# Impact of the Great Body Shop on Student Health Risks: A Partial Replication of the Robinson (1999) Analysis of the Minnesota Student Survey

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## Abstract

The purpose of this study was to replicate, as much as possible, the analysis completed by Dr. David Robinson for the Great Body Shop (GBS) in 1999. This involved a reanalysis of Minnesota Student Survey (MSS) data from 1995 and 1998. The 1995 data set was limited to districts that had implemented the Great Body Shop curricula for at least two years (n = 911). To create a comparison group, a 2% random sample was drawn from students who had not been exposed to the GBS (n = 885). Thus, the effective sample size for the 1995 analysis consisted of 1,796 students. For the 1998 data set, there were 7,230 (13.8%) students from districts implementing GBS curricula. Again, because the potential comparison group was so much larger than the treatment group, a 15% random sample of students from non-GBS districts was drawn for comparison (n = 7,206). We performed an Analysis of Covariance, with the scales reported by Robinson (1999) and calculated by us. The independent variable was GBS Exposure. On the whole, results suggest that the GBS curriculum had a significant positive impact on students exposed to the material. Students experiencing the GBS curricula reported significantly higher self esteem and better school environments. Further, results from the 1998 data set suggest that exposure over time increases the level of impact students experienced from instruction using these curricula.

*Keywords:*

The Great Body Shop (GBS) curriculum is a comprehensive health, substance abuse and violence prevention curriculum covering kindergarten through sixth grade. It was developed and marketed by the Children's Health Market, Inc (CHM). and is distributed nationally. The curriculum covers a broad array of health issues in an age-appropriate way and is designed especially for urban youth. It has received a generally favorable review from the Education Development Center (1995) and Robinson (1999) found it to be effective at reducing violent and anti-social behavior and improving scores on Minnesota Student Survey (MSS) social health constructs.

The curriculum contains a Teacher's Guide, Student Issue briefs, and Parent Bulletins that support ten monthly themes, which are taught through forty lessons. Monthly thematic units contain a variety of tools teachers may choose to use with their students. These tools allow teachers to customize their instruction to meet district guidelines and integrate the lessons into other parts of the curriculum. Some of the tools found in the Teacher's Guide for each theme include a monthly Parent Bulletin, four scripted lessons, special education notes, materials list, quiz, homework, substance abuse/violence prevention portfolio activities, and teaching strategies. Additionally there are performance assessment sheets, cross-curricular reinforcement activities, black lined masters, and reference resources. Weekly lessons range in length from 20-35 minutes at the primary level to 45-60 minutes at the intermediate level.

The Children's Health Market supports school district staff development efforts in a variety of ways. In addition to a Basic Teacher Orientation, special topic workshops are offered that target specific areas of interest to classroom teachers

and are designed to address both content and pedagogy. After initial training, customized technical assistance and follow-up training is offered through Consulting Trainers who have been certified by CHM for their knowledge of content and training methods. Consulting Trainers provide demonstration lessons, peer-planning, observation/ feedback, trouble-shooting, and debriefing discussions.

The content of THE GREAT BODY SHOP is divided among ten subjects or tracks, each of which is developed from one grade level to the next according to state and national guidelines. These are Injury Prevention, Personal Safety, Functions of The Body, Nutrition, Community Health and Safety, Violence Prevention, Self Worth, Growth, Development, and The Cycle of Family Life, Substance Abuse Prevention, HIV/AIDS & Illness Prevention, Environmental Health, Consumer Health, and Physical Fitness. Each grade level of the program from Kindergarten through sixth grade is structured so that knowledge, values, life skills and critical thinking skills are introduced through concepts that are age appropriate and familiar. Knowledge is built sequentially.

The Great Body Shop also employs a systems approach to prevention. In addition to the forty lesson curriculum used by classroom teachers, children and their families receive monthly family resources designed to affect the health and well-being of the family system. Community service projects and resources further connect the educational system with that of the family and community. Further information on the curriculum is available via the Internet.

The Minnesota Student Survey (MSS) survey was developed as a way to monitor priority risk and protective behaviors among students. The MSS has been in use in Minnesota since 1989. The MSS is based upon work by staff at the Minnesota Department of Public Health and Department of Education. Harrison & Luxenberg (1995) detail the development of the instrument and some of its properties. The survey is voluntary, confidential and anonymous on the part of students. Conducted every three years in all participating school districts (typically 90-100% of the state's public schools), it is given to 6th, 9th and 12th graders.

The MSS includes questions about the school environment, activities, and health. It asks specifically about behaviors that may put young people at risk: use of alcohol, tobacco, and other drugs; violence; and sexual activity. It asks for the student's perspective on the positive and negative aspects of life. Roughly 200 questions yield a database of 320 variables.

The Minnesota Student Survey (MSS) was administered to public school students in grades 6, 9, and 12 in 1989, 1992, 1995, and 1998. The administration of the MSS reflected the implementation of The Great Body Shop (GBS) comprehensive health education program in Minnesota public schools in 1995 and in 1998. We were interested in the impact of GBS on students' health risk behaviors and protective factors, and considered a quasi-experimental research design in which 6th grade student health risk behaviors are assessed during two time periods (1995 and 1998), and are compared to student responses in schools that did not participate in the GBS program. While we were interested in students' changed health risk behaviors, the design employed here would assess two different groups of students – one in 6th grade during the MSS administration in 1995, and the other group in 6th grade in 1998.

The purpose of this study was to replicate and enhance the unpublished analysis of MSS data from 1995 and 1998 that was conducted by Robinson in 1999. This was to correct some limitations of the original analysis, most notably, in the treatment of missing data. Robinson (1999) had three research questions:

1. Do students exposed to GBS use less health risk behaviors compared to students who are not exposed to GBS?
2. Do students exposed to GBS experience fewer health risk and more protective factors than students not exposed to GBS?
3. Do students exposed to GBS make greater gains in health behaviors and risk/protective factors than comparison students?

Robinson (1999) obtained the raw data set from the Minnesota Data Center and matched that with data from the Children's Health Market to create a data file identifying individual schools. The data set he utilized was not available in this complete form for our analysis. Policies now in place in Minnesota prevented the release of the raw data files. In publicly available data files, all geographic detail has been removed, so analysis is restricted to the state level. This prevented a full replication of the study conducted by Robinson (1999). For purposes of this study, the Minnesota Data Center prepared a data set in which districts implementing the GBS curriculum could be identified as such.

Two further matching variables used in the Robinson study were not available for our use. To balance the design, each school was assigned a proximity score to St. Paul, MN. This was used to match comparison schools to GBS schools. While Robinson (1999) argues that this was to control for urban 'stressors' it would arguably be more likely to control for general urban/rural status. However, proximity to St. Paul, MN may not have been the best marker for either characteristic. A second variable was the percentage of free/reduced lunches. This was used to indicate the relative economic condition of the community surrounding the school. Neither of these is controlled for in the current report. This represents a possible weakness of the current analysis. However, without obtaining actual building/district identifiers we are unable to address this issue.

Robinson (1999) created 13 scales within the MSS. Five scales are based upon Harris & Luxenberg (1995) who identified five factors predictive of substance use problems and are as follows: Family Caring; Other Caring; Self Esteem; Emotional Distress; and Antisocial Behavior. Five scales measuring risk and protective domains were developed based upon US Department of Education guidelines: Community, School, Family, Peer, and Individual risk factors. Robinson also created scales for substance abuse, violence, and conduct domains. While Robinson provides some information on what each construct represented, there is no table identifying what items comprise each scale.

**Methods**
We have attempted to reconstruct the eight scales present in both the 1995 and 1998 data sets. Our reconstruction of these scales is found in Table 1. While we cannot be certain we have reconstructed these accurately, we have achieved a reasonable approximation in number of items and content of items. Cronbach's alphas, discussed later in this paper, are also similar to those presented in Robinson (1999).

Table 1
Items comprising scales used in analysis.

| Scale | Direction | Items Comprising Scales | |
|---|---|---|---|
| | | **1995** | **1998** |
| Self-Esteem | + | 39, 40, 41, 42$^\dagger$, 43$^\dagger$, 44$^\dagger$, 45$^\dagger$ | 42, 43, 44, 45$^\dagger$, 46, $^\dagger$ 47$^\dagger$, 48$^\dagger$ |
| Family Caring | + | 38b, 38f, 38g, 38h, 38i | 41b, 41f, 41g, 41h, 41i |
| Other Caring | + | 38c, 38d, 38e | 41c, 41d, 41e |
| Emotional Distress | + | 46$^\dagger$, 47, 48, 49, 50, 51$^\dagger$ | 49$^\dagger$, 50, 51, 52, 53, 54$^\dagger$ |
| Antisocial Behavior | + | 68$^\dagger$, 69$^\dagger$, 71$^\dagger$ | 70$^\dagger$, 71$^\dagger$, 73$^\dagger$ |
| School Risk /Protective Factors | + | 21a$^\dagger$, 21b$^\dagger$, 21c, 22a$^\dagger$, 22b$^\dagger$, 23b$^\dagger$, 23c$^\dagger$, 23d$^\dagger$, 23e, 23f | 14a$^\dagger$, 14b$^\dagger$, 14c, 15a$^\dagger$, 15b$^\dagger$, 16b$^\dagger$, 16c$^\dagger$, 16d$^\dagger$, 16e, 16f |
| Violence | + | 29$^\dagger$, 30$^\dagger$, 70$^\dagger$ | 22$^\dagger$, 23$^\dagger$, 72$^\dagger$ |
| Conduct | + | 68$^\dagger$, 69$^\dagger$, 70$^\dagger$, 71$^\dagger$, 72$^\dagger$, 73$^\ddagger$, 74$^\dagger$ | 70$^\dagger$, 71$^\dagger$, 72$^\dagger$, 73$^\dagger$, 74$^\dagger$, 24$^*$ |

$^\dagger$Reverse Scored; $^\ddagger$Recoded: (4=4), (1=3), (2=2), (3=1); *This item was rewritten in the 1998 survey. Recoded to (1=4) (2=3) (3=1). Item 75 would also have been included but was not given to 6th graders this year.

Robinson (1999) does not discuss how scales were calculated but examination of his tables suggests an average was calculated across items to represent a scale score for each individual. The current analysis uses summed scores. In essence, the responses for each item are added together to create an overall summary measure for each scale. Table 1 also indicates the directionality of each scale along with whether items were reverse scored. Thus, in distinction from the Robinson (1999) analysis, higher values on every scale represent healthier responses.

### Sample

A total of 50,763 6th grade students completed the MSS in the 1995 school year of whom 3,033 (6%) were in districts using GBS curricula. Because only one district added the GBS in 1994, and another single district added the curriculum in 1995, state policy required that the data provided for analysis did not distinguish between the districts for those two years. As a result, we could not distinguish students with one year of experience from those who had just begun the curriculum. Therefore, we chose to limit the 1995 data to those districts that had participated since 1993. This reduced the treatment sample size (students who were exposed to the GBS curricula) to a total of 911 students.

As mentioned previously, no variables were available to match on urban/rural setting or economic conditions. We therefore did not match school districts, opting for a covariance design rather than a matched-groups ANOVA.

The number of 6th grade students in the treatment group was so much smaller than the potential number of comparison subjects that we elected to draw a 2% random sample of students from those districts without GBS exposure to form a comparison group. This resulted in a sample comprised of 885 students. Thus, the effective sample size for the 1995 analysis consisted of 1,796 students.

A total of 52,547 6th grade students completed the MSS in 1998. Of these, 7,230 (13.8%) were from districts implementing GBS curricula. Again, because the potential comparison group was so much larger than the treatment group, a 15% random sample of students from non-GBS districts was drawn for comparison (n = 7,206).

Tables 2, 3, and 4, present gender, age, and race/ethnicity by year and group membership. Males and females were distributed equally in both the comparison and GBS groups. In the 1995 group, age was not significantly different between the two groups. However, in the 1998 data, age did differ significantly between the two groups (t = 4.474; df = 14,434; p<.001). The two groups differed in age by approximately one day – a matter of little practical significance. Race did not differ by group membership in 1995. However, in 1998, race did vary significantly by group. The GBS group was more racially diverse than the comparison group. Further examination revealed that one or two districts that participated in the GBS curricula were majority non-white during the years covered by the study. As a result, this variable was entered as a covariate for the 1998 study.

### Instrumentation

The survey was administered through a group standardized pencil and paper format in Minnesota school districts. Participation in the survey was voluntary. Students were not required to complete the questionnaire. The survey had passive parental consent.

As mentioned previously, Table 1 lists the questions comprising each scale. Appendix A lists the Cronbach alphas for each scale by survey year. As can be seen, the majority of the scales have acceptable internal consistency. Scores ranged from a low of .425 (Violence, 1998) to a high of .861 (Family Caring, 1995). Violence has very low internal consistency, possibly indicating that the items comprising this measure do not assess the same behavior. However, for this study, we felt it was important to replicate the previous research and thus it is included here.

Table 2
Distribution of gender across the treatment and comparison groups and year.

|  |  | Comparison | | GBS | |  |  |
|---|---|---|---|---|---|---|---|
| Year | Gender | Count | % | Count | % | Total | % |
| 1995 | Male | 446 | 50.4 | 459 | 50.4 | 905 | 50.4 |
|  | Female | 439 | 49.6 | 452 | 49.6 | 891 | 49.6 |
|  | Total | 885 | 100.0 | 911 | 100.0 | 1796 | 100.0 |
| 1998 | Male | 3620 | 50.2 | 3652 | 50.5 | 7272 | 50.4 |
|  | Female | 3586 | 49.8 | 3578 | 49.5 | 7164 | 49.6 |
|  | Total | 7206 | 100.0 | 7230 | 100.0 | 14436 | 100.0 |

Table 3
Mean age by year and group.

|  | 1995 | | | 1998[†] | | |
|---|---|---|---|---|---|---|
| Group | n | Mean | SD | n | Mean | SD |
| Comparison | 879 | 11.78 | 0.699 | 7206 | 11.74 | 0.508 |
| GBS | 903 | 11.73 | 0.772 | 7230 | 11.70 | 0.524 |

[†]$p < .001$

Table 4
Racial/ethnic category by year and GBS participation.

|  |  | Comparison | | GBS | |  |  |
|---|---|---|---|---|---|---|---|
| Year | Race/Ethnicity | Count | % | Count | % | Total | % |
| 1995 | Non-White | 93 | 11.6 | 109 | 13.1 | 202 | 12.4 |
|  | White | 712 | 88.4 | 720 | 86.9 | 1432 | 87.6 |
|  | Total | 805 | 100.0 | 829 | 100.0 | 1634 | 100.0 |
| 1998 | Non-White | 996 | 15.0 | 2191 | 32.4 | 3187 | 23.8 |
|  | White | 5632 | 85.0 | 4576 | 67.6 | 10208 | 76.2 |
|  | Total | 6628 | 100.0 | 6767 | 100.0 | 13395 | 100.0 |

**Missing Values**
Examination of the data for both years proceeded by examining the patterns of missing data. Using the SPSS Missing Values package, two-sample t tests were conducted to test whether missing data were distributed randomly among the calculated scale scores. Results of the analysis indicated that missing data was not distributed at random. Therefore, new values were imputed using regression to replace the missing data.

In order to use regression to impute missing values, the data used to calculate the values must be related. We are assuming that missing data can be estimated from equations based on data

available. Appendix B1 presents the correlation matrix for scale variables in the 1995 data set. Appendix B2 presents the correlation matrix for the 1998 data set. All the correlations are significant.

Appendix C1 presents mean values for the scale scores in 1995 prior to imputing missing data and after using regression to impute missing data. As can be seen from the table, using regression to impute the values for missing data did not substantively alter the mean or standard deviation of the scale scores. The ANCOVA analysis (discussed below) will use the imputed data values. The table also shows that three of the scales had far more missing data than the other scales (Other Caring; School Risk/Protective Factors; and Conduct).

Appendix C2 presents the same analysis for the 1998 data set. As before, the distribution of overall scores remains substantively similar. Again, Other Caring, School Risk/Protective Factors, and Conduct, have a higher number of missing values. Examination of patterns suggests that an entire school district did not allow these questions to be answered.

**Analysis**

To examine the research questions presented above, we propose an Analysis of Covariance (ANCOVA), with the scales reported by Robinson (1999) and calculated by us using the items presented in Table 1 as dependent variables. The independent variable will be GBS Exposure. To control for bias due to non-random sampling, we will use age and gender as covariates. For the 1998 data set we will also use race as a covariate. To control for alpha inflation, we will use a Bonferonni adjustment to alpha. There are eight planned comparisons, which results in the alpha level being set to 0.006.

**Results**

**Research Question 1**. Do students exposed to GBS report less health risk behavior compared to students who are not exposed to GBS?

Three of the scales measure behavior: antisocial behavior, violence, and conduct problems. Table 5 presents the results of the ANCOVA for the 1995 data. There were no significant differences observed on these three scales. However, the treatment group did have a slightly higher observed score for violence and conduct problems, indicating potentially fewer problems/ issues. The 1998 data, however, did differ significantly by GBS exposure on all three scales (see Table 6). Remember, that in our analysis, as opposed to Robinson (1999), for all scales a higher score indicates behavior that is more desirable. Post-Hoc tests revealed the same pattern. Students from districts with three and four years of GBS participation differed significantly from all other groups. Students from districts with five years of participation differed from all groups save those with two years of participation. Students with no years of exposure and one or two years of exposure did not differ significantly on these measures.

Examination of the adjusted mean scores suggests that over time, GBS results in behaviors that are more positive. The exception to this is the group labeled '3 or 4 years.' Because of state rules limiting identification of districts, we had to combine districts that were participated for three years with those who were participated for four years into one category. This category was comprised of 60.1% non-white students, a markedly different racial/ethnic makeup from the other districts (see Table 7). We have no way of knowing how the environment of these students differed from those of other students in the sample. Given the demographic patterns of Minnesota, and the fact that the Madison, MN district began using the GBS during this time period, we suspect this is an urban, racial/ethnic, or socio-economic effect.

Table 5
Mean scores by treatment group for 1995 data.

| Variable | Comparison Adj. Mean | Treatment Adj. Mean | Difference |
|---|---|---|---|
| Self-Esteem[‡] | 22.975 | 23.707 | 0.732 |
| Family Caring | 20.421 | 20.618 | 0.197 |
| Other Caring | 11.047 | 10.953 | -0.094 |
| Emotional Distress | 21.584 | 22.018 | 0.434 |
| Antisocial Behavior | 14.270 | 14.273 | 0.003 |
| School Risk[‡] | 34.799 | 35.564 | 0.765 |
| Violence | 14.211 | 14.328 | 0.117 |
| Conduct | 28.572 | 28.729 | 0.157 |

[a]n = 911; [b]n = 885; [‡]p < .001

Table 6
Adjusted mean scores by treatment group for 1998 data.

| Variable | Comparison[a] Mean[f] | 1 year[b] Mean | Diff.[g] | 2 year[c] Mean | Diff. | 3 or 4 years[d] Mean | Diff. | 5 years[e] Mean | Diff. |
|---|---|---|---|---|---|---|---|---|---|
| Self-Esteem[‡] | 23.112 | 23.281 | 0.169 | 23.351 | 0.239 | 23.069 | -0.043 | 23.647 | 0.535 |
| Family Caring[‡] | 20.753 | 20.793 | 0.040 | 21.262 | 0.509 | 20.973 | 0.22 | 21.217 | 0.464 |
| Other Caring[‡] | 11.087 | 11.126 | 0.039 | 11.649 | 0.562 | 10.824 | -0.263 | 11.210 | 0.123 |
| Emotional Distress[‡] | 21.750 | 21.855 | 0.105 | 21.991 | 0.241 | 21.707 | -0.043 | 22.368 | 0.618 |
| Antisocial Behavior[‡] | 14.310 | 14.274 | -0.036 | 14.378 | 0.068 | 14.137 | -0.173 | 14.461 | 0.151 |
| School Risk[‡] | 34.843 | 34.795 | -0.048 | 34.971 | 0.128 | 34.629 | -0.214 | 35.814 | 0.971 |
| Violence[‡] | 14.212 | 14.194 | -0.018 | 14.292 | 0.08 | 14.054 | -0.158 | 14.415 | 0.203 |
| Conduct[‡] | 25.568 | 25.517 | -0.051 | 25.702 | 0.134 | 25.235 | -0.333 | 26.013 | 0.445 |

[a]n = 6628; [b]n = 2432; [c]n = 866; [d]n = 2533; [e]n = 936; [f]Adjusted means reported; [g]Difference between GBS adjusted mean and Comparison adjusted mean; [‡]p < .001

Table 7
Distribution of Non-white and white race/ethnicity by years of district participation in GBS.

| Years | Non-White Count | % | White Count | % |
|---|---|---|---|---|
| No years | 996 | 15.0 | 5632 | 85.0 |
| 1 year | 424 | 17.4 | 2008 | 82.6 |
| 2 years | 78 | 9.0 | 788 | 91.0 |
| 3 or 4 years | 1523 | 60.1 | 1010 | 39.9 |
| 5 years | 166 | 17.7 | 770 | 82.3 |
| Total | 3187 | 23.8 | 10208 | 76.2 |

Examination of the adjusted mean scores suggests that over time, GBS results in behaviors that are more positive. The exception to this is the group labeled '3 or 4 years.' Because of state rules limiting identification of districts, we had to combine districts that were participated for three years with those who were participated for four years into one category. This category was comprised of 60.1% non-white students, a markedly different racial/ethnic makeup from the other districts (see Table 7). We have no way of knowing how the environment of these students differed from those of other students in the sample. Given the demographic patterns of Minnesota, and the fact that the Madison, MN district began using the GBS during this time period, we suspect this is an urban, racial/ethnic, or socio-economic effect.

**Research Question 2**. Do students exposed to GBS experience fewer health risk and more protective factors than students not exposed to GBS?

From Table 5, there were no significant differences observed between GBS exposed students and non-GBS exposed students on family caring, other caring, or emotional distress. There were significant differences observed between the two groups on self-esteem and school risk. On both scales, GBS students had higher scale scores. For the 1998 data (see Table 6), all the scales differ significantly. The table also suggests that the longer student's are exposed to GBS curricula, the more positive their reported levels of protective factors. There is no clear pattern of perceptual change among the means shown in Table 6, however, in all the reported scores, students with five years of exposure reported higher levels of protective factors.

**Research Question 3**. Do students exposed to GBS make greater gains in health behaviors and risk/protective factors than comparison students?

In the Robinson (1999) study, the report stated:

> ". . . we calculated the difference in means for GBS students in 6th grade in 1995 and in 1998 and the comparison group in 1995 and in 1998. The difference was calculated by subtracting the mean present in '95 from the '98 mean for the respective group." (p. 7)

An issue with this analytical approach is that the four means being compared come from four distinct and separate groups. Not only are the students comprising the groups different, but so are the participating schools, the environment within which they behave, and a host of other unmeasured, uncontrolled, variables. Leaving a residue of largely unexplainable variation among the data sets which cannot even be tested for real differences.

Rather than repeat this flawed analysis, we entered the number of years students were exposed as a testable variable in the 1998 data set. As has been mentioned repeatedly above, there is a general pattern that longer exposure to GBS curricula results in more desirable behavior and reported protective factors. Students with five years of exposure, on every scale, were significantly more likely to report healthier behavior and protective factors.

**Discussion**

On the whole, these results suggest that the GBS curriculum has a significant positive impact on students exposed to the material. Further, results from the 1998 data set suggest that exposure over time increases the level of impact students experienced from instruction using these curricula. We cannot be certain whether this is due to students being exposed to more of the curriculum, to teachers becoming better at teaching the curriculum with experience, or some combination of the two. Further, the years of exposure is also confounded with the districts within which the students received instruction. It is possible that the significant increases in positive behavior and protective factors result more from the environment of instruction than from the curricula. The data available to us do not allow a direct assessment of district effects. It must also be noted that for each year of exposure there were multiple districts included. This means that for district to have influenced the results, multiple districts must have shared the same characteristics.

In the 1995 data set (see Appendix C2) all scores, but one, are higher for the GBS group. Again, higher scores indicate more healthy behaviors. Students experiencing the GBS curricula reported significantly higher self esteem and better school environments. Further, results from the 1998 data set suggest that exposure over time increases the level of impact students experienced from instruction using these curricula. As can be seen from Table 5, the adjusted mean scores for students receiving the GBS curricula were higher than those for students in the comparison sample. Two of these were significantly different (GBS students had higher self esteem and lower school risk). In the 1998 data set, all scales differed significantly with GBS students having higher adjusted mean scores. There is a group of students, which includes a large proportion of non-white students that reported lower scores on all but one scale (Family Caring). If we ignore the group comprised of students with three or four years of instruction, there are 24 difference scores between GBS students and the comparison group. All but four of these difference scores favor students with GBS exposure.

It should also be noted that while these were significant positive effects, the effect sizes were small. Most of the effect sizes represented less than 1% of the variance explained in the dependent variable. This could be due to several factors. The instrument was not designed to assess content covered in the GBS curricula, and may have missed important effects not covered in the MSS. Some of the subscales have very few items (antisocial and violence) leading us to question the reliability of these scales, and hence their validity. Lastly, the design of the study, particularly limitations in the data available for analysis, left many additional variables unmeasured that may have confounded this analysis. For example, there were no data available on the socio-economic status of any student. This variable alone might have controlled for the effect noted with the "3 or 4 years" group (see Table 7). Racial/ethnic markers frequently mask socio-economic conditions. Similar weakness existed in the Robinson (1999) survey.

The design of the data collection also imposed a number of other limitations that need to be noted. While our use of analysis of covariance compensates for some of the weaknesses inherent in not having random assignment, they cannot fully do so. The inability to measure district level effects, the inability to track students over time (1995 – 1998), and the absence of any pretest data also limit our capacity to answer the research questions. An experiment with random assignment and pretest data would far better assess the impact of the GBS curricula upon student health behavior and protective factors. These two steps should be part of any future assessment of the impact of the curriculum.

**References**
Education Development Center (1995). Choosing the tools: A review of selected k-12 health education curricula. Newton, MA: author.
Harrison, P. A., & Luxenberg, M. G. (1995, February). Comparisons of alcohol and other drug problems among Minnesota adolescents in 1989 and 1992. Archives of Pediatrics & Adolescent Medicine, 149(2), pp. 137-144.
Robinson, D. S. (1999, May 27) The impact of the great body shop on student health risk behaviors and other risk and protective factors using the Minnesota student survey. A report presented to the Children's Health Market. Boston: Massachusetts Society for the Prevention of Cruelty to Children.

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# Appendix A
Cronbach's alpha for each scale.

| | Cronbach's Alpha | |
|---|---|---|
| **Scale** | **1995** | **1998** |
| Self-Esteem | .805[†] | .784 |
| Family Caring | .861 | .853 |
| Other Caring | .680 | .630 |
| Emotional Distress | .819 | .809 |
| Antisocial Behavior | .748 | .686 |
| School Risk /Protective Factors | .777 | .752 |
| Violence | .540 | .415 |
| Conduct | .784 | .741 |

[†]Alpha's are based on raw item scores.

# Appendix B1
## Correlation matrix of study variables using 1995 data.

| | Age | Self-Esteem | Family Caring | Other Caring | Emotional Distress | Antisocial Behavior | School Risk | Violence | Conduct |
|---|---|---|---|---|---|---|---|---|---|
| Age | 1.00 | | | | | | | | |
| Self-Esteem | -0.07[†] | 1.00 | | | | | | | |
| Family Caring | -0.10 | 0.44 | 1.00 | | | | | | |
| Other Caring | -0.11 | 0.30 | 0.51 | 1.00 | | | | | |
| Emotional Distress | -0.07 | 0.58 | 0.52 | 0.35 | 1.00 | | | | |
| Antisocial Behavior | -0.30 | 0.28 | 0.34 | 0.28 | 0.34 | 1.00 | | | |
| School Risk | -0.12 | 0.35 | 0.42 | 0.40 | 0.42 | 0.41 | 1.00 | | |
| Violence | -0.20 | 0.24 | 0.33 | 0.26 | 0.30 | 0.65 | 0.37 | 1.00 | |
| Conduct | -0.25 | 0.29 | 0.39 | 0.32 | 0.39 | 0.88 | 0.46 | 0.78 | 1.00 |

[†]All correlations significant at $p < .001$.

# Appendix B2
## Correlation matrix of scales for 1998 data.

| | Age | Self-Esteem | Family Caring | Other Caring | Emotional Distress | Antisocial Behavior | School Risk | Violence | Conduct |
|---|---|---|---|---|---|---|---|---|---|
| Age | 1.00 | | | | | | | | |
| Self-Esteem | -0.06 | 1.00 | | | | | | | |
| Family Caring | -0.06 | 0.45 | 1.00 | | | | | | |
| Other Caring | -0.04 | 0.31 | 0.46 | 1.00 | | | | | |
| Emotional Distress | -0.05 | 0.59 | 0.49 | 0.29 | 1.00 | | | | |
| Antisocial Behavior | -0.11 | 0.28 | 0.31 | 0.25 | 0.31 | 1.00 | | | |
| School Risk | -0.07 | 0.37 | 0.39 | 0.37 | 0.40 | 0.38 | 1.00 | | |
| Violence | -0.09 | 0.20 | 0.25 | 0.20 | 0.25 | 0.60 | 0.34 | 1.00 | |
| Conduct | -0.13 | 0.27 | 0.34 | 0.27 | 0.33 | 0.87 | 0.41 | 0.80 | 1.00 |

[†]All correlations significant at $p < .001$.

## Appendix C1
Continuous variables for 1995 data set showing raw data and regression estimated replacement values for missing data.

| Variable | Unadjusted | | | | Estimated[†] | |
|---|---|---|---|---|---|---|
| | Mean | SD | N | % Missing | Mean | SD |
| Self-Esteem | 23.3839 | 4.251 | 1623 | 9.6 | 23.3463 | 4.204 |
| Family Caring | 20.5633 | 4.482 | 1674 | 6.8 | 20.5209 | 4.478 |
| Other Caring | 10.9542 | 3.032 | 1529 | 14.9 | 10.9990 | 3.030 |
| Emotional Distress | 21.8519 | 4.266 | 1641 | 8.6 | 21.8042 | 4.269 |
| Antisocial Behavior | 14.3031 | 1.618 | 1623 | 9.6 | 14.2719 | 1.633 |
| School Risk | 35.2288 | 4.987 | 1495 | 16.8 | 35.1869 | 4.941 |
| Violence | 14.2763 | 1.464 | 1676 | 6.7 | 14.2702 | 1.456 |
| Conduct | 28.6914 | 3.377 | 1471 | 18.1 | 28.6520 | 3.431 |

[†]n = 1796 for all variables.

## Appendix C2
Continuous variables for 1998 data set showing raw data and regression estimated replacement values for missing data.

| Variable | Unadjusted | | | | Estimated[†] | |
|---|---|---|---|---|---|---|
| | Mean | SD | N | % Missing | Mean | SD |
| Self-Esteem | 23.1271 | 4.257 | 1067 | 7.4 | 23.1127 | 4.251 |
| Family Caring | 20.8407 | 4.337 | 825 | 5.7 | 20.7938 | 4.349 |
| Other Caring | 11.0499 | 2.907 | 1481 | 10.3 | 11.0521 | 2.890 |
| Emotional Distress | 21.8010 | 4.257 | 1223 | 8.5 | 21.7610 | 4.398 |
| Antisocial Behavior | 14.2885 | 1.549 | 1173 | 8.1 | 14.2739 | 1.561 |
| School Risk | 34.7758 | 4.865 | 2177 | 15.1 | 34.7927 | 4.843 |
| Violence | 14.1969 | 1.416 | 894 | 6.2 | 14.1893 | 1.413 |
| Conduct | 25.5573 | 3.064 | 1565 | 10.8 | 25.5152 | 3.089 |

[†]n = 14,436 for all variables.