Help Reduce Cholesterol and Lower the Risk of Heart Disease with Real Appeal®

Obesity is a risk factor for heart disease. Real Appeal, an online weight management program, is a scientifically based intensive lifestyle intervention (ILI) aimed at helping people lose weight and reduce the risk of costly chronic diseases.

Being obese can raise blood cholesterol, increase blood pressure and increase the risk of heart disease and stroke.[1] Heart disease tends to occur when there is too much cholesterol in the body. This happens when low density lipoproteins (LDL) clogs arteries with plaque. According to the Centers for Disease Control (CDC), lowering cholesterol can reduce the risk of a heart attack and cardiovascular mortality.[2]

Heart disease[3-5] -
- Affects **30%** of the population.
- Is the **leading cause of death** in the U.S.
- Costs the U.S. **$315 billion annually**.

By 2030, estimated costs are **$1.5 trillion**.

Research validates the connection between ILI, weight loss and improved cardiovascular health.[6-8] Research also shows that losing just 5% of initial body weight can improve health outcomes, reduce health care costs, and improve employee performance and attendance, [9,10]

This paper describes a study completed by Real Appeal which demonstrated that losing weight significantly reduced total cholesterol. Likewise, the amount of cholesterol reduction was directly linked to the amount of weight loss. Participants who lost 5% or more of their body weight had the largest reduction in total cholesterol, significantly reducing their cholesterol an average of 7 points (3.6%) more than non-participants. On average, Real Appeal study participants reduced their total cholesterol 2.4 points (1.5%) more than non-participants, a statistically significant reduction. These results are equivalent to the outcomes reported by the U.S Preventive Services Task Force (USPSTF) as an effective reduction in cholesterol for an ILI.[8]

Figure 1. Average total cholesterol reduction

Real Appeal members with 5%+ body weight loss

Reduced their cholesterol by an average of

7 points.

Summary:
Cardiovascular disease is a chronic and costly disease. Losing weight and reducing cholesterol helps lessen the risk of cardiovascular disease. Real Appeal helps people lose weight and improve their cardiovascular health.

Study Methods:

Using a retrospective study design, total cholesterol values from a cohort of Real Appeal participants were compared to values from a propensity-matched cohort of non-participants. A difference-in-difference measurement was used to compare changes from baseline to year one for both participants and non-participants. Eligible study subjects registered for Real Appeal between July 2015 and June 2016, were at least 18 years old and were continuously enrolled in their medical plan at least one year prior and one year following their Real Appeal registration date, and had a cholesterol lab test within 18 months prior to their registration date and a cholesterol lab test within 12 months following their registration date. Members of the participant cohort were required to have attended at least four Real Appeal coaching sessions. The non-participant cohort was comprised of people who registered for Real Appeal but chose not to enroll. Excluded from the study were persons who had been diagnosed or treated for an exclusion condition: dementia and organic disorders; HIV; inflammatory or degenerative CNS; ESRD; hemophilia; transplants; hospice care; cancer; pregnancy and birth; bariatric surgery; high cost claimant > $100k. Participants were matched 1:1 without replacement to non-participants using a propensity-matched technique to adjust for differences between the two cohorts.

Results:

A total of 4,368 study subjects met the study criteria: 2,672 participants and 1,696 non-participants (Table 1). Study subjects were majority female, from the south region and 37% had a baseline cholesterol value in the borderline high or high range (Table 2).

Table 1. Study sample counts by inclusion / exclusion criteria

Description		Total	
Registered between July 2015-June 2016		100,876	
Participants		**Non-Participants**	
Attended Welcome Session	69,598 (69)	Did not attend Welcome Session	31,278 (31)
Qualified for program	60,352 (87)		
Registrant claims enrollment history available	54,098 (90)	Registrant claims enrollment history available	28,525 (91)
Was continuously enrolled for 12 months prior to and 12 months following their registration date	40,320 (75)	Was continuously enrolled for 12 months prior to and 12 months following their registration date	19,217 (67)
Met inclusion criteria	33,667 (83)	Met inclusion criteria and eligible for study	16,066 (84)
Attended 4+ sessions eligible for study	22,344		
Had at least one cholesterol lab test prior to and follow registration date	2,672	Had at least one cholesterol lab test prior to and follow registration date	1,696

Table 2. Characteristics of study sample

	Participants N = 2,672	Non-Participants N = 1,696
Female Male	2,110 (79) 562 (21)	1,286 (76) 410 (24)
Age (Mean, SD)	50.2 (9.3)	49.4 (10.1)
Midwest Northeast South West	261 (10) 100 (4) 2,018 (75) 293 (11)	119 (7) 78 (4) 1,336 (79) 163 (10)
Baseline Total Cholesterol (Mean, SD)	189.1 mg/dl (38)	191.9 mg/dl (39)
Baseline Total Cholesterol Category Good (<200) Borderline High (200-239) High (240+)	1,714 (64) 709 (27) 249 (9)	1,018 (60) 483 (28) 195 (12)

A standardized difference value (stnd diff) greater than or equal to 0.1 indicates the variable is not balanced between cohorts. Table 3 shows that prior to the matching process the cohorts were not equally balanced (Midwest variable was > .1) and that matching process balanced the cohorts.

Table 3. Standardized difference table matching participants with non-participants

Variable	Before Matching			After Matching		
	Participant	Non-Participant	Stnd Diff	Participant	Non-Participant	Stnd Diff
Risk Score	2.7	2.6	.06	2.7	2.6	.02
Age	50.2	49.4	.08	49.8	49.6	.03
Baseline Cholesterol	188.9	191.9	.08	191.6	192	.01
Female	.79	.76	.08	.77	.77	0
Midwest	.10	.07	.10	.06	.07	.03
Northeast	.04	.05	.04	.04	.04	.03
South	.76	.79	.08	.79	.79	.02
West	.11	.10	.04	.11	.10	.03

As shown in Table 4, participants significantly reduced their total cholesterol 2.4 mg/dl more than non-participants, a 1.5% difference. Cholesterol reduction increased with participant weight loss; participants who lost 5% or more of their weight significantly reduced their cholesterol by 7 mg/dl compared to non-participants, a 3.6% difference.

Table 4. Real Appeal cholesterol difference-in-difference results for year one

By Level of Weight Loss	Categories						
	Sample Size	Participant Description	Average (Pre) Cholesterol Value	Average Year 1 (Post) Cholesterol Value	Pre/Post Difference	Difference in Difference	P Value
Total	1674 1674	Participants Non-Participants	191.6 mg/dl 192.0 mg/dl	188.0 mg/dl 190.8 mg/dl	-3.6 -1.2	2.4 mg/dl lower (1.5%)	<.05
<3%	1419 1419	Participants Non-Participants	189.3 mg/dl 190.0 mg/dl	188.6 mg/dl 189.7 mg/dl	-0.7 -0.3	0.4 mg/dl lower	.4
3-4.9%	460 460	Participants Non-Participants	187.2 mg/dl 187.3 mg/dl	183.0 mg/dl 185.9 mg/dl	-4.2 -1.4	2.8 mg/dl lower	.2
5%+	772 772	Participants Non-Participants	189.2 mg/dl 188.9 mg/dl	183.3 mg/dl 189.9 mg/dl	-5.9 +1	7 mg/dl lower (3.6%)	<.001

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