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Beyond size and structure: how social network quality influences diabetes management self-efficacy in black/African American men

Tyler Prochnow[1,2,3] · Meg Patterson[1,3] · Jeong-Hui Park[1,2,3] · Ledric D. Sherman[1,2,3] · Matthew Lee Smith[1,2,3]

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Abstract

The quality of social connections plays a vital role in chronic disease management, particularly for populations experiencing health disparities in Type 2 diabetes (T2D) outcomes. This study examined the influence of social network characteristics on diabetes management self-efficacy among Black/African American men with T2D, a population experiencing significant health disparities. Using a national sample of 1225 Black/African American men, we investigated how network composition, support patterns, and perceived health behaviors within networks relate to diabetes self-efficacy. Results revealed complex relationships between social network characteristics and self-efficacy. Having highly supportive network members emerged as the strongest positive predictor of diabetes self-efficacy ($\beta = 0.27$, $p < 0.001$), followed by network members' perceived engagement in healthy eating ($\beta = 0.17$, $p < 0.001$). Having a higher proportion of friends in one's network was positively associated with self-efficacy ($\beta = 0.08$, $p = 0.005$), while having a higher proportion of infrequent contacts showed a negative association ($\beta = -0.15$, $p = 0.001$). Other network composition variables, including family relationships and healthcare provider presence, showed no significant associations with self-efficacy. Network structural characteristics, including size ($\beta = -0.01$, $p = 0.78$) and relationship heterogeneity ($\beta = 0.02$, $p = 0.49$), also showed no significant associations. These findings suggest that the quality and nature of social relationships, particularly the presence of highly supportive friends and those modeling healthy behaviors, may be more important than network size or composition in promoting diabetes self-efficacy among Black/African American men. Results indicate a need for interventions that focus on fostering quality friendships and encouraging regular contact within networks, while also leveraging the positive influence of health behavior modeling among network members.

Keywords Social networks · Diabetes self-efficacy · Black/African American men · Health disparities · Chronic disease management

Introduction

The prevalence and impact of Type 2 diabetes (T2D) continues to pose major problems for healthcare systems and communities across the United States. Current estimates indicate that over 130 million Americans are affected by diabetes or prediabetes, highlighting the substantial scope of this public health concern (Centers for Disease Control and Prevention (CDC), 2022). Within this broader context, Black/African American communities face a particularly pronounced burden of T2D and its associated complications. Research consistently demonstrates marked disparities in both diabetes diagnosis rates and health outcomes among Black/African American populations compared to other racial and ethnic groups (Beckles, 2016). Black/African American men are disproportionately affected by diabetes, as evidenced by higher age-adjusted death rates for hyperglycemic crises. Specifically, the mortality rate for hyperglycemic crises among Black/African American men was 45.8%, significantly higher than that of White men (25.7%), White women (13.7%), and Black/African American women (19.5%) (Centers for Disease Control and

✉ Tyler Prochnow
tprochnow@tamu.edu

[1] School of Public Health, Texas A&M Health Science Center, 212 Adriance Lab Rd., College Station, TX 77843, USA

[2] Center for Health Equity and Evaluation Research, Texas A&M University, College Station, TX 77843, USA

[3] Center for Community Health and Aging, Texas A&M University, College Station, TX 77843, USA

Prevention, 2010). This disproportionate impact of T2D on Black/African American communities manifests in multiple ways. Not only do Black/African American adults experience diabetes diagnosis rates approximately 60% higher than their non-Hispanic White counterparts, but they also encounter more severe health complications (Magliano et al., 2019). These complications frequently include serious cardiovascular conditions, reduced kidney function, and increased risk of lower-limb amputations, contributing to significant differences in health outcomes and quality of life (Powers et al., 2020). Understanding and addressing these disparities requires careful consideration of both clinical factors and the broader social context that influences diabetes management and health outcomes in Black/African American communities (Assari et al., 2020; Bhattacharya, 2024).

Among Black/African American populations, men face unique challenges in T2D management. Research indicates that Black/African American men are less likely to engage in preventive healthcare services, have lower medication adherence rates, and experience worse glycemic control compared to women and men from other racial/ethnic groups, respectively (Powell et al., 2016; Sherman & McKyer, 2015). These disparities are further compounded by socioeconomic factors, healthcare access barriers, and systemic inequities in healthcare delivery (Gilbert et al., 2016; Williams & Mohammed, 2013).

Self-efficacy and diabetes management

Within the context of these disparities, diabetes self-efficacy—one's confidence in their ability to manage their condition—emerges as a critical factor in successful disease management. The concept of self-efficacy encompasses not only an individual's belief in their capability to perform specific diabetes management tasks but also their perceived ability to overcome obstacles and maintain consistent care routines over time (Krichbaum et al., 2003). Research demonstrates that individuals with higher levels of diabetes self-efficacy typically show improved health outcomes across multiple indicators, including better glycemic control and higher rates of medication adherence (Karimy et al., 2018; Qin et al., 2020). These individuals also tend to engage more frequently in essential self-care behaviors, including regular blood glucose monitoring, proper foot care, and maintenance of healthy dietary practices (Jiang et al., 2019; Karimy et al., 2018). The relationship between self-efficacy and improved health outcomes has been consistently demonstrated across diverse populations and healthcare settings (Daniali et al., 2017; Slovinec D'Angelo et al., 2014). For Black/African American men specifically, building and maintaining self-efficacy carries particular significance given the unique barriers they face in healthcare settings and disease management (Powell et al., 2016; Sherman et al., 2019). These barriers often include limited access to healthcare resources, experiences of discrimination within healthcare systems, and structural, social, and cultural factors that may influence healthcare-seeking behaviors (Cheatham et al., 2008; Griffith et al., 2016; Hammond et al., 2010; Jiang et al., 2019; Peters et al., 2019; Powell et al., 2016). This suggests that interventions focused on enhancing self-efficacy must consider both individual capabilities and the broader social context in which disease management occurs (Jiang et al., 2019; Sherman & McKyer, 2015).

Social cognitive theory influences

Social Cognitive Theory (SCT) provides a comprehensive framework for understanding diabetes self-efficacy. According to SCT, self-efficacy develops through four primary sources: mastery experiences (personal success in managing diabetes), vicarious experiences (observing others' successful management), social persuasion (encouragement and feedback from others), and physiological states (physical and emotional responses to management tasks) (Bandura, 1997, 2001, 2002). The theory suggests that individuals actively construct their self-efficacy beliefs through cognitive processing and integration of information from these various sources, rather than passively receiving influence from their environment (Bandura, 2002). Additionally, SCT emphasizes that self-efficacy beliefs are domain-specific, meaning that an individual's confidence in managing diabetes may differ significantly from their confidence in other areas of their life, highlighting the importance of focused interventions for diabetes management (Bandura, 1997). Furthermore, the theory posits that these sources of self-efficacy operate interactively rather than in isolation, with social and environmental factors potentially enhancing or diminishing the impact of each source on an individual's overall self-efficacy development (Bandura, 2001). These sources of self-efficacy are deeply embedded within social contexts and relationships. SCT has been widely applied in health-related behavior change studies and serves as a key theoretical framework, particularly in health promotion programs and interventions targeting chronic disease management. For instance, one study demonstrated that self-efficacy in health behavior change are associated with improved health outcomes through systematic review and meta-analysis (Stacey et al., 2015). Furthermore, Islam and colleagues successfully enhanced the self-care capabilities of individuals with diabetes by promoting positive outcome expectations through interactions among individuals, environments, and behaviors, grounded in the principle of reciprocal determinism (Islam et al., 2023).

Social network influences on SCT

Social networks may influence many concepts in the SCT through various mechanisms that shape health behaviors and disease management. Network members can provide opportunities for vicarious learning through shared experiences with diabetes management, offer verbal encouragement and support, and help create environments conducive to successful management experiences (Perry & Pescosolido, 2015; Vassilev et al., 2014). Social support manifests in multiple forms within these networks, including emotional support through empathy and encouragement, instrumental support through tangible assistance with management tasks, and informational support through sharing knowledge and resources (Mohebi et al., 2018). These supportive interactions are enhanced by social influence processes, where network members' attitudes and behaviors regarding health management can shape an individual's own approach to diabetes care (Gatlin et al., 2017). Social norms within networks establish expectations and standards for health behaviors, potentially facilitating or hindering effective diabetes management, while social capital provides access to valuable resources and information that can improve management capabilities (Flôr et al., 2018; Perry et al., 2016). Additionally, networks provide social validation of management efforts, collective problem-solving opportunities, and shared accountability that reinforces positive health behaviors, creating a complex web of influence that can significantly impact an individual's capacity for and approach to diabetes self-management (Hunter et al., 2019; Schram et al., 2021).

Despite substantial research on social networks and health outcomes, studies specifically examining the relationship between social network characteristics and self-efficacy in diabetes management among Black/African American men remain limited. Available evidence suggests that the quality of social support rather than the quantity significantly influences diabetes self-efficacy and outcomes. Recent studies have demonstrated that satisfaction with diabetes-related support is more strongly associated with improved quality of life and glucose monitoring than the mere amount of support received (Bowen et al., 2015). Support from family members has shown mixed effects, with some research indicating it promotes disease management confidence while other studies suggest family support may sometimes undermine autonomy if perceived as controlling (Mayberry & Osborn, 2012; Wang et al., 2024). Healthcare provider relationships have shown inconsistent associations with self-efficacy, particularly among racial/ethnic minority populations where historical factors and communication barriers may influence provider-patient dynamics (Cheatham et al., 2008; Griffith et al., 2016). Research consistently demonstrates that interactions characterized by respect for autonomy, positive feedback, and non-judgmental assistance significantly enhance management confidence (Bowen et al., 2015). Furthermore, perceived health behaviors among network members strongly influence both self-efficacy and health behaviors through modeling and normative effects (Wang et al., 2024; Wu & Sheng, 2019).

The intersection of race, gender, and network influences on self-efficacy remains significantly understudied. While research has documented unique network characteristics among Black/African American communities and identified challenges to diabetes management among Black/African American men, few studies have specifically examined how these network characteristics influence self-efficacy in this population. Cultural factors, including masculine identity concerns and cultural norms within these networks, may shape how diabetes-related support is both provided and received (Griffith et al., 2016). Traditional masculine norms, which may emphasize self-reliance and stoicism, can interact with cultural beliefs about health and illness to influence how men engage with their social networks for diabetes management support (Griffith et al., 2016; Seawell et al., 2015). The intersection of race, gender, and network influences on self-efficacy remains significantly understudied; while research has documented unique network characteristics among Black/African American communities (Taylor et al., 2013) and identified challenges to diabetes management among Black/African American men (Sherman & Williams, 2018), few studies have specifically examined how these network characteristics influence self-efficacy in this population. The present study addresses this gap by examining specific relationships between network characteristics and diabetes self-efficacy among Black/African American men.

Study aims

This study examines how social network characteristics influence diabetes self-efficacy among Black/African American men with T2D. By applying social network analysis within a SCT framework, we seek to understand how different aspects of social relationships—including network size, composition, and interaction patterns—contribute to or detract from diabetes management confidence. This understanding is crucial for developing culturally informed interventions that effectively leverage existing social resources to enhance self-efficacy and improve T2D outcomes in this underserved population.

Methods

Study design and sample

This study employed a cross-sectional design using data collected via an online survey administered between February and June 2024. The internet-based survey assessed social network characteristics, diabetes self-efficacy, and related psychosocial factors among Black/African American men with T2D. A nation-wide United States based sample was obtained through Cloud Research recruitment panels; more information on Cloud Research and their online panel support can be found elsewhere (Hartman et al., 2023). Inclusion criteria were self-identification as Black/African American, male, age 21 years or older, self-reported T2D medical diagnosis, and residence in the United States. Potential participants were directed to a Qualtrics survey link and provided with an Institutional Review Board-approved information sheet. Participation was voluntary, and respondents could withdraw at any time. Three quality/attention checks were included to ensure data integrity, and respondents had to pass all checks to be included in the final sample (Curran, 2016). These questions involved having to respond in a specific way to reduce the chance of inattentive or careless responses. A total of 4184 individuals viewed the consent sheet and screening questions; however, 1,604 individuals were deemed not qualified based on inclusion criteria, 706 failed a quality check, and 649 were removed based on missing data. The final study sample consisted of 1,225 Black/African American men with T2D.

Measures

Social networks

Social network characteristics were assessed using a multiple name generator approach following the Arizona Social Support Interview Schedule (Barrera, 1980). The multiple name generator method systematically identifies meaningful social connections across different support domains by asking participants to name individuals who provide specific types of assistance (McCarty et al., 2019). Participants responded to four structured prompts designed to identify key network members: "Who gives you advice about important matters?", "Who do you confide in about personal concerns?", "Who provides practical help or assistance with daily tasks?", and "Who sometimes makes managing your diabetes more difficult?" This comprehensive approach captured both supportive and potentially problematic relationships. Participants could list the same individual across multiple prompts, with each unique person included only once in the final network roster. On average, participants identified 5.8 network members (SD = 4.3).

For each identified network member, participants provided detailed information across several domains. Network composition variables included relationship type, where participants categorized each network member as spouse, child, parent, sibling, friend, extended family member, healthcare provider, or other relationship. These were calculated as percentages of the total network (e.g., "Percent spouse" represents the proportion of network members identified as spouses). Specific relationship types were included because different relationships may provide unique forms of support that could influence management confidence, with research suggesting that particular relationships (e.g., spouses vs. friends) may differentially impact health behavior self-efficacy (Mayberry & Osborn, 2012; Nguyen et al., 2016). Due to the compositional nature of relationship type data (percentages summing to 100%), centered log-ratio transformations were performed on network composition variables prior to analysis, following established procedures for compositional data (Aitchison, 1982). This transformation addresses the constraints and dependencies inherent in these data while preserving relative relationship information. Participants also indicated whether each network member had been diagnosed with diabetes (yes/no/don't know), with results expressed as the percentage of network members with T2D, as shared disease experience may facilitate vicarious learning and enhance self-efficacy through modeling successful management behaviors (Bandura, 2001).

Network structure was assessed through two primary measures. Network size was calculated as the total number of unique individuals named across all prompts. Relationship heterogeneity was measured using a diversity index (calculated using Shannon's entropy formula) that captured the variety of relationship types present in the network, standardized to range from 0 (all network members share the same relationship type) to 1 (maximum diversity of relationship types) (Hausser & Strimmer, 2009). This measure was included because more diverse networks may provide complementary forms of support that collectively enhance diabetes management self-efficacy (Reeves et al., 2014).

Network interaction variables encompassed multiple aspects of communication and support. Contact frequency was measured by having participants rate how often they communicated with each network member using a six-point scale (5 = several times daily, 4 = once daily, 3 = 3–5 days weekly, 2 = 1–2 days weekly, 1 = less than weekly, 0 = never). From these ratings, we calculated "Percent talk less than once per week" (proportion of networks contacted infrequently) and "Mean communication frequency" (average contact frequency across all network members). These

measures were included because regular contact may facilitate ongoing support and reinforcement needed to maintain diabetes management confidence (Perry & Pescosolido, 2015). Diabetes-specific communication was assessed by having participants rate how often they discussed diabetes management with each network member on a five-point scale (5 = several times daily, 4 = once daily, 3 = 3–5 days weekly, 2 = 1–2 days weekly, 1 = less than weekly, 0 = never), aggregated as "Mean T2D communication frequency." This variable was included based on evidence that disease-specific supportive interactions may be particularly influential for developing management confidence through problem-solving and knowledge sharing.

Support quality was assessed by having participants rate how supportive each network member was of their diabetes management efforts on a four-point scale (1 = not at all supportive to 4 = very supportive). From these ratings, we calculated "Percent very supportive" (proportion rated as "very supportive") and "Mean social network support" (average support rating across all network members). Support quality measures were included because positive, encouraging feedback from others represents a key source of self-efficacy according to SCT (Bandura, 2001), with previous research demonstrating associations between quality social support and diabetes management (Schram et al., 2021).

Health behavior perceptions within the network were measured by having participants rate their perception of each network member's engagement in physical activity and healthy eating on four-point scales (0 = never to 3 = often), calculated as "Mean perception of physical activity frequency" and "Mean perception of healthy eating frequency." These measures were included because SCT suggests that observing health behaviors in others provides opportunities for vicarious learning and establishes behavioral norms that can enhance self-efficacy for similar behaviors (Bandura, 2001; Schram et al., 2021).

Diabetes self-efficacy

Diabetes self-efficacy was measured using the Self-Efficacy for Diabetes (SED) Scale developed by the Stanford Patient Education Research Center (Stanford patient education research center, 1990). This validated instrument consists of 8 items that evaluate participants' confidence in performing various diabetes management tasks range from 1 (not at all confident) to 10 (totally confident). The SED scale has demonstrated strong psychometric properties with excellent internal consistency (Cronbach's $\alpha = 0.85$) and test-retest reliability (ICC = 0.80) (Lorig, 1996). The sum of the scores (ranging from 10 to 80) was calculated and higher scores on the scale indicate greater self-efficacy in diabetes management.

Control variables

Sociodemographic data were collected to serve as control variables in the analyses. These included age, rurality (categorized as rural, suburban, urban, or other), educational attainment (less than high school, some college/2-year degree, 4-year degree or higher), employment status (student, employed, unemployed, retired, or unable to work), annual household income (measured in $25,000 USD increments), marital status (married/partnered, never married, divorced/separated, or widowed), and Body Mass Index (BMI).

Data analysis

Descriptive statistics, including frequencies, means, and standard deviations, were calculated to summarize the characteristics of the participants. The analytical approach employed linear regression analyses to examine the relationship between social network characteristics and diabetes self-efficacy. A full model incorporating social network characteristics was analyzed to determine their contribution beyond demographic factors. Regression analyses were performed in SPSS v.29.0.0.0 (IBM, 2022). Statistical significance was determined at a significance level of $p < 0.05$.

Results

Sample characteristics

The study sample consisted of 1225 Black/African American men with T2D. Participants had a mean age of 41.9 years (SD = 14.5) and a mean Body Mass Index of 31.0 (SD = 9.2). Most participants resided in urban areas (52.4%), followed by suburban (36.1%) and rural areas (11.1%). Educational attainment was distributed across three levels: 34.0% held a 4-year degree or higher, 42.9% had some college or a 2-year degree, and 23.1% had a high school education or less. Most participants were married or partnered (61.1%), while others reported never being married (27.6%), divorced or separated (8.8%), or widowed (2.5%). Regarding employment, most participants were employed (78.2%), with others being retired (9.7%), not employed (5.9%), disabled (4.4%), or students (1.9%). See Table 1 for full demographics.

Social network characteristics and diabetes self-efficacy

The linear regression analysis examining the relationship between social network characteristics and diabetes self-efficacy explaining 16.7% of the variance ($R^2 = 0.167$,

Table 1 Sample characteristics of black/african American men with type 2 diabetes (N=1225)

Characteristic	Mean (SD)	*n*	%
Age (years)	41.9 (±14.5)		
Body mass index (kg/m^2)	31.0 (±9.2)		
Number of chronic conditions	2.5 (±1.9)		
Residential area			
Urban		642	52.4
Suburban		442	36.1
Rural		136	11.1
Other		4	0.3
Educational attainment			
Some high school, no diploma		20	1.6
High school diploma/GED		263	21.5
Some college, no degree		315	25.8
Technical/vocational training		43	3.5
Associates degree		166	13.6
Bachelor's degree		311	25.4
Master's degree		91	7.4
Doctoral degree		14	1.1
Annual household income			
Less than $24,999		140	11.4
$25,000-$49,999		323	26.4
$50,000-$74,999		303	24.7
$75,000-$99,999		223	18.2
$100,000-$124,999		109	8.9
$125,000-$149,999		52	4.2
More than $150,000		74	6.0
Marital status			
Married/partnered		749	61.1
Never married		338	27.6
Divorced/separated		108	8.8
Widowed		31	2.5
Employment status			
Employed		958	78.2
Retired		119	9.7
Not employed		72	5.9
Disabled		54	4.4
Student		23	1.9

SD, standard deviation; GED, general educational development program. Total percentages may not equal 100 due to rounding

Table 2 Social network characteristics predicting diabetes self-efficacy among black/African American men

Network characteristic	Unstandardized β (SE)	Standardized β	*p*-value
Network composition			
Percent spouse	0.06 (0.12)	0.01	0.65
Percent child	0.15 (0.15)	0.03	0.32
Percent parent	− 0.06 (0.12)	−0.02	0.64
Percent friend	0.31 (0.11)	0.08	0.005
Percent sibling	− 0.13 (0.12)	−0.03	0.29
Percent extended family	0.14 (0.12)	0.04	0.24
Percent healthcare provider	− 0.19 (0.13)	−0.05	0.14
Percent with T2D	− 1.95 (2.04)	−0.03	0.34
Network interaction			
Percent talk less than 1 week	− 9.18 (2.83)	−0.15	0.001
Mean talk frequency	− 1.61 (0.85)	−0.10	0.06
Mean T2D talk frequency	0.25 (0.58)	0.02	0.67
Mean physical activity frequency	1.76 (1.09)	0.06	0.11
Mean healthy eating frequency	5.19 (1.19)	0.17	<0.001
Percent very supportive	12.93 (2.82)	0.27	<0.001
Mean social network support	− 1.23 (1.76)	−0.04	0.49
Network structure			
Network size	− 0.03 (0.11)	−0.01	0.72
Relationship heterogeneity	0.97 (1.39)	0.02	0.49

Note: SE=Standard Error. Model R^2 = 0.167, p< 0.001. Analysis controlled for age, education, income, and BMI. T2D=Type 2 Diabetes. Relationship heterogeneity scored from 0 (not at all diverse) to 1 (most diverse)

p<0.001). The proportion of very supportive network members emerged as the strongest association (β=0.27, p<0.001), indicating that participants with more highly supportive connections reported greater diabetes management confidence. Network members' perceived engagement in healthy eating also showed a positive significant association with self-efficacy (β=0.17, p< 0.001). Having a higher proportion of friends in one's network was significantly associated with self-efficacy (β=0.08, p= 0.005). Participants who reported a higher proportion of network members contacted less than weekly reported significantly less self-efficacy (β = − 0.15, p= 0.01). The mean frequency of general communication with network members approached but did not reach statistical significance (β = − 0.10, p=0.06). Other network characteristics, including network size (β = − 0.01, p=0.78), relationship heterogeneity (β=0.02, p= 0.49), and frequency of diabetes-specific discussions (β=0.02, p=0.67), showed no significant associations with self-efficacy. The presence of family members (spouse: β=0.01, p=.0.64; siblings: β = − 0.03, p= 0.29; parents: β = − 0.02, p=0.64; extended family: β=0.04, p= 0.24) and healthcare providers (β = − 0.05, p= 0.14) in participants' networks also showed no significant relationships with self-efficacy. See Table 2 for regression results.

Discussion

The present study examined how social network characteristics influence diabetes self-efficacy among Black/African American men with T2D. Through the lens of SCT (Bandura, 1997, 2001, 2002), we investigated how various aspects of social relationships contribute to or detract from diabetes management confidence in this historically underserved population. Our findings revealed complex and sometimes counterintuitive relationships between network composition, interaction patterns, and diabetes self-efficacy, with

important implications for understanding how social relationships may influence disease management confidence.

Social support dynamics

The relationship between social support and diabetes self-efficacy among Black/African American men revealed complex and sometimes counterintuitive patterns. The presence of highly supportive network members emerged as the strongest predictor of diabetes self-efficacy, aligning with foundational social support theory and previous research on chronic disease management (Perry & Pescosolido, 2015; Vassilev et al., 2014). This finding reinforces the critical role that strong, positive relationships play in building confidence for disease management. SCT suggests that such supportive relationships facilitate self-efficacy development through multiple mechanisms, including social persuasion, emotional encouragement, and the creation of environments conducive to successful management experiences (Bandura, 2001). However, mean network support was not significantly associated with self-efficacy presenting an intriguing paradox that challenges traditional assumptions about social support in health management. This finding may be explained by emerging research suggesting that well-intentioned but excessive support can sometimes undermine personal autonomy and self-efficacy in disease management (Hawkins et al., 2015; Hurt et al., 2015). Previous studies have identified similar patterns in other chronic disease populations, where higher levels of general support were sometimes not as beneficial to confidence in self-management abilities (Fisher et al., 2013; Walker et al., 2012).

Network composition

The examination of network composition revealed nuanced patterns in how different relationships influence diabetes management self-efficacy among Black/African American men. While traditional assumptions suggest family support is universally beneficial for chronic disease management, our findings paint a more complex picture (Jones et al., 2008; Lister et al., 2013). Family relationships - including spouses, parents, siblings, and extended family members—showed no significant associations with self-efficacy. The lack of associations between family relationships and self-efficacy suggest a need to further explore the qualities of individual relationships instead of broad composition categories. Family members' well-intentioned support efforts might sometimes be perceived as controlling or undermining autonomy, particularly within the context of traditional family roles and expectations (Bhattacharya, 2024; Griffith et al., 2016; High, 2022). Cultural factors, including expectations around strength and self-reliance, may further complicate these family dynamics (James, 2024). These findings align add further context to the intersection of family relationships, masculine identity, and chronic disease management among Black/African American men (Griffith et al., 2016; Hammond et al., 2010) while also suggesting a need for more detailed approaches to understanding the meaning behind family relationships including qualitative work exploring this area.

However, having friends comprise a larger proportion of one's network demonstrated a positive relationship with diabetes management confidence. This finding aligns with prior research suggesting that friendships may provide unique forms of support that differ from family relationships, potentially offering more reciprocal and less obligatory forms of encouragement for diabetes management (Nguyen et al., 2016). The positive association between friend relationships and self-efficacy may reflect the voluntary nature of these connections, where individuals can selectively maintain relationships with friends who positively reinforce their diabetes management efforts. Research shows that these disparate ties, friends as opposed to family, may be important for adults experiencing health challenges (Perry et al., 2022; Perry & Pescosolido, 2015).

The percent of the network made up of healthcare providers showed no significant association with self-efficacy in our sample. This finding warrants particular attention as it may reflect broader systemic issues in provider-patient relationships. Previous research has documented disparities in healthcare experiences among Black/African American men, including challenges with trust, communication, and cultural competency (Cheatham et al., 2008; Gilbert et al., 2016). Historical and ongoing experiences of discrimination within healthcare systems may influence how professional support is perceived and utilized (Williams & Mohammed, 2013). However, this may also result should also be interpreted with caution. It may be hypothesized that men who are confident in their ability to manage T2D may not feel the need to engage with medical professionals to support their disease management. Simultaneously, it may also be true that men who are engaging with medical professionals regularly feel more confident in their ability to manage their disease due to this consistent contact. Nonetheless, our (non-significant) results indicate that there may be more important qualities to assess within these relationships instead of just the type of relationship. Moreover, the findings highlight the importance of considering both professional medical support and informal social relationships in comprehensive diabetes management strategies.

Social norms and health behaviors

The influence of perceived health behaviors within social networks emerged as a crucial factor in understanding self-efficacy development. SCT emphasizes the importance of vicarious learning and behavioral modeling in shaping individual behavior and confidence (Bandura, 1997, 2001). Our findings support this theoretical framework, demonstrating that network members' perceived engagement in healthy behaviors were significantly associated with participants' diabetes self-efficacy. This aligns with research showing that social networks can shape health behaviors through both direct modeling and the establishment of normative behaviors (Patterson et al., 2022; Prochnow & Patterson, 2022; Prochnow et al., 2020). The particularly strong influence of perceived healthy eating behaviors among network members highlights the central role of dietary management in diabetes care. This finding builds on previous research demonstrating the social nature of eating behaviors and their susceptibility to network influences (Vassilev et al., 2014). The visibility and shared nature of eating behaviors within social networks may make them particularly powerful vectors for social influence and modeling (Hurt et al., 2015). Additionally, the positive association with physical activity perceptions suggests that seeing network members engage in regular exercise may provide both motivational and instructional benefits for diabetes management (Perry et al., 2016; Prochnow et al., 2020, 2022). These social norm influences operate through multiple mechanisms. Network members who model healthy behaviors provide concrete examples of successful health management, offering both practical strategies and motivation (Schram et al., 2021). Furthermore, when healthy behaviors become normative within a social network, they can create supportive environments that reinforce positive health choices and build confidence in one's ability to maintain these behaviors (Taylor et al., 2013).

Communication patterns

The significance of regular communication in maintaining self-efficacy reflects the important role of consistent social connection in chronic disease management. Research on social networks and health behaviors suggests that frequent interaction provides opportunities for support provision, information sharing, and behavioral modeling (Perry & Pescosolido, 2015). However, our findings indicate that the mere presence of communication may be less important than its quality and consistency, supporting previous research on the importance of meaningful rather than frequent interactions (Small, 2017). The lack of association between diabetes-specific discussions and self-efficacy challenges assumptions about the need for explicit health-focused communication. This finding suggests that beneficial support and influence may often occur through indirect means, such as behavioral modeling and general emotional support, rather than direct discussions about disease management (Vassilev et al., 2014). This aligns with research showing that subtle forms of social influence can be more effective than direct intervention in shaping health behaviors (Zupa et al., 2022).

Network structure

The absence of significant associations between network structural characteristics (size and heterogeneity) and diabetes self-efficacy provides important insights for understanding social support mechanisms. These findings challenge traditional assumptions about the benefits of large, diverse networks in health management (Vassilev et al., 2014). Instead, it suggests that the quality of relationships and the behaviors modeled within networks may be more crucial than their structural characteristics (Schram et al., 2021).

Implications

Findings from this study have implications for both clinical practice and intervention development in diabetes management for Black/African American men. First, our results suggest a fundamental need to reconceptualize how social support is integrated into diabetes management programs. Rather than focusing on expanding social networks or increasing general support, interventions should prioritize enhancing the quality of existing supportive relationships. This might involve teaching network members how to provide autonomy-supporting assistance rather than potentially controlling or undermining forms of support. The strong influence of perceived health behaviors within networks suggests promising directions for intervention design. Programs might be more effective if they focus on creating opportunities for positive health behavior modeling, particularly around dietary practices and physical activity. This could involve developing family-based or community-based interventions that emphasize collective health behavior change rather than individual-focused approaches (Vassilev et al., 2014). Such programs should carefully consider how to promote supportive family relationships while preserving individual autonomy in disease management. Our findings also suggest the need for interventions that address the complex dynamics of family support. Programs should help family members understand how their support efforts might be perceived and provide guidance on delivering assistance in ways that enhance rather than diminish self-efficacy. This might involve educational components for family members

about autonomy-supportive behaviors and communication strategies that respect the dignity and independence of individuals managing diabetes (Griffith et al., 2012; Powell et al., 2016).

Healthcare providers and systems must critically examine their approaches to supporting Black/African American men with diabetes. The negative association between healthcare provider presence and self-efficacy indicates a need for changes in how medical support is delivered to this population. This result may indicate a need to establish supportive connections outside of healthcare. This could also involve implementing cultural competency training that goes beyond surface-level understanding to address historical distrust, systemic barriers, and the unique intersections of masculinity and health management in Black/African American communities (Gilbert et al., 2016; Hammond et al., 2010).

Limitations

Several limitations should be considered when interpreting these results. The cross-sectional nature of the study prevents causal inferences about the relationships observed. It is entirely plausible that the associations displayed here may be influenced by another variable not measured. Self-reported data may be subject to social desirability bias, particularly regarding health behaviors and support received. Further, participants were asked to self-report T2D diagnosis, and no clinical confirmation was required which may introduce bias. Additionally, while the sample was nationwide (United States based), regional variations in social support patterns and healthcare access could influence these relationships. Future longitudinal research examining how these relationships develop and change over time would provide valuable insights.

Conclusion

This study provides important insights into how social network characteristics influence diabetes self-efficacy among Black/African American men. The findings challenge traditional assumptions about social support in chronic disease management and highlight the complex nature of these relationships. While highly supportive relationships and positive health behavior modeling appear beneficial, the quality and nature of these relationships matter more than structural network characteristics or general support levels. These insights can inform the development of more effective, culturally appropriate interventions for this underserved population.

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Data availability Data can be made available upon reasonable request.

Declarations

Conflict of interest The authors have no conflicts to disclose.

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