

**REVIEW OF TYPE 2 DIABETES SELF-MANAGEMENT
PROGRAMS IN HAWAI'I AND MENTAL HEALTH**

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ABSTRACT

Background Type 2 diabetes is a complex chronic condition. To achieve positive outcomes patients must have an understanding of diabetes and self-efficacy to carry out self-management. Studies have shown that diabetes self-management education interventions positively affect physical and mental health outcomes, thereby improving the patient's diabetes self-management.

Purpose The purpose of this article was to determine if four diabetes self-management programs (DSMP) on the Island of Hawaii are providing competent care based on national standards of curriculum components, addressing mental health concerns affecting diabetes self-management, and providing culturally adapted care.

Methods This study was carried out in three stages: 1) selecting programs for analysis; 2) comparing evaluated programs based on American Association of Diabetes Educators Self-care behaviors through the review of program manuals and supplemental materials; and 3) interviewing program directors.

Results A review of community-based, self-management programs on Hawaii Island reveals that they provide competent care based on national Diabetes Self-Management Education standards. The reviewed programs appear to be successful and include culturally adapted education. However, assessments for mental health are not currently being used to assess a patient's need for treatment of common mental health problems such as depression.

Conclusion The current evidence of a connection between diabetes and depression indicates that DSMPs should assess for depression and provide effective treatment, especially for ethnic groups that have a high prevalence of diabetes and diabetes-related hospitalizations. More research is needed to determine how programs could better address culture and mental health concerns related to diabetes self-management education.

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LIST OF ABBREVIATIONS

<u>Abbreviation</u>	<u>Term</u>
ADA	American Diabetes Association
AADE	American Association of Diabetes Educators
BMI	Body Mass Index
BP	Blood pressure
CBT	Cognitive Behavioral Therapy
CDSMP	Chronic Disease Self Management Program
CHW	Community Health Worker
DSME	Diabetes Self Management Education
DSMP	Diabetes Self Management Program
EHR	Electronic health record
FSBS	Finger Stick Blood Sugar
HbA1C	Glycosated Hemoglobin
HDL	High-density lipoproteins
LDL	Low-density lipoproteins
NHPI	Native Hawaiian & Pacific Islander
PCP	Primary care physician
QoL	Quality of Life
RN	Registered nurse
T2D	Type 2 Diabetes

CHAPTER 1

INTRODUCTION

Over 76,000 (7.8%) residents in the state of Hawaii have been diagnosed with Type 2 diabetes (T2D) [1] with Native Hawaiian/Pacific Islanders (NHPI) and Filipinos (46% of population) [2] having diabetes rates three times higher than average [3, 4]. In Hawaii there have been consistent increases in diabetes-related hospitalizations [5] and deaths [1] despite improved medical treatment and management [5]. Hospitalizations due to hypoglycemia, hyperglycemia, kidney failure, infections, and cardiovascular disease [4] are a costly result of insufficient primary care, and poor self-management [6, 7] and disproportionately affect those of NHPI, Filipinos and Japanese heritage [8].

The daily requirements of managing diabetes are demanding and impact the patient, their family, and their community [9]. To maintain or improve health for persons with diabetes, fluctuations due to food intake, stress, medications, etc. must be accounted for [10] by testing finger-stick blood sugar levels (FSBS) throughout the day [9]. Studies indicate psychological factors strongly influence the ability and motivation for positive self-management [7, 9].

Primary care providers and other healthcare professionals, such as nutritionists, have traditionally been the primary source of education for patients with diabetes but this is changing. Diabetes care has become more patient-centered, with patients actively involved in decision-making and self-management, with support from healthcare professionals [9, 11, 12]. Through diabetes self-management programs (DSMP), participants learn self-care and problem-solving skills to improve their health. DSMPs exist to provide education and support in a group setting to facilitate well-informed choices in self-care [13]. The outcomes targeted by DSMPs are usually: reduction of blood glucose (A1c) percentage¹, lower Body Mass Index (BMI), and improved quality of life [13].

Educating participants in diet, physical activity and medication management increases self-efficacy for positive self-management [14]. Since diabetes is a complex, chronic disease, each DSMP participant, with the assistance of an educator, should continuously refine and improve self-care through assessment, goal setting, planning, implementation, evaluation, and documentation [12, 13, 15]. The American Association of Diabetes Educators (AADE) determined a framework of seven integral Self-Care Behaviors of diabetes self-management education (DSME) [16], known as the

¹ Blood glucose measurements are reported as Hb A1c, or A1c, levels. The ADA recommends that healthy A1c levels below 7%. [4]

AADE7™ [17]. They are: Healthy Eating, Being Active, Monitoring, Taking Medication, Problem Solving, Healthy Coping, and Reducing Risks.

Patients with diabetes and depression have high stress levels and impaired daily functioning, contributing to poor self-management [11, 12]. People under 50 with a history of depression are 30% more likely to acquire T2D [18] and persons with diabetes have much higher rates of depression than those without diabetes, regardless of ethnic group [7, 19, 20, 21]. Research indicates 1 in 3 diabetes patients may be suffering from depression, dysthymia, or subclinical depression [9, 19, 21]. In a study in Hawaii, researchers found 45% of 141 diabetes patients surveyed had undiagnosed depression symptoms [20]. Their findings indicated an A1c level higher than 7% was directly correlated to a lower quality of life and increased depressive symptoms [20]. The bi-directionality of T2D and depression is likely due to biochemical brain changes (depression leads to T2D) and the burden of having a chronic illness (T2D leads to depression) [19]. Depression and poor diabetes self-management symptoms both include changes in weight, appetite, sleep patterns, and fatigue [7, 9] making diagnosis difficult. Having both depression and diabetes leads to unhealthy patients and high healthcare costs [7, 9].

Cultural values, traditions, and perceptions of self-care influence health-related behaviors and the success of interventions for diabetes and depression [7, 9, 22, 24, 25]. Collective cultures, such as Native Hawaiian, Filipino, and Japanese, tend to prioritize family needs over self-care [20]. Therefore, patients may sacrifice their personal health by under-medicating, accepting unhealthy foods, or missing doctor appointments [23-27] to avoid burdening family or doctors. Studies examining culturally adapted DSMP indicated higher satisfaction, better outcomes for A1c, BMI, and knowledge of diabetes compared to interventions that are not culturally adapted [26-37]. These interventions included: translators; colloquialisms; serving and/or describing culturally adapted meals; multiethnic models; and multiethnic educators.

Purpose of the Study

Despite advancements in patient care and self-management, diabetes rates continue to rise, especially for NHPI, Japanese and Filipinos [3, 4]. Therefore, the factors affecting high quality DSME such as mental health and culture suggest that evaluations and modifications are key to participant success. This study reviews community-based DSMP in Hilo, Hawaii where diabetes rates and cultural diversity are higher than national averages. By reviewing and comparing the outcome measures and curriculum of four community-based diabetes self-management programs, this study aims to (1)

determine if they provide care comparable to national standards based on curriculum components, (2) review how they address mental health concerns, and (3) their cultural adaptations.

CHAPTER 2

METHODOLOGY

This study was carried out in three stages: 1) selecting programs for analysis; 2) comparing evaluated programs based on review of program manuals and supplemental materials; and 3) interviewing program directors.

Program Selection

Programs were included based on the following criteria: a) consisted of a series of self-management classes; b) accessible to the community; and c) used quantifiable outcome measures (e.g. BMI, A1c, mental health etc.). Programs at large health management organizations, such as Kaiser and BlueCross BlueShield, were not included because they are not accessible by the general public. Four programs met the aforementioned inclusion criteria.

Each program is offered free to the community. Two programs are at low-income community health clinics, one is offered by a State of Hawaii office, and one is offered as a public service by a state hospital.

Program Comparison

The following information for each of the four programs was recorded in a table: a) Foundational model; b) Program length and class duration; c) Class structure; d) Cost to participants; e) Instructional style; f) Formative measures; and g) Outcome measures (see *Table 1*). For each individual program the reported outcome measures were listed based on their assessment at intake, during, and/or at the end of the DSME program. Unique offerings are notated at the bottom of the table as “Miscellaneous”. These aspects of the program may account for potential effects contributing to changes in outcome measures.

Using the manual’s Table of Contents and supplemental materials, each of the program’s discrete curriculum components was recorded. Next, the curriculum information from the manuals and supplemental materials of the programs was incorporated into a Master list. The topics with similar curriculum intentions were grouped together and organized into categories following the constant comparison principle. This was an iterative inductive process by which components of program curricula were combined into similar categories and labeled with a definition based on the properties. After the first author conducted the initial coding, a Community Psychologist with 17 years experience in her field, acted as an expert criterion rater; she confirmed the coding categories and

made suggestions to refine list. Intake processes were gathered from supplemental materials such as intake forms, program packets for instructors, and program director interviews. Using the manuals and supplemental material, a Counseling Psychologist independently confirmed the curricula components from the list of Curriculum for each of the four programs. The list of curriculum categories was then grouped into broad thematic categories of: physical health, nutrition, and mental health. What emerged from this process was formatted into *Table 1*.

Table 1. Diabetes self-management programs in Hilo, Hawaii

Program Title	<i>Program A</i>	<i>Program B</i>	<i>Program C</i>	<i>Program D</i>
Agency	Low-income Clinic	State of Hawaii	Low-income clinic	State Hospital
General Structure				
Based on:	1) Life with Diabetes [37] 2) The Art of Empowerment [38]	1) Stanford Diabetes Self Management Program (DSMP) by Lorig, Gonzalez, et al. [13]	Requests from constituents gathered by Community Health Workers and input from DSME group participants	Art and Science of Diabetes Self-Management Education Desk Reference [39]
Length/duration <i>Programs meet 1/wk</i>	10 weeks 2 hours/class	6 weeks 2 ½ hours/class	10 weeks 2½ hours/class	9 classes 75 minutes
Class structure	½ hour Education ½ hour listening ½ hour Q&A Goal setting	½ hour goal review Interactive educational component ½ hour goal setting	Education & gardening	Goal review Educational presentation Goal setting
Cost (to participant)	Free; billed to insurance	Free; funded by Office of Aging & run by trained volunteers	Free; funded by grants	Free; funded by hospital for community
Led by:	Professionals and Diabetes educators	Trained peer educators	Professionals and educators	Medical professionals
Curriculum				
<i>Physical Health</i>				
Pathophysiology	x	x	x	x
Diabetic medication	x	x	x	x
Monitoring blood sugar	x	x	x	x

Physical activity	x	x	x	x
Co-morbidity	x		x	
Health care team		x		x
Dental care	x		x	
Foot/skin care	x	x	x	
Substance use	x			
<i>Nutrition</i>				
Healthy eating	x	x	x	x
Meal planning	x	x	x	x
Portion control	x	x	x	x
Serves food/recipes	x		x	
<i>Mental Health</i>				
Goal setting & Behavior changes	x	x	x	x
Psychological adjustment/acceptance	x	x	x	x
Stress & coping skills	x	x	x	x
Guided relaxations		x		
Depression	x	x	x	x
Communication skills		x		
Positive thinking		x		x
Social support	x		x	
Culturally adapted	x	x	x	
Intake	A1c, weight, BP ² ; pretest	<i>Stanford</i> intake questionnaire	A1c, weight, BP ¹ , LDL, 3-day food intake, physical activity assessment	By PCP: A1c, LDL, HDL, BMI; participant goals
Ongoing measures	Each class (done by participants): FSBS ³ , weight, BP ¹ ; pretest	Goals from previous week discussed, including barriers	Each class: weight, BP ¹ , FSBS ² , 3-day food intake, activity assessment; posttest/topic	None; voluntary self-report on changes/goals

² Blood pressure

³ Finger Stick Blood Glucose

Outcome measures	A1c, weight, BP ¹ ; posttest; program evaluation	6-month feedback group with self-report; program and leader evaluation	6 and 12-month follow up: A1c, FSBS; weight; BMI; program evaluation	Set by individuals with help from director; typically A1c or BMI related
Unique characteristics	Medical providers are available after group; has ‘advanced’ class; rolling open enrollment; EHR info available to director; smoking cessation focus; uses software to evaluate and update program	Evidence based; feedback about individual leaders from individual participants; gives relaxation CD; offers Chronic Disease Management Program; uses a “buddy” system accountability	Builds, stocks and helps maintain a garden box for participant; Provides transportation; has other behavioral health classes available	In-patient population visited by director, referred at discharge; rolling open enrollment; curriculum given at intake
Cultural Adaptations	Translators; multiethnic models & presenters; local foods	Opening prayer each class; local name and logo; local food potlucks; local examples; 6-month reunion; completion certificate; assistance with forms; local models & presenters	Mandate to serve NHPIs; colloquial language; multiethnic models, food, & presenters; spiritual component; Native healing methods addressed; family-like atmosphere;	

Program Director Interviews

A semi-structured interview confirmed and filled gaps in the table of key characteristics of each DSMP. The 15-question interview guide solicited the following information about each program: development of program, use of advisory board, program details (including duration and structure), description of intake and data collection, use of assessment tools, recruiting process, cost to participants, ability to repeat program, family member participation, follow-up process, and internal evaluation of program. A specific question to address mental health assessment was included as was two open-ended questions soliciting input on aspects not previously covered. Two program directors returned their interviews electronically, one director returned a partial electronic interview, which was supplemented by notes from a phone conversation, and one director was interviewed in person, with notes approved by director. The responses from the interviews were incorporated into the table.

CHAPTER 3

RESULTS

Summary of General Structure

The *Program A* curriculum is presented by diabetes educators, physicians, and professionals for 30 minutes per topic. Presentations are then followed by a half-hour question and answer period. At the end of class, participants set personal goals related to the presentation topic.

Program B is the only program taught by peer-educators, selected to reflect the community and typically have the same or similar chronic disease [14]. Instruction is based on script for each topic. Since this program does not have medical staff, they do not give medical advice. Their model emphasizes the patient's personal knowledge of his/her disease and the patients becoming 'experts' on their own health. Each class opens with a review of goals and closes with a setting of goals for the week [14]. *Program B* has the shortest program duration at only six weeks and class length is 2 ½ hours, including shared food at the end of class.

Program C prides itself on facilitation by educated professionals who reflect the ethnicities of the local community. Of the reviewed programs their classes are one of the longest in length, 2 ½ hours, which includes a sit down meal. An RN directs the program and other staff are trained professionals. Professionals from the community are invited to present on specialty topics, such as eye, foot, and behavioral health care.

Of the four groups *Program D* has the shortest class duration (75 minutes). The director stated that, "this amount of time was the maximum that participants are able to focus and retain the information presented." Most participants have been patients of the emergency room or have received inpatient treatment due to diabetes complications. The program's director, an AADE certified educator and RN, and medical professionals present the curriculum.

The reviewed programs each believe familial support is integral to the success of self-management and they encourage family members to attend. The 'support person' is asked to attend every class and is treated as an equal member of the program.

Summary of Curriculum

Program A, is a recognized program by the ADA and *Program D*, is accredited by the AADE. Two programs, *Program A* and *Program B*, use evidence-based manuals for treatment—ADA Life With Diabetes [38] and Stanford DSMP [14], respectively. The *Program A* program director also uses

The Art of Empowerment as a training manual for DSME [39]. The *Program D* is AADE accredited and the curriculum is based on the Art and Science of Diabetes Self-Management Education Desk Reference [40], which outlines presenting the scientific knowledge of diabetes and individualizing the program. *Program C* meets the guidelines of AADE7™ [17] but is not accredited. The director stated the Native Hawaiian community perceived disparities in access to healthcare information so they formed a clinic to offer self-management education to support the health of the Native Hawaiians. They then developed the DSMP from what patients at the clinic wanted to know about diabetes care and input from participant feedback.

Physical Health

All programs cover the pathology of diabetes including symptoms, diagnosis, risk factors, and complications. Each program addresses physical activity in their curriculum. Two programs, *Programs A* and *C*, have trained staff to safely lead participants in appropriate exercises. Although *Program B* covers pathology and treatment of diabetes, it does not deal with specifics of medication, monitoring blood sugar or dental care because medical staff does not lead it. The participants are taught the skills needed for diabetes treatment, as well as how to talk to, organize, and work with their health care team.

Nutrition

Controlled consumption of food is an integral way T2D patients can affect their personal health; modifications to diet is both personal and emotional for most people, making it a point of stress for people diagnosed with diabetes [9]. All programs emphasize improvements in nutrition and portion control.

Mental Health

The *Program A* curriculum offers a mental health module during Week 9 called Psychological Adjustment—Stress and Coping. The presentation, by a behavioral health specialist, is focused on the relationship between the effects of stress on glucose levels and using healthy coping techniques to manage stress. The instructor discusses the symptoms of depression and compares them to physical symptoms of poor diabetes control, alcohol abuse, medication side effects, and other illnesses. Participants are encouraged to seek support from the instructor, the leaders of the program, and PCPs for depression.

Program B curriculum covers mental health in some part of every session with a discussion of a different aspect of mental health; e.g., adjusting to diabetes (weeks 1-6), stress management (week

3), relaxation techniques (weeks 3 & 4), handling difficult emotions (week 4), depression (week 5), and positive thinking (week 5). The Stanford DSMP protocol incorporates feedback and goals into each session, inviting participants to have heightened awareness about their emotional state [13]. In their manual, depression is noted as a common occurrence in chronic illness and management of emotional states is part of self-care.

The fifth week of *Program C* a mental health professional from the community presents information about Coping Skills. The presenters are active members of the community promoting mental and/or behavioral health for Kanaka Maoli (Native Hawaiians) and other local cultures. The curriculum for this module covers management of day-to-day stress, communication skills, and acceptance. During group sessions instructors emphasize all questions are welcome and staff are approachable for personal questions regarding mental health concerns. Participants can schedule appointments at a licensed Marriage and Family counselor's office in the facility.

The curriculum of *Program D* introduces mental health concerns as a result of stress—physical, emotional, and sexual health, during the Stress and Coping module (Week 8).

Intake

Program A gives a curriculum pretest during intake and asks several questions related to psychological adjustment. The pretest, and subsequent posttest, allows the director to document occurred learning—although emotional changes are not an outcome measure. The majority of participants are referred from the medical clinic and in the Electronic Health Record (EHR) the PCP is able to note a depression screening. Participants of *Program B* complete a questionnaire before attending group. Besides demographic information, the questionnaire asks about physical health, ability to cope with chronic condition, confidence in diabetes management-related tasks, medications and medical care; it does not include a mental health assessment tool.

A Community Health Worker (CHW)⁴ of the *Program C* clinic interviews potential participants. The CHW visits their home and discusses details of their lives including stressors, mental health concerns, and history of depression. The CHW can make counseling referrals during intake if requested by participant. The *Program D* intake interview with the director includes questions specifically related to diabetes care and mental health. The director asks what are potential participants

⁴ Community Health Workers are trained (but not formally educated) individuals who come from the community in which they serve. CHW's are used to address health disparities, access to health education and to provide low cost support services to clinics and patients [25].

personal goals for the DSMP and what they perceive as obstacles/barriers to meeting goals. The director asks if the participant has depression or anxiety.

Ongoing Measures

Program A and *Program C* regularly check A1c, FSBS, blood pressure and weight; in addition *Program C* records activity level and a 3-day food intake self-report. Participants at *Program A* are taught how to take their own blood pressure and record the collected data themselves. *Program D* participants are invited to share any changes or goals met during the week on a voluntary basis.

Outcome Measures

The *Program A* clinic reported on outcome measures for thirteen participants in 2009⁵ [42]. Pre-DSMP class the average A1c level was 8.1% and afterwards was 6.42%. BMI average went from 28.76 to 26.43, still higher than national norms of 18.5-24.9. It was reported that 0% were depressed post-group but no initial measurement for comparison. Through the patients' EHR, the program director is able to compare outcome measures of patients who have participated in the DSMP with those who have not [42]. The data indicated that most people complete the program and also participate in continued education. The *Program C* director reported data collected in 2013: 40% of participants brought A1c levels to <7%; 50% of participants lowered their fasting blood glucose levels to <140; 5% loss in average body weight. According to the *Program C* director their data is unpublished but they cite high satisfaction and retention rates for their program. The *Program B* DSMP did not provide and has not published any outcome measures. The director stated that data is turned in to University of Hawaii at Manoa, presumably for future publishing. The director also reported high satisfaction from participants. *Program D* collects similar data for post-DSMP as it does at intake. No data has been publicly published from this program. Since they do not collect data about mental health, it can be assumed they would not have outcome measures to report.

Unique Characteristics

Each of the reviewed programs has distinct offerings that may be what makes the DSMP efficacious for participants. For example, *Program A* appointments with PCP after DSMP group sessions allows patients to bring up concerns they have from group, including requests for mental health support. This DSMP has open enrollment, allowing patients at the clinic to start at the earliest convenience. Graduates can attend monthly meetings at a local park for drop-in support, continuing education and a diabetes-friendly potluck. Through the EHR the DSMP director documents notes to

⁵ Average time 30 months DSMP and support group

PCPs for follow-up and data collection. They are unique in having a smoking cessation component, with 100% success [42]. The DSMP team uses evidence based Improvement Model [45] to evaluate and update the program annually.

Program B solicits feedback from participants about individual leaders, as well as rigorously evaluates and re-trains leaders. Participants receive a CD of guided and progressive muscle relaxations, which have been shown to supplement treatments for chronic disease [14, 43] and depression [41]. *Program B* also offers Chronic Disease Management Program (CDSMP) groups. The director stated some participants repeat the diabetes program but more frequently participants attend the CDSMP group.

Program C offers an opportunity to grow food in a raised bed garden built and stocked by staff. During each class, the resident gardener presents information about gardening. Instructors found that gardening gives participants a sense of purpose and self-confidence—qualities that theoretically generalize to enhance self-care. They share the recipes and instructions on substituting ingredients to reduce fat and sugar. Other differences include the facilitated biweekly ongoing support group for DSMP graduates, providing transportation and the five behavioral health classes at the clinic (Smoking Cessation, Cardiovascular Health, etc.). Participants are allowed to repeat the class on an availability basis and the program director reported many people take the class multiple times, in addition to the other classes offered. The clinic currently offers evening classes to accommodate working participants. The clinic currently offers evening classes to accommodate working participants and has a facilitated biweekly ongoing support group for DSMP graduates.

Program D offers rolling open enrollment so a participant may start the DSMP immediately after discharge, when they may have the highest motivation to make lifestyle changes. This program gives participants the curriculum at intake in case a participant doesn't return for group sessions.

Cultural Adaptations

Three of the four programs reviewed are culturally adapted Diabetes Self Management Programs. *Program A* presenters include multiethnic locals, and, as stated earlier, is the only facility to offer classes in a native language and to provide translators on site. *Program A* is the only DSMP that offers translators and classes in Marshallese and Chuukese. This is important because there are health disparities for NHPI, with almost no data specifically on Micronesians—who tend to have low incomes, less access to healthcare and a high prevalence of co-morbid conditions with diabetes [44].

Participants are occasionally treated to home-cooked, culturally adapted diabetic-friendly food made by the director and staff.

Program B maintained fidelity through cultural modifications to the evidence-based DSMP by working with Stanford advisors and program adaptation software called Track Change Tool. The Stanford program has been adapted into other languages and cultures [38]. Changes made to *Program B* included: local name, program orientation, prayer to open sessions, serving healthy local food, completion certificate, assisting form completion, 6-month reunion, and use of local educational models. Results from a study tracking the program indicated that Asian and Pacific Islanders (as well as Caucasians) had improved communication with physicians, improved social/role activity, decreased distress, and better self-efficacy [38]. The *Program C* clinic is mandated to provide behavioral health services to the underserved NHPI community. During presentations all language, food, persons, and educational material are familiar to participants. To emphasize their community-focused philosophy and take advantage of a teaching moment, at each class the staff cooks diabetic-friendly food and sits to eat with participants. They share the recipes and instructions on substituting ingredients to reduce fat and sugar. This program incorporates a strong spiritual component and the inclusion of traditional Hawaiian healing modalities.

CHAPTER 4

DISCUSSION

With diabetes and pre-diabetes rates on the rise, there's an urgent need for interventions that offer accessible, effective, and affordable solutions. Community-based DSMP provide the skills and support so persons with diabetes can make better decisions for their personal health. It would be advantageous to the participants, the programs, and the community to have means to strengthen these DSMP and make them even more effective. The aims of this paper were to determine if the reviewed programs are providing competent care based on national standards, addressing mental health concerns related to diabetes, and providing culturally adapted care.

The first aim of this review was to compare programs to national standards of curriculum components and all programs met these standards as summarized by the AADE7™. Additionally the programs were compared to each other in a table based on structure, curriculum components, outcome measures, and unique program aspects. Each of the programs has similar group-based structure with one meeting a week, which are led by trained instructors. Each uses similar curriculum components, all reflective of National Standards for DSME.

The second aim was to assess each program's method to address the mental health concerns of participants, particularly depression, as recommended by research [19]. The International Diabetes Federation (IDF) treatment guidelines requires that standard care should include assessment, with validated measures, of psychological status of persons with diabetes [15]. National Standards of Diabetes DSME include assessment of a participant's need for mental health care [13]. To meet these standards it would be necessary to use assessment tools to complement insightful, well-trained educators. The reviewed programs do not currently use assessment tools and the possible reasons are that they believe the rapport with participants is strong enough for someone to ask for help, that a staff member would notice if mental health support was needed, or they haven't considered the need to assess mental health.

However, without an assessment of emotional health, the programs cannot accurately and reliably recognize the individual's need for a clinical diagnostic interview and follow up treatment. The most immediate and significant change in outcome measures for a DSMP may be behavioral health related as opposed to a physiologic outcome measure [14, 44]. Studies targeting depression in diabetes care have shown that interventions such as Cognitive Behavioral Therapy (CBT) and Motivational Interviewing may be effective in reducing symptoms of depression and achieving

physical outcomes [46-49]. Despite the limited studies, the outcomes indicate the potential efficacy of non-pharmacological interventions for the self-management of depression and T2D. The reviewed programs might consider incorporating CBT to address a variety of behavioral and physical health issues such as self-defeating cognitive and behavioral patterns. All of the programs include some aspect of problem-solving and/or emotional regulation, with which it is likely that all participants struggle. Therefore, an assessment and direct intervention of these mental states would be beneficial to the participants. Experts recommend using validated instruments to measure both general health and disease-specific outcomes to best assess the physical and mental concerns of patients with diabetes [44]. The directors of each of the reviewed programs report that participants universally benefit from the DSMP and that there are positive effects on outcome measures. Yet, this has not been empirically demonstrated for mental health due to lack of assessment.

Lastly, a majority of the reviewed programs addressed cultural adaptations to tackle unmet health needs of various ethnic groups. The Island of Hawaii is predominately rural, low income, and multiethnic, posing challenges to behavioral health professionals working to support patients with diabetes. Cultural adaption to DSMP curriculum seeks to address health disparities, as well as to make education about diabetes relevant to the lives of underserved ethnic and cultural communities [20, 27-39]. The unique aspects of the four reviewed programs reflect the creativity in Hawaii to meet the needs of community members. Offerings such as meals, transportation, translators, and continuity of care supplement standardized diabetes education and remove barriers to participation in diabetes programs. In order to address the concerns of patients from a variety of ethnic backgrounds, barriers such as language, perceptions of health, educational background and access to care, should be addressed. Programs will need to continue to build strong relationships with their participants, expand outreach, and modify their DSMP to improve accessibility.

Limitations

There are several significant limitations to this review. First, there was a limitation in sampling—only four programs qualified for inclusion. Opening up the review of programs to include other community-based programs across the state would allow for more data. Second, limiting the review to only community-based programs prevented other modes of intervention from being examined, such as individual and tele-health interventions. Additionally, the methodology used in this review relied on titles, manuals, and one-time interviews to represent programs and curricula elements. Greater knowledge of the curricula, attendance at each program, and an independent confirmation of

the course material would enhance study rigor, especially as only one program reported on collected data for their outcome measures [14].

Conclusions

Further research is needed to study the effectiveness of the Hilo diabetes self-management programs, particularly regarding long-term maintenance of behavior changes. Future research needs to focus on further surveying of mental health in the individual and the effect of diabetes on the community, by increasing the number of assessments and standardized outcome measures for programs already running. Additionally, identifying predictors such as social support, mental health, cultural adaptation, and problem solving may improve the quality of interventions. This work should take place in a community atmosphere, involving people with diabetes from diverse backgrounds [31].

In addition to this research, local diabetes self-management programs would benefit from directly addressing mental health in their intake, curriculum, and outcome measures. This information will help participants make changes necessary to improve their quality of life, A1c, and BMI outcomes. This assessment will indicate a need to refer participants for mental health counseling.

Since Native Hawaiians, Filipino Americans, Japanese Americans and persons of these mixed ancestries are at an increased risk of T2D [3, 6, 50] but are underrepresented in diabetes research [6-8, 50], continuing to track participants of DSMPs in Hawaii may facilitate more effective treatment for these populations. Diabetes and depression research has relied on assessment tools that may not have been validated for multiethnic populations [50]. Research in Hawaii could help confirm the validity of the various tools, as well as help clinicians and educators more accurately assess and address mental health for diabetic patients from diverse ethnic backgrounds. Addressing the needs of participants in DSMP in Hawaii could benefit the individuals and also decrease high health care costs associated with expensive diabetes related hospital admissions.

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