

# DEPRESSION SCREENING OF CHILDREN AND ADOLESCENTS WITH DIABETES

by Elizabeth Shaw 2004

## **Background/ Introduction**

Depression is the most common mental health problem in the United States, occurring at increasingly younger ages (1). Studies have shown that people with diabetes are twice as likely to suffer from depression than those who do not have the disease. In fact, depression is present in 15% of patients with diabetes (2). Little information exists about the prevalence of depression in children with diabetes.

Three questions were asked in this project. First, what percent of children who agreed to complete a depression screening questionnaire scored within a range that indicated they should have further evaluation for depression, and did this differ significantly from the general population in which the questionnaires were validated? Second, did symptoms of depression vary with the length of time the child or adolescent had diabetes? And third, did females with diabetes show more symptoms of depression than males who had diabetes?

The first hypothesis for the project was that the children and adolescents who took part in the study would have higher average scores on the questionnaires than the children and adolescents on whom the questionnaires were validated. This was based on epidemiological studies that have shown that depression is present in 2.5 % of children and 8.3 % of adolescents who do not have diabetes. Previous research by Kovacs showed that the stresses of having a chronic medical condition, the demanding schedule of diabetes self-care, and the threat of future medical complications are issues not only affecting adults with diabetes but children and adolescents with diabetes as well. In addition, 27.5% of the study population developed major depressive disorder. The study population was made up of children 8-13 years old who had just been diagnosed with diabetes and were studied longitudinally for ten years (3).

The second hypothesis for this project was that children and adolescents were more likely to experience symptoms of depression after the first six months of diagnosis based on a theory by B. J. Anderson and J. Coyne. Their theory predicts that at initial diagnosis, children and adolescents feel more support due to the coming together of family and friends and also the possible relief that their child has a treatable disease rather than a terminal disease. Families tend to pull together in times of crisis and may also feel more support by the intense education efforts given at the initial diagnosis. However, after the patient and family go home and try the diabetes management program, they may feel a sense of disillusionment, because completing the diabetes self-management activities on a daily basis and in the time frame recommended might be more demanding than they realized it would be at diagnosis. Anderson et al. theorized that initial adjustment could then lead to miscommunication between children and adolescents and their families, which puts family members at higher risk for mental health and family problems (4).

The third hypothesis for the project presented in this paper was that the female subjects with diabetes would have a higher average score on the questionnaire than the male

subjects who had diabetes. This hypothesis was based on a meta-analysis of 42 studies where R. J. Anderson showed that women are at a significantly higher risk of developing major depression than men. The Anderson study showed 28% of the females who participated developed major depression and 18% of the males in the study developed major depression (4). In another study by Kovacs, young women with diabetes were nine times more likely to develop recurrent depression than the young men (3). It is important to note that this study by Kovacs was not conducted on children and adolescents.

Childhood depression was once viewed as rare, or just a "normal mood swing" typical of a particular developmental stage, however today researchers are learning more about depression among children and adolescents (1). Along with the developmental stages that children and adolescents go through comes a commonly felt emotion of wanting to "fit in." Having to manage diabetes with blood glucose monitoring, insulin injections, and attention to food patterns can take a toll on the self-images of children and adolescents, influencing the views of peers. The project reported in this paper was different from many of the projects cited because of its specific emphasis on childhood depression.

### **Methods**

Significant preparation went into this project before the questionnaire was administered. The following questionnaires were chosen: Reynolds Child Depression Scale (RCDS) for children ages 8-12 and Reynolds Adolescents Depression Scale (RADS) for adolescents ages 13-18. These questionnaires (as shown in Appendices 1 and 2) were chosen because they were well validated, easy to score, easily understood by the subject, and took no longer than 10-15 minutes for the subjects to complete.

The next step was writing a proposal to the Park Nicollet Institutional Review Board (IRB) and the Protocol Review Committee (PRC), consisting of an introduction, methods, suggested data analyses, and a discussion of the predicted results and future studies. After the proposal was completed in mid-July, it was sent to the Park Nicollet IRB, and then presented by Dr. Schafer to the Park Nicollet PRC. The project was approved by the IRB and PRC on August 1, 2003.

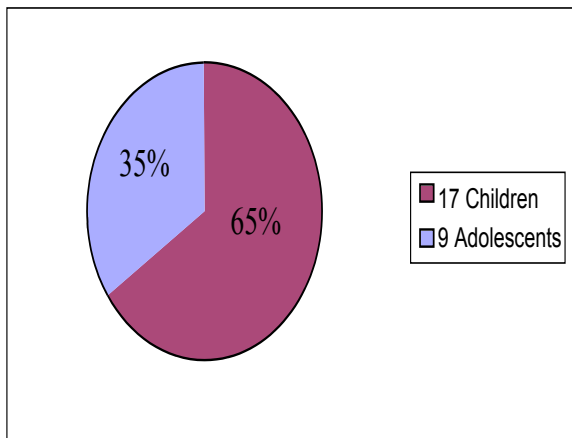
The next step was to invite children to fill out the RCDS and adolescents to fill out the RADS at the School Health Fair on August 5, 2003. The Fair was held at the International Diabetes Center (IDC) at Park Nicollet Clinic. The goal of the Fair was to educate children about diabetes in multiple different fashions. A booth was set up for this project, and children and adolescents completed the questionnaire in chairs located next to the booth. After the completion of the questionnaire, percentages of children and adolescents who scored at or above the cut off scores were calculated. This determined whether a subject might exhibit signs of depression. The cut off scores for possible signs of depression were defined in the Reynolds Professional Manual. The depression score was calculated by adding the scores for questions 1-30. (See Appendices 1 and 2 for the questionnaires.) Items 1-29 on the RCDS were scored from 1-4 points and the reverse-scored items (questions-1, 5, 10, 12, 23, 25) were scored from 4-1. Question 30 was scored from 5-1. On the RADS, the scores for questions 1-30 ranged from 1-4 and the reverse-scored items (1, 5, 10, 12, 23, 25, 29) from 4 to 1 (5, 6).

The means, standard deviations, and frequencies were calculated. The depression scores were compared to the scores of the children and adolescents who completed the questionnaires for validation. These scores were found in the Professional Manuals for the RCDS and the RADS. Correlations between the children's and adolescent's scores on the questionnaire and the length of time the children and adolescents had diabetes were calculated. Finally, t-tests were conducted to analyze differences between male and female scores on the questionnaires.

## Results

Figure 1 shows the distribution of children and adolescents who participated. The questionnaire was completed by 17 children between the ages of 8 through 12, making up 65% of the study population. Nine adolescents between the ages of 13 through 18 completed the questionnaire, making up 35% of the study population. Figure 2 shows the distribution of males and females who participated in the study. There were 18 females, making up 69% of the study population, and 8 males, making up 31% of the study population.

**Figure 1: Distribution of Children and Adolescents**



**Figure 2: Distribution of Females and Males**

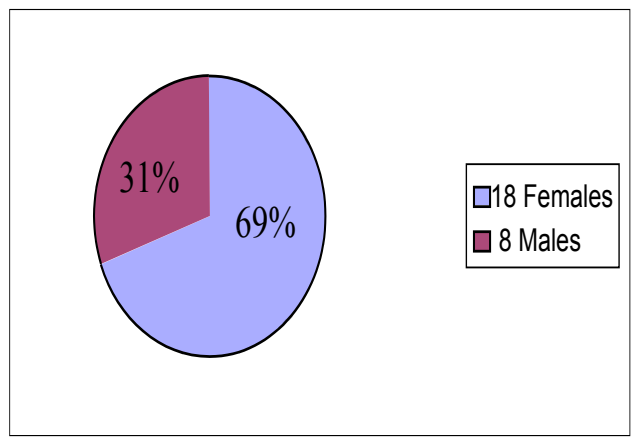
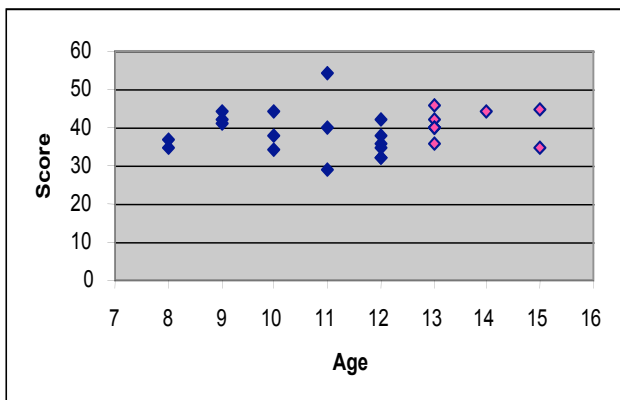


Figure 3 shows the distribution of depression scores on the questionnaire according to age. Blue represents the depression scores of the children, and pink represents the depression scores of the adolescents. The mean score for children was 38.4, and for adolescents was 40.9. The difference between the children and adolescents scores was marginally significant ( $p = 0.0626$ ); a p-value of 0.05 or smaller was considered statistically significant. Figure 4 shows the same data with a correlation line.

**Figure 3: Distribution of Score and Age**



**Figure 4: Distribution of Score and Age**

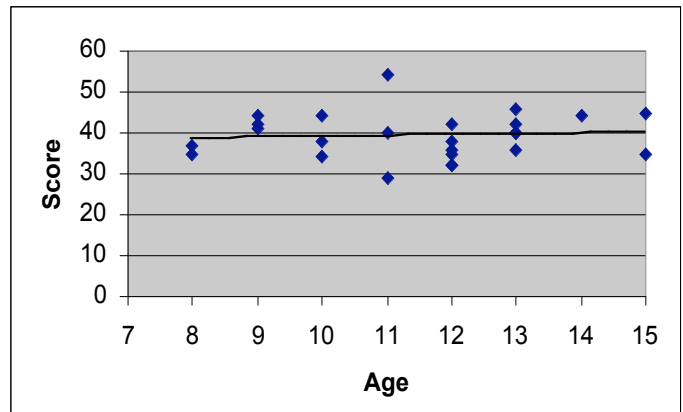


Figure 5 shows the distribution of depression scores between the two genders ( $p= 0.708$ ). The figure also shows that the high score was 54, however this point was not high enough to reach the cutoff score of the questionnaire. The mean score for the male participants was 39.88, and the mean score for the female participants was 39.00. T-tests showed no statistical difference in scores between males and females.

**Figure 5: Comparison of Male and Female Scores**

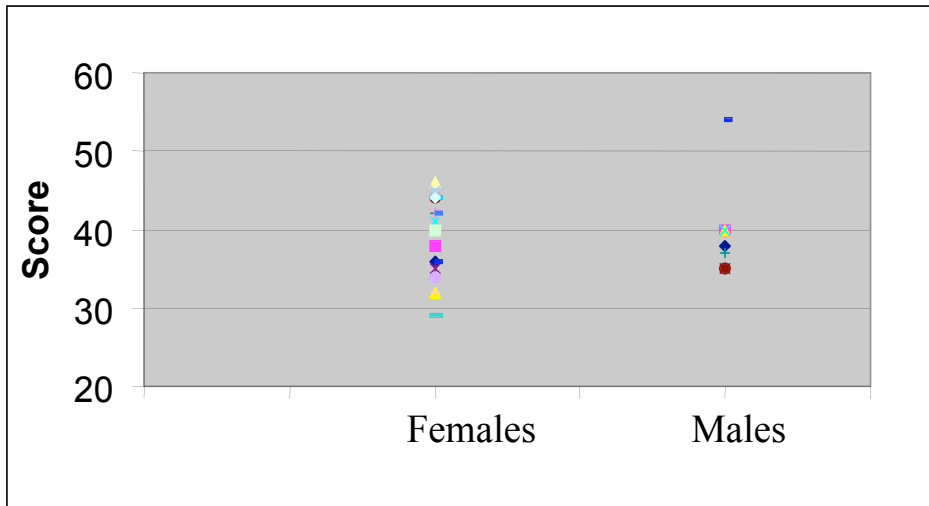


Figure 6 (next page) shows the correlation between the depression scores and duration of diabetes. The mean score for subjects whose diagnosis date was six months or more before the date of the health fare was 39. The mean score for subjects whose diagnosis date was less than six months before the date of the health fare was 41. The difference was not statistically significant ( $p = 0.714$ ).

**Figure 6: Correlation Line of Score vs. Duration**

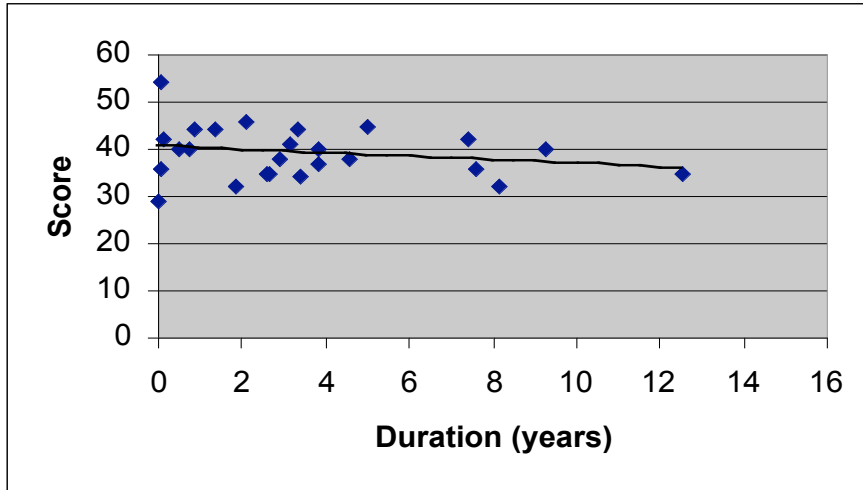
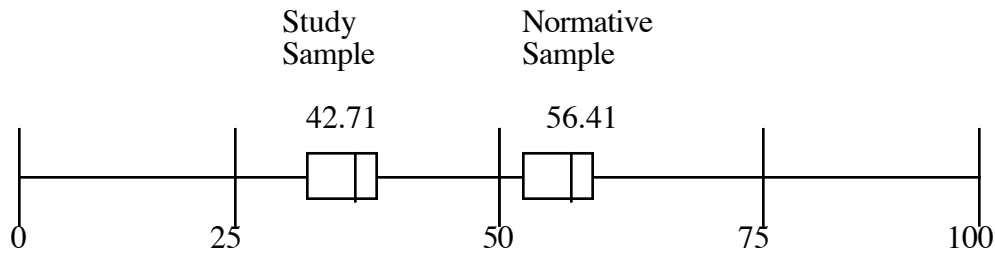
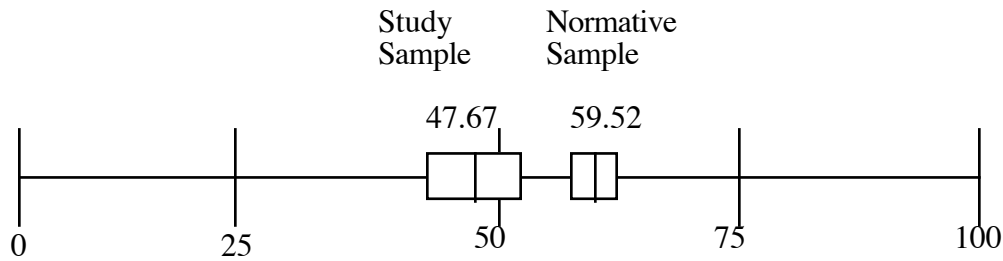


Figure 7 and 8 (next page) show the mean of the normative sample depression scores and the sample scores from the project. For both children and adolescents, the normative mean score was higher than the mean scores from the project. The box in which the mean scores are reported is called the 95% confidence interval (CI). This means that 95% of the time the average score will fall in the range of the two numbers making up the ends of the box. For the sample of children in the project, the CI was 39.44-45.97 compared to the normative sample (55.79-57.03). In Figure 8 for the study sample of adolescents, the CI was 43.23-52.10, which was compared to the normative sample of adolescents CI of 59.21-59.84. The number of participants for the normative sample of children and adolescents was 1,620 and 9,052. The number of participants in this project was 17 children and 9 adolescents. In both cases, the study sample scores are significantly different from the normative sample scores, since the confidence intervals do not overlap.

**Figure 7: Comparison of this Study and the Normative Sample (Children ages 8-12)**



**Figure 8: Comparison of this Study and the Normative Sample (Adolescents ages 13-18)**



### **Discussion**

The first hypothesis, which was that children and adolescents who took part in the study would have higher average scores for depression than children and adolescents on whom the questionnaires were validated, was not proven. The children and adolescents who took part did not have a higher average score than the children and adolescents on whom the questionnaires were validated. The mean for the normative sample was 13.7 points higher than the mean for this project. The number of subjects who participated in the study was far lower than the normative sample. There were specific sample characteristics shown by subjects who participated, which may not be true of children and adolescents in the general population. All children and adolescents were motivated enough to attend the School Health Fair. There was at least one parent with each subject as well. Some parents observed their child or adolescent while he or she were completing the questionnaire, and this could have influenced the child or adolescent to answer the question differently than they would have if their parents had not been present.

The normative sample also consisted of children and adolescents from a wide variety of socio-economic backgrounds. The children and adolescents who participated in the study all had diabetes, attended the health fair, and seemed to be managing their diabetes successfully. There was not a wide range of children and adolescents who participated in the project, which may have affected the results.

Regarding the second hypothesis, which was that children and adolescents were more likely to experience symptoms of depression after the first six months of diagnosis, there was a marginally significant negative correlation ( $p = 0.073$ ) between the duration the child or adolescent had diabetes and the depression score. The mean score for children and adolescents who had diabetes less than six months was slightly higher than the mean score for those whose diagnosis date was six months or more. However, these data were not significant and therefore did not prove the second hypothesis. Further studies including a larger sample size would be helpful in order to investigate this hypothesis.

The third hypothesis, which was that female subjects would have a higher average score for depression than the male subjects, was not proven. The males who participated had an average score of 40, and females averaged 39. The analyses comparing male and female scores showed no statistically significant difference. There were only eight males in the study; it is not known whether a gender difference would be found with a larger number of subjects. There were very few males between the ages of 8-18 who attended the school

health fair. Balancing the number of females and males who participated was a challenge. A valuable sub-study to this project would be to specifically examine children of varying ages to see if older children score higher for depression.

For future work, a larger sample size including varying socio-economic, gender, and race of participants would probably make the findings more generalized. Also, surveying outside of a fair designed to help the participants manage their diabetes would provide a more heterogeneous and representative sample for determining depression. A study such as this would best be conducted during a subject's clinical visit, and should therefore be conducted by pediatric health care professionals. Generally speaking, it seemed that the participants of this project were receiving great support for their disease. A longitudinal study designed to compare the depression scores of a population receiving therapy, with a population not receiving therapy would be an interesting follow up study. Such a study could possibly lead to improving therapy for children and adolescents with diabetes.

### **Acknowledgements**

I would first like to thank my young cousin Jack, whose diagnosis of diabetes was the primary instigator of my research. I have learned a great deal about diabetes, and this project is something I would not have done without him.

At the International Diabetes Center, Beth Schneider helped me a great deal as I learned about diabetes. She also introduced and set me up with Dr. Schafer. Dr. Schafer acted as my primary advisor. She helped me develop the idea for my project, gather the materials, write the proposal to the Institutional Review Board, and conduct the experiment. Because the project was with children, it was important for me to understand the importance of confidentiality, and Dr. Schafer helped me with this. She taught me about HIPPA and other important aspects of patient confidentiality. She also taught me about how children cope with diabetes and suggested theories that could specifically back up my project. Her constant willingness to act as not only my advisor but also as my teacher has made me truly grateful. Robyn Anderson helped me a great deal with data analyses. Using the complicated computer program SAS, Robyn and I did the analyses together, and she taught me specific points of the program. Robyn was consistently available for answering any questions I had. This aspect of her help I am very grateful for, she never allowed me to be lost in my project.

### **Works Cited**

1. At Health, Inc. (2003); see <http://www.athealth.com/Consumer/disorders/ChildDepression.html>.
2. B.J. Anderson, R.R. Rubin, Eds. *Practical Psychology for Diabetes Clinicians: Effective Techniques For Key Behavioral Issues*. (American Diabetes Association, Virginia, 2, 2001), ch. 22.
3. M. Kovacs, D. Goldston, D.S. Obrosky, L.K. Bonar, *Diabetes Care*. **20**, pp.36-51 (1997).
4. Anderson, R.J., Freedland, K.E., Clouse, R.E., and Lustman, P.J.: The Prevalence of Comorbid Depression in Adults With Diabetes: A Meta- Analysis. *Diabetes Care* 24, pp. 1069-1078, 2001.

5. W.M. Reynolds, *Reynolds Adolescent Depression Scale: Professional Manual*. (Psychological Assessment Resources, Inc., USA, 1987), pp. 5-6.
6. W. M. Reynolds, *Reynolds Child Depression Scale: Professional Manual*. (Psychological Assessment Resources, Inc., USA, 1989), pp.1-3, 7-11.