Time

Figure 1 Plotted Change in Mean Pre-test to Post-test Scores in 3 Files



Furthermore, to better understand the possible influence that children's variables of age, gender, and number of loss events may have on their questionnaire responses from pre-test to post-test, additional multivariate analyses were conducted. Toward this goal, Repeated Measures analyses were conducted with each file separately. These results are reported for files RL 12, RL 34, and SL below, respectively.

File RL 12

Conducting Repeated Measures analysis for data in file RL 12 revealed that number of loss events very slightly influenced the amount of change children experienced in this program as evidenced in Table 7 below. In particular, children with three reported loss events evidenced the most amount of mean change from pre-test to post-test (Pillai's Trace F = 3.11, df = 2, p = .045) (Figure 2). The findings also suggest that there are some possible interactive effects with age but these findings are only approaching statistical significance.

Figure 2 Plotted Change in Mean Pre-test to Post-test Scores by Number of Losses

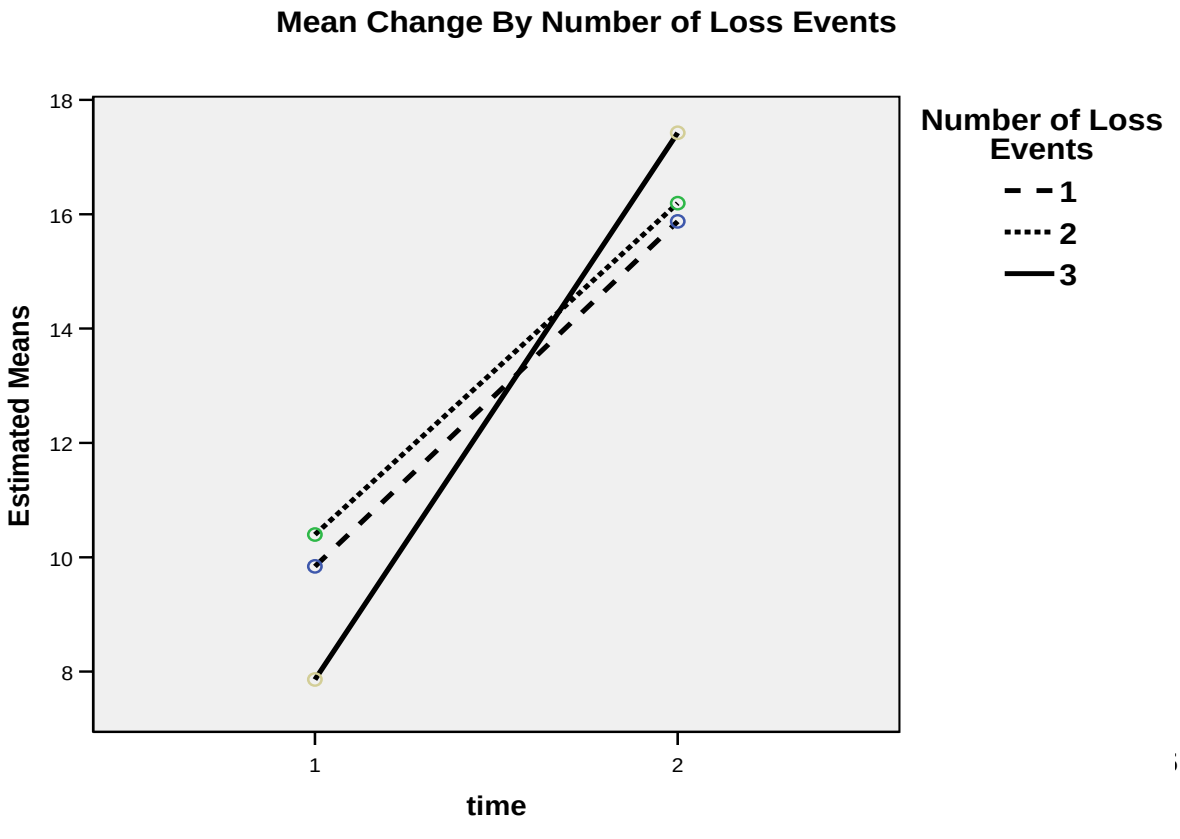


Table 7 **Change in File RL 12 Controlling for Effects of Age, Gender, and Number of Events**

Multivariate Tests [b]

Effect		Value	F	Hypothesis df	Sig.	Partial Eta Squared
time	Pillai's Trace	.136	187[a]	1.000	.000	.136
	Wilks' Lambda	.864	187[a]	1.000	.000	.136
	Hotelling's Trace	.157	187[a]	1.000	.000	.136
	Roy's Largest Root	.157	187[a]	1.000	.000	.136
time * Age	Pillai's Trace	.004	2.536[a]	2.000	.080	.004
	Wilks' Lambda	.996	2.536[a]	2.000	.080	.004
	Hotelling's Trace	.004	2.536[a]	2.000	.080	.004
	Roy's Largest Root	.004	2.536[a]	2.000	.080	.004
time * Gender	Pillai's Trace	.001	1.436[a]	1.000	.231	.001
	Wilks' Lambda	.999	1.436[a]	1.000	.231	.001
	Hotelling's Trace	.001	1.436[a]	1.000	.231	.001
	Roy's Largest Root	.001	1.436[a]	1.000	.231	.001
time * nevents	Pillai's Trace	.005	3.110[a]	2.000	.045	.005
	Wilks' Lambda	.995	3.110[a]	2.000	.045	.005
	Hotelling's Trace	.005	3.110[a]	2.000	.045	.005
	Roy's Largest Root	.005	3.110[a]	2.000	.045	.005
time * Age * Gender	Pillai's Trace	.001	.519[a]	2.000	.595	.001
	Wilks' Lambda	.999	.519[a]	2.000	.595	.001
	Hotelling's Trace	.001	.519[a]	2.000	.595	.001
	Roy's Largest Root	.001	.519[a]	2.000	.595	.001
time * Age * nevents	Pillai's Trace	.007	2.158[a]	4.000	.072	.007
	Wilks' Lambda	.993	2.158[a]	4.000	.072	.007
	Hotelling's Trace	.007	2.158[a]	4.000	.072	.007
	Roy's Largest Root	.007	2.158[a]	4.000	.072	.007
time * Gender * nevents	Pillai's Trace	.002	1.466[a]	2.000	.231	.002
	Wilks' Lambda	.998	1.466[a]	2.000	.231	.002
	Hotelling's Trace	.002	1.466[a]	2.000	.231	.002
	Roy's Largest Root	.002	1.466[a]	2.000	.231	.002
time * Age * Gender * nevents	Pillai's Trace	.002	.469[a]	4.000	.759	.002
	Wilks' Lambda	.998	.469[a]	4.000	.759	.002
	Hotelling's Trace	.002	.469[a]	4.000	.759	.002
	Roy's Largest Root	.002	.469[a]	4.000	.759	.002

a. Exact statistic

b. Design: Intercept+Age+Gender+nevents+Age * Gender+Age * nevents+Gender * nevents+Age * Gender * nevents
Within Subjects Design: time

File RL 34

Conducting Repeated Measures analysis for data in file RL 34 revealed that gender had a small influence on the mean amount of change children experienced from pre-test to post test as evidenced in Table 8 below. In particular, girls had a slightly greater amount of change than boys (Pillai's Trace F = 4.48, df = 1, p = .035) (Figure 3).

Figure 3 Plotted Change in Mean Pre-test to Post-test Scores by Gender

Table 8 **Change in File RL 34 Controlling for Effects of Age, Gender, and Number of Events**

Multivariate Tests[b]

Effect		Value	F	Hypothesis df	Sig.	Partial Eta Squared
time	Pillai's Trace	.320	348.7[a]	1.000	.000	.320
	Wilks' Lambda	.680	348.7[a]	1.000	.000	.320
	Hotelling's Trace	.471	348.7[a]	1.000	.000	.320
	Roy's Largest Root	.471	348.7[a]	1.000	.000	.320
time * Age	Pillai's Trace	.000	.004[a]	2.000	.996	.000
	Wilks' Lambda	1.000	.004[a]	2.000	.996	.000
	Hotelling's Trace	.000	.004[a]	2.000	.996	.000
	Roy's Largest Root	.000	.004[a]	2.000	.996	.000
time * Gender	Pillai's Trace	.006	4.483[a]	1.000	.035	.006
	Wilks' Lambda	.994	4.483[a]	1.000	.035	.006
	Hotelling's Trace	.006	4.483[a]	1.000	.035	.006
	Roy's Largest Root	.006	4.483[a]	1.000	.035	.006
time * nevents	Pillai's Trace	.005	1.932[a]	2.000	.146	.005
	Wilks' Lambda	.995	1.932[a]	2.000	.146	.005
	Hotelling's Trace	.005	1.932[a]	2.000	.146	.005
	Roy's Largest Root	.005	1.932[a]	2.000	.146	.005
time * Age * Gender	Pillai's Trace	.001	.384[a]	2.000	.681	.001
	Wilks' Lambda	.999	.384[a]	2.000	.681	.001
	Hotelling's Trace	.001	.384[a]	2.000	.681	.001
	Roy's Largest Root	.001	.384[a]	2.000	.681	.001
time * Age * nevents	Pillai's Trace	.003	.628[a]	4.000	.642	.003
	Wilks' Lambda	.997	.628[a]	4.000	.642	.003
	Hotelling's Trace	.003	.628[a]	4.000	.642	.003
	Roy's Largest Root	.003	.628[a]	4.000	.642	.003
time * Gender * nevents	Pillai's Trace	.008	2.817[a]	2.000	.060	.008
	Wilks' Lambda	.992	2.817[a]	2.000	.060	.008
	Hotelling's Trace	.008	2.817[a]	2.000	.060	.008
	Roy's Largest Root	.008	2.817[a]	2.000	.060	.008
time * Age * Gender * nevents	Pillai's Trace	.003	.672[a]	3.000	.569	.003
	Wilks' Lambda	.997	.672[a]	3.000	.569	.003
	Hotelling's Trace	.003	.672[a]	3.000	.569	.003
	Roy's Largest Root	.003	.672[a]	3.000	.569	.003

a. Exact statistic

b. Design: Intercept+Age+Gender+nevents+Age * Gender+Age * nevents+Gender * nevents+Age * Gender * nevents
Within Subjects Design: time

File SL

Conducting Repeated Measures analysis for data in file SL revealed that children's ages, gender, or number of losses had no influence on the amount of change children experienced as evidenced in Table 9 below.

Table 9 Change in File SL Controlling for Effects of Age, Gender, and Number of Events

Multivariate Tests [b]

Effect		Value	F	Hypothesis df	Sig.	Partial Eta Squared
time	Pillai's Trace	.346	49.266[a]	1.000	.000	.346
	Wilks' Lambda	.654	49.266[a]	1.000	.000	.346
	Hotelling's Trace	.530	49.266[a]	1.000	.000	.346
	Roy's Largest Root	.530	49.266[a]	1.000	.000	.346
time * Age	Pillai's Trace	.022	1.066[a]	2.000	.349	.022
	Wilks' Lambda	.978	1.066[a]	2.000	.349	.022
	Hotelling's Trace	.023	1.066[a]	2.000	.349	.022
	Roy's Largest Root	.023	1.066[a]	2.000	.349	.022
time * Gender	Pillai's Trace	.002	.163[a]	1.000	.688	.002
	Wilks' Lambda	.998	.163[a]	1.000	.688	.002
	Hotelling's Trace	.002	.163[a]	1.000	.688	.002
	Roy's Largest Root	.002	.163[a]	1.000	.688	.002
time * nevents	Pillai's Trace	.002	.154[a]	1.000	.696	.002
	Wilks' Lambda	.998	.154[a]	1.000	.696	.002
	Hotelling's Trace	.002	.154[a]	1.000	.696	.002
	Roy's Largest Root	.002	.154[a]	1.000	.696	.002
time * Age * Gender	Pillai's Trace	.001	.048[a]	2.000	.953	.001
	Wilks' Lambda	.999	.048[a]	2.000	.953	.001
	Hotelling's Trace	.001	.048[a]	2.000	.953	.001
	Roy's Largest Root	.001	.048[a]	2.000	.953	.001
time * Age * nevents	Pillai's Trace	.020	.942[a]	2.000	.394	.020
	Wilks' Lambda	.980	.942[a]	2.000	.394	.020
	Hotelling's Trace	.020	.942[a]	2.000	.394	.020
	Roy's Largest Root	.020	.942[a]	2.000	.394	.020
time * Gender * nevents	Pillai's Trace	.004	.363[a]	1.000	.548	.004
	Wilks' Lambda	.996	.363[a]	1.000	.548	.004
	Hotelling's Trace	.004	.363[a]	1.000	.548	.004
	Roy's Largest Root	.004	.363[a]	1.000	.548	.004
time * Age * Gender * nevents	Pillai's Trace	.005	.231[a]	2.000	.794	.005
	Wilks' Lambda	.995	.231[a]	2.000	.794	.005
	Hotelling's Trace	.005	.231[a]	2.000	.794	.005
	Roy's Largest Root	.005	.231[a]	2.000	.794	.005

a. Exact statistic

b. Design: Intercept+Age+Gender+nevents+Age * Gender+Age * nevents+Gender * nevents+Age * Gender * nevents
Within Subjects Design: time

Next, the analysis focused on examining which of the noted predictor variables (file membership, pre-test, age, gender, or number of losses) would best contribute to a post-test score (dependent variable) . This analysis conducted Multiple Regression Analysis (MRA) using the stepwise procedure. The results for this analysis can be seen in Tables 10 and 11 below.

Table 10 Multiple Regression Analysis: File membership, Pre-test Score, Age, Gender, and Number of Looses as Predictors of Children's Post-test Score

MRA - Model Summary - Stepwise Procedure

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics			
					R Square Change	F Change	df1	Sig. F Change
1	.629[a]	.396	.396	5.021	.396	1375.019	1	.000
2	.661[b]	.437	.436	4.850	.041	151.319	1	.000
3	.664[c]	.440	.439	4.837	.003	12.356	1	.000
4	.665[d]	.442	.441	4.830	.002	7.064	1	.008

a. Predictors: (Constant), File

b. Predictors: (Constant), File , Pretest

c. Predictors: (Constant), File, Pretest, Age

d. Predictors: (Constant), File, Pretest, Age, Gender

The findings in Table 10 suggest that 44% of the children's outcome at post-test can be explained by four significant predictor variables or by program membership (1=SL, 2=RL34, 3=RL12) , pre-test score, age, and gender (Male=0, Female=1), but not by the number of loss events. Table 11 shows that although age and gender are significant predictors, these variables play a negligible role compared to program membership or pre-test score in determining a child's post-test score.

Table 11 MRA: File Membership, Pre-test Score, Age, and Gender as Significant Predictors of Post-test Score

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	37.204	.484		76.860	.000	36.255	38.154
	File Membership (1=SL, 2=RL34, 3=RL12)	-6.886	.186	-.629	-37.081	.000	-7.250	-6.522
2	(Constant)	39.040	.491		79.542	.000	38.078	40.003
	File Membership (1=SL, 2=RL34, 3=RL12)	-6.536	.182	-.598	-35.989	.000	-6.892	-6.180
	Pre-test Score	-.299	.024	-.204	-12.301	.000	-.347	-.252
3	(Constant)	43.692	1.411		30.967	.000	40.925	46.459
	File Membership (1=SL, 2=RL34, 3=RL12)	-7.392	.304	-.676	-24.354	.000	-7.988	-6.797
	Pre-test Score	-.303	.024	-.207	-12.481	.000	-.351	-.255
	Age	-.277	.079	-.097	-3.515	.000	-.431	-.122
4	(Constant)	43.569	1.410		30.909	.000	40.805	46.334
	File Membership (1=SL, 2=RL34, 3=RL12)	-7.338	.304	-.671	-24.155	.000	-7.934	-6.742
	Pre-test Score	-.304	.024	-.208	-12.542	.000	-.352	-.257
	Age	-.274	.079	-.096	-3.479	.001	-.428	-.119
	Gender (0=Boy, 1=Girl)	-.002	.001	-.044	-2.658	.008	-.004	-.001

a. Dependent Variable: Post-test Score on Rainbows Questionnaire

Lastly, the three data files (RL 12, RL 34, and SL) were combined to examine all possible interactive effects of variables that may contribute to change in children's pre-to-post-test scores. That is, Repeated Measures analysis was conducted with variables: time (pre-post change in children's scores on the Rainbows questionnaire); program file membership (1=SL, 2=RL 34, 3=RL12); age (1= 10 years and younger, 2=11 years and older); gender (0-Boy, 1=Girl); and number of loss events (1, 2, 3). The overall results are displayed in Table 12.

Table 12 Repeated Measures Analysis with File Membership, Time, Age, Gender, and Number of Loss Events

Multivariate Tests [b]

Effect		Value	F	df	Sig.	Partial Eta Squared
time	Pillai's Trace	.152	369.283[a]	1.000	.000	.152
time * file	Pillai's Trace	.035	36.713[a]	2.000	.000	.035
time * Gender	Pillai's Trace	.002	1.947[a]	2.000	.143	.002
time * nevents	Pillai's Trace	.000	.245[a]	2.000	.783	.000
time * Age	Pillai's Trace	.001	.404[a]	3.000	.750	.001
time * file * Gender	Pillai's Trace	.001	.610[a]	2.000	.543	.001
time * file * nevents	Pillai's Trace	.003	1.916[a]	3.000	.125	.003
time * Gender * nevents	Pillai's Trace	.002	1.343[a]	3.000	.259	.002
time * file * Gender * nevents	Pillai's Trace	.001	.446[a]	3.000	.720	.001
time * file * Age	Pillai's Trace	.000	.291[a]	1.000	.589	.000
time * Gender * Age	Pillai's Trace	.002	.761[a]	5.000	.578	.002
time * file * Gender * Age	Pillai's Trace	.000	.185[a]	1.000	.667	.000
time * nevents * Age	Pillai's Trace	.003	1.077[a]	6.000	.374	.003
time * file * nevents * Age	Pillai's Trace	.001	.657[a]	2.000	.519	.001
time * Gender * nevents * Age	Pillai's Trace	.002	.551[a]	6.000	.770	.002
time * file * Gender * nevents * Age	Pillai's Trace	.000	.169[a]	1.000	.681	.000

a. Exact statistic

b. Design: Intercept+file+Gender+nevents+Age+file * Gender+file * nevents+Gender * nevents+file * Gender * nevents+file * Age+Gender * Age4+file * Gender * Age+nevents * Age+file * nevents * Age+Gender * nevents * Age+file * Gender * nevents * Age
Within Subjects Design: time

These findings in Table 12 confirm that the overall children's change in scores on the Rainbows questionnaire is primarily attributable to the time variable (pre-post change) (Pilai's Trace F = 369.283, df = 1, p = .000) and file variable (program membership in RL12, RL 34, or SL) (Pilai's Trace F = 36.713, df = 2, p = .000) . Other variables of children's age, gender, and number of events, did not significantly contribute to the overall change effect seen across the overall data set.

Summary

In view of all the analyses conducted in this section, it seems that the results point to several observations:

- Controlling for the differences in children's pretest scores across the three files demonstrates that the mean change in children's post-test responses on the Rainbows questionnaire is statistically significant and positive. This result is evident in all three data files.
- Children participating in the Rainbows Elementary Edition Levels 3 and 4 evidence the most amount of positive change followed by the Spectrum Levels 1 and 2, and Rainbows Elementary Edition Levels 1 and 2. These findings support the proposition that children benefit from Rainbows as evidenced by their positive mean change on the Rainbows questionnaire in all three data files.
- Children's age, gender, and number of loss events have some differential effects. That is, within the Rainbows Elementary Edition Levels 1 and 2, children's amount of positive change was affected by the number of loss events, and children with more amount of loss in this program showed more beneficial change. This effect was not replicated in the other two program files.

- Children's gender affects the amount of positive change experienced in the Rainbows Elementary Edition Levels 3 and 4 in that girls showed a slightly greater change than boys. The gender interactive effect was not replicated in the other program files.
- Overall, the data showed that in all three programs children experienced positive and statistically significant change, and this change persisted while controlling for possible influences of children's age, gender, and number of loss events.

SECTION III

PSYCHOMETRIC EXAMINATION OF THE QUESTIONNAIRE

The current 7-item 5-point Likert scaled Rainbows questionnaire was tested for its reliability and validity. The reliability analysis included item to item reliability using Cronbach's alpha. The validity analysis included exploratory factor analysis.

Reliability

Reliability analysis examines the items' internal consistency. The Cronbach's alpha coefficient for pre-test equals .97 and for post-test, equals .90. These results indicate that the questionnaire seems to have a high degree of item consistency.

Construct Validity

Exploratory factor analysis was used to analyze the questionnaire in order to determine how many constructs are present in the questionnaire. The whole sample consisted of all cases present in all three files. The extraction method of principal component analysis showed that only one construct is represented by the seven items in the questionnaire and it explains about 63% of the total variance (Table 13).

Table 13 Factor Analysis

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.389	62.697	62.697	4.389	62.697	62.697
2	.528	7.549	70.245			
3	.490	7.003	77.249			
4	.455	6.495	83.743			
5	.414	5.916	89.659			
6	.380	5.422	95.082			
7	.344	4.918	100.000			

Extraction Method: Principal Component Analysis.

All items in the questionnaire had principal component matrix value loadings of .76 or better on just one principal component (Table 14). This principal component represents one construct and, thus, the result suggests that all seven items are conceptually related. When the set of questions is examined closely, it can be seen that the items are tapping a construct that has to do with a child's perception or awareness of communication feelings in different contexts, within self, in family, and in the general environment.

Table 14 Factor Analysis Principal Component Item Loadings

Factor Analysis Principal Component Matrix [a]

	Component
	1
Q1:I can talk about my feelings.	.797
Q2: I know what to do to make angry feelings OK.	.770
Q3: I can talk to people in my family.	.776
Q4: I understand my family changes.	.764
Q5: I pay attention well in school.	.787
Q6: I know how to solve my problems.	.807
Q7: I know there are people who care about me. - Post	.839

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Overall, the results of this analytical examination of the Rainbows questionnaire suggests that the questions are being understood by children in a predictable or consistent manner and they seem to represent one construct of children's perception of how they communicate their feelings in different contexts.

LIMITATION OF ANALYSIS

These findings need to be viewed with a healthy dose of caution in that the data for this analysis were derived from a non-experimental implementation of three programs within Rainbows. These findings represent a pilot examination of program collected data across three programs with similar but uncontrolled implementations. This data analysis cannot answer the question whether the program intervention activities as implemented by the Rainbows program are, in fact, responsible for the change observed in children's answers on the Rainbows questionnaire. Rather, the findings only show that, indeed, children within all three programs show positive change in their responses on the Rainbows questionnaire from pre-test to post-test. As the current examination cannot utilize a comparison or a control group of children, alternate plausible explanations for the change in children's responses on the Rainbows questionnaire can be actually due to many methodological bias factors that are inherent in non-randomized designs. For example, children's maturation, occurrence of other history-related events, reactivity to testing, novelty effect, social desirability bias and other such internal design effects may influence children's responses on the questionnaire. As children were selected by non-probability sampling or by convenience or as they presented themselves to the programs, or by referral, the findings also cannot be generalized beyond the sample of children in this data set.

Future assessment of Rainbows' impact on children needs to consider several aspects of evaluation: a. Use an experimental design in implementation of the program with random

assignment of children to an intervention and control group for comparison; b. Attempt to implement a second follow-up at a later date to examine if the impact of change still holds over time; c. Consider adding another instrument, preferably a standardized instrument that is related to the Rainbows questionnaire in a meaningful but specific way; and d. document the fidelity of implementation of program activities (including the ‘dose’ of activities used in intervention).