

concern that women may be receiving lesser support than men in the management of T2D. Another service provider expressed his thoughts on how men can have a greater involvement in the care of themselves, as well as for their loved ones,

And you know, I think that culturally speaking, that if we can make that impact on the males when they're younger, like this program that we're trying to get going now, okay. That it's, that these are things that they need to be responsible for... And so, culturally speaking, we need to make the males more aware that, you know, that it's okay to take care of yourself. And number two, it's okay to take care of someone else.

These comments suggest that there is a role for greater gender role flexibility in ensuring that women receive greater support in the management of T2D. A greater level of male involvement in their own care can also reduce the pressure of care provision that women may have.

Considerations in Implementing Social Support Components in T2D Management

Participants also conveyed several considerations in implementing social support components in T2D management. Stress constituted a substantial part of the discussion and alluded to the *importance of addressing various components of stress* in developing social support interventions. Participants in all three groups described various components of T2D management as stressful; these included having to keep up with medications, as well as having to manage other co-existing chronic conditions. Stress was also described in care provision, such as from a social support person who spoke regarding his family member who has T2D,

His stress level, his stress level hasn't been all that much lately. He, the only way, the only way he gets like really stressed is when he's got to pick up his little kids from grandma, or his kids, now if his kids need help or something, and he can't do it, then he gets kind of, a little bit stressed out about it, but, he's been doing, he's been hanging in there pretty good with it.

Various stressors in T2D management were also described, such as family, finances, home environment, and unemployment. A pertinent stressor that was repeatedly discussed was having multiple responsibilities, compounded by financial difficulties. Stress was attributed to not having

enough finances to manage day-to-day aspects, such as groceries. A female participant in the T2D group described her daily worries,

I think it's just the worry about, about doing day to day things like, sometimes you're running kind of low on money, and you're always thinking, well now where am I going to get my groceries, where am I going to get my gas. You know, just daily little things that you worry about, like what's going to happen to me today, what am I going to be doing today, where am I going to be going?

In view of these stressors, participants in the service provider groups related the importance of coping strategies to manage stress and improve T2D management. Participants with T2D cited several coping strategies, such as exercise, creative expression, and staying busy. Additionally, the presence of a support system was paramount in addressing various stressors. This was echoed by the comment of a female service provider,

And, you can't eliminate stress, but you need to help people and help yourself deal with it in a different way. Or, find a good and a bad somehow, and make change there, but that's really hard to see in the moment of this black cloud that surrounds you as you're walking around, you know. A support system would come in very handy there.

In addition to addressing these stressors, having an understanding of how participants perceived the integration of social support in T2D management is essential in developing interventions. Participants raised the need to consider the emotional toll on social support persons, namely *caregiver stress*. Social support persons alluded to a negative impact on themselves when they observed their loved ones with T2D lacking personal responsibility toward managing T2D, such as not adhering to treatment components despite their advice. Moreover, providing social support was also perceived to be more challenging or stressful if patients had multiple comorbidities. At the same time, participants also recognized the positive impact on social support persons. This included having a greater awareness of T2D, which can be a motivation to adopt healthier behaviors in preventing T2D.

Participants also described the idea of *balance* in T2D management and how it was an important consideration in the provision of social support. Balance was described in several ways, such as the balance between physical and mental or emotional health or as the balance between

taking a serious and light-hearted approach in encouraging patients to adopt healthier behaviors. A service provider summarized this point by sharing her perspective on providing balanced advice,

I think it's important to not take anything away from someone, especially in the beginning. And to be the accepting, in other words to say, you know, if you drink your body will work with it this way while when you have diabetes, so I don't want to sanction and say, you know, go out there and drink because it's just fine, but I don't want to say take away your whole social activity, but rather, ok, if you have a drink, your body is going to interpret it as sugar. This interpretation is going to be wrong and you could get into trouble with low sugar, so always eat if you're going to drink. Something simple I could say.

Timing was also a consideration in the provision of social support. The time of diagnosis was frequently cited as the most stressful due to the multiple routine checks involved, information overload, and a perceived lack of control. This suggests the role that social support can play at this time, and how this can translate into early care-seeking behavior.

Finally, while participants described the strengths of an Indigenous lifestyle in supporting social connectedness and T2D management, considering the *challenges associated with these social and cultural aspects* is also important for a holistic understanding of an Indigenous lifestyle. Central to the concept of social connectedness was the role of food, which is often associated with social activity. Some participants described the challenges of balancing social expectations to enjoin community activities where food played a key role and the need to adhere to dietary guidelines to promote diabetes control. This was compounded by the limited healthy food options available at such events, as described by a participant who faced such challenges,

The other phenomenon, as far as going to potlucks and not being able to find your perfect food is going to potlucks and have people looking at you and saying, 'I am sorry, we don't have anything for you to eat.' I have had that happen and it's like, I think I can eat. Just because I got diabetes doesn't mean that I haven't got food.

Overall, participants describe the importance of addressing various stressors in T2D management, considering caregiver stress, achieving balance, considering appropriate timing, and looking into the challenges associated with social and cultural components of an Indigenous lifestyle – so as to support T2D management in the community.

DISCUSSION

This study explores the perspectives of AI communities on the role of social support in T2D management and presents ideas on how social support can address underlying stressors that contribute to T2D inequities, as well as provides a potential channel of intervention to improve T2D management in these communities. The findings encompass ideas relating to four dimensions of social support, namely 1) perception of social support, 2) functions of social support, 3) context of social support, and 4) implementation of social support interventions. These reinforce previous works on the dimensions of social support, while introducing several new ideas.

The first step to understanding how social support can be explored as a means of intervention in improving health outcomes is to understand the perceptions on the sources of social support and the type of social support being provided (House et al., 1988). These dimensions are depicted in the participants' understanding of the meaning of social support. The sources of social support can range from those in one's informal network (for example, family, friends, coworkers, supervisors) and in more formal networks (for example, health care professionals, human service workers; Heaney & Israel, 2008). In this present study, participants highlighted the preponderance of informal networks as a source of social support, particularly family and community members. This reinforces Kaplan's work on social support and health that describes how relationships are key sources of support (Kaplan et al., 1977). Another key factor to consider is the content of social support; this is related to the perceptions of support recipients, rather than the objective behaviors (Wethington & Kessler, 1986). Participants' description of social support as important in T2D management, as well as their keenness to offer social support, suggest the potential that interventions comprising of social support components can have in enhancing T2D management for individuals with T2D.

Although the exact mechanisms of how social support affects health outcomes are not known, research suggests that some potential mechanisms include stress-buffering effects, changing affective states, increasing self-efficacy, and influencing change in negative health behaviors (DiMatteo, 2004). House et al. (1988) characterize these potential mechanisms of social support into four main components: 1) emotional support, 2) instrumental support, 3) informational support, and 4) appraisal support. The functions of social support described by participants affirm these mechanisms, especially the emotional and appraisal function of social support. In addition, participants describe mechanisms such as positive reinforcement and an enabling role that social support can play. Understanding these mechanisms of social support is

important in developing interventions and building on the social support functions that are already present in the community.

Another aspect to consider is the social and cultural contexts unique to Indigenous communities and how this can influence social support. Alongside the key dimensions of support discussed previously (meaning and function), it is also important to consider the range of contextual factors that may affect its form and occurrence (Shumaker & Brownell, 1984). These contextual factors include the characteristics of participants and environmental characteristics (Shumaker & Brownell, 1984). Participants' perspectives on the social and cultural contexts can be understood in two dimensions, firstly, contextual factors that represent barriers to optimal T2D management, and secondly, strengths relating to the unique social and cultural contexts that can enhance T2D management.

Barriers to optimal T2D management can be linked to specific socio-historical factors that influence illness beliefs among AI individuals, therefore influencing health outcomes. Studies of disease “explanatory models (EM),” which refer to how patients conceptualize illnesses and seek treatment, find that these EMs are impacted by cultural factors – factors that can either support or inhibit positive health behavior (Henderson & Henderson, 2002). Specific to AI communities, historical trauma experienced by AIs have been shown to influence the construction of illness narratives. Traumatic experiences, alongside the influence of neocolonialism and oppression, have been associated with the onset of T2D, with AI individuals describing how experiences such as domestic violence and substance abuse issues result in feelings of powerlessness and guilt (Ferreira, 2006). Hill (2006) describes the importance of the balance between an individual and the environment, and how lived experiences can influence coping behavior. These can result in survival skills such as learned helplessness, denial, and passive-aggressive behaviors (Tafoya & Del Vecchio, 2005) – themes that were conveyed directly and indirectly in this study. These shape mindsets of denial and a reluctance to ask for help, thus influencing EMs of T2D that can manifest in delayed care seeking (Henderson, 2010). It is crucial to consider these mindsets, especially where they can pose a challenge to the provision of social support. For example, reluctance to ask for help may impede the uptake of social support even when widely available. The understanding of the socio-historical context is thus important in identifying risk and protective factors specific to the AI community so as to develop culturally tailored interventions (Whitbeck, 2006), address gaps in social support provision, and leverage on the strengths of the community in the efforts to improve T2D management.

At the same time, the unique social and cultural contexts of AI communities also present several strengths that can be considered in incorporating social support components in T2D management. A salient point is the importance of a sense of belonging in AI communities; this is influenced by cultural identity, traditional practices, and the value of community. Hill (2006) describes the AI worldview and the central role of relatedness and connectedness in health outcomes, relating to having a sense of belonging that stems from understanding the individual and community's place within the tribe. Factors that impact the relatedness/belonging and health outcomes include cultural identity, traditional practices, community, and family values and beliefs (Hill, 2006) – themes that were also found in the participants' responses. Thus, engagement with cultural identity, traditional practices, and community has great implications in the management of T2D and should be considered as a scaffold for social support interventions.

Another sociocultural context pertinent to the role of social support in T2D self-management in AI communities is the context of family. Participants in this present study relate the fact that family constituted a large aspect of social support provision, with family having specific functions in the management of T2D. The family is widely recognized as an important social context for health behavior change, due to its fundamental role in shaping child and adolescent behaviors and the intensity and longevity of interactions with family members that have the potential to effect change across the life course (Okechukwu et al., 2014). As such, it presents a unique channel of intervention in T2D management. Specific to AI communities, previous literature has shown a preference for family support in help seeking (Aronson et al., 2016; Walls et al., 2006), and in the context of T2D, engaging family members has also been shown to be feasible, acceptable, and impactful (Chambers et al., 2015). Family constitutes a central aspect of Indigenous lifestyle and identity and plays an important role in T2D management. This includes being a motivation for improving self-management. Conversely, the absence of familial support has been cited as a source of stress for individuals with T2D (Elm et al., 2019). This stems from family members lacking understanding about the disease, resulting in disappointment and frustration among individuals with T2D (Elm et al., 2019). It is thus unsurprising that participants convey a desire for family members to have knowledge on T2D, both as a means of providing support and a preventive measure for the family members themselves.

Related to family are the roles that family members play in the provision of care. Familial obligations and interdependence are core values in tribal communities (Goins et al., 2011), and providing care for the family, especially dependent members, is deemed important (Baldrige,

2001). Moreover, the extended family holds particular significance for AIs and is seen as a protective buffer that provides social, emotional, spiritual, and material support to each other (Martin & Yurkovich, 2014). Such family values can be viewed as an avenue of social support when the provision of care includes supporting family members in T2D management. Yet, they can potentially also pose a challenge when patients with T2D prioritize looking after their family members over their own needs of managing T2D. The differing expectations of care provision between genders are also a consideration in familial social support; these underscore traditional gender roles in AI communities, where women play a significant part in raising families and are viewed as caretakers of children and relatives (Martin & Yurkovich, 2014). These roles extend to their old age, where playing the parts of grandmothers is an important obligation (LaFromboise et al., 1990; Bahr, 1994). While women in AI communities hold these roles in high esteem, findings from the present study suggest that a certain level of gender role flexibility can promote greater balance of social support, especially in favor of women who feel like they may not be receiving as much support as men. As such, social support interventions should consider the various dimensions of family roles, perhaps by generating discussion on how to balance these roles with one's own self-care, as well as to facilitate greater male involvement.

Lastly, perspectives shared by participants highlight several considerations in developing social support interventions. Understanding the stressors in the management of chronic diseases such as T2D is fundamental in exploring the potential of social support interventions in mediating these stressors. While these stressors are experienced as chronic strains precipitated by discrete events, they are often developed in the contexts of prior unresolved loss and grief and can often be linked to fundamental causes such as poverty, genocide, and colonization (Elm et al., 2019). This represents multigenerational layers of trauma that predispose Indigenous people to illness through greater exposure to stress (Link & Phelan, 1995). Given the substantial evidence that stress is associated with T2D etiology and outcomes (Fisher et al., 2008; Hamer et al., 2010; Roberts et al., 2015), it is therefore crucial to understand how people with T2D perceive stress and how social support can seek to buffer these stress experiences.

Participants in the present study echo perspectives of other AI communities in earlier studies, specifically, that stressors in the context of T2D relate to chronic stressors such as financial stressors, health management, social roles, and job features (Walls et al., 2017; Elm et al., 2019). A dominant theme among these chronic stressors related to social roles, with many participants in this study sharing how having multiple responsibilities, particularly in caretaking

activities, resulted in additional stress compounded by the stress of managing a chronic disease. This augments the earlier discussion on the dimensions of family roles and how interventions should seek to address role-related stressors in order to facilitate greater self-care and enhance T2D management. In particular, interventions can consider the stress-reducing functions that social support can have (Shumaker & Brownell, 1984). This includes the specificity model of support, where social support can provide the patient with T2D with the specific resources needed related to the stressor, hence functioning as a direct coping strategy (Shumaker & Brownell, 1984). This can be relevant in addressing chronic stressors such as financial stressors and employment. As for role-related stressors, social support can function as a means of cognitive appraisal and adaptation, where social support persons promote clearer understanding of the stressor, provide coping resources, and enhance self-esteem in coping with the situation (Shumaker & Brownell, 1984). Studies in other populations have documented positive effects of social support on psychosocial outcomes, such as depression and quality of life (Bond et al., 2010; Sacco & Yanover, 2006), with one study reporting that individuals who reported having greater proximal and distal sources of social support were associated with having less depressive symptomology and better diabetes self-management (Fortmann et al., 2010). These augment the notion that social support interventions have potential in buffering such stressors, thus improving T2D self-management.

Moreover, participants highlight other considerations in the implementation of social support interventions, such as the importance of considering the potential stress on social support persons in developing social support interventions. While caregiving and family can be protective, it can also impact physical and mental health (Coser et al., 2018). At the same time, caregiving offers a platform to draw upon the benefits of increased education and awareness of T2D for family members who do not have T2D. Timing is also key, and involving social support persons at earlier stages of the condition may also have multi-fold effects of preventing caregiver stress, while encouraging earlier care seeking for the patients. Finally, while the social and cultural contexts of Indigenous communities provide many avenues of promoting social connectedness and T2D management, it is also important to consider the challenges associated with these aspects, such as current gaps in integrating aspects of healthy eating into community events. This can be addressed by offering healthier eating options at community gatherings, as well as increasing education and awareness on T2D, especially through platforms that are interwoven with stories of community members – solutions that are voiced out by participants themselves in this study.

Limitations and Future Work

We acknowledge several limitations to this study. We developed the questions for focus group interviews in collaboration with CRCs; their feedback, input from the broader community, and extant prevalence data led us to focus on T2D as a significant problem. As such, many of our questions aimed to elucidate nuanced understanding of the stressors and struggles associated with T2D. A limitation to this approach is that our questions may have biased participants to focus solely on problematic aspects of T2D for the community and individuals living with the disease.

As we took a predominantly inductive approach to the data analysis, we identified a broad landscape of themes that provides an initial understanding of the role of social support in T2D management, guided by theoretical frameworks of social support constructs. We recognize that the data in this present study is extremely rich and detailed, and further analysis can reveal deeper nuances that can augment the understanding of social support, especially relating to AI communities. Given the preponderance of stress in T2D management, and the presence of historical and contemporary stressors relating to the social context of AI communities, further investigation of dimensions of stress pertaining to social support is important in future research. This includes other categories of stressors such as microaggressions and lateral oppression, which are widespread in the community (Elm et al., 2019). As such, these additional stressors should be given further inquiry especially where they may influence the provision of social support by health care providers and community members.

While social support forms the content component of social ties, future research can also seek to examine the structural component, which is the role of social integration and social networks. Such will complement the findings from this study and present a more holistic understanding of the nature of social relationships in health outcomes.

It is envisioned that the insights gained from this study can inform future social support interventions in supporting T2D management. An existing framework that social support interventions can be incorporated into is the community health worker (CHW) model, often referred to as community health representatives (CHR) in AI communities, where CHRs serve as community members who can mediate between health care systems and communities to improve the health of the population (Satterfield et al., 2002). CHW models have shown to be effective in improving T2D self-management in other underserved populations, such as by improving HbA1c levels and other clinical outcomes, as well as by increasing patient satisfaction and knowledge (DePue et al., 2013; Gary et al., 2009; Norris et al., 2006; Gary et al, 2003). In AI communities,

individuals with diabetes who were enrolled in a multi-level intervention involving CHRs have been shown to have improvements in glycosylated hemoglobin and low-density lipoprotein (Trevisi et al., 2019). While these interventions involve social support components such as patient accompaniment and home visits, future CHR interventions can expand on the social support components and investigate the effectiveness of these in improving T2D outcomes. Such interventions can incorporate the structures of social support highlighted in this study, as well as to address the barriers to care seeking and optimal T2D management. Cultural identity and strong social ties are also strengths that can be leveraged in developing interventions. These can complement the community members' suggestions on T2D management interventions, such as the inclusion of personal narratives, social network interventions, and community-driven services.

CONCLUSION

All in all, social support has been shown to be beneficial in improving T2D management and overall outcomes. Findings from this study elucidate some of the mechanisms of social support specific to AI communities, as well as important social, cultural, and historical factors influencing social support. It is envisioned that the findings of this study can inform social support interventions related to T2D management, in seeking to achieve a broader goal of reducing diabetes inequities in AI communities.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interests.

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APPENDIX

Table A1
Examples of questions for focus groups

1. Community members living with T2D

- When did you first discover you had diabetes?
- How has your outlook on life changed, if at all, since you were diagnosed with diabetes?
- What were hardest things to change in your life?
- How do you feel about living with diabetes on a day-to-day basis?
- How, if at all, does stress impact the way you manage your diabetes?
- If you were interested in getting more information on topics such as diabetes care, mental health, and coping with stress, where would you go for help?
- Are there any barriers that would stop you from asking for help about these or other health topics?
- Overall, how do you cope with your diabetes? How do you cope with the stressors and emotional challenges in your life?
- Who, if anyone, are the significant people you rely on during challenging times?
- What types of programs or initiatives are needed to effectively address diabetes in your community?
- What role did/does the community play in your diabetes diagnosis and management?
- What are the strengths and weaknesses of your community in addressing diabetes?

2. Social support persons

- Think of the people who are close to you that are living with T2D. What are some of the challenges you see that are related to living with diabetes?
- Do these friends or family members sometimes need support managing their disease? If so, how do you support them?
- Do you think stress plays a role in how people manage their diabetes? If so, how?
- What mental health or emotional challenges have you noticed in people who have been coping long-term with diabetes?
- How has being around someone close to you with diabetes impacted your life?
- What is the best way to address diabetes in the community?
- What role can social support services (friends, family, elders) play in addressing diabetes?
- Do you think that having social support systems are an important part of diabetes treatment?

3. Service providers

- How big of a problem is T2D in this community?
- What role do you see lifestyle (for example, diet and exercise) playing in diabetes diagnosis and management?
- What, if any, mental health issues do you commonly see as a service provider in the community?
- Our project is interested in understanding diabetes management and treatment in your community. We are especially interested in knowing about ways in which non-physical health (for example, distress, depression, anxiety, substance use) and stress might impact diabetes care. How are mental health issues dealt with? How are they perceived by the broader community?

continued on next page

Table A1 Continued
Examples of questions for focus groups

3. Service providers

- When discussing diabetes in a clinic setting, how is mental health talked about, if at all?
- Do people bring these kinds of issues up? Do you as a service provider talk about them?
- For diabetic patients who might also have a mental health problem or substance use problem, how are multiple issues addressed?
- Do you think stress plays a role in how people manage their diabetes? How so?
- Are there any challenges in treating/preventing diabetes in your community, such as cultural or community barriers?
- Are there any culturally specific considerations that need to be taken into account when treating patients with diabetes?
- How thoroughly (if at all) do the different service systems in your community coordinate care? How thorough is follow-up care?
- What can service providers do to better serve those currently living with diabetes or prevent those at-risk of developing diabetes?

Table A2
Number of participants by focus groups

	Bois Forte (n)	Lac Courte Oreilles (n)
Individuals with T2D, group 1	5	9
Individuals with T2D, group 2	8	9
Social support persons, group 1	6	9
Social support persons, group 2	5	12
Service providers, group 1	6	10
Service providers, group 2	4	12
Total	34	61

Table A3
Summary of research questions and guiding objectives

Research question	Guiding objectives
1 How does social support impact the management of T2D in AI communities?	<ul style="list-style-type: none"> • What is the understanding of the role of social support in T2D in AI communities? • How do the social contexts of Indigenous communities influence social support mechanisms? • What are the mechanisms through which social support impacts components of T2D management? • What roles are pertinent in these dimensions of social support; are these influenced by constructs such as gender and inter-generational factors? • How can family, as a context of social support, be beneficial in T2D management? • In which stages of T2D management is social support most optimal?
2 How can social support interventions address the underlying stressors that contribute to T2D inequities in AI communities?	<ul style="list-style-type: none"> • What barriers in T2D can social support help to overcome? • What are some considerations in implementing social support components in T2D management? • What social support interventions can be incorporated into the community?

Table A4
Theme categories and sub-themes

Themes	Sub-themes
Perception of social support	<ul style="list-style-type: none"> • Importance of social support in T2D management • Attitudes towards social support • Uptake of social support • Sources of social support provision – family, and community
Functions of social support	<ul style="list-style-type: none"> • Emotional support • Instrumental support • Positive reinforcement • Enabling role • Approaches in providing social support
Social and cultural contexts of social support	<ul style="list-style-type: none"> • Barriers to optimal T2D management – illness beliefs, especially denial, and the belief of not wanting to be a burden • Strengths relating to the unique social and cultural contexts, namely 1) cultural identity, and 2) family, which has specific functions in social support such being a source of motivation, and care provision
Considerations in implementing social support components in T2D management	<ul style="list-style-type: none"> • Addressing stressors in T2D management • Caregiver stress • Balance • Timing • Challenges associated with the social and cultural aspects of Indigenous communities