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Original Research

The Association between Body Mass Index and Physical Activity, and Body Image, Self Esteem and Social Support in Adolescents with Type 1 Diabetes

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ABSTRACT

Objective: To examine the associations between body mass index (BMI) and physical activity with body image, self-esteem and social support in adolescents with type 1 diabetes compared to adolescents without health conditions.

Methods: We studied 46 adolescents with type 1 diabetes and 27 comparison adolescents who provided self-reports of height and weight, which were used to calculate BMI z-scores. Participants also completed validated questionnaires that assessed physical activity, body image, self-esteem and social support.

Results: No significant group differences were found between adolescents with type 1 diabetes and comparison adolescents in terms of BMI and physical activity. Examination of group and gender revealed that higher BMI was significantly associated with a less positive body image in girls with diabetes only. Higher BMI was associated with poorer self-esteem and lower levels of social support in adolescents with diabetes, particularly girls. Higher levels of physical activity were not associated with a more positive body image and no significant associations were found between physical activity and self-esteem or social support.

Conclusions: BMI and physical activity levels of adolescents with type 1 diabetes do not differ from those of adolescents without diabetes. Higher BMI is associated with a less positive body image and poorer psychosocial outcomes, particularly in girls with diabetes. As body image concerns and various psychosocial factors could be precursors to the development of eating-disorder symptoms, future research in adolescents with diabetes with higher BMIs should examine the associations among these variables. Further, it is essential that research on body image take into account gender differences.

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R É S U M É

Objectif : Examiner les liens entre l'indice de masse corporelle (IMC) et entre l'activité physique, et l'image corporelle, l'estime de soi et le soutien social des adolescents souffrant de diabète de type 1 et des adolescents sans affections.

Méthodes : Nous avons étudié 46 adolescents atteints de diabète de type 1 et 27 adolescents témoins ayant fourni des auto-évaluations de leur taille et de leur poids, qui ont été utilisées pour calculer les écarts réduits de l'IMC. Les participants ont également rempli les questionnaires validés qui évaluaient l'activité physique, l'image corporelle, l'estime de soi et le soutien social.

Résultats : Aucune différence significative n'a été observée entre les groupes d'adolescents atteints du diabète de type 1 et d'adolescents témoins en matière d'IMC et d'activité physique. L'examen du groupe et du sexe a révélé qu'un IMC plus élevé était significativement associé à une image corporelle moins positive seulement chez les filles souffrant de diabète. Un IMC plus élevé a été associé à une estime de soi plus médiocre et à des niveaux plus faibles de soutien social chez les adolescents souffrant de diabète, particulièrement chez les filles. Des niveaux plus élevés d'activité physique n'ont été pas associés à une image corporelle plus positive, et aucun lien significatif n'a été observé entre l'activité physique et l'estime de soi ou le soutien social.

Conclusions : L'IMC et les niveaux d'activité physique des adolescents souffrant du diabète de type 1 ne diffèrent pas de ceux des adolescents ne souffrant pas de diabète. Un IMC plus élevé est associé à une

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image corporelle moins positive et des résultats psychosociaux plus médiocres, particulièrement chez les filles souffrant de diabète. Puisque les préoccupations liées à l'image corporelle et les divers facteurs psychosociaux pourraient être des précurseurs à la manifestation de symptômes du trouble de comportement alimentaire, de nouvelles recherches sur les adolescents souffrant de diabète et ayant des IMC plus élevés devraient examiner les liens entre ces variables. Par ailleurs, il est essentiel que les recherches sur l'image corporelle tiennent compte des différences entre les sexes.

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Introduction

Type 1 diabetes is one of the most common chronic health conditions of childhood (1). It is managed by an involved treatment regimen that strives to maintain healthy glycemic control so as to reduce the risk for short- and long-term medical complications. Intensified treatment protocols for type 1 diabetes have been found to result in weight gain, which may be distressing to adolescents. Studies have reported that youth with type 1 diabetes have higher body mass indexes (BMIs) compared to peers who do not have health conditions (2–5). The Diabetes Control and Complications Trial reported that 48% of adolescents with type 1 diabetes using intensive insulin therapy were overweight compared to 28% of adolescents using standard insulin therapy (5). Although intensive insulin therapy significantly reduces diabetes-related complications, adolescents with type 1 diabetes who have BMIs within the obese range may be at increased risk for heart and cerebrovascular disease associated with high blood pressure and high cholesterol levels (5,6).

Body image is defined as an individual's perspective and feelings about his or her body (7). Adolescence is a developmental stage in which body image is of particular concern, given the increased rate of eating disorders during this period (8). Higher BMIs have been associated with less positive body images in adolescents who do not have health conditions (9). Mixed results have been reported as to whether adolescents with type 1 diabetes have more body image concerns compared to adolescents without health conditions (8,10,11); however, adolescents with type 1 diabetes who have high BMIs may be at particular risk for body image concerns.

Studies that have examined the relationship between BMI and body image concerns in adolescents with type 1 diabetes are few. Meltzer and colleagues reported that higher BMI was a significant predictor of body dissatisfaction (a less positive body image) in both male and female adolescents with type 1 diabetes but that it was a more powerful predictor of body image in females (8). Higher BMI has also been associated with later development of disordered eating behaviours (e.g. intentional insulin omission to reduce weight) in adolescents with type 1 diabetes (12). Limited research has investigated the association between BMI and psychosocial factors such as self-esteem and social support. A study completed in Greece reported a slight (but not statistically significant) relationship between higher BMI and lower self-esteem (13). Examination of the research literature revealed no studies that have investigated the relationship between BMI and social support in adolescents with type 1 diabetes.

Physical activity is important to physical and emotional health (14). To the best of our knowledge, no studies have investigated the relationship between physical activity and body image in youth with diabetes. However, 1 study of adolescent girls who did not have health conditions found that BMI was a better predictor of body image than physical activity (15). Reviews of research that has examined the association between physical activity and psychosocial variables, such as self-esteem and social support, have reported that youth without health conditions who display higher physical activity levels report higher levels of self-esteem (14) and higher levels of social

support from parents and significant others (16). Research examining the interplay between physical activity and self-esteem in children and adolescents with type 1 diabetes has reported mixed results (13,17,18). One study found that higher levels of physical activity in youth with type 1 diabetes were associated with slightly higher self-esteem (13), whereas other studies have not found a significant relationship between physical activity and self-esteem (17,18). There is a lack of research into the relationship between physical activity and social support in adolescents with diabetes.

The main purpose of the present study was to investigate the relationships between BMI and physical activity and body image, self-esteem and social support in adolescents with type 1 diabetes compared to adolescents without diabetes. It was hypothesized that a higher BMI would be associated with a less positive body image, lower self-esteem and lower levels of social support. It was also hypothesized that higher levels of physical activity would be related to fewer body image concerns, higher self-esteem and higher levels of social support. A cross-sectional descriptive study using adolescents' self-reports on questionnaires was used to investigate the hypotheses.

In summary, there is a lack of research into the relationship between BMI and social support in adolescents with diabetes. Further, the associations between physical activity and body image and social support in adolescents with diabetes have not been investigated. Therefore, this study provides new information about the relationships among BMI and physical activity and body image, social support and self-esteem in adolescents with type 1 diabetes. Because adolescents with type 1 diabetes are at risk for developing eating disorders, a better understanding of the associations among these variables may assist us in identifying youth who may be at increased risk.

Methods

Participants

Adolescents 12 to 18 years of age were recruited from a pediatric hospital diabetes clinic. The clinic population is 49.8% female and 50.2% male. All participants had been diagnosed with diabetes for at least 6 months. Approximately 90% of the clinic population is Caucasian, and 10% are from other ethnic backgrounds. We randomly selected 300 adolescents with diabetes from the clinic database and approached them as potential participants. Of the group, 27 adolescent girls and 19 adolescent boys (mean age=15 years, SD=1.62) volunteered to participate in the study. Adolescents from the orthopedics clinic were chosen as a comparison sample because they were treated in the same hospital setting as the patients with diabetes but were not treated for chronic health conditions. These comparison adolescents had been seen for bone fractures and were no longer active patients. We contacted 400 potential comparison participants from the orthopedic clinic, and 27 adolescents, 13 girls and 14 boys, between 12 and 18 years of age (mean age 14.9 years, SD=1.64) volunteered to participate. These participants displayed no limitations in physical activity or ambulation at the time of participation. The majority of the comparison participants did not have chronic health conditions; however, 2 had

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