

**Table1. Baseline participant characteristics.**

Variable	Group		N	p
	Control (n=60, 52.2%)	Intervention (n=55, 47.8%)	115	
<b>Gender</b>				0.43
Male	25 (21.7%)	19 (16.5%)	44	
Female	36 (31.3%)	35 (30.4%)	71	
<b>Age (years)</b>				0.70
40≥	4 (3.5%)	6 (5.2%)	10	
41-50	32 (27.8%)	27 (23.5%)	59	
50≤	24 (29.9%)	22 (19.1%)	46	
Mean (SD)	49.43 (6.15)	48.05 (5.96)		0.21
<b>Education Level</b>				0.20
Illiterate	7 (6.1%)	1 (0.9%)	8	
Primary/Secondary School	8 (7%)	11 (9.6%)	19	
High School	4 (3.5%)	9 (7.8%)	13	
Diploma	16 (13.9%)	12 (10.4%)	28	
Associate Degree	10 (8.7%)	12 (10.4%)	22	
Bachelors' Degree	14 (12.2%)	9 (7.8%)	23	
Masters' Degree	1 (0.9%)	1 (0.9%)	2	
<b>Job Status</b>				0.11
Unemployed	1 (0.9%)	0	1	
Full-time	33 (28.7%)	28 (24.3%)	61	
Part-time	0	5 (4.3%)	5	
Retired	8 (7%)	44 (3.5%)	12	
Housekeeper	18 (15.7%)	18 (15.7%)	36	
<b>Marital Status</b>				0.05
Married	51 (44.7%)	52 (45.6%)	103	
Single	4 (3.5%)	0	4	
Divorced	0	2 (1.8%)	2	
Widow/Widower	4 (3.5%)	1 (0.9%)	5	
<b>Other measures</b>	<b>Mean(SD)</b>	<b>Mean (SD)</b>		
Years since diagnosis	6.10 (3.10)	5.58 (2.66)		0.34
Weight (kg)	76.94 (12.46)	71.18 (9.80)		0.90
Height (cm)	164.64 (9.11)	163.09 (8.78)		0.35
BMI (kg/m <sup>2</sup> )	28.40 (4.40)	29.05 (3.44)		0.40
LDL-C (mg/dl)	128.40 (32.53)	119.60 (27.24)		0.12
TG (mg/dl)	182.85 (51.92)	185.27 (65.74)		0.82

BMI, body mass index; LDL-C, LDL-cholesterol; TG, Triglyceride. [Units: kg, kilograms, cm, centimeters; m, meters; mg, milligrams, dl, deciliter]; SD, standard deviation.



Table 2 Intervention Strategies to Improve Target Constructs <sup>a</sup> .		
	Target construct	Content and Procedure
Sessions 1-3 <sup>b</sup>	<i>Perceived risk</i>	Watching a 3-4 minute film about diabetic complications (retinopathy, neuropathy, nephropathy and cardiovascular disease) along with complementary explanations by the facilitators using simple terms (blurred vision and blindness, damage to nerves, kidney damage and irreparable effects on heart and vessels, respectively), followed by a 10 minute group-based discussion mainly about the costs of treatment and importance of complications.
	<i>Attitude</i>	The elicited behavioral beliefs from the formative phase comprising advantages (e.g., helping control weight/ weight loss, making me healthier, reducing/ helping control blood sugar levels) and disadvantages (e.g., having a bad taste, restricting food intake, taking too much attention, making me tired) of the three behaviors were discussed in detail among participants.
	<i>Subjective norm</i>	Perceptions of social support from others (i.e., normative beliefs) were discussed and appropriate approaches to deal with other people were considered to influence <i>subjective norm</i> . Participants were asked to mention referents (e.g., spouse, children) who approve or disapprove of their performing the behaviors and discuss strategies to encourage approval and tackle any disapproval.
	<i>PBC</i>	The participants were encouraged to think about the extent to which they have control over performing the behaviors and discussed strategies to facilitate better control (to improve <i>PBC</i> ). Barriers (e.g., eating out in restaurants/ workplace or parties, hunger, high costs) and facilitators (e.g., promoting knowledge) identified in the formative stage were also considered.
	<i>Intention</i>	A consideration of above influences, in combination, to produce healthier decision making specific to one's own particular circumstances regarding the behaviors were discussed and examples were given to strengthen intentions.
	<i>Planning</i>	The necessity of planning including goal-setting and how to deal with difficult situations and setbacks to facilitate behavior change were discussed.
Session 4	<i>All constructs</i>	The previous sessions were summarized and participants had an opportunity to ask any questions or raise any issues with the facilitators

<sup>a</sup>The participants' behavioral (underlying attitude), normative (underlying subjective norm), and control (underlying PBC) beliefs regarding low-fat food consumption, carbohydrate counting, and physical activity were elicited prior to the present study in a formative phase via face-to-face interviews with 30 adults representative of the target population and then used as the basic components for discussions in each session.

<sup>b</sup>In the first three sessions, each was related to a single behavior (session 1, low-fat food consumption; session 2, carbohydrate counting; session 3, physical activity, respectively), targeting all included constructs (perceived risk, attitude, subjective norm, PBC, intention and planning), while the last session (Session 4) summarized the previous content.

Table 3. Number of items, internal consistency (Cronbach's Alpha/ Pearson's r), response anchors, and measures used for integrated constructs assessed at Time 1 and Time 2.							
Construct		# of items	α/r			Response anchors	Measures (items examples for CC)
			LFF	CC	PA		
Intention		2	T1=0.82 T2=0.75	T1=0.7 3 T2=0.6 7	T1=0.65 T2=0.69	1 (strongly disagree); 7 (strongly agree)	e.g. "It is likely that I will count the number of carbohydrate in foods during the next month" and "I intend to count the number of carbohydrate in foods during the next month".
Attitude		6	T1=0.96 T2=0.83	T1=0.8 4 T2=0.8 1	T1=0.91 T2=0.80	1(good); 7(bad) <sup>a</sup> 1(pleasant); 7(unpleasant) <sup>a</sup> 1(useful); 7(useless) <sup>a</sup> 1(wise); 7(foolish) <sup>a</sup> 1(valuable); 7(worthless) <sup>a</sup> 1(beneficial); 7(harmful) <sup>a</sup>	I think counting carbohydrate in foods during the next month is... good (1)/ bad (7), etc.
Subjective norm		3	T1=0.96 T2=0.94	T1=0.9 5 T2=0.9 3	T1=0.93 T2=0.89	1 (strongly disagree); 7 (strongly agree)	e.g. "Most people who are important to me think that I should count the number of carbohydrate in foods during the next month", "Important people in my life expect me to count the number of carbohydrate in foods during the next month" and "Most people whose opinion I value would approve of my carbohydrate counting during the next month".
Perceived behavioral control		3	T1=0.91 T2=0.90	T1=0.8 9 T2=0.9 0	T1=0.94 T2=0.91	1 (strongly disagree); 7 (strongly agree)	e.g. "I'm confident that if I wanted to I could count the number of carbohydrate in foods during the next month", "Whether or not I count the number of carbohydrate in foods is completely up to me during the next month" and "I have complete control over whether I count the number of carbohydrate in foods during the next month".
Perceived risk	Risk susceptibility	1	-	-	-	1 (strongly disagree); 7 (strongly agree)	e.g. "If I didn't count the number of carbohydrates, it is likely to lead to further diabetic complications".
	Risk severity	1 (single item common across all behaviors)	-	-	-	1 (strongly disagree); 7 (strongly agree)	e.g. "If I experience further diabetic complications, it is a very serious problem".
Planning <sup>b</sup>		7 <sup>c</sup>	T1=0.93 T2=0.92	T1=0.8 3 T2=0.8 3	T1=0.91 T2=0.91	1 (almost never true) to 7 (almost always true)	e.g. "When to count carbohydrate", "How to count carbohydrate", "How often to count carbohydrate", "What to do if something interferes with my plans", "How to cope with possible setbacks", "What to do in difficult situations in order to stick to my intentions" and "When I have to pay extra attention to prevent lapses".
Behavior		1	-	-	-	1 (to a very small extent)/ 7 (to a very large extent)	e.g. "counting the number of carbohydrate in foods during the next month".

LFF, low-fat food; CC, carbohydrate counting; PA, physical activity.

**Low-fat food/meal consumption** was defined as "reducing saturated fat intake by low-fat dairy products, using polyunsaturated and monounsaturated oils [plant based], avoiding fried foods and trimming fat from meat [Lean meat]" (Diabetes Australia, 2015). **Carbohydrate counting** was defined as "identifying which foods contain carbohydrate, then assessing how much carbohydrate a serving of food (or an entire meal) contains with respect to recommendations and if you use insulin, match with insulin dose" (ADA, 2017; Joslin Diabetes Center, 2019) and **physical activity** was defined as "engaging in moderate physical activity for at least 150 minutes per week [half an hour/day, most of the days of week]" (Diabetes Australia, 2018). The item examples below are for carbohydrate counting.

<sup>a</sup> Reverse scored items.

<sup>b</sup> Included both action and coping planning.

<sup>c</sup> Seven items for CC. LFF and PA contained 6 and 8 item measures for planning, respectively. LFF and PA items were "When to choose **low-fat foods/ engage in regular physical activity**", "Where to **engage in regular physical activity**", "How to choose **low-fat foods/ engage in regular physical activity**", "How often to **engage in regular physical activity**", "What to do if something interferes with my plans", "How to cope with possible setbacks", "What to do in difficult situations in order to stick to my intentions" and "When I have to pay extra attention to prevent lapses".

**Table 4. Means (Standard Deviations) and Significance Levels Examining Time by Condition Effects for Integrated Measures of Low-fat Food Consumption at Baseline and 8-week Post-intervention.**

Variable	Condition	Pre- intervention	CIs	8-week post- intervention	CIs	F- value	p	Partial $\eta^2$
		n=115		n=107				
Behavior	Control	4.84 (0.96)	4.54, 5.15	5.04 (0.86)	4.74, 5.34	.336	.56	.004
	Intervention	4.91 (1.09)	4.61, 5.21	5.00 (1.15)	4.70, 5.29			
Intention	Control	5.68 (0.92)	5.44, 5.92	5.67 (0.76)	5.44, 5.90	.656	.42	.007
	Intervention	5.76 (0.71)	5.51, 6.00	5.89 (0.81)	5.65, 6.12			
Attitude	Control	6.29 (0.64)	6.13, 6.45	6.27 (0.54)	6.13, 6.42	.972	.32	.011
	Intervention	6.43 (0.44)	6.27, 6.59	6.49 (0.41)	6.35, 6.63			
Subjective Norm	Control	5.34 (1.02)	5.07, 5.61	5.39 (0.97)	5.15, 5.64	2.019	.15	.022
	Intervention	5.80 (0.81)	5.52, 6.06	5.69 (0.65)	5.45, 5.93			
PBC	Control	5.67 (0.82)	5.41, 5.92	5.66 (0.77)	5.41, 5.92	.103	.74	.001
	Intervention	5.82 (0.89)	5.57, 6.07	5.77 (0.95)	5.52, 6.03			
Susceptibility	Control	5.76 (0.94)	5.48, 6.03	5.73 (0.90)	5.49, 5.98	1.183	.28	.013
	Intervention	5.80 (0.90)	5.53, 6.07	5.95 (0.78)	5.70, 6.20			
Severity	Control	5.86 (0.90)	5.58, 6.15	5.97 (0.80)	5.73, 6.21	1.579	.21	.017
	Intervention	5.82 (1.01)	5.54, 6.10	6.13 (0.83)	5.89, 6.37			
Planning	Control	4.77 (0.96)	4.46, 5.09	4.58 (0.88)	4.28, 4.89	8.782	.00	.089
	Intervention	4.73 (1.17)	4.42, 5.05	4.87 (1.18)	4.57, 5.18			
CIs, confidence intervals; $\eta^2$ , eta squared								

**Table 5. Means (Standard Deviations) and Significance Levels Examining Time by Condition Effects for Integrated Measures of Carbohydrate Counting at Baseline and 8-week Post-intervention.**

Variable	Condition	Pre- intervention	CIs	8-week post-intervention	CIs	F-value	p	Partial $\eta^2$
		n=115		n=107				
Behavior	Control	4.23 (1.12)	3.90, 4.56	4.36 (1.18)	4.03, 4.69	4.377	.03	.046
	Intervention	4.54 (1.16)	4.20, 4.88	5.10 (1.07)	4.77, 5.44			
Intention	Control	5.70 (0.81)	5.43, 5.96	5.61 (0.68)	5.40, 5.83	8.144	.00	.082
	Intervention	5.71 (0.99)	5.45, 5.98	6.02 (0.79)	5.80, 6.23			
Attitude	Control	6.02 (0.73)	5.82, 6.22	6.17 (0.57)	6.00, 6.33	.061	.80	.001
	Intervention	6.17 (0.63)	5.97, 6.38	6.35 (0.54)	6.18, 6.51			
Subjective Norm	Control	5.54 (0.97)	5.28, 5.80	5.60 (0.89)	5.25, 5.85	3.066	.08	.033
	Intervention	5.79 (0.80)	5.53, 6.06	5.63 (0.84)	5.38, 5.89			
PBC	Control	5.34 (0.77)	5.10, 5.58	5.37 (0.67)	5.17, 5.57	7.528	.00	.076
	Intervention	5.34 (0.88)	5.10, 5.59	5.68 (0.72)	5.48, 5.89			
Susceptibility	Control	5.68 (0.98)	5.39, 5.96	5.63 (0.98)	5.36, 5.91	2.896	.09	.031
	Intervention	5.73 (0.99)	5.44, 6.02	6.02 (0.93)	5.74, 6.30			
Severity	Control	5.85 (0.90)	5.57, 6.13	5.97 (0.79)	5.74, 6.21	1.296	.25	.014
	Intervention	5.82 (1.01)	5.54, 6.10	6.13 (0.83)	5.89, 6.36			
Planning	Control	4.31 (0.94)	4.04, 4.59	4.32 (1.03)	4.01, 4.63	4.548	.03	.048
	Intervention	4.24 (0.94)	3.96, 4.52	4.57 (1.12)	4.26, 4.89			
CIs, confidence intervals; $\eta^2$ , eta squared								

**Table 6. Means (Standard Deviations) and Significance Levels Examining Time by Condition Effects for Integrated Measures of Physical Activity at Baseline and 8-week Post-intervention.**

Variable	Condition	Pre- intervention	CIs	8-week post- intervention	CIs	F- value	p	Partial $\eta^2$
		n=115		n=107				
Behavior	Control	4.56 (1.06)	4.24, 4.88	4.43 (1.24)	4.07, 4.79	1.307	.25	.014
	Intervention	4.63 (1.10)	4.31, 4.94	4.71 (1.18)	4.36, 5.07			
Intention	Control	5.66 (0.90)	5.40, 5.91	5.71 (0.69)	5.50, 5.92	2.103	.15	.023
	Intervention	5.68 (0.84)	5.42, 5.94	5.94 (0.72)	5.73, 6.15			
Attitude	Control	6.50 (0.52)	6.35, 6.64	6.60 (0.48)	6.47, 6.73	.124	.72	.001
	Intervention	6.47 (0.48)	6.33, 6.62	6.55 (0.41)	6.42, 6.68			
Subjective Norm	Control	5.71 (0.85)	5.45, 5.96	5.77 (0.80)	5.53, 6.01	.357	.55	.004
	Intervention	5.88 (0.88)	5.62, 6.13	5.87 (0.81)	5.64, 6.11			
PBC	Control	5.50 (1.01)	5.21, 5.78	5.42 (0.90)	5.17, 5.66	3.460	.06	.037
	Intervention	5.72 (0.93)	5.44, 6.01	5.86 (0.77)	5.62, 6.11			
Susceptibility	Control	5.78 (0.98)	5.51, 6.04	5.91 (0.89)	5.67, 6.15	.792	.37	.009
	Intervention	5.82 (0.82)	5.56, 6.09	6.10 (0.76)	5.86, 6.35			
Severity	Control	5.84 (0.91)	5.56, 6.13	6.00 (0.78)	5.76, 6.23	.965	.32	.011
	Intervention	5.82 (1.01)	5.54, 6.11	6.13 (0.83)	5.89, 6.36			
Planning	Control	4.53 (0.93)	4.26, 4.79	4.39 (0.85)	4.13, 4.66	11.261	.00	.111
	Intervention	4.44 (0.86)	4.18, 4.71	4.66 (0.95)	4.40, 4.93			
CIs, confidence intervals; $\eta^2$ , eta squared								

**Table 7. Means (Standard Deviations) and Significance Levels Examining Time by Condition Effects for Weight, BMI and Lipid Profile at Baseline and 8-week Post-intervention**

Variable	Condition	Pre- intervention	CI	8-week post- intervention	CI	F-value	p	Partial $\eta^2$
		n=115		n=107				
Weight	Control	77.03 (12.50)	73.76, 80.29	77.06 (12.59)	73.81, 80.32	3.195	.07	.077
	Intervention	77.61 (10.09)	74.27, 80.94	77.15 (9.91)	73.83, 80.48			
BMI	Control	28.67 (4.26)	27.53, 29.82	28.70 (4.29)	27.57, 29.84	4.228	.05	.044
	Intervention	29.32 (3.66)	28.16, 30.49	29.14 (3.56)	27.98, 30.30			
LDL-C	Control	133.43 (30.16)	125.26, 141.61	133.97 (30.54)	126.25, 141.70	.131	.71	.001
	Intervention	119.36 (26.70)	111.01, 127.72	120.43 (22.62)	112.53, 128.33			
TG	Control	186.43 (49.34)	169.59, 203.28	186.83 (50.06)	170.67, 202.99	18.693	.00	.169
	Intervention	187.04 (67.18)	169.83, 204.24	177.54 (62.30)	161.03, 194.05			
BMI, body mass index; LDL-C, LDL-cholesterol; TG, triglyceride; CI, confidence intervals; $\eta^2$ , eta squared								