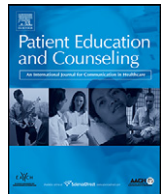




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### Self Management

## Self-management programs conducted within a practice setting: Who participates, who benefits and what can be learned?

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### ABSTRACT

**Objective:** To investigate the impact of generic and diabetes-specific self-management programs offered in a real world context.

**Methods:** A quasi-experimental design with 12-week follow-up compared *Living with a Chronic Condition* and *Living with Diabetes*. Self-report data collected included: Self-management Knowledge and Skills; Health Related Quality of Life (HRQOL); Depression; Social Isolation; Loneliness; Self-efficacy; and Health Behaviours.

**Results:** Participants ( $N = 458$ ) in the two programs differed on almost all baseline measures. Both demonstrated statistically significant improvements in Self-management Knowledge and Skills, as well as reductions in depression. In addition to younger age, low HRQOL, high self-efficacy and Positive and Active Engagement in Life, were the clinical factors most likely to lead to improvements in HRQOL and self-efficacy. Changes in different characteristics predicted different outcomes.

**Conclusion:** Both generic and disease-specific programs led to improved outcomes, despite the two programs attracting significantly different participants. Referral patterns also differed but GP referral rates were low for both.

**Practice implications:** Positive participant outcomes can be achieved in real life clinical settings. While younger people with a positive attitude may appear to gain more, it is important to encourage people from low socio-economic status to enter these programs so that social inequalities in health are not worsened.

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### 1. Introduction

The prevalence of long term conditions is in epidemic proportions placing considerable pressure on governments, health systems and the broader community [1]. The Chronic Care Model [2–5] is guiding reform in many countries. It advocates system change, with “proactive teams” supporting “activated patients” to manage their chronic conditions [6].

Self-management is the only element of the Chronic Care Model that involves direct interaction between health providers and people living with chronic conditions. The Australian National Chronic Disease Strategy defines self-management as “active participation by people in their own health” [7]. The most common interventions to support client self-management are six to eight week group programs with content tailored to participants with a single, specific condition (disease-specific programs) or to participants with mixed and/or multiple conditions (generic programs). Both aim to provide people with knowledge and skills needed to manage their risk factors, monitor their disease(s), make effective use of services and/or manage the impact of disease on their lives [8].

Early efficacy studies have suggested reduction in unplanned hospital admissions and/or length of stay in hospital, more efficient

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use of health professionals' time and/or improved self-care capacity (for an example see [9] a report of a generic program). More recently meta-analyses have raised more questions than provided answers. Which demographic and clinical characteristics predict positive outcomes is unclear. Some suggest more improvement in younger female participants [10]; others suggest more improvement for individuals with more severe symptoms [11,12].

The mechanism for change also remains unconfirmed. Which participant skills, knowledge or characteristics improve and which are associated with better outcomes are unknown. A recent meta-analysis [13] exploring the link between changes following a diabetes intervention and quality of life, was inconclusive. Further, Foster et al. [14] concluded that as self-management lacks a unique theoretical framework, it is impossible to draw conclusions regarding how programs work.

The relative merits of generic versus disease specific programs are queried. Some suggest generic programs result in improved self-efficacy and quality of life [14,15]; others report disease-specific programs lead to improvements in medically focused interim outcomes such as glucose control or hypertension [16,17]. Answers are hampered by lack of comparability across research designs and outcome measures. Few, if any, reports are available that concurrently examine different self-management programs.

Finally, efficacy studies do not always translate into effectiveness, i.e. whether a "program does more good than harm when delivered under real-world conditions" [18]. Glasgow et al. [19] states that while diabetes programs are effective and cost-effective in preventing complications they are poorly implemented in practice.

### 1.1. Purpose

This paper reports on an evaluation, undertaken in 'real-world conditions', of the disease-specific *Living with Diabetes* (*Diabetes*) program offered by a not for profit charitable agency and *Living Life with a Chronic Condition* (*Chronic Condition*) program delivered by the Western Australian General Practice (GP) Network (practices grouped together to access support and education). Both programs were funded by the Western Australian Department of Health. This paper addresses the following questions:

- (1) What is the demographic profile of participants in the two programs and does it differ?
- (2) Does participation in a generic or disease-specific self-management program, offered in a real-world rather than research context result in:
  - improvements in self-management knowledge; skill; quality of life; self-efficacy,
  - decreased levels of depression; social isolation; loneliness,
  - improved management of behavioural risk factors (exercise, alcohol intake, smoking), at post-intervention and/or follow-up?
- (3) Which baseline clinical and demographic characteristics predict improvement in quality of life; depression; self-efficacy?
- (4) Changes in which characteristics predict positive changes in quality of life; depression; self-efficacy?

## 2. Methods

### 2.1. Design

Question 1 was addressed using a comprehensive questionnaire including source of referral. A pre-test/post-test design with 12-week follow-up identified changes in outcomes over time

(Question 2). Data from baseline and follow-up answered Questions 3 and 4.

### 2.2. Participants

The only criterion for program participation was a diagnosis of at least one chronic condition. In the *Diabetes* program a diagnosis of type 2 diabetes was specified. Carers (spouses/significant others) were also invited to participate. Participants learned of programs via agency websites, newsletters, word of mouth and through referral. A targeted letter campaign by the Department of Health informed people with known chronic conditions about the *Chronic Condition* program. People newly included on the voluntary diabetes register received a personal letter or phone call. GPs and other health professionals were encouraged to refer clients.

As an evaluation of existing services, denial of service to create a control group was not ethical. Instead, all individuals, from September 2008 to March 2010, rather than a sample of people attending the programs, were invited to participate. Participation was voluntary and had no bearing on access to service. No data were collected from participants who declined research involvement, however this number was noted. For this study, carers and those who did not self-identify as having a chronic condition(s) were excluded. With this exception, all who provided informed voluntary consent were included in the analyses. This study was approved by the Curtin Health Research Ethics Committee (approval OT-0302008).

### 2.3. The two self-management support interventions

*Living Life with a Chronic Condition*. Renamed in Western Australia, the Chronic Disease Self-Management Program (CDSMP) developed at Stanford University and described at <http://patient-education.stanford.edu/> is designed to provide adults with any chronic condition(s) the knowledge, skills and confidence to work collaboratively with health providers to improve their health outcomes and reduce demand on the health system [20]. It is a highly scripted six week group program (2.5 h per week). Leaders are certified and organizations licensed through Stanford University.

*Living with Diabetes*. Specifically developed by Diabetes Western Australia, this is a highly interactive, behaviourally based group intervention for people with type 2 diabetes. The overall goal is to "improve self management and facilitate lifestyle modification for people with type 2 diabetes through high quality education and reduce the risk or delay the onset of long term complications" [21]. The six modules are delivered by a nurse, dietician, and/or a physiotherapist hired and trained by the organization. There is a structured protocol and manual including, for each module, a module outline, script, overhead outline, master copies of participant handouts and facilitator resources.

### 2.4. Data collection

Demographic and pre-test data were collected after enrolment and either prior to or at the first session. Referral source was collected. Post-test data collection occurred at the last session or in the week after completion. All data were collected via self-report surveys returned to the service provider then forwarded to the researchers. Follow-up data were collected 12 weeks later, via mail, by the research team.

### 2.5. Dependent variables and measurement tools

With no restrictions on diagnosis, measurement of severity of condition(s) using biomedical markers was not feasible. Instead relevant self-report outcomes were selected.

**Self-management knowledge and skills.** The Health Education Impact Questionnaire Version 2 (heiQ) is a 40-item questionnaire with eight independent scales. Six (all with Cronbach's alpha  $>0.81$ ) were used: Positive and Active Engagement in Life, Skill and Technique Acquisition, Constructive Attitudes and Approaches, Health Services Navigation, Social Integration and Support, and Emotional Wellbeing. Item development was guided by a strong grounded theory approach, including concept mapping workshops with consumers of patient education programs, healthcare professionals and policymakers. This was followed by robust psychometric analysis in public outpatient settings [22] and translation into 20 languages [23].

**Health Related Quality of Life (HRQOL).** The Assessment of Quality of Life (AQoL-8) assesses four life domains: Independent Living, Social Relationships, Physical Senses and Psychological Wellbeing [24,25]. Responses are transformed to a utility scale ranging from  $-0.04$  (worst possible) to  $1.00$  (best possible) health related quality of life. Norms for the Australian population are available [26].

**Depression.** The depression module from the Patient Health Questionnaire (PHQ-9) is a well validated, self report measure with 9 items. Higher scores indicate higher frequency of symptoms. Internal consistency (Cronbach's alpha  $\alpha = 0.86$ – $0.89$ ) and test retest reliability (ICC  $0.84$ ) are good [27]. The PHQ-9 discriminates between people with and without major depression and is sensitive to change [28].

**Social isolation.** A three item self report measure derived from the Revised UCLA Loneliness Scale (R-UCLA) which correlates well ( $0.82$ ) with the original [29] was used. Total scores range from 3 to 9 with higher scores indicating greater social isolation.

**Loneliness.** A single question with four possible responses: always feel lonely, often feel lonely, sometimes feel lonely, never feel lonely [30] was employed; lower scores indicate less loneliness.

**Self-efficacy.** The six item Stanford Self-efficacy measure covers domains common across many chronic diseases; symptom control, role function, emotional functioning and communicating with physicians [31]. It has an internal consistency reliability of  $\alpha = 0.91$  ( $n = 605$ ) [32]. Higher scores indicate better self-efficacy.

**Health behaviours.** Data on typical days per week doing exercise, and daily tobacco and alcohol use were collected using items asking frequency of each.

## 2.6. Statistical analysis

Analyses were conducted using SPSS 17.0 and SAS version 9.1. Chi-square and independent *t*-tests were used to compare socio-demographic and baseline clinical characteristics of the two groups (univariate tests). A multivariate linear regression model

was used to identify which variables were independently associated with group membership (Question 1). A Random Effects Model (REM) was used to examine changes in each group over time (Question 2). REM is the appropriate analysis method because it takes into account the correlations in the data due to the repeated measurements on individuals, and is preferred to other statistical methods because all data are used without the need to impute values for missing data [33]. Baseline scores were entered as covariates. A *p*-value of  $<0.05$  was considered statistically significant.

A sub-sample of all participants with complete baseline and follow-up data was drawn to answer Questions 3 and 4. Three key outcome measures (HRQOL, depression and self-efficacy) were selected and re-defined as binary variables; i.e. either improved or not. Improvement was defined as the minimal clinically important difference (MCID); a change of  $0.06$  from baseline score for the AQoL-8 [26]; a 50% decline from the baseline score for the PHQ-9 [27]; and as no MCID is available for the Stanford Self-efficacy Scale, a change of  $1$  was chosen. Independent variables used for Question 3 were age, number of chronic conditions and baseline scores on quality of life, depression, six domains of the heiQ, self-efficacy, social isolation and loneliness. Change scores on clinical characteristics from pre-test to follow-up (22 weeks difference) were entered into a logistic regression model to assess how well they predicted positive outcomes (Question 4).

## 3. Results

A total of 930 people registered for the two programs in approximately equal numbers (Table 1). Of these 147 did not attend and a further 325 were carers, did not report a chronic condition, or declined participation so were excluded from these analyses. The remaining 458 (49.2% of registrants and 58.5% of people with chronic conditions who gave consent) were enrolled in the study and provided baseline (pre-test) data (*Diabetes* = 222; *Chronic Condition* = 236). Attrition at post-test was 25.3% and at follow-up 23.4%.

Participants in the two programs differed significantly on almost all demographic variables (Question 1 - Tables 2 and 3). Participants in the *Diabetes* program were younger, had higher education levels and more were employed with higher weekly incomes than those in the *Chronic Condition* program. Co-morbidity was common in both groups (Table 3), although participants in the *Diabetes* program who had significantly fewer reported health conditions reported greater engagement in previous education/rehabilitation programs. There were more women than men in the generic program compared to approximately equal men and women in the *Diabetes* program. Table 4 shows that the two groups

**Table 1**  
Program participation and questionnaire completion.

Program participation		All participants, <i>n</i> (%)	Living with Diabetes, <i>n</i> (%)	Living Life with a Chronic Condition, <i>n</i> (%)
Pre-test	Registered but did not participate in the self-management program	147 (15.8)	65 (13.6)	82 (18.1)
	Participated in program but excluded from analysis a	325 (35.0)	190 (39.8)	135 (29.8)
	Participated in the program and included in analysis <sup>a</sup>	458 (49.2)	222 (46.5)	236 (52.1)
	Total	930	477	453
Post-test	Included in analysis but did not complete the questionnaires (missing data)	116 (25.3)	63 (28.4)	53 (22.5)
	Included in analysis and completed questionnaires	342 (74.7)	159 (71.6)	183 (77.5)
	Total	458	222	236
Follow-up	Included in analysis but did not complete the questionnaires (missing data)	107 (23.4)	57 (25.7)	50 (21.2)
	Included in analysis and completed questionnaires	351 (76.6)	165 (74.3)	186 (78.8)
	Total	458	222	236

<sup>a</sup> Carer, no reported chronic condition, or declined research participation.

**Table 2**  
Socio-demographic characteristics of participants at baseline.

Socio-demographic characteristics	Living with Diabetes <i>n</i> = 222	Living Life with a Chronic Condition <i>n</i> = 236	Group comparison		Sample with complete data used for Questions 3 and 4
			Test	<i>p</i> -value	
Gender, <i>n</i> (%)					
Female	107 (48.2)	154 (65.5)	$\chi^2$	<0.001	208 (59.4)
Male	115 (51.8)	81 (34.5)			142 (40.6)
Age					
Mean (SD)	60.0 (11.0)	70.05 (10.5)	<i>t</i> -test	<0.001	66.2 (11.5)
Range	27.4–85.0	27.0–92.9			27.48–92.95
Highest education level <i>n</i> (%)					
Primary school or less	6 (2.8)	18 (8.0)	$\chi^2$	<0.001	19 (5.6)
Secondary school	98 (45.4)	137 (60.6)			179 (52.6)
Vocational qualification	64 (29.6)	51 (22.6)			92 (27.1)
Tertiary qualification	48 (22.2)	20 (8.8)			50 (14.7)
Previously participated in a health education/rehabilitation program					
Mean (SD)	0.5 (0.6)	0.26 (0.5)	<i>t</i> -test	<0.001	0.4 (0.6)
Range	0–2	0–2			1–2
Employment status, <i>n</i> (%)					
Full-time	87 (40.3)	1 (0.4)	$\chi^2$	<0.001	61 (17.9)
Part-time	24 (11.1)	15 (6.6)			31 (9.1)
Unemployed	10 (4.6)	10 (4.4)			12 (3.5)
Home duties	17 (7.9)	12 (5.3)			19 (5.6)
Retired/pensioner	78 (36.1)	190 (83.3)			217 (63.8)
Income level/week, <i>n</i> (%)					
\$999 or less	104 (56.5)	177 (90.8)	$\chi^2$	<0.001	225 (77.6)
Between \$1000 and \$1999	59 (32.1)	14 (7.2)			47 (16.2)
More than \$2000	21 (11.4)	4 (2.1)			18 (6.2)
Number of health conditions					
Mean (SD)	2.0 (1.1)	2.6 (1.3)	<i>t</i> -test	<0.001	2.3 (1.2)
Range	1–5	1–6			1–6

Note. Some participants declined to answer some questions. Therefore the total number or responses per item differs from the total number of participants.

were significantly different on almost all measures at baseline. With the exception of social isolation participants in the *Chronic Condition* group had poorer scores on all variables.

The most common referral source (Table 5) for the *Diabetes* program was a targeted 'Letter of Invitation' sent by the Department of Health to people with known conditions. For people in the *Chronic Condition* program, referral by 'Other Health Professional' (i.e. other than a GP) and by 'Family/Friend/Self' exceeded those attending as a response to a personal letter. GP referrals accounted for only about 4% of all known referrals, including those to the *Chronic Condition* program delivered through the GP Network (Table 5).

Participants in neither group demonstrated improvements in HRQOL or reductions in either social isolation or loneliness (Table 6). Post hoc, pair-wise comparison indicated similar statistically significant improvements for both groups at post-test and follow-up on four of the six heiQ domains (Positive and Active Engagement in Life, Skill and Technique Acquisition, Social Integration and Support, and Health Service Navigation). Both

groups also showed reduced levels of depression from pre-test to post-test, however this was only sustained at follow-up for participants in the *Chronic Condition* program. While not demonstrating significant improvement in Emotional Wellbeing at post-test, both groups had significantly improved by follow-up. Differences between groups also occurred. Participants in the *Chronic Condition* program showed significant improvements in Constructive Attitudes and Approaches and Self-efficacy (at both time points), while those in the *Diabetes* program did not.

Exercise patterns, alcohol intake and smoking habits are known risk factors for many chronic conditions. Overall participants had low levels of alcohol and tobacco use, indicating limited need for improvement. Despite this, participants in the generic program demonstrated an increase in the number of days engaged in exercise and a reduction in tobacco use, both being maintained at follow-up. In contrast participants in the *Diabetes* program showed improvements in all three risk factors at post-test but by follow-up, only reductions in tobacco use were sustained. Alcohol intake showed an initial drop at the post-test time period, but had

**Table 3**  
Health conditions of the participants at baseline.

Health conditions	Living with Diabetes <i>n</i> = 222, <i>n</i> (%)	Living Life with a Chronic Condition <i>n</i> = 236, <i>n</i> (%)	Sample with complete data used for Questions 3 and 4, <i>n</i> (%)
Asthma	21 (9.5)	54 (22.9)	55 (15.7)
Cancer	13 (5.9)	23 (9.7)	21 (6.0)
Coronary heart disease	21 (9.5)	63 (26.7)	68 (19.4)
Depression	45 (20.3)	60 (25.4)	69 (19.7)
Diabetes	222 (100)	90 (38.1)	222 (63.2)
Fibromyalgia	5 (2.3)	12 (5.1)	13 (3.7)
Osteoarthritis	41 (18.5)	91 (38.6)	105 (29.9)
Osteoporosis	9 (4.1)	58 (24.6)	56 (16.0)
Rheumatoid Arthritis	14 (6.3)	29 (12.3)	33 (9.4)
Other	64 (28.8)	122 (51.7)	140 (39.9)

**Table 4**

Clinical characteristics of participants at baseline.

Clinical characteristics	Score range	Mean score Living with Diabetes <i>n</i> = 222 mean (SD)	Mean Score Living Life with a Chronic Condition <i>n</i> = 236 mean (SD)	<i>p</i> -value <i>t</i> -test	Sample with complete data used for Questions 3 and 4 mean (SD)
heiQ					
Positive and Active Engagement in Life	1–4	3.16 (0.5)	2.95 (0.5)	0.001	3.1 (0.5)
Emotional Well-being	1–4 <sup>a</sup>	2.09 (0.7)	2.37 (0.6)	<0.001	2.3 (0.7)
Constructive Attitudes and Approaches	1–4	3.30 (0.5)	2.97 (0.5)	<0.001	3.1 (0.5)
Skill and Technique Acquisition	1–4	2.90 (0.5)	2.20 (0.5)	<0.001	2.9 (0.5)
Social Integration and Support	1–4	2.99 (0.6)	2.79 (0.6)	0.003	2.9 (0.6)
Health Service Navigation	1–4	3.17(0.5)	3.03 (0.5)	0.010	3.1 (0.5)
Quality of Life	–0.04–1	0.73 (0.2)	0.48 (0.2)	<0.001	0.6 (0.3)
Depression	0–27 <sup>a</sup>	3.94 (4.8)	6.56 (5.2)	<0.001	5.3 (5.1)
Social Isolation	3–9	4.02 (1.6)	4.64 (1.7)	0.001	4.3 (1.7)
Loneliness	1–4	3.49 (0.7)	3.24 (0.7)	0.001	3.4 (0.7)
Self-efficacy	1–10	8.16 (1.9)	6.61 (2.1)	<0.001	7.3 (2.0)
Typical Days Doing Exercise	1–6	2.40 (0.9)	2.10 (1.0)	0.008	2.3 (0.9)
Tobacco Use	1–3 <sup>a</sup>	1.45 (0.8)	1.20 (0.6)	0.041	1.2 (0.6)
Typical Alcohol Drinks	1–4 <sup>a</sup>	1.59 (0.9)	1.40 (0.7)	0.010	1.5 (0.7)

<sup>a</sup> A higher score indicates poorer health.

**Table 5**

Source of referral to programs.

Referral source	All participants ( <i>n</i> = 458)	Living with Diabetes ( <i>n</i> = 222) <i>n</i> (%) <sup>a</sup>	Living Life with a Chronic Condition ( <i>n</i> = 236) <i>n</i> (%) <sup>a</sup>
Family/friend/self	58	2 (1.3)	56 (25.5)
General Practitioner (GP)	15	7 (4.6)	8 (3.6)
Letter of Invitation	103	65 (42.8)	38 (17.3)
Other Health Professional	85	6 (3.9)	79 (35.9)
Personal Phone Call	34	33 (21.7)	1 (0.5)
Other	77	39 (25.7)	38 (17.3)
Total (known)	372	152	220
Unknown	86	70	16

<sup>a</sup> Calculated as a percentage of known responses.

**Table 6**

Results of Random Effects Model showing changes over time.

Outcome	Group	Least squared means			<i>p</i> -value			
		Pre-test	Post-test	Follow up	Main Effect of Time	Time comparisons		
						Pre-test–Post-test	Pre-test–Follow up	Post-test–Follow-up
heiQ domains								
Positive and Active Engagement in Life	Diabetes <sup>a</sup>	3.05	3.17	3.12	<0.001	<0.001	0.021	0.146
	Chronic Condition <sup>b</sup>	3.05	3.19	3.13		<0.001	0.009	0.034
Emotional Wellbeing	Diabetes	2.26	2.19	2.18	0.005	0.075	0.036	0.794
	Chronic Condition	2.27	2.20	2.18		0.072	0.021	0.643
Constructive Attitudes and Approaches	Diabetes	3.14	3.18	3.15	0.001	0.299	0.794	0.463
	Chronic Condition	3.11	3.21	3.26		0.001	<0.001	0.110
Skill and Technique Acquisition	Diabetes	2.85	3.14	3.08	<0.001	<0.001	<0.001	0.188
	Chronic Condition	2.87	3.09	3.07		<0.001	<0.001	0.419
Social Integration and Support	Diabetes	2.88	3.04	3.02	<0.001	<0.001	<0.001	0.620
	Chronic Condition	2.87	2.97	2.98		0.004	0.001	0.642
Health Service Navigation	Diabetes	3.08	3.08	3.16	<0.001	0.017	0.006	0.748
	Chronic Condition	3.15	3.17	3.20		0.001	<0.001	0.532
Quality of Life	Diabetes	0.62	0.63	0.64	0.113	0.660	0.253	0.518
	Chronic Condition	0.59	0.61	0.62		0.366	0.055	0.350
Depression	Diabetes	5.29	4.57	4.94	<0.001	0.009	0.191	0.214
	Chronic Condition	5.49	4.40	4.66		<0.001	0.002	0.373
Social Isolation	Diabetes	4.38	4.27	4.48	0.219	0.287	0.245	0.040
	Chronic Condition	4.38	4.35	4.39		0.775	0.923	0.721
Loneliness	Diabetes	3.36	3.39	3.35	0.407	0.516	0.803	0.404
	Chronic Condition	3.31	3.38	3.36		0.227	0.543	0.572
Self-efficacy	Diabetes	7.37	7.53	7.42	<0.001	0.158	0.714	0.332



**Table 6** (Continued)

Outcome	Group	Least squared means			p-value	
		Pre-test	Post-test	Follow up	Main Effect of Time	Time comparisons
						Pre-test–Post-test    Pre-test–Follow up    Post-test–Follow-up
Typical Days Doing Exercise	Chronic Condition	7.13	7.55	7.52		<0.001    <0.001    0.813
	Diabetes	2.28	2.46	2.34	<0.001	0.006    0.397    0.073
	Chronic Condition	2.17	2.55	2.44		<0.001    <0.001    0.105
Tobacco Use	Diabetes	1.35	0.88	0.65	<0.001	<0.001    <0.001    0.016
	Chronic Condition	1.33	0.92	0.90		<0.001    <0.001    0.815
Typical Alcohol Drinks	Diabetes	1.54	1.46	1.59	0.010	0.021    0.261    0.002
	Chronic Condition	1.49	1.47	1.52		0.543    0.457    0.207

<sup>a</sup> Living Well with Diabetes.<sup>b</sup> Living Life with a Chronic Condition.**Table 7**

Baseline characteristics that predict improvements in outcomes.

Outcome variable	R square		Significant predictors: baseline clinical and demographic characteristics	Odds ratio	95% Confidence interval		p-value
	Cox and Snell	Nagelkerke			Lower bound	Upper bound	
Quality of Life	0.16	0.22	Positive and Active Engagement in Life	1.95	1.04	3.69	0.04
			Self-efficacy	1.25	1.02	1.53	0.03
			Age	0.96	0.94	0.99	0.00
			Quality of Life	0.01	0.00	0.03	0.00
Depression	0.00	0.00	–	–	–	–	–
Self-efficacy	0.18	0.29	Positive and Active Engagement in Life	3.04	1.36	6.80	0.01
			Self-efficacy	0.43	0.32	0.57	0.00
			Quality of Life	10.94	1.79	66.99	0.01

returned to and perhaps exceeded baseline levels at the time of follow-up (Table 6). It should be noted that all changes were small and may not be clinically meaningful.

Paired baseline and follow-up data, available for 351 participants, were used to examine predictors of positive outcomes (Tables 2–4). This sub-group included mostly females (59.4%) and mostly older adults (mean age = 66.2 ± 11.5). Most had at least secondary school-level education (52.6%), were retired (63.8%) and had a low level of income (less than AUS\$1000 per month for 77.6%). They had a mean number of 2.6 ± 1.3 chronic conditions.

A logistic regression analysis indicated that there was a higher probability for younger people, those with lower baseline HRQOL, higher self-efficacy and higher scores on the Positive and Active Engagement in Life domain of the heiQ to show clinically important improvements in HRQOL (Table 7) after completing one of the programs (Question 3). Higher baseline scores on the

Positive and Active Engagement in Life scale and the AQoL-8, and lower self-efficacy scores were associated with improvements in self-efficacy. None of the studied variables were found to predict clinically important differences in depression. Neither program attended nor number of chronic conditions was associated with any of the outcomes.

Logistic regression was also used to examine whether changes in any of the clinical characteristics would predict positive outcomes in HRQOL, self-efficacy or depression (Question 4). Reduced depression (lower scores) predicted improved HRQOL and self-efficacy. Other predictors were specific to only one outcome: reduced social isolation was a significant predictor of better HRQOL; improved self-efficacy and HRQOL were predictors of reduced depression; and improved Skill and Technique Acquisition scores were predictors of improved self-efficacy (Table 8). Despite the significance of the results, these variables only explained a

**Table 8**

Change in clinical characteristics that predict improvements in outcomes.

Outcome variable	R square		Significant predictors: change in clinical characteristics	Odds ratio	95% Confidence interval		p-value
	Cox and Snell	Nagelkerke			Lower bound	Upper bound	
Quality of Life	0.09	0.12	Social Isolation	0.77	0.60	0.99	0.05
			Depression	1.12	1.02	1.23	0.02
Depression	0.11	0.18	Self-efficacy	1.36	1.06	1.75	0.02
			Quality of life	10.23	1.05	100.03	0.05
Self-efficacy	0.07	0.11	Skill and Technique Acquisition	2.86	1.37	5.95	0.01
			Depression	1.13	1.02	1.25	0.02

small proportion of the variance in the models (from 7% to 11%) as determined by the Cox and Snell, and Nagelkerke *R* squares. These values compare the fit of the model with the predictors to one without them.

## 4. Discussion and conclusion

### 4.1. Discussion

Participants in the two programs were significantly different from each other demographically, suggesting that, in this practice context, the two programs attracted different people (Question 1). There are a number of possible explanations. Use of the voluntary diabetes register to contact those newly diagnosed increased the likelihood that younger adults attended that program. Most *Diabetes* programs were held outside regular work hours, while the generic program was most frequently offered during the work day. Finally, information on referral source provides some insight. Direct, personal approaches via letter or phone call were most effective for recruiting people to the *Diabetes* program. Referral by a health professional (other than GP) or by family, friend or self, were most common for participants in the *Chronic Condition* program. While some strategies to promote the two programs were centrally initiated, the existence of the voluntary register was clearly beneficial. Referral by GPs was very low for both programs, even for the *Chronic Condition* program which was delivered by the GP Networks. Experience in both Australia and the UK is similar with explanations focused on work practices, time constraints, training and organizational structures [8].

Overall, both groups performed very well, with statistically significant improvements in their self-management knowledge and skills, as indicated by the improved heiQ scores on five of six domains measured (four at post-test and follow-up and one at follow-up). Participants in the *Chronic Condition* program showed additional improvements on the domain of Constructive Attitudes and Approaches. Both groups had relatively low levels of depression at baseline (Table 4) yet both demonstrated statistically significant reductions at follow-up. This agrees with other studies showing that self-management approaches can be effective for individuals with mild depression [34].

Participants in the *Chronic Condition* program showed improvements in self-efficacy, which is consistent with other studies reporting on CDSMP programs internationally [32,35–37]. While consistent with the aim and intent of both these programs, it is important to note that the self-efficacy tool used – one of the few that can be used across diagnosis – was developed by the researchers who developed the CDSMP and items mirror the content of that program. This may explain the improvement found only in this group. An additional explanation may be found in the baseline scores where participants in the *Diabetes* program showed significantly better self-efficacy scores, suggesting less potential to improve or a ceiling effect.

Interestingly HRQOL did not improve over time for either group. The AqOL has been used in similar recent studies in people with stroke [38] and arthritis [39]; similarly no differences were observed. In the UK, HRQOL in the Expert Patients Program was measured using a similar measure, the EQ-5D, and very small differences were observed in a large study [40]. HRQOL is a composite of a wide range of wellbeing indicators including activities of daily living and psychosocial wellbeing. It is likely that this is a more downstream potential impact and may only improve after sustained and longer term interventions.

Despite suggestions in the literature that disease-specific programs lead to better symptom and risk factor management [41], this was only partially supported in this study. Participants in the disease-specific program did make small gains in modifiable

risk factors during the intervention period but these were not sustained. By contrast, similar gains (increased exercise and reduced tobacco use) made by participants in the generic *Chronic Condition* program were sustained. Self-management interventions are based on the belief that lifestyle and behaviour change requires more than simply information, with programs typically emphasizing problem solving, decision making and action planning. To gain an understanding of why participants in one program differed from another, purpose and intent of the program, together with program goals, content and delivery would need to be examined. Frameworks, such as the Q-SAF [42] to assess the quality of self-management programs are becoming available and may be useful in future studies to uncover why some programs result in behaviour change and others do not.

“Who should be referred to self-management programs?” and “Who benefits most?” are critical questions in times of limited finances. Three baseline characteristics (low HRQOL, high Self-efficacy and Positive and Active Engagement in Life) emerged as having strong predictive value for both HRQOL and Self-efficacy. People who, in their own view, were more “actively engaged” and had “plans to do enjoyable things” were more likely to have improved outcomes suggesting they may be more likely to adopt newly learned skills. If rationing of services is required, practitioners may wish to select based on these three characteristics. However, it is those people who are disempowered, with worse health and few resources, who are more likely to have lower Positive and Active Engagement in life. Hence, selection based on this variable has the potential to increase health and social inequalities. Systematic reviews [11,12] have suggested that severity of condition predicts outcomes, with those with more severe conditions benefitting most. Measuring severity of condition across diagnosis is difficult; in this study the number of comorbid conditions was used as a proxy for severity. Interestingly it was not a predictor of any of the three outcomes studied.

Knowing which personal and clinical characteristics change over time and whether these changes predict positive outcomes deepens our understanding of the mechanisms within self-management interventions. In this study, quality of life and self-efficacy improved over time, but no significant improvements in social isolation, loneliness or depression were shown by participants in either program. However, when all characteristics were entered into the logistic regression model, change in social isolation and depression level predicted clinically significant improvements in HRQOL. Furthermore, change in self-efficacy was a predictor of reduced depression, while reduced depression was a predictor of improved self-efficacy. These results suggest that the mechanisms for change are indeed complex with positive outcomes likely dependent on change in more than one characteristic. Future analysis using structural equation modelling is needed to further our understanding of how self-management programs work.

### 4.2. Conclusion

Two self-management programs, offered through existing service providers have attracted different participants. Recruitment/referral strategies, along with hours of operation appear to contribute to this difference. Referral by GPs was the least effective. Outcomes in a real life context mirror, to a large extent, those from randomized control trials. Three clinical characteristics (low HRQOL, high Self-efficacy and Positive and Active Engagement in Life) and one demographic characteristic (age) distinguish those most likely to improve in HRQOL and self-efficacy. The most potent ingredient of interventions is not yet clear with changes in different characteristics predicting different outcomes. No one mechanism predicts improvements in all outcomes.

### 4.3. Practice implications

Positive participant outcomes can be achieved in the real life clinical setting, making efforts to implement programs worthwhile. Given consistently low referral rates through primary care physicians, efforts made to directly reach people with known chronic conditions, their families and friends are likely to be more effective than those directed toward physicians. While younger people with a positive attitude may appear to gain more, it is important to constantly encourage people from low socioeconomic status who may be disempowered (having low positive and active engagement in life) to enter these programs so that social inequalities in health are not worsened.

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