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What are the needs, factors, behaviors, and complications associated with
type 1 Diabetic Adolescent Females with Disordered Eating?

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Abstract

Eating disorders can be a potentially deadly disease that most commonly occurs among adolescent females in Western culture. They are marked by poor self-esteem and body image, as well as fear of gaining weight. Type 1 diabetes is a chronic disease in which a person's body lacks the ability to create and use insulin effectively. The management of type 1 diabetes involves daily management of food intake, blood sugar evaluation, and insulin injections. Unfortunately, insulin manipulation offers an easy way to purge unwanted calories and lose weight.

The purpose of this study was to understand what are the needs, factors, behaviors, and complications associated with type 1 Diabetic Adolescent Females with disordered eating. After a search of the most recent literature from 2004 to 2011, a total of ten quantitative articles were included in the literature review.

The findings of this literature review reveal a significant number of adolescent females with type 1 diabetes are manipulating insulin in order to lose or maintain weight; with the short and long-term consequences of insulin manipulation being deadly.

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Fortunately, there are specific screening tools available to Nurse Practitioners in order to properly screen for disordered eating among adolescent females with type 1 diabetes. The literature is lacking however, in effective treatment options for this group of adolescent females with type 1 diabetes.

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Introduction

Eating disorders in the United States are a common problem among adolescent females, in part because of developmental changes occurring in puberty and also because of western culture's drive for thinness (Ackard, D.M., Neumark-Sztainer, V.N., Schmitz, K.H., & Jacobs, H.P., 2008). Eating disorders are considered to occur along a spectrum of symptoms that include disordered eating behaviors as well as clinical eating disorders (Kelly, S.D., Howe, C.J., Hendler, J.P., & Lipman, T.H., 2005). There are three different categories of eating disorders: bulimia nervosa, anorexia nervosa, and eating disorders not otherwise specified (ED-NOS).

Adolescent females diagnosed with type 1 diabetes could potentially be at greater risk of developing an eating disorder for the following two reasons: body image discontent as a response to effective insulin treatment that can lead to weight gain, and constant focus on management of diet as a means to obtain metabolic control on a daily basis, resulting in a preoccupation with weight gain and food

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consumption (Ackard, D.M., et al, 2008). Type 1 diabetic adolescent females have the unique ability to control their weight by omitting or restricting insulin in their diet as a way to purge calories and lose weight. In order to maintain weight loss, a type 1 diabetic must maintain a state of chronic hyperglycemia which can have both short and long-term negative effects on a patient's health (Ackard, D.M., et al, 2008). Although insulin omission is considered to be a form of purging, the diagnostic criteria for adolescent females with type 1 diabetes varies when including insulin omission as a form of disturbed eating behavior or not (Ackard, D.M., et al, 2008). The current literature is inconclusive as to whether or not adolescents with type 1 diabetes are at greater risk for developing an eating disorder. Current estimates of individuals without diabetes who are diagnosed with an eating disorder are estimated to be between one and ten percent, mostly in Caucasian females (Kelly, S.D., et al, 2005), whereas rates of eating disorders among adolescent females with type 1 diabetes have been known to occur in as many as sixteen percent of individuals (Kelly, S.D., et al, 2005).

Whether or not adolescent females with type 1 diabetes are at greater risk for developing an eating disorder compared to those individuals without type 1 diabetes is not the question. What is most important is the fact that the combination of these two diseases could be disastrous in nature. This literature review aims to discover what are the needs, factors, behaviors, and complications associated with adolescent females with type 1 diabetes and disordered eating.

Identification of the Issue

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Type 1 diabetes is an endocrine disorder in which the person's own immune system attacks the pancreatic beta (B) cells and results in low insulin levels. Pancreatic B cells are cells within the pancreas that secrete the hormone insulin, they are also known as the islets of langerhans (Tortora, G.J., & Derrickson, B., 2009). Insulin's main job is to transport glucose into all the cells of the body in order to give each cell the energy to work. If insulin is unavailable, glucose remains in the bloodstream at high levels and spills into the urine. The person's body has no other option other than to resort to a second, less ideal form of energy. The body then breaks down fatty acids to create energy in the form of fatty acids and glycerol. With this type of breakdown, the fatty acids will release acids known as ketones into the bloodstream and then the urine. If the ketones continue to buildup, a deadly condition known as ketoacidosis can occur in which blood ph falls and death can ensue very quickly (Tortora, G.J., & Derrickson, B., 2009). Signs of ketoacidosis include: nausea, vomiting, stomach pain, sweet fruity smelling breath, and weight loss (Mayo Clinic, 2010). Many people who do not yet know they have type 1 diabetes may present to the clinic or emergency department near or at the stage of ketoacidosis. In fact, "the hallmark signs of diabetes are polyuria (excessive urine production), polydipsia (excessive thirst), and polyphagia (excessive eating)" (as cited in Tortora, G.J., 2009, p683).

Diagnosis for type 1 diabetes might include a random blood sugar (if the result is 200mg/dl or greater this is considered a diagnosis for diabetes), fasting blood sugar (if it is between 100-125mg/dl it is indicative of prediabetes and if it is greater than 126mg/dl it is considered diabetes), or a hemoglobin A1C (is the

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average blood sugar level over the past two to three months and considered the most accurate way to determine diabetes control). The healthcare provider can also screen for autoantibodies that are common in type 1 diabetes. The presence of ketones in the urine is also a sensitive indicator of type 1 diabetes (Mayo Clinic, 2010).

Once a person is diagnosed with type 1 diabetes, he or she and their family will meet with a diabetes educator to learn how to monitor blood sugar levels, take insulin, eat healthy foods, and exercise and maintain a healthy weight. Regular visits to the endocrinologist are required to continually monitor the control of the patient's diabetes by looking at hemoglobin A1C levels, taking urine samples, and following other types of blood work which monitor cholesterol levels, thyroid function, kidney function, and blood pressure (Mayo Clinic, 2010).

As mentioned above, without appropriate amounts of insulin either by organic or artificial means, the result will induce glucosuria (glucose is excreted through the urine and therefore large amounts of calories are also excreted) and allow a person to consume excess calories without resultant weight gain. (Kelly, S.D., Hendler, J.P., & Lipman, T.H., 2005). This is what gives adolescent females with type 1 diabetes the unique ability to lose weight, to *omit* or *restrict* insulin. Battaglia, et al (2006) considers *insulin manipulation* to be the umbrella term for the previous two terms and defines it as: "reducing or withholding the necessary amount of insulin the body requires" (p. 552). The term *diabulimia* is also well recognized in the

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diabetes community and identifies the practice of insulin manipulation among type 1 diabetics (Ruth-Sahd, et al, 2009).

According to the DSM IV-TR criteria for Eating Disorders (Table 1), insulin manipulation actually falls under the category for Bulimia Nervosa, although in the literature insulin manipulation is more commonly referred to as *disordered eating* (as in Criteria for Eating Disorder Not Otherwise Specified-ED-NOS) rather than a full-blown *eating disorder*. For the sake of this paper, the term *Disordered Eating* will be used when referring to an adolescent female with type 1 diabetes who displays any form of insulin manipulation or eating disorder.

Table 1 DSM IV-TR Criteria for Eating Disorders (Cleveland Clinic, 2011)
Box 1: DSM IV-TR Criteria for Anorexia Nervosa
Refusal to maintain body weight at or above a minimally normal weight for age and height: weight loss leading to maintenance of body weight <85% of that expected or failure to make expected weight gain during period of growth, leading to body weight less than 85% of that expected.
Intense fear of gaining weight or becoming fat, even though under weight.
Disturbance in the way one's body weight or shape are experienced, undue influence of body weight or shape on self-evaluation, or denial of the seriousness of the current low body weight.
Box 2: DSM IV-TR Criteria for Bulimia Nervosa
Recurrent inappropriate compensatory behavior to prevent weight gain: self-induced vomiting, misuse of laxatives, diuretics, enemas, or other medications (insulin), fasting, or excessive exercise.
The binge eating and inappropriate compensatory behavior both occur, on average, at least twice a week for 3 months.
Self-evaluation is unduly influenced by body shape and weight.

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The disturbance does not occur exclusively during episodes of anorexia nervosa.
Recurrent episodes of binge eating characterized by both:
Eating in a discrete period of time (e.g. within any 2-hour period), an amount of food that is definitely larger than most people would eat during a similar period of time and under similar circumstances.
A sense of lack of control over eating during the episode, defined by a feeling that one cannot stop eating or control what or how much one is eating.
Box 3: DSM IV-TR Criteria for Eating Disorder Not Otherwise Specified
For female patients, all of the criteria for anorexia nervosa are met except that the patient has regular menses.
All of the criteria for anorexia nervosa are met except that, despite significant weight loss, the patient's current weight is in the normal range.
All of the criteria for bulimia nervosa are met except that the binge eating and inappropriate compensatory mechanisms occur less than twice a week or for less than 3 months.
The patient has normal body weight and regularly uses inappropriate compensatory behavior after eating small amounts of food (e.g., self-induced vomiting after consuming two cookies).
Repeatedly chewing and spitting out, but not swallowing large amounts of food.

Literature Review

Search strategies used for this literature review included a CINAHL and MEDLINE search of English-language articles; that focused on eating disorders among adolescent females. The keywords used were *female, type 1 diabetes, adolescents, eating disorders, disturbed eating, and insulin omission*. Research studies

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published from 2004 to present, were examined. Ten quantitative studies met the criteria for inclusion in this review.

A review of ten research studies conducted regarding eating disorders among adolescent females with type 1 diabetes was examined. Three of the ten studies included a control group of adolescent females without diabetes (Ackard, D.M., Vik, N., Neumark-Sztainer, D., Schmitz, K.H., Hannan, P., & Jacobs, D.R. 2008; Colton, P., Olmsted, M., Daneman, D., Rydall, A., & Rodin, G. 2004; Smith, F., Latchford, G.J., Hall, R.M., & Dickson, R.A. 2008). Two of the studies found that significantly more diabetic than nondiabetic females were found to engage in disturbed eating behaviors such as binge eating, the use of intense and excessive exercise for weight control, and bulimia (8% of diabetic girls versus 1% of non diabetic girls)(Colton, P. et. al, 2004; Smith, F. et. al, 2008). Ackard, D.M., et al (2008) found that, overall, females with diabetes showed lower use of less extreme unhealthy weight control behaviors such as fasting, eating very little food, and avoiding meals than peers without diabetes ($p < 0.001$). There was no statistically significant difference ($p = 0.375$) between the control group and the diabetes group concerning the use of extreme unhealthy weight control behaviors such as vomiting, taking diet pills, laxatives, or manipulating insulin. However, 10.3% of the diabetic adolescents reported taking less insulin than was recommended as a way to control their weight. In addition, 45% of the females in this study who manipulated insulin reported being unhappy with their weight compared to 10.9% of those who did not reported being very unhappy or unhappy with their weight. Unfortunately, there

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was no statistical significance determined or p values interpreted in response to the insulin manipulation question.

Two longitudinal studies examined a group of adolescent females with diabetes and then conducted a follow up data collection between eight and twelve years later to determine clinical outcomes in relation to disturbed eating habits and attitudes (Goebel-Fabbri, A.E., Fikkan, J., Franko, D.L., Pearson, K., Anderson, B.J., & Weinger, K. 2008; Peveler, R.C., Bryden, K.S., Neil, A.W., Fairburn, C.G., Mayou, R.A., Dunger, D.B., & Turner, H.M. 2005). Goebel-Fabbri, A.E., et al, (2008) found that females who reported insulin restriction as a means of weight control in the first part of the study were more likely to report nephropathy and foot problems at the time of follow-up. In addition, they found insulin restriction also increased the risk of death during the 11-year study by 3.2 times ($p=0.05$). Thirty percent of the females reported insulin restriction during the first part of this study and also scored higher on measures of diabetes distress, fear of hypoglycemia, bulimia, and other eating disorder symptoms (Goebel-Fabbri, A.E., et al, 2008). Peveler, R.C., et al (2005) also found that 36% of female participants intentionally reduced or omitted insulin to control their weight. At the time of follow-up, 8-12 years later, 61% of participants with a history of disordered eating were still misusing insulin to control their weight. This study showed a statistically significant difference ($p<0.001$) in test scores concerning shape concern, weight concern, and dietary restraint among subjects with a history of insulin manipulation and those not manipulating insulin. As found in the study by Goebel-Fabbri, A.E., et al, (2008), there was also a statistically significant difference between disturbed eating habits and attitudes,

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insulin misuse, poor glycemic control, and the development of microvascular complications. ($p < 0.001$).

Battaglia, M.R., Ramin, A., Katte, H., Hall, P.L., & Lawrence, P.C., (2005) focused on disordered eating among adolescent females with type 1 diabetes using multiple daily injections (MDI) of insulin for glycemic control versus those who used continuous subcutaneous insulin infusion (CSII) as a means of glycemic control. Although findings between these two groups did not show a statistically significant difference ($p = .28$) in regards to disordered eating behaviors and attitudes, the MDI group showed poorer glycemic control in those individuals who were omitting insulin as a form of weight control compared to the CSII group in which no individuals were found to be omitting insulin. The CSII group also reported a higher quality of life and more self-efficacy in regards to their diabetes than did those in the MDI group.

Two studies investigated the use of two different screening tools used to evaluate disordered eating among adolescent females with type 1 diabetes (Markowitz, J.T., Lowe, M.R., Volkening, L.K., & Laffel, M.B. 2009; Markowitz, J.T., Butler, D.A., Volkening, L.K., Antisdel, J.E., Anderson, B.J., & Laffe, L.M.B., 2010). Markowitz, J.T., et al (2010) used three questionnaires: the Eating Disorder Examination Questionnaire (EDE-Q), Three-Factor Eating Questionnaire Cognitive Restraint (TFEQ-CR), and the Power of Food scale (PFS). Results of this study determined those adolescent females who ever reported being overweight revealed statistically significant more disordered eating behaviors on all three surveys. More

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importantly, the one question “Have you ever been overweight?” was able to identify female adolescents more likely to endorse disordered eating attitudes and behaviors in eating (Markowitz, J.T., et al, 2010). The study conducted by Markowitz, J.T., et al in 2009 used the Diabetes Eating Problem Survey (DEPS) to determine disordered eating among adolescent females with type 1 diabetes. The DEPS was originally created to assess disordered eating behavior among adults with type 1 diabetes; but the researchers of this study aimed to determine if it would be accurate in evaluating pediatric patients with type 1 diabetes. The results showed exceptional construct validity (multiple different questions and p score values) as well as external validity (multiple different questions and p score values). The benefits of this survey other than its validity and consistency are that it can be completed in 10 minutes during a routine clinical encounter.

A history of being overweight correlated positively to disordered eating among type 1 diabetic adolescent females. Grylli, V., Wagner, G., Hafferl-Gattermayer, A.H., Schober, E., & Karwautz, A. (2005); & Olmsted, M.P., Colton, P.A., Daneman, D., Rydall, A.C., & Rodin, G.M. (2008) determined that having a higher body mass index (BMI) or being overweight indicated a greater likelihood for disordered eating. Grylli, V. et al (2005) also found diabetic adolescents had less positive attitudes towards life, more problems, lower self-esteem, a higher depressed mood, and less joy in life than did the adolescents without eating problems and body image concerns. Olmsted, M.P., et al (2008) conducted a 2-year follow-up study of adolescent females with type 1 diabetes in order to determine the predictors of Disordered Eating Behaviors (DEB) among this population. Again,

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the findings were statistically significant ($p < 0.0001$) in determining that DEB were predicted by a higher BMI percentile, concerns about weight and shape, and lower self-esteem, as well as depressive symptoms after the 2-year follow-up.

The final study examined for this review focused on determining whether chronic medical conditions increase the likelihood of an eating disorder among female adolescents (Smith, F., Latchford, G.J., Hall, R.M., & Dickson, R.A., 2008). The researchers were interested in examining the rates of disordered eating in two separate chronic illnesses that somehow deform or disfigure the body (a curved spine in scoliosis and weight gain in type 1 diabetes) compared to rates of disordered eating among healthy female adolescents without disfigurement. Adolescent females with scoliosis, type 1 diabetes, and a control group of healthy adolescent females completed the Eating Disorder Examination Questionnaire, and had weight and BMI measurements taken. In comparison to the control group, females with diabetes were significantly more likely to engage in bulimia and binge eating, with a total of 27.5% of diabetic participants falling into this category. In addition, all of those participants who were categorized as overweight or obese in the diabetes group were also classified as pathological in regards to eating behavior.

Discussion of Findings

Although the research is still unclear whether or not type 1 diabetic adolescent females have a higher rate of eating disorders than those without diabetes, it is clear that a significant number of adolescent females are manipulating their insulin in order to lose or maintain weight. This is of most danger because of

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the short and long-term complications associated with insulin omission such as: ketoacidosis, poor metabolic control exhibited by an elevated hemoglobin A1C, increased risk of microvascular complications such as retinopathy and nephropathy, and an increased likelihood of death (Kelly, S.D., Howe, C.J., Hendler, J.P., & Lipman, T.H., 2005). Adolescents most at risk to misuse insulin are those who are or ever have been overweight, as well as those who use multiple dose injections to control blood glucose levels rather than an insulin pump. Fortunately, there are proper screening tools available to health care personnel in order to identify eating disorders specific to the type 1 diabetic population when working in primary care. Once identified, those adolescent females can receive appropriate intervention and treatment for their disease.

Counseling/Education/Implications for Practice

The most important aspect of counseling a diabetic adolescent female patient with a suspected eating disorder is to be able to communicate concerns about her state of health when seeing her in clinic. Because most patients will not be forthcoming with their eating disorder, the topic is the nurse practitioner's responsibility to address. A qualitative study conducted by Tierney, S., Deaton, C., & Whitehead, J. (2008) examined attitudes and practices of healthcare professionals towards people with type 1 diabetes that also exhibit disturbed eating. Unfortunately, those healthcare professionals participating in this study avoided the subject of disturbed eating or weight control unless they had a good relationship with the patient; mainly because they felt unskilled in this particular area. If this is

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the case with healthcare professionals, a screening tool such as the DEPS (Markowitz, J.T., et al, 2010) would not only be helpful in determining those females engaged in disturbed eating, but would also give the practitioner a tool to use in order to help guide them to the patients most likely requiring intervention.

The next step in counseling an adolescent female with disturbed eating is to help refer her to the appropriate programs such as cognitive behavioral therapy (CBT) or an eating disorders program in which she can begin to deal with her disease. Improvement in diabetes management will not happen until the appropriate treatment first begins for her eating disorder (Kelly, S.D., Howe, C.J., Hendler, J.P., & Lipman, T.H., 2005).

Adolescent females with type 1 diabetes engaging in disturbed eating need to be informed of the risks involved when these two diseases coincide. Such risks included in the patient's education should include information regarding poor glycemic control and the progression of microvascular and macrovascular complications, higher hemoglobin A1C levels leading to earlier than expected diabetes related complications, and cardiovascular disease risk being ten times more likely in patients with diabetes as compared to the population without (Ruth-Sahd, L.A., Schneider, M., & Haagen, B., 2009).

Adolescent females with type 1 diabetes need to be reminded that during puberty, their insulin requirements increase and glucose sensitivity decreases by one-third. Therefore, it is vital that females with diabetes are vigilant in checking

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their blood glucose levels frequently and administering insulin as required in order to keep their blood sugar levels stable.

Finally, it is important to educate the type 1 diabetic population of female adolescents that they are likely to have a higher body mass index (BMI) than those without diabetes because of the metabolic effect insulin therapy has on a person's body (Starkey, K., & Wade, T., 2010). This is particularly important to address in Western culture, where thin is the ideal and a higher BMI in this population may increase body dissatisfaction and the drive to be thin.

Important information for healthcare professionals to use in combination with surveys and physical measurements are "red flags" which may indicate to a practitioner that an adolescent female with type 1 diabetes has an eating disorder. These include: "lack of finger stick marks, lack of prescription refills for insulin, weight loss, spikes in hemoglobin A1C levels that do not match patient records, low self-esteem, poor body image, a flat affect, and depressed mood" (Ruth-Sahd, L.A., & Schneider, M., 2009, p152).

Despite the suggestions some research has made for methods of treatment for adolescent females with type 1 diabetes and an eating disorder, little has been done in this field to examine effective treatment and management of both diseases. The Tierney, S. et al study (2008) determined that psychologists and other experts in eating disorders did not necessarily have a good understanding of the problems of an eating disorder within the context of type 1 diabetes. In addition, no information was found during this review of the literature examining what

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Endocrinology recommends as the best method of treatment for these females. As with any eating disorder, it is recommended that a complete psychiatric evaluation be performed prior to any decisions made regarding in-patient versus outpatient services (Hasken, J., Kresl, J., Nydegger, T., & Temme, M., 2010). The psychiatric component of this disorder is vital in treatment because major depression is shown to occur in one out of every 5 people with diabetes (Kelly, D., et al, 2005).

Future research in this field needs to examine the most effective methods of treatment for this population of adolescent females. Both psychiatry and endocrinology need to work together in order to address both of these diseases; treating one and ignoring the other will not solve the problem.

Mandatory continuing education for Nurse Practitioners working in Primary care is necessary to assure all providers are aware of the dangers of insulin omission or underuse in this population, methods to screen for it, and proper referrals for treatment if an adolescent female with type 1 diabetes is found to have an eating disorder.

Future healthcare policy should include requirements for all primary care clinics to obtain specific health risk assessments for the type 1 diabetes population in screening for an eating disorder. Such screening tools would simply include the question "I take less insulin than I should" (Hasken, J. et al, 2010) to identify those at risk for disordered eating.

Internet Resources

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Sadly, a search of internet resources for both professionals and patients did not reveal much information regarding eating disorders among adolescent females with type 1 diabetes. The American Diabetes Association's website (www.diabetes.org) search engine spoke nothing of eating disorders among adolescents. The Juvenile Diabetes Research Foundation's website (www.jdrf.org) was a little more hopeful in that it had a section just for teens and a link to an article about Diabulimia. This website also had an online diabetes support team available. The National Eating Disorders website (www.nationaleatingdisorders.org) had no search engine and the tab for information and resources revealed nothing about type 1 diabetes. The American Psychiatric Association's (www.psych.org) search engine also did not find any information on type 1 diabetics and eating disorders. Finally, the American Psychological Association's (www.apa.org) search engine and web page also had no information on type 1 diabetics and eating disorders. The lack of information on these five websites reinforces the need for further research to help inform both the public and health care professionals of ways they can help those suffering from this potentially deadly disease.

Adolescent females with type 1 diabetes have the unique ability to control their weight through the use of insulin omission or under dosing of insulin. If this form of weight loss ensues, there will be detrimental effects on the short and long-term health of individuals endorsing this form of a disordered eating. Fortunately, with specific screening tools that assess eating disorders specific to type 1 diabetics, Nurse Practitioners can reliably determine those females at risk and in need of help for their disease.

References

Ackard, D.M., Neumark-Sztainer, V.N., Schmitz, K.H., & Jacobs, H.P. (2008).

Disordered eating and body dissatisfaction in adolescents with type 1 diabetes and a population-based comparison sample: comparative prevalence and clinical implications. *Pediatric Diabetes*, 9, 312-319.

American Diabetes Association. <http://www.diabetes.org>

American Psychiatric Association. <http://www.psych.org>

American Psychological Association. <http://www.apa.org>

Battaglia, M.R., Alemzadeh, R., Katte, H., Hall, P.L., & Perlmutter, L.C. (2006).

Brief report: disordered eating and psychosocial factors in adolescent females with type 1 diabetes mellitus. *Journal of Pediatric Psychology*, 31(6), 552-556.

Disordered Eating

Cleveland Clinic. (2011). DSM IV-TR Criteria for Eating Disorders.

<http://www.clevelandclinicmeded.com/medicalpubs/diseasemanagement/psychiatry-psychology/eating-disorders>.

Colton, P., Olmsted, M., Daneman, D., Rydall, A., & Rodin, G. (2004).

Disturbed eating behavior and eating disorders in preteen and early teenage girls with type 1 diabetes: a case-controlled study. *Diabetes Care*, 27(7), 1654-1659.

Goebel-Fabbri, A.E., Fikkan, J., Franko, D.L., Pearson, K., Anderson, B.J., & Weinger, K. (2008).

Insulin restriction and associated morbidity and mortality in women with type 1 diabetes. *Diabetes Care*, 31(3), 415-419.

Grylli, V., Wagner, G., Hafferl-Gattermayer, A., Schober, E., & Karwautz, A. (2005).

Disturbed eating attitudes, coping styles, and subjective quality of life in adolescents with type 1 diabetes. *Journal of Psychosomatic Research*, 59, 65-72.

Hasken, J., Kresl, L., Nydegger, T., & Temme, M. (2010).

Diabulimia and the role of school health personnel. *Journal of School Health*, 80(10), 465-469.

Juvenile Diabetes Research Foundation. <http://www.jdrf.org>

Kelly, S.D., Howe, C.J., Hendler, J.P., & Lipman, T.H. (2005).

Disordered Eating

Disordered eating behaviors in youth with type 1 diabetes. *The Diabetes Educator*, 31(4), 572-587.

Markowitz, J.T., Lowe, M.R., Volkening, L.K., & Laffel, L.M.B. (2009).

Self-reported history of overweight and its relationship to disordered eating in adolescent girls with type 1 diabetes. *Diabetic Medicine*, 26, 1165-1171.

Markowitz, J.T., Antisdel, J.E., Butler, D.A., Anderson, B.J., Volkening, L.K., & Laffel, L.M.B. (2010).

Brief screening tool for disordered eating in diabetes. *Diabetes Care*, 33(3), 495-500.

Mayo Clinic. (2010, November). *Type 1 diabetes*.

Retrieved from <http://www.mayoclinic.com/health/type-1-diabetes>.

National Eating Disorder Association. <http://www.nationaleatingdisorders.org>

Olmsted, M.P., Colton, P.A., Daneman, D., Rydall, A.C., & Rodin, G.M. (2008).

Predication of the onset of disturbed eating behavior in adolescent girls with type 1 diabetes. *Diabetes Care*, 31(10), 1978-1982.

Peveler, R.C., Bryden, K.S., Neil, A.W., Fairburn, C.G., Mayou, R.A., Dunger, D.B., & Turner, H.M. (2005).

The relationship of disordered eating habits and attitudes to clinical outcomes in young adult females with type 1 diabetes. *Diabetes Care*, 28(1), 84-88.

Disordered Eating

Ruth-Sahd, L.A., Schneider, M., & Haagen, B. (2009).

Diabulimia: what it is and how to recognize it in critical care. *Dimensions of Critical Care Nursing, 28(4), 147-153.*

Smith, F.M., Latchford, G.J. Hall, R.M., & Dickson, R.A. (2008).

Do chronic medical conditions increase the risk of eating disorder? A cross-sectional investigation of eating pathology in adolescent females with scoliosis and diabetes. *Journal of Adolescent Health, 42, 58-63.*

Starkey, K., & Wade, T. (2010).

Disordered eating in girls with type 1 diabetes: examining directions for prevention. *Clinical Psychologists, 14(1), 2-9.*

Tierney, S., Deaton, C., & Whitehead, J. (2008).

Caring for people with type 1 diabetes mellitus engaging in disturbed eating or weight control: a qualitative study of practitioners' attitudes and practices. *Journal of Clinical Nursing, 18, 384-390.*

Tortora, G.J., & Derrickson, B. (2009).

Principles of Anatomy and Physiology. Hoboken, New Jersey: John Wiley & Sons, Inc.