Research

Factors influencing self-management in patients with type 2 diabetes in general practice: a qualitative study

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Abstract. Many Australian adults with type 2 diabetes mellitus (T2DM) do not follow recommended self-management behaviours that could prevent or delay complications. This exploratory study aimed to investigate the factors influencing self-management of T2DM in general practice. Semi-structured qualitative interviews were conducted with patients with T2DM ($n = 10$) and their GPs ($n = 4$) and practice nurses ($n = 3$) in a low socioeconomic area of Sydney, New South Wales, Australia. The interviews were analysed thematically using the socio-ecological model as a framework for coding. Additional themes were derived inductively based on the explicitly stated meaning of the text. Factors influencing self-management occurred on four levels of the socio-ecological model: individual (e-health literacy, motivation, time constraints); interpersonal (family and friends, T2DM education, patient-provider relationship); organisational (affordability, multidisciplinary care); and community levels (culture, self-management resources). Multi-level strategies are needed to address this wide range of factors that are beyond the scope of single services or organisations. These could include tailoring health education and resources to e-health literacy and culture; attention to social networks and the patient–provider relationship; and facilitating access to affordable on-site allied health services.

Introduction

Over the past three decades, the prevalence of diagnosed type 2 diabetes mellitus (T2DM) has tripled, with 1.26 million Australians currently living with T2DM (Australian Institute of Health and Welfare (AIHW) 2014; National Diabetes Services Scheme (NDSS) 2017). T2DM is a progressive chronic disease, which requires effective management to prevent complications (Department of Health 2015). In Australia, general practice plays a key role in supporting self-management (Royal Australian College of General Practitioners (RACGP) 2016). Self-management involves the patient working in partnership with their healthcare providers and carers so they can: understand their condition and treatment options; engage in care planning and health promotion activities (e.g. diet, physical activity); and monitor and manage the signs and symptoms of T2DM (RACGP 2016). However, the 2016 Diabetes MILES-2 Survey of 1265 Australians with T2DM identified that recommended self-management behaviours were not routinely practiced by all (Ventura *et al*. 2016). Eight per cent reported that they had not followed a healthy eating plan on any of the past 7 days, while 12% said that they had not participated in at least 30 min of physical activity on any of the past 7 days.

It is well established that health behaviours are determined by a complex range of individual and environmental factors (Glanz *et al*. 2008). The socio-ecological model (SEM) provides a comprehensive framework for considering how factors at the intrapersonal, interpersonal, organisational and social levels can effect individual health behaviours and inform the development of multi-level interventions.

Few qualitative studies have explored the factors influencing T2DM self-management using a socio-ecological framework, instead focusing on a selection of factors such as family support, patient–provider communication and cultural factors (Wellard *et al*. 2008; Rose and Harris 2013; Rose and Harris 2015; Levin-Zamir *et al*. 2016). A Canadian study conducted by Brown *et al*. (2002) explored factors influencing T2DM management across three domains: the patient, provider and health system. They noted a dynamic interplay between the domains and the importance of addressing them in the management of T2DM. Their study, however, only explored the perspective of the GP and did not specifically focus on self-management.

The aim of this qualitative study was to explore the factors influencing self-management of T2DM in patients attending general practices in South West Sydney (SWS) from both a patient and provider perspective. A secondary aim was to assess how consistent the findings were with the socio-ecological model.

What is known about the topic?

• Factors that influence self-management of type 2 diabetes occur at multiple levels of the socio-ecological model and include health literacy, patient-provider communication, availability of services and culture.

What does this paper add?

• This paper uses the socio-ecological model to integrate factors that influence self-management usually reported in separate studies. It also provides new information about the role of e-health literacy.

Methods

Study design

This was an exploratory study that utilised a cross-sectional, qualitative design. It was nested within a larger multi-site Canadian–Australian study called 'Innovative Models Promoting Access to Care Transformation' (IMPACT). The larger study evaluated models to improve access to care for vulnerable groups using a mixed-methods design. In SWS, the IMPACT study aimed to improve access to self-management support for patients with poorly controlled T2DM in general practice. The intervention involved GPs and practice nurses (PNs) conducting health checks with patients and introducing them to a website that provided information about T2DM self-management and relevant services.

Ethical approval was obtained from the UNSW Human Research Ethics Committee (HC16508), and written informed consent was obtained from all participants.

Research setting

The study was conducted in SWS, which is characterised by a higher proportion of culturally and linguistically diverse (CALD) populations and a higher rate of socioeconomic disadvantage, than the rest of Sydney (South Western Sydney Primary Health Network 2016). This area had a higher prevalence of T2DM than the national average and a higher rate of T2DM-related hospitalisations than the rest of NSW (Centre for Epidemiology and Evidence 2016; NDSS 2017).

Sample

Overall, 14 GPs, 6 PNs and 68 patients with poorly controlled T2DM (HbA1c >7%, blood pressure >130/80 mmHg, body mass index >30 or high lipids) from 11 general practices in SWS participated in the larger study. GP recruitment was via invitation by the South Western Sydney Primary Health Network. Patients were recruited via mailed invitation from the practices of participating GPs.

Pre-intervention and post-intervention interviews were conducted for the qualitative study. A subset of 13 providers participated in pre-intervention interviews (Table 1). The providers were selected via purposive sampling to achieve variation in provider type, location and size of practice, gender and age (Braun and Clarke 2013). The post-intervention interview samples were limited to participants who had

Table 1. Patient and provider sample numbers for a larger[B] study and the current study

PN, practice nurse. Data are presented as *n*

	Patients	Providers	
		GPs	PNs
Recruited for larger study	68	14	6
Pre-intervention interviews (current study)	0	10	3
Post-intervention interviews (current study)	10	4[A]	3[A]

[A]All four GPs and one PN had also participated in a pre-intervention interview.
[B]Multi-site Canadian–Australian study called 'Innovative Models Promoting Access to Care Transformation' (IMPACT).

completed the intervention. Ten patients and seven providers participated in these interviews. Purposive sampling was again conducted to achieve variation in practice location, gender and age (Braun and Clarke 2013).

Data collection

Semi-structured pre-intervention interviews were conducted by a researcher from the larger study (O Hermiz) and semi-structured post-intervention interviews were conducted by one of the authors (J Dao). Patient interviews were conducted over the phone 1–3 months after they received the health check visit. Provider interviews were conducted in person at their general practice before the intervention and 1–2 months after completing the intervention. Each interview was audio recorded and lasted ~45 min.

Interview guides

The pre-intervention interview guide explored the capacity of the provider, general practice and healthcare system to provide care for patients with T2DM (Appendix 1). The post-intervention interview guide was based on existing literature on the factors influencing self-management of T2DM and the SEM (Glanz *et al*. 2008; Booth *et al*. 2013; Levin-Zamir *et al*. 2016) (Appendix 2).

Data analysis

The interview transcripts were coded using thematic analysis (Braun and Clarke 2013). The method of analysis was a hybrid of two approaches of thematic analysis outlined by Fereday and Muir-Cochrane (2006). It incorporated the deductive approach guided by existing theory developed by Crabtree and Miller (1992) and the inductive data-driven approach by Boyatzis (1998).

A coding framework was informed by the SEM, access to healthcare framework and chronic care model (Bodenheimer *et al*. 2002; Glanz *et al*. 2008; Levesque *et al*. 2013). The analysis involved an iterative process of applying the coding framework to the data, and adding and modifying codes based on the data. NVivo was used to organise data under the relevant codes and themes (NVivo 11; QSR International Pty Ltd, Melbourne, Vic., Australia). All transcripts were coded by J. Dao, while M. Harris and W. Lo independently coded two transcripts each. Coding was

discussed to agree on an analysis that was faithful to the data. The results are presented under four levels of the SEM.

Results

Thematic analysis of the interview transcripts revealed four overarching themes corresponding to four levels of the SEM: individual, interpersonal, organisational and community, under which several factors influencing self-management were identified. While the factors are presented separately in these results, each patient reported being influenced by multiple factors (at least three) across the four levels.

Patients' and providers' responses were usually consistent with each other. However, patients only spoke from their individual experiences, while providers talked about all their patients with poorly managed T2DM and factors relating to the healthcare system. Patients' and providers' views sometimes diverged; for example, regarding barriers to motivation and self-management education programs.

Participant characteristics

Participant samples included a range of demographic backgrounds, as presented in Tables 2 and 3.

Individual-level factors

E-health literacy

To effectively use e-health information, patients need access to the Internet and skills in navigating the Internet and appraising health information. Only patients who said they had access to the Internet were included in this study. Speaking about their patients with T2DM in general, providers said that most of them were elderly and did not have access to the Internet. They said that these patients preferred to get their information through face-to-face appointments and hardcopy resources. Providers stated that if patients did have access to the Internet, they did not know how to use it unless a family member helped them and that this help was not always available. Two patients said that they were not computer literate and so would often ask their children for help.

> . . .all I know about computers is turn the power point on and that's about it [laughs], but my daughter helps me out [Patient].

One of the patients reported that her son would help but quickly become impatient, resulting in her giving up on learning how to use the technology at times.

Table 2. Characteristics of patients interviewed
F, female; M, male

Number	Gender	Age group (years)	Language spoken at home	Occupation	Perceived financial situation
P1	F	70–79	English	Retired	Poor
P2	F	70–79	English	Retired	Comfortable
P3	F	40–49	English	Employed	Modestly comfortable
P4	M	60–69	English	Retired	Tight
P5	F	30–39	Arabic	Unable to work	Poor
P6	F	60–69	English	Retired	Tight
P7	M	60–69	English	Employed	Comfortable
P8	M	60–69	English	Employed	Modestly comfortable
P9	M	50–59	English, Samoan, German	Unable to work	Modestly comfortable
P10	F	60–69	English, Samoan	Unemployed	Tight

Table 3. Characteristics of healthcare providers interviewed
F, female; M, male

Number	When interviewed[A]	Gender	Age group (years)	Location	Country of training
GP1	Pre	F	30–39	Urban	India
GP2	Pre	M	60–69	Urban	India and Australia
GP3	Pre	F	40–49	Urban	China
GP4	Pre	F	70–79	Urban	India
GP5	Pre	M	50–59	Urban	Australia
GP6	Pre	M	50–59	Urban fringe	Australia
GP7	Both	F	60–69	Urban	India
GP8	Both	F	40–49	Urban	Australia
GP9	Both	M	50–59	Semi-rural	Australia
GP10	Both	F	50–59	Urban	New Zealand
PN1	Pre	F	30–39	Urban	Australia
PN2	Pre	F	40–49	Urban fringe	Australia
PN3	Post	F	20–29	Urban	New Zealand
PN4	Post	F	30–39	Urban	New Zealand
PN5	Both	F	40–49	Semi-rural	Australia

[A]Pre-intervention, post-intervention or both.

My son, when I ask him to help me, 'Oh, how do you get an app?' . . .he says, 'Oh god, it'll take forever to show you,' so I gave up [Patient].

Providers stated that there were patients who knew how to use the Internet but had difficulties appraising the quality of the information. One GP added that appraising information was more difficult for older patients. Providers further reported that younger patients often 'consulted Dr Google' before an appointment, which could be problematic when patients could not effectively appraise the information. Most patients in the study said that they knew how to navigate the Internet, but had difficulties appraising the health information.

You can google and get a lot of crap [. . .] and that's how I got myself into strife [. . .] I read on the Internet that [a medication] was dangerous, and a whole heap of other crap, so I went off it [Patient].

Some patients reported that they relied on the Internet for T2DM information. One such patient was newly diagnosed, and felt like she was 'kind of all alone with it' and that the limited time during appointments affected her ability to ask questions. Another patient stated that she used the Internet for information because the GP was not always available; for example, outside of opening hours.

Motivational factors

Patient motivation was identified as important for engaging in self-management. A range of barriers and facilitators to patient motivation was described.

Barriers.   Most patients generally seemed motivated to self-manage and did not report barriers to motivation. Some patients stated that the cold weather was sometimes demotivating in terms of exercise. Two patients seemed to be complacent about their disease, which for one patient was linked to lack of information.

Well, I didn't really care because I didn't have much information. It was just like, oh diabetes, everybody gets diabetes so who cares. . . [Patient].

Most providers said that lack of motivation was a common barrier to self-management. Many providers linked patients' apathy to the asymptomatic nature of the disease, and lack of understanding of the seriousness of the disease. Several providers said that some patients were initially motivated but then lost motivation over time. One GP attributed this to not meeting weight-loss goals and the side-effects of medications. Many providers and some patients mentioned that pre-existing mental health conditions, such as depression, posed a barrier for certain patients, as it affected their motivation and self-efficacy, and contributed to sedentary behaviour and over-eating.

If you're very low, which I tend to hit sometimes, you just, your self-worth goes, 'why am I doing this'? Yeah, basically, you know, I just don't want to do anything [Patient].

Facilitators.   Patients and providers stated that knowing others who had developed diabetic complications was a source of motivation to self-manage. Patients considered self-monitoring of blood sugar levels, diet and weight as motivators to self-manage.

Well, with regards to suggesting to write down what I eat and that's the biggest guilt trip of all [Patient].

Time constraints

Patients reported that they lacked the time to prepare healthy meals, engage in exercise or take medications due to commitments such as work, study or caring for the family.

Exercise, yeah I work full-time and having, yeah, a disabled daughter it's just time, time's just- time [Patient].

Providers said that patients who worked full time would not take a day off work to attend appointments because they prioritised work over their health, especially if they were the main breadwinners.

Interpersonal-level factors

Family and friends

Patients' partners and families were more often described as facilitators than barriers by both patients and providers. Patients said that their family or partner assisted them in various self-management activities, including taking medications, cooking and going to appointments.

Several providers and one patient spoke of the value of involving the family or main food preparer in the consultation so that they could also receive the T2DM education. Providers particularly recommended this for Pacific Islander patients for whom family was an important aspect of their culture.

If you talk to one person who's got the diabetes it's actually better to speak to the family or I often ask who cooks at home [. . .] because there's no point just talking to the patient if they're not the person that's responsible for what they're eating [GP].

Patients' family and friends could, however, be a barrier to self-management. Some patients mentioned that their partners offered them unhealthy foods or ate unhealthy meals in front of them. Providers said that the family and friends of some patients were negative influences as they gave patients advice that was inconsistent with evidence-based guidelines.

Patient education

Patients said that their main T2DM educational sources were the GP and dietician, who both provided mostly dietary education. Some patients wanted more information on set meal plans, pre-packaged meals and healthy snack ideas. Most of these patients reported that they were struggling with their diet and lacked dietary support from their GP or a referral to a dietician.

In terms of the mode of education, many patients said that they preferred face-to-face education, rather than reading information sources. They said it was more personal and tailored to their needs.

Well, it's much better to face a doctor and hear the doctor's opinion than try to read something and get it wrong. [. . .] Because the doctor makes it personal [Patient].

Providers described tailored education as a key component of effective education. Although several providers emphasised the importance of culturally tailored education, they asserted that not

all dieticians tailored their dietary advice to their patients' cultural background or financial resources.

> [. . .] a lot of them are on Centrelink [. . .] for example, let's talk about a patient. [. . .] she had seen a dietician, she came back to me, she's like, 'Everything she's told me to buy I can't afford it. This is what I buy, this, this, this and that.' [PN].

Patient–provider relationship

Many providers, especially PNs, described rapport as a key factor in building a positive patient–provider relationship. Providers stated that rapport resulted in their patients' continued attendance, increased reception to education and treatment compliance.

GPs said that taking their time and consulting or greeting patients in their language were used as tools for building rapport. PNs noted that they had the advantage of longer appointment times, which allowed them to build rapport.

> So I do have the extra time and I think that builds a good rapport and a relationship with the patient because they know that I'm allowed to spend the extra time with them. So they're not afraid to ask questions and I think that's one of the barriers, at the moment that may stand between patient and doctor. . . [PN].

Patients appeared to appreciate how their providers were honest, caring and encouraging, and how they took the time to explain concepts thoroughly.

> I trust the doctor. The nurse that's there is very good. I get treated like a human being, and not just cattle [Patient].

Organisational-level factors

Affordability

Providers reported that they were aware that patients' ability to pay was a common and significant issue for accessing allied or specialist care. They tried to accommodate this by referring patients to free or subsidised services such as those funded by Medicare (including Care Plans), public hospitals and South Western Sydney Primary Health Network. Although many providers highlighted the cost benefits of the five allied health visits available under Medicare Team Care Arrangements, they argued that the number of visits covered was inadequate for a patient with a long-term condition.

> [. . .] it's not enough if they need to go more often, and then they start having to pay out of pocket [GP].

Many providers commented that there was a long waiting time associated with accessing free allied services through the public health system.

> Now, this [diabetes clinic] is a free service. It is no cost to the patient. So, there's usually a very long wait. Six months is not unheard of [GP].

Multidisciplinary care

Many providers highlighted the benefits of collaborating with a multidisciplinary team based at their general practice or within

reach. This not only provided convenient access to a range of allied health services for patients, but also allowed easier coordination between providers.

> We have our own podiatrist, dietitian, exercise physiologist, yeah. We have all the services on site. So it's very easy for the patient. That's why the patient is happy [GP].

At general practices with a PN, the PN worked closely with the GP and shared the role of education and referrals. PNs played a key role in assessment and measurement, which allowed the GP to focus on other issues.

Community-level factors

Culture

Patients from Pacific Islander and Lebanese backgrounds explained how cultural practices made it difficult to eat healthily. Patients from both cultures stated that it was offensive to refuse meals prepared by the host.

> To me, sometimes it's a bit - it's offensive that if you refuse, in my culture, if you refuse anything, they think 'Oh it's what's wrong with him?' or, 'My food is not good for you,' sort of thing, yeah. So, in that way it's hard to say, 'Like I can't, mate, I'm diabetic, I can't eat that thing,' [. . .] We always put on big feeds, and it's just custom that whatever the family gives you, you sit down, no questions asked, everybody hoes in [Patient].

Providers from Pacific Islander backgrounds stated that big feasts were culturally important and that 'big is beautiful' was still widely accepted.

Self-management support resources

Some patients sought out self-management support resources such as websites, emails, seminars and magazines from Diabetes Australia or the NDSS. These were considered useful in supporting self-management.

> Reading about other people's experience. [. . .] It helps me immensely to know I'm not alone [Patient].

Some GPs revealed that they were aware of but did not think it necessary to refer patients to self-management education programs. One GP thought that they would be 'quite useful', but that it was the diabetic educator's role to refer patients to these education programs. Another GP commented that these programs were not currently suitable for this patient population.

> It's [self-management program] not in vogue at the moment. . . It's just a new thing, it's a bit diffic- and plus, like I said, the particular groups I'm dealing with are older, middle-aged, I'm not dealing with the type 1 diabetics, more type 2, or very overweight people [GP].

One PN was not aware of these programs, but was interested in learning more about them.

Some patients were not previously aware of these programs and strongly expressed their desire to be involved in them, especially in support groups and dietary education.

Because then I can better manage my diabetes with other people in the same situation. We can give each other pointers and help each other out [Patient].

Other patients who had been involved in self-management education programs had found them beneficial in providing dietary education.

Several GPs mentioned that resources were not culturally tailored. A GP stated that it was difficult for her to culturally tailor resources herself within the limited consultation time.

I have an Asian patient and I give them the pamphlet and they go through it very quickly, they don't read it, they just look at the pictures, then they go, 'Oh, I don't eat any of that.' And so it's not necessarily useful for them [GP].

Discussion

This study aimed to explore the factors influencing self-management of T2DM by patients in general practices in a low socioeconomic area of Sydney. We found that multiple factors at different levels of the SEM were pertinent to the self-management of T2DM.

At the individual level, motivation, time constraints and e-health literacy were identified as factors influencing self-management. Motivation and time constraints have been well documented in the literature (Williamson *et al.* 2000; Brown *et al.* 2002; Murphy *et al.* 2011; Booth *et al.* 2013). While two patients reported being complacent about their disease, most patients did not report a lack of motivation to self-manage. Providers were more likely to discuss a lack of motivation as a barrier to self-management than patients. The reason for this discrepancy is not clear. It might be because the study's patients were more motivated than the general population of patients providers see. Providers might underestimate patients' motivation or patients might be unwilling to admit to a lack of motivation. Greater clarity is needed to guide action.

E-health literacy has been increasingly recognised as important to the self-management of T2DM (Kaufman *et al.* 2017). Providers reported that most of their patients with T2DM were elderly and lacked access to the Internet. A survey of adults aged ≥ 65 years in the USA found that one-third of the participants never use the Internet (Anderson and Perrin 2017). Providers stated that although some patients had Internet access, they lacked capacity to use it. Two patients reportedly experienced this. Anderson and Perrin (2017) found that 34% of older Internet users reported little to no confidence in using electronic devices to perform online tasks. Providers said that although some patients knew how to use the Internet, they experienced difficulties appraising the quality of the information. Patients' responses reflected this sentiment. Tennant *et al.* (2015) surveyed adults aged ≥ 50 years who used the Internet and found that only 52% were confident in evaluating the quality of the information. With the increasing use of e-health in supporting self-management, providers need to be aware of their patient's level of e-health literacy, particularly their ability to appraise information, and tailor their advice accordingly. Furthermore, resources and tools need to be tailored to a low level of e-health literacy by following good design principles, such as singular focus and explicit navigation, and testing the e-health

interventions with the target audience to ensure they are accessible and engaging to those populations (Rowsell *et al.* 2015).

At the interpersonal level, the patients' family and friends either hindered or supported self-management; for example, some cooked healthy meals for the patient while others offered the patient unhealthy food. This finding was consistent with previous research with families (Wellard *et al.* 2008; Rose and Harris 2013; Mayberry and Osborn 2014) and providers (Nagelkerk *et al.* 2006; Ball *et al.* 2016). Thus, providers could identify how families and friends can better support (or not hinder) self-management. Involving the family might be especially important for those patients whose cultural background places strong emphasis on family relationships. Wen *et al.* (2004) recommended involving the whole family in self-management support for Mexican-American patients with T2DM.

At the interpersonal level, the patient–provider relationship was identified as a factor influencing self-management. Providers reported that rapport resulted in the continued attendance of patients at the practice, increased reception to education and treatment compliance. Similarly, Choi *et al.* (2017) found that rapport was crucial to adherence to self-management regimes. Providers also identified that time was important in building rapport, and that PNs had the advantage of longer appointments for developing rapport. This has implications for enhancing the clinical role of PNs by focusing funding on clinical-based activities, such as chronic disease management, rather than non-clinical activities, as proposed by Afzali *et al.* (2014).

At the organisational level, access issues predominated. These issues included the availability and affordability of multidisciplinary care, which have not been explored by previous research into self-management of T2DM. Providers emphasised the importance of onsite multidisciplinary care as it increased the physical availability of services and facilitated easier coordination between providers. Affordability of specialist and allied health services was highly pertinent to half of this study's participants, who reported their financial situation was constrained. To accommodate patients with low incomes, providers referred patients to services that were free or subsidised. However, providers reported that these services were associated with long waiting times, which reduced patients' access to these services. Further, the number of visits allowed under Medicare Care Plans were insufficient to address the needs of patients with financial constraints. The Health Care Home program offers a more flexible approach to funding; for example, through bundled payments, to assist access to multidisciplinary care, in particular allied health (Department of Health 2018).

At the community level, cultural barriers to maintaining a healthy diet were evident in the Pacific Islander and Middle Eastern cultures; for example, patients from these cultural backgrounds reported that it was considered offensive to refuse meals prepared by the host. Such cultural barriers have been identified in previous research (Haden 2009; Levin-Zamir *et al.* 2016). Several providers reported a lack of culturally tailored advice from dieticians and health information resources. There is evidence that tailoring diabetes interventions according to the culture, language, religion and health literacy skills of the patient

group can contribute to positive patient outcomes (Zeh *et al.* 2012). This highlights the need to culturally tailor self-management resources, especially dietary education.

Patients and providers expressed different views about diabetes self-management education programs. Some patients reported that they did not know that these programs existed and were interested in it, especially in regards to diet. Others had attended such programs and found it valuable. However, some providers were aware of but did not think it necessary or appropriate to refer patients to these programs. Structured diabetes education programs have been shown to improve patient outcomes in the long term (Steinsbekk *et al.* 2012), and the RACGP recommends all T2DM patients be referred to such programs (RACGP 2016). This incongruence between patients' interest in self-management programs and providers' underuse of these programs was also found in the Diabetes MILES-2 survey (Ventura *et al.* 2016). This suggests a need to increase awareness of available programs and evidence of their effectiveness to both patients and providers.

All of the patients reported barriers to self-management at two or more levels of the SEM model (e.g. time constraints and affordability). This suggests that strategies to improve patient self-management that focus on a single factor (e.g. patient education) might be insufficient for achieving a significant and lasting effect on self-management behaviours. Multi-level interventions could be used to systematically target areas of change at each level of influence (Glanz *et al.* 2008).

Limitations

The findings from this study could be affected by selection bias, as it is likely that those who were more interested in improving self-management participated in the larger study. Exposure to the larger study's Internet-based intervention might have influenced participants' responses. As all patients had Internet access as a selection criterion of the larger study, the findings might not be generalised to the three-in-ten households in SWS that did not have Internet access (ABS 2011). The study sample was sourced from a low number of practices and did not include all of the cultural groups that exist in SWS, which limited the generalisability of the results. A larger and more diverse sample might have identified a greater range of factors and been able to give more insight into how factors interact with each other or work differently for different population groups. Further research might elucidate additional factors, such as social stigma and physical environments, which have been previously associated with self-management but were not found in this study (Wellard *et al.* 2008; Booth *et al.* 2013).

Conclusion

The poor rates of self-management in Australians with T2DM can be attributed to a range of factors operating at multiple levels of the SEM: individual (e-health literacy, motivation, time constraints); interpersonal (family and friends, T2DM education, patient-provider relationship); organisational (affordability, multidisciplinary care); and community levels (culture, self-management resources). Multi-level self-management strategies are needed to address these factors. These include tailoring health education and resources to e-health literacy and culture; attention to social networks and the patient–provider relationship; and facilitating access to affordable, on-site allied health services.

Conflicts of interest

The authors declare that they have no conflicts of interest.

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Appendix 1.   Pre-intervention interview guide

Pre-intervention interview questions for healthcare providers.

Healthcare providers
What has been your experience with patients with poorly controlled type 2 diabetes?
Tell me about clients/patients with poorly controlled type 2 diabetes who are particularly memorable. (Explore details to try to understand whether the significance of this to the provider is rooted in: systemic issues, characteristics of the vulnerable group, OR provider's ability to understand and orient vulnerable patients)
What do you think are the factors that influence a GP/practice's capacity or willingness to provide care to patients with poorly controlled type 2 diabetes?
How is the practice staffed? How is it governed?
How does the practice organise itself to make it easier for vulnerable clients to get care?

Appendix 2.   Post-intervention interview guide

Post-intervention interview questions for patients and healthcare providers. SEM, socio-ecological model

Patients	Healthcare providers
Where do you mostly get your information about how to manage your diabetes? What are your reasons for using this source of information?	Where do your patients with type 2 diabetes usually receive information about how to self-manage? Do you think the information is tailored to the patient's language, culture or health literacy?
How easy or difficult is it for you to look after your diabetes?	How do you support your patients to self-manage their type 2 diabetes?
What are the main barriers/challenges with managing your diabetes? What helps you to care for your diabetes? (Explore at various levels of SEM)	What are the main barriers and facilitators to self-management in your patients with type 2 diabetes? (Explore at various levels of SEM)