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Treating Mental Illness Among Diabetic Black Male Adolescents: A Review

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Abstract

Objective—To examine randomized controlled trials (RCTs) for treatment evidence for Black male adolescents suffering from comorbid mental illness and diabetes mellitus.

Method—A review of the studies published in English-language journals was conducted.

Results—We found no RCT focused on Black males with diabetes mellitus Type 2 (DMT2). However, we found RCT inclusive of Black male adolescents with diabetes mellitus Type 1 (DMT1). Multisystemic therapy appears to be the best supported overall treatment for DMT1 management and psychosocial functioning followed by an enhanced form of behavioral family systems therapy for diabetics. Metformin was the only treatment in this review noted for use within DMT2. Metformin and a nursing-based telephone case management intervention realized utility as secondary services.

Conclusions—There are gaps present for what effectively treats comorbid mental illness and DMT2 in Black male adolescents. For comorbid mental illness and DMT1, there are gaps in additional efficacious treatments, effectiveness across conditions, and effect duration beyond 24 months.

Keywords

mental illness; diabetes; Black male adolescents

The Centers for Disease Control and Prevention (CDC, 2015) reports as of 2012 that more than 21 million Americans were diagnosed with Type 1, Type 2, or gestational diabetes and another 8.1 million individuals suffering from prediabetes or diabetes mellitus Type 2 (DMT2) are estimated to be undiagnosed. Diabetes mellitus Type 1 (DMT1) is a condition where the body does not produce insulin. DMT2 is a form of diabetes where individuals have some production of insulin in their pancreas, but either does not produce enough and/or

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are unable to effectively utilize their insulin. Prediabetes is when an individual has some of the clinical symptoms of the condition but does not meet enough criteria for a full diagnosis.

Black Americans (Black) are disproportionately burdened by diabetes. Blacks have the second highest prevalence of diabetes for any racial/ethnic group at 13.2% (CDC, 2015). DMT2 prevalence will soon be the highest in Black adolescents because the rates have been rising since 2001 for this group, while other at-risk groups have remained constant (Dabelea et al., 2014). Imperatore et al. (2012) found the number of adolescents with DMT2 is expected to quadruple from 20,000 in the year 2010 to approximately 80,000 in the year 2050 and that the prevalence of diabetes will continue to rise in Black adolescents under the age of 20.

When the context of Black adolescent diabetes is viewed through the additional burden of co-occurring mental illness, the public health concern becomes even greater and warrants a holistic, calculated response. In the United States, one in five Black adolescents have been found to meet criteria for some mental health or substance use disorders (Byck, Bolland, Dick, Ashbeck, & Mustanski, 2013). Additionally, 12.1% had at least one mental health or substance abuse disorder, while 5.8% had between two and four (Byck et al., 2013). Black adolescents have also been found to be at the greatest risk of emotional/ behavioral disorder (Copeland, 2006). This disproportional burden of both mental illness and DMT2 in Black adolescents is a public health concern that must be actively addressed.

Physical health and mental health risk factors can accumulate to have devastating impact on the health of Black adolescents. The link between mental health and chronic disease has been well studied; revealing the negative impact that reduced mental health can have on people suffering from chronic conditions such as diabetes (Perry, Presley-Cantrell, & Dhingra, 2010). For example, in the United States, those with DMT2 have a 25% chance of also being comorbid with depression (Mental Health America, 2016). Even more striking is that depression impacts 70% of individuals dealing with complications from diabetes (Mental Health America, 2016). Clearly, this is a comorbid problem that worsens over time and requires effective interventions and even preventive measures. Yet, the literature is less clear on the experiences of Black adolescents comorbid with DMT2 and mental illness. The knowledge base is more limited for males in particular due to lower tendency to seek treatment for mental illness or chronic health conditions subjecting them to greater risk for poor outcomes (Griffith, Allen, & Gunter, 2011; Lindsey, Chambers, Pohle, Beall, & Lucksted, 2012).

Given the reported rise in diabetes prevalence for Black adolescents and the current estimates of Black adolescent challenges with diabetes and various mental illnesses, additional study of what are the known efficacious treatments is warranted. This systematic review will focus on literature detailing what behavioral, psychosocial, pharmacological interventions exist and which of these are efficacious for the treatment of these comorbid health conditions among Black adolescent males. We focus on the treatment literature for Black male adolescent because of the need to understand the health experience of boys and men due to their higher risk for poorer outcomes when in need of treatment for chronic physical (Nelson, 2002) and mental illnesses (Bains, 2014; Lau, Lin, & Flores, 2012).

Literature Review

Prior research is equivocal on the association between the experiences of being Black and the health condition of diabetes (Auslander, Thompson, Dreitzer, White, & Santiago, 1997; Nwobu & Johnson, 2007; Mayer-Davis et al., 2009; Vivian, Carrel, & Becker, 2011). In this article, Black describes the diverse groups of people of African descent linked by physical characteristics, culture, and/or racial stratification (Zuberi, 2001). The prior research illustrates a connection between a family history of DMT2 and increased insulin resistance of Black adolescents (Nwobu & Johnson, 2007; Rothman et al., 2008). Black adolescents are reportedly at increased risk of poorer outcomes from DMT2 due to medical indicators such as reduced metabolic control, being hospitalized more often for diabetic ketoacidosis, and missing more clinic visits (Auslander et al., 1997). They also suffer from more diabetes risk factors such as being overweight or obese (Janicke, Harman, Kelleher, & Zhang, 2008; Lewis-Moss, Paschal, Redmond, Green, & Carmack, 2008; Nwobu & Johnson, 2007; Rodriguez-Santos, Berry, & Grey, 2005; Rothman et al., 2008; Thompson & Barksdale, 2010; Vivian et al., 2011) and complications due to DMT2 (Auslander et al., 1997; Nwobu & Johnson, 2007; Vivian et al., 2011) including more emergency room utilization (Rothman et al., 2008; Vivian et al., 2011) and greater levels of mortality (Auslander et al., 1997). Additional negative outcomes include higher levels of insulin therapy (Rothman et al., 2008), increased insulin resistance (Gellar, Schrader, & Nansel, 2007; Nwobu & Johnson, 2007; Rodriguez-Santos et al., 2005), raised hemoglobin A1c (Auslander et al., 1997; Mayer-Davis et al., 2009), decreased high-density lipoprotein, higher low-density lipoprotein, and elevated triglycerides (Mayer-Davis et al., 2009).

The relationship between DMT2 and mental illness is further complicated by the documentation of certain psychiatric medications producing side effects such as weight gain, obesity, and diabetes (Constantine & Tandon, 2008; Levitt-Katz et al., 2005; Weber, Cowan, Millikan, & Niebuhr, 2009). Risk factors for DMT2 like obesity are known to have psychosocial effects including altered body image, lower self-esteem, and greater depression in Black adolescents (Grey et al., 2004; Janicke et al., 2008; Rodriguez-Santos et al., 2005). Psychiatric conditions like depression and schizophrenia are linked with obesity (Levitt-Katz et al., 2005), increased Body Mass Index, and higher fasting insulin levels in adolescents (Jaser, Holl, Jefferson, & Grey, 2009). Depressive symptoms among children and adolescents (10–15 years) in an ethnically diverse sample that was 47% male and 48.7% Black are also associated with lower physical activity levels, less confidence in maintaining a healthy diet, and diminished decision-making around health behaviors (Jaser et al., 2009), which further exacerbates DMT2 outcomes such as poorer blood sugar control. Furthermore, in an ethnically diverse sample of youth including 37% males and 79% Black American, one of every five youth was found to have a mental disorder at their first presentation of diabetes (Levitt-Katz et al., 2005).

Moreover, with respect to DMT2, an astounding 35.6% of adolescents also had psychiatric disorders (Janicke et al., 2008). However, as recent as 2008, there were still scant data on the rates of psychiatric conditions in adolescents with DMT2 (Janicke et al., 2008). This is problematic since we have learned that increased mental illness is associated with reduced adherence to treatment advice, poorer diet, and lessened physical activity (Janicke et al.,

2008). These conditions contribute to a vicious cycle of comorbidity that is difficult to disentangle and intervene upon. Information on what treatments work best for these comorbid conditions in Black adolescents is needed.

Purpose of the Present Study

The objective of this study is to review the English-language published research on treatment for comorbid mental illness and DMT2 within the Black male adolescent population. Black male adolescents are focused on in this review because Black males have the most excess death of all racial/ethnic groups that increases with age (Thorpe, Richard, Bowie, LaVeist, & Gaskin, 2013). Moreover, Black males endure a higher burden of increased morbidity, earlier onset of disease, more advanced illness, and earlier mortality than any other male group in the United States (Thorpe et al., 2013). Black male adolescents can be reluctant to share issues with mental illness with their peers, are unlikely to receive immediate familial support to enter formal treatment, and are often under the radar of mental health and other professionals in their social ecology (Lindsey et al., 2006). Even when Black adolescents receive services, many terminate from services early or fail to complete the planned treatment (Copeland, 2006). Given these realities of Black male adolescents and the need to respond to growing physical health and mental health issues within this population, this study was undertaken.

The question guiding this review was: What treatments are the most effective for Black adolescent (ages 12–19) males suffering from comorbid mental illness and DMT2?

Method

EbscoHost, ProQuest, SCOPUS, and Web of Science were searched up until November 12, 2015, using the following terms, searching under the filters of abstract OR subject OR title within EbscoHost, ProQuest, and SCOPUS. These four databases were searched because they include additional primary databases. MEDLINE including PubMed, PsycINFO, and Social Work Abstracts are included within the EbscoHost database. Sociological Abstracts is included within ProQuest. The filter “Topic” encompasses abstract OR subject OR title for the Web of Science database. This search was segmented into four larger search topics: Black, randomized controlled trial (RCT), diabetes, and mental illness. Each search topic was compiled to be as comprehensive as possible with the aforementioned terms.

Under each of these larger research topics the following were searched using these specific search terms:

The Black terms were searched as “black” OR “blacks” OR “african american*” OR “african-american*.”

The RCT terms were searched 3 times as to not overload the system and were separated to encompass the varied terms used for RCT and later connected via an OR search. The first and second RCT term searches were separately searched as (1) “randomi* control* trial*” OR “randomi* clinical trial*” OR “randomi* trial*” and (2) “rct.” The third RCT searches had to be individualized to the respective databases. Within Ebsco-Host, the RCT term was

“randomi* W10 trial*.” Within Pro-quest, the RCT term was “randomi* PRE/10 trial*.” Within Scopus, the RCT term was “randomi* PRE/10 trial*.” Within Web of Science, the RCT term was “randomi* NEAR/10 trial*.” Accordingly, these three separate terms for RCT were combined via the OR option creating a single RCT search term.

The diabetes terms were searched as diabet* OR “diabetes mellitus type 1” OR “diabetes mellitus type I” OR “diabetes type 1” OR “diabetes type I” OR wolfram* OR “diabetes mellitus type 2” OR “diabetes mellitus type II” OR “diabetes type 2” OR “diabetes type II.”

The mental illness terms were searched as “mental*” OR “psycholog*” OR “psychiatr*” OR “mood*” OR “behavior*” OR “distress.”

Upon creating these four larger search terms, the results were combined using the AND option: Black terms AND RCT terms AND diabetes terms AND mental illness terms. Only English-language publications and articles from scientific journals were included in our search results. All articles were examined for inclusion/exclusion criteria in order to limit the results that were used in the final analysis. Inclusion criteria were articles where there were Black adolescent population (ages 12–29) representation in the sample, a RCT study, diabetes treatment, and mental health treatment. The time and date limitations were 2000–2015. When review articles were located fitting all inclusion criteria, the original articles contained in the review were extracted for analysis as well.

Results

This initial search yielded 58 total results (see Figure 1). The four inclusion criteria were applied during a full review of each article. There were 41 articles excluded from the final analysis due to not meeting full inclusion criteria. One article fulfilled full inclusion criteria, but only included two Black participants total between the ages of 18 and 59 years in addition to having a lower age limit of 28 years in their sample. Since the study did not present data in a form enabling the identification of participants by age and racial/ethnic identity and the best-case scenario was to obtain unrepresentative results for Black male adolescents, this article was excluded. Therefore, 15 articles were included for the final analysis (see Table 1). Nine of the 15 articles were related to a single-parent study using the same data. A different 4 of the 15 articles were also related to a single-parent study using the same data. There were only four unique control trial studies located on this topic.

The 15 articles were reviewed in full by two independent, secondary reviewers in addition to the primary reviewer for validation of inclusion criteria and the extraction of relevant information. Each of the studies included in the final review was comprised of sizable representation of Black and male adolescents enabling the results to be interpreted as effective for the population of interest.

There were no studies found in this review that reflected treatment for comorbid DMT2 and mental illness. Three of the unique studies examined participants with DMT1 and psychosocial functioning issues. One of these studies opened their recruitment to individuals with either DMT1 or DMT2 but failed to enroll or report on any DMT2 findings. The fourth unique study mentioned that the intervention under current investigation had been used

previously in populations suffering from DMT2. Although the treatments found focused on DMT1, this review will still report on their utility.

The treatments mentioned in this review literature included two systemic therapies: multisystemic therapy (MST) and behavioral family systems therapy (BFST) including a modified BFST for diabetics (BFST-D), a nursing-based education (ED) and telephone case management (TCM) intervention, and a pharmacological treatment (Metformin).

Systemic Therapy Intervention

MST demonstrated the ability to reduce hospital admissions realizing medical cost savings (Ellis, Naar-King, et al., 2005; Ellis, Frey, et al., 2005b; Ellis et al., 2004; Ellis et al., 2008; Ellis, Templin, Naar-King, Frey, & Cunningham, 2007), lower diabetes-related distress, and increase regimen adherence (Ellis, Frey, et al., 2005a; Ellis, Templin, Naar-King, Frey, & Cunningham, 2007). MST showed that it improves blood sugar testing (Ellis, Frey, et al., 2005b; Ellis et al., 2004; Ellis, Yopp, et al., 2007) though one study found this effect in single-parent homes only (Ellis, Yopp, et al., 2007). Cakan, Ellis, Templin, Frey, and Naar-King (2007) reported that the ability of MST to improve blood glucose testing has also been linked to improving blood sugar levels of adolescents despite weight categorization (normal vs. overweight). However, normal weight youth improve at much greater levels. MST was demonstrated to improve metabolic control (Ellis, Frey, et al., 2005b; Ellis, Naar-King, et al., 2005; Ellis et al., 2004; Ellis, Templin, et al., 2007; Ellis, Yopp, et al., 2007). Blood sugar testing mediated metabolic control in this study (Ellis, Yopp, et al., 2007). Within two-parent homes, MST only produced increased support from both caregivers. MST was also shown to reduce parental overestimation of adolescent responsibility for diabetes management (Naar-King, Ellis, Idalski, Frey, & Cunningham, 2007).

Additionally, MST is a treatment that appears to be effective regardless of the age, ethnicity (Ellis, Frey, et al., 2005b; Naar-King et al., 2007), or gender of the adolescent (Ellis, Frey, et al., 2005b). In contrast to the differential finding based on single-parent households versus two-parent households (Ellis, Frey, et al., 2005b), another analysis concluded that there was no difference by family composition (Naar-King et al., 2007). MST delivered clinically significant, improved results over all forms of control group interventions consisting of standard care (SC) in health-care settings. Moreover, MST different effects seem to present and sustain at various time points between 3 and 24 months. MST suggests the longest potential efficacy of all treatments in this review.

BFST-D demonstrated the ability to lower negative communication and increase positive communication between adolescents and mothers, lower negative reciprocity and increased positive reciprocity, and increase problem-solving and problem resolution (Wysocki et al., 2008). Additionally, BFST-D lowered average blood sugar levels, increased treatment adherence (Wysocki et al., 2007), and lowered family conflict (Wysocki et al., 2006). The unmodified version of BFST lowered diabetes-specific conflict and improved parent–adolescent relationships (Wysocki et al., 2000). BFST had no effect on treatment adherence. Contrarily, BFST-D demonstrated treatment effects at 6-, 12-, and 18-month follow-up.

Nursing-Based Intervention

Another type of intervention that is designed around additional social and educational support has been implemented in the medical sector, specifically within nursing. Howe et al. (2005) reported on a nursing-based intervention of combined ED and TCM as compared to ED alone and SC. SC was typically a 30-min visit with a nurse practitioner or endocrinologist every 3 months. The ED intervention included SC plus a onetime education session by a master's-prepared nurse to provide families with basic skills for diabetes management (Howe et al., 2005). The ED and TCM group received SC and the ED intervention in addition to weekly telephone calls for 3 months or the first clinic visit followed by a call every 2 months from the study coordinator. The only significant finding was that ED and TCM combined increased treatment adherence for all, including Black male adolescents. This effect held at 6-month follow-up.

Pharmacological Intervention

Klein, Cottingham, Sorter, Barton, and Morrison (2006) conducted an RCT of Metformin treatment for adolescents being treated with atypical antipsychotic therapies for mental illness. Twenty youth (60% male and 40% Black) received placebos while 18 (50% male and 22% Black) received Met-formin as a treatment. Thirty-two percent of this sample was Black adolescents. This study found that Metformin had no adverse reactions, could abate weight gain, reduce insulin resistance, and improve sugar metabolism in adolescents treated with atypical antipsychotic therapies for mental illness. All of the effects were sustained at 8 weeks while the weight abatement was sustained at 16 weeks and initiated at 4 weeks. This intervention was effective for all participants across ethnic categories and sexes, including Black male adolescents. These interventions are important in the management of comorbid mental illness and diabetes for a variety of reasons and provide the field with directions for advancement of health care for Black male adolescents. Although promising, the small sample size overall and even smaller number of Black adolescents represented restrict the interpretation of this treatment's effectiveness.

Discussion

We found scant treatment evidence for comorbid mental illness and DMT2. All of the treatment studies located focused exclusively on individuals with DMT1, except for some background information provided on the pharmacological intervention of Metformin (Klein et al., 2006). The search terms specifically included multiple terms that should have located studies with individuals with DMT2 in the sample. Given the robustness of the search terms with respect to diabetes, it is possible to infer that there have been no studies specifically examining Black male adolescents and comorbid mental illness DMT2 published in English-language journals. This is a gap that would make a contribution to the field if it were to be filled. The remaining studies provided information on successful treatments with DMT1 and psychosocial issues that warrant incorporation into the knowledge base of researchers and practitioners that work to improve the comorbid physical and mental health conditions of Black male adolescent males.

Systemic therapies, nursing-based ED and TCM, and pharmacological treatment (Metformin) are the approaches found in this review for treating Black adolescent males experiencing diabetes-related issues and psychiatric symptomatology as described above in the Results section. Systemic therapies are treatments derived from an ecological viewpoint versus an individual stance and with roots in family therapy (Retzlaff, Von Sydow, Beher, Haun, & Schweitzer, 2013; Shields, Finley, Chawla, & Meadors, 2012). The ecology can include family, friends, professionals, neighbors, or anyone invested in the health and well-being of the adolescent.

Of the systemic therapies, MST seems to be the best treatment for Black male adolescents coping with diabetes and mental illness-related distress. MST helps participants medically by supporting them to better adhere to treatment (Ellis, Frey, et al., 2005a; Ellis, Templin, et al., 2007), increase blood sugar testing (Cakan et al., 2007; Ellis, Frey, et al., 2005b; Ellis et al., 2004; Ellis, Yopp, et al., 2007), maintain lower levels of blood sugar (Cakan et al., 2007), and gain overall improved metabolic control (Ellis, Naar-King, et al., 2005; Ellis, Frey, et al., 2005b; Ellis et al., 2004; Ellis, Templin, et al., 2007; Ellis, Yopp, et al., 2007). It also supports them psychosocially by reducing diabetes-related stress for adolescents and parents who may promote increased mental health functioning (Ellis, Frey, et al., 2005a). MST is a powerful tool for managing complex comorbid mental illness and diabetes in Black male adolescents.

MST is also an optimal treatment because it demonstrates cost-effectiveness via reduction in hospital admissions. This makes the treatment beneficial to adolescents, caregivers, providers in multiple sectors, and society at-large. Additionally, MST is versatile and has the ability to be effective across adolescents with heterogeneous individual-level and family-level characteristics. This verifies its usefulness with this review's population of focus. However, it is an optimal treatment within specific conditions including normal weight adolescents and/or families with two parents involved in treatment. Practitioners should be mindful of its additional potential to positively impact under these conditions, especially if service capacity is limited. Furthermore, best practice for comorbid mental illness and diabetes may require adolescents to achieve healthy weight-level goals prior to or at the start of intensive psychosocial and diabetes-related treatment.

The studies found in this review focused on an urban population of adolescents only. Comparison studies would need to be conducted and/or located in a future review to ascertain the generalizability of MST across community-level characteristics. There were conflicting findings on MST's impact across family composition. Further study is needed to clarify what additional mechanisms are influencing the treatment effects in the family context. Finally, though MST has some efficacy up to 24 months of time, this was not true for all of its benefits. Studying what factors influence and how to increase the duration of effectiveness across treatment benefit would be valuable.

BFST-D is another effective treatment option that realizes treatment effects at the end of treatment, 6-month follow-up, and 18-month follow-up. While both versions of BFST are effective in some ways, practitioners can achieve improved results with their comorbid mentally ill and diabetic patients by using the BFST-D, especially related to treatment

adherence. BFST-D also impacted adolescents medically (Wysocki et al., 2007) and psychosocially (Wysocki et al., 2006; Wysocki et al., 2008; Wysocki et al., 2000). BFST-D was not effective at improving communication between adolescents and fathers. This is an area that warrants additional study. BFST-D was also more effective in adolescents with higher average blood sugar levels. Practitioners dealing with chronically ill diabetic adolescents comorbid with mental illness should consider this as a best-practice approach to treatment.

Although proven effective, BFST-D and MST treatment results were obtained from samples of adolescents with poor control of their blood sugar. Additional study would be beneficial to understanding the impact of this treatment on additional profiles of the Black adolescent population. In other words, the current prerequisites for services like MST and/or the intensive focus on adolescents with poor blood sugar control may be a barrier to effective service access to adolescents at risk of diabetes and mental illness or suffering from it at lower clinical levels. In order to establish generalizability of systemic treatments for Black male adolescents, there is a need for exploration of treatment effect upon the within-group diversity present in the Black male adolescent population.

The nursing-based intervention of combined ED and TCM yielded increased treatment adherence that maintained up to 6 months. This makes it a complementary treatment that could be used in conjunction with other treatments like BFST (since it did not support treatment adherence). However, it does not seem to offer enough benefit for a practitioner to pursue this treatment approach alone. Further research is needed to see how long the treatment effect can be sustained and if additional benefit can be derived. Evaluation of its effectiveness combined with added treatment approaches would also be valuable to the field.

There was one pharmacological treatment (Metformin) found in this review used to treat patients suffering from mental illness requiring atypical antipsychotic medication (Klein et al., 2006). Metformin is effective at preventing risk factors of diabetes including excessive weight gain, lower insulin sensitivity, and irregular sugar metabolism. Therefore, this treatment has application as a preventive intervention and as a reactive intervention. There is a need for more exploration of additional psychological and pharmacological treatment interventions for those suffering from comorbid diabetes and psychological distress. There were four Black adolescents in the treatment condition and eight Black adolescents in the control condition. This small sample size of Black adolescents is cause to accept cautiously these results for the application to Black male adolescents specifically until larger-scale replication can be performed.

Social work research professionals did not appear to author any of the final articles included in this study. This is a point of emphasis as social workers are the largest contributors of mental health care in the United States (National Association of Social Workers, n.d.), and they may offer a valuable, additional perspective on Black male adolescents dealing with mental illness and diabetes treatments and may be a resource that may be further utilized in investigating, understanding, and treating issues for Black male adolescents suffering from comorbid mental illness and DMT2.

Conclusion

This review has found that the available English-language journal literature discusses approaches to treating Black adolescent males with comorbid diabetes and mental illness health concerns that include systemic therapies, a nursing-based intervention, and a pharmacological treatment (Metformin). The available scientific knowledge on what works for the wide within-group diversity of Black adolescent males' health with respect to diabetes and mental illness is insufficient for guiding clinical treatment. This knowledge gap is even more apparent for DMT2 and comorbidity with mental illness. There is a need for more research with various Black male adolescent population profiles, which examines the development of and testing of more interventions, and to determine whether full treatment effects can be sustained (e.g., up to and beyond 24 months).

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Figure 1.
Flow diagram of diabetes and mental illness studies: Exclusion and inclusion.

Table 1

Mental Illness and Diabetes Systematic Review Article Overview.

Author (Year)	Intervention	Demographics	Outcomes	Effect Size/Duration	Did It Work for Black Male Adolescents?
Systemic therapy					
Ellis, Frey, et al. (2005b); Ellis, Naar-King, et al. (2005); Ellis et al. (2008); Ellis, Templin, et al. (2007); Ellis, Yopp, et al. (2007)	Multisystemic therapy (MST); Intensive home-based psychotherapy	<i>N</i> = 127 Age = 10–17 years <i>M</i> (age) = 13.2 ± 2 Black = 63% Male = 49%	Lowered hospital admissions Cost savings Increased support from caregivers in two-parent households, improved blood sugar testing (BGT) and metabolic control (MC) in single-parent households BGT mediated metabolic control in single-parent households Lowered diabetes-related distress Increased regimen adherence and metabolic control Effective across all ages, genders, and ethnicities	0.31 at 6 months 0.27 at 12 months 0.23 at 18 months 0.23 at 24 months Decreased HbA1c = 92 Decreased diabetes-related distress = 13% Increased metabolic control = 0.61 (intent to treat)/0.77 (per protocol)	Yes, the treatments improved psychosocial functioning and diabetes-related management
Ellis, Frey, et al., (2005a); Ellis et al. (2004)	MST: Intensive home-based psychotherapy	<i>N</i> = 127 Age = 10–17 years <i>M</i> (age) = 13.2 ± 2 Black = 63% Male = 49%	Increased MC Lowered hospital admission No effect on emergency room visits Increased BGT	0.8 at 3 months Reduced cost (.68) Charges (.64) Direct hospital (.63) 3rd Party cost (.62)	Yes, the treatments improved psychosocial functioning and diabetes-related management
Cakan et al. (2007)	MST: Intensive home-based psychotherapy	<i>N</i> = 127 Age = 10–17 years <i>M</i> (age) = 13.2 ± 2 Black = 63% Male = 49%	Average blood sugar level decreased Increased BGT	0.91 in normal weight adolescents up to 24 months 0.20 in overweight adolescents up to 24 months	Yes, the treatment improved diabetes-related management
Naar-King et al. (2007)	MST: Intensive home-based psychotherapy	<i>N</i> = 127 Age = 10–17 years <i>M</i> (age) = 13.2 ± 2 Black = 63% Male = 49%	Lowered parental overestimation of adolescent responsibility in diabetes management Age, family composition, and ethnicity had no effect	Post-treatment and 12-month follow-up = 0.44	Yes, this intervention helped parents become more supportive of adolescents by reducing the overestimation of adolescent responsibility in their diabetes-related care
Wysocki et al. (2007); Wysocki et al. (2006); Wysocki et al. (2008)	Behavioral family systems therapy for diabetes (BFST-D)	<i>N</i> = 104 Age = 11–16 years Black = 30.6% Male = 55%	Lowered negative communication Increased positive communication Lowered negative reciprocity Increased positive reciprocity (PR) Increased problem-solving Increased problem resolution Lowered average blood sugar Increased treatment adherence	Effective at 6 months by 40–46%. The effect did not sustain at 12 or 18 months Effective at 6 months by 28–38%. The effect sustained at 12 or 18 months 6 months 12 months 18 months 6 and 18 months 7–8% at 6, 12, and 18 months 6, 12, and 18 months	Yes, overall treatment was effective at varying lengths of times up to 18 months for different outcomes
Wysocki et al. (2000)	Behavioral family systems therapy (BFST)	<i>N</i> = 119 <i>M</i> (age) = 12–16.75 years Black = 21%	Improved parent-adolescent relationship Lowered diabetes-specific conflict	.57 at 3 months 6–24% at 3 months	Yes, the treatment improved diabetes-related psychosocial functioning

Author (Year)	Intervention	Demographics	Outcomes	Effect Size/Duration	Did It Work for Black Male Adolescents?
Nursing-based intervention Howe et al. (2005)	Education and telephone case management	Male = 42% $N = 75$ $M(\text{age}) = 12.4 \pm 3.3$ Black = 36.5% Male = 55%	Increased treatment adherence	24% at 6 months	Yes, the treatment improved diabetes-related management
Pharmacological intervention Klein, Cottingham, Sorter, Barton, and Morrison (2006)	Metformin	$N = 38$ Age = 10–17 years Black: 11.5% Males: 74.9%	Abate weight gain Reduce insulin resistance Improve sugar metabolism No adverse reactions	4, 8, 16 weeks 8 weeks 8 weeks	Yes, the pharmacological treatment was beneficial in the management of diabetes-related risk factor (weight gain) in adolescents within mental illness treatment