REDUCING CARDIOVASCULAR RISK USING Shae

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Keeping a healthy lifestyle is essential to reduce the risk for developing cardiovascular disease[1-9]. However, it is something that many individuals struggle with, especially in the later stages of life[10,11]. In fact, the risk of cardiovascular disease tends to increase with age because of factors like hormonal changes[12,13] or the cumulative effects of our daily choices and environmental exposures[13,14]. The evidence-based Shae health and wellness program aims to support adopting healthier lifestyles, through personalized dietary recommendations, sleep cycle management, tailored exercise suggestions, and online social support[15-17]. It is available as an online app via desktop or mobile device with the possibility of receiving online community support from other participants. More details on the program's development, methodology, and aims can be found at https://shae.ai.

In this study, the effectiveness of the program was assessed in people with moderate to high risk for developing cardiovascular disease, using the Framingham Risk Score (FRS) as a classifier for overall cardiovascular disease risk that is based on a composite of biometric measurements, lifestyle choices (including smoking, alcohol use, and exercise), as well as the prevalence of associated health conditions (like hypertension, hypercholesterolemia, and dysglycemia). This widely validated and established assessment tool[18-21] classifies graded risk of cardiovascular disease. A score of 10-19 points is considered to be an intermediate risk of cardiovascular disease, while 19 points and above is considered high risk[22,23]. This study examined changes in lifestyle behaviors and biometric measures that have been associated with increased cardiovascular risk, with a focus on changes in FRS[22,23], waist circumference[24,25], waist-to-height-ratio (WHtR)[26-28], body mass index (BMI)[29-31], and body fat index (BFI)[32-34].

Based on the calculated results of the FRS, 193 individuals started the program with an intermediate to high cardiovascular risk. Their progress was followed for up to four years. Longitudinal analyses using a within-group pairwise t-test showed that the Shae health and wellness program was remarkably effective in decreasing each of the key measurements and indices associated with higher risk of cardiovascular disease for all participants. Table 1 summarizes the change from entering to finalizing the program for the six measurements and the FRS, stratified by gender and age group.

Table 1. Table of significant effects from a within-group pairwise t-test.

		n	*Initial*	*Final*	*Change*	*p-value*
Waist						
Under 65 Years Old	Male	42	99,28	93,42	-5,87	< 0,005
	Female	66	96,45	86,10	-10,35	< 0,005
Over 65 Years Old	Male	17	101,20	94,08	-7,12	< 0,005
	Female	68	96,00	87,09	-8,91	< 0,005
Weight		*n*	*Initial*	*Final*	*Change*	*p-value*
Under 65 Years Old	Male	42	87,34	83,82	-3,52	< 0,005
	Female	66	79,40	73,33	-6,07	< 0,005
Over 65 Years Old	Male	17	83,13	78,94	-4,19	< 0,005
	Female	68	79,50	72,22	-7,28	< 0,005
Waist-to-Height-ratio		*n*	*Initial*	*Final*	*Change*	*p-value*
Under 65 Years Old	Male	42	0,56	0,53	-0,04	< 0,005
	Female	66	0,59	0,52	-0,07	< 0,005
Over 65 Years Old	Male	17	0,57	0,53	-0,04	< 0,005
	Female	68	0,59	0,54	-0,06	< 0,005
Body Mass Index		*n*	*Initial*	*Final*	*Change*	*p-value*
Under 65 Years Old	Male	42	27,79	26,65	-1,14	< 0,005
	Female	66	29,56	27,28	-2,28	< 0,005
Over 65 Years Old	Male	17	26,71	25,42	-1,29	< 0,005
	Female	68	30,41	27,65	-2,76	< 0,005
Body Fat Index		*n*	*Initial*	*Final*	*Change*	*p-value*
Under 65 Years Old	Male	42	24,64	20,88	-3,76	< 0,005
	Female	66	44,10	36,44	-7,65	< 0,005
Over 65 Years Old	Male	17	26,54	22,81	-3,72	< 0,005
	Female	68	43,94	37,16	-6,78	< 0,005
Framingham Risk Score		*n*	*Initial*	*Final*	*Change*	*p-value*
Under 65 Years Old	Male	42	16,58	15,09	-1,49	0,01
	Female	66	15,49	9,14	-6,35	< 0,005
Over 65 Years Old	Male	17	28,73	25,07	-3,66	0,03
	Female	68	16,28	12,96	-3,32	< 0,005

Improvements in body measurements

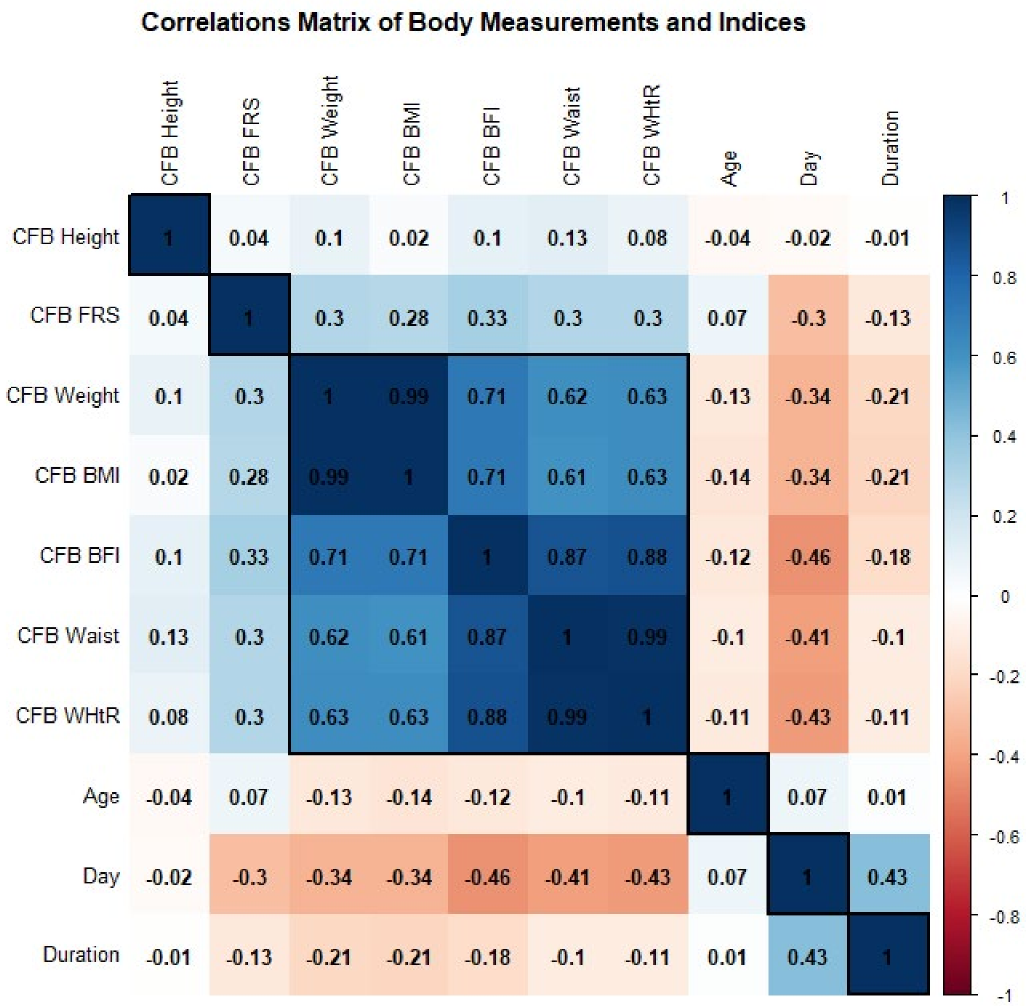
The Shae program was highly effective across all age groups, regardless of age group or gender. In all cases, benefits of program participation are evident, as observed in Table 1 by the differences (Change) between entering the program (Initial) to the end of the program (Final) that all have significant negative effects (ie: statistically significant improvements). Overall, there was an average significant decrease in waist, weight, WHtR, BMI, and BFI (all $p < 0.005$), suggesting that the program was very effective in reducing weight and fat in participants of all ages and both genders, which is crucial to decreasing cardiovascular risk and being healthier overall.

Weight loss and body composition

Looking closer at the changes over the course of the program revealed that there were numerous significant differences in day group comparisons across the body composition measurements. A correlation matrix (Figure 1) allows us to examine which factors are related to which others for a deeper understanding of the effects of the program. For instance, a strong correlation was found for changes in several body measurements and indices: BMI ($p=0.02$), BFI, waist circumference and WHtR (all $p<0.001$). Of note, a stronger negative correlation was found between BFI ($r = -0.46$) and WHtR ($r= -0.43$), than between BFI and weight ($r= -0.34$) or with BFI ($r= -0.34$). These results indicate that through involvement in the program, participants were preferentially losing body fat rather than a combination of muscle and fat, which is crucial in decreasing cardiovascular risk[35-36].

Considering weight loss can include water weight or losses of lean body mass, it's important to assess the composition of the weight loss to ensure that the lifestyle changes are causing the desired effects. Observing a stronger negative correlation between both time and BFI, and time and waist-to-height ratio, showed that visceral fat was steadily decreasing while the participant stayed in the program[37-39]. These findings confirm that the Shae health and wellness program was effective in reducing waist circumference, correlated with a reduction in visceral fat[37,38], which is crucial to decreasing cardiovascular risk[4], and offers both short- and long-term health benefits while encouraging healthier lifestyle choices[7].

Figure 1. Correlations matrix of body measurements and indices.



Abbreviations: BFI = body fat index; BMI = body mass index; CFB = Change-From-Baseline; FRS = Framingham Risk Score; WHtR = waist-to-hip-ratio.

Improvements in cardiovascular risk

A closer look at cardiovascular risk revealed a significant drop in FRS, suggesting that the program has significant effects on reducing cardiovascular risk, with the decreases in body measurements most likely playing an important role. The longer the follow-up time, the higher the percentage of subjects that saw a reduction in cardiovascular risk, which is a finding that underlines the long term viability of the program. Although significant results were found for the different age groups and both genders, some improvements were stronger than others. There was a significant interaction ($p<0.001$) between follow-up time and gender, which resulted in differential rates of decrease in FRS over time between both genders. For example, results showed that female participants regardless of age exhibited greater changes in FRS ($p < 0.005$) than men. In male participants under 65 years of age, improvements were significant ($p = 0.01$), yet not a strong as in women, while male participants of over 65 years of age also saw a smaller yet significant improvement ($p = 0.03$). These results suggest that though the program can be effective for both genders regardless of age, it warrants further investigation into gender differences in program use and effects.

Short and long term effects on cardiovascular risk

With regard to cardiovascular risk, there were not only significant improvements in both male and female participants throughout most age groups, but immediate effects were found. This indicates that health benefits take hold quite quickly with the recommended lifestyle changes, and the steady decline of CVD risk also implies that yo-yo effects often seen in stringent diets[40,41] were not observed in this healthy-lifestyle-promoting program. Overall, the 70-year-old age group made the biggest improvements in anthropometric measurements and indices, which is a very encouraging result since both adopting new lifestyle habits and losing weight becomes more difficult with age[10,42]. The largest decreases were realized by the 500+ day group, meaning that improvements are progressive and continue over time resulting in those who stayed in the program longer having the best results. The scatter plots below (Figures 2 to 4) show the change-from-baseline (CFB) in FRS, in gender, age groups, and duration of participation in days, respectively.

Figure 2. Changes in intermediate and high risk male and female participants during the program.

Figure 3. Changes in intermediate and high risk age groups during the program.

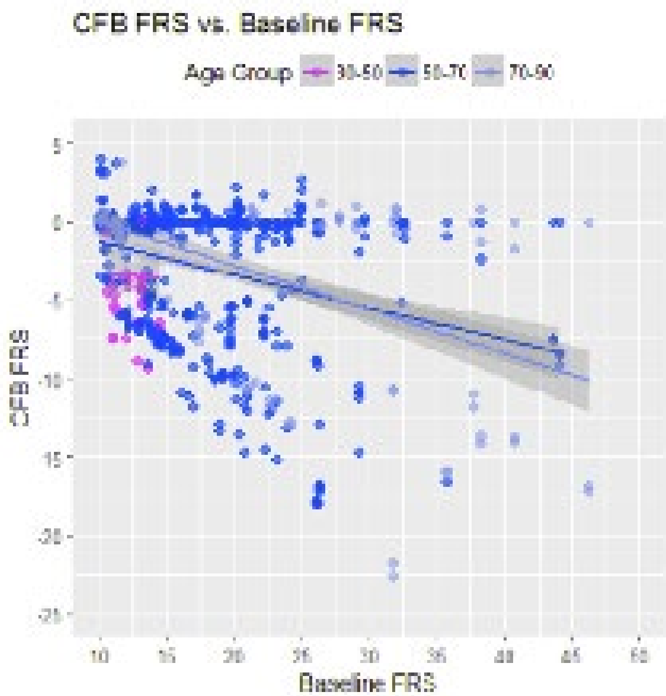
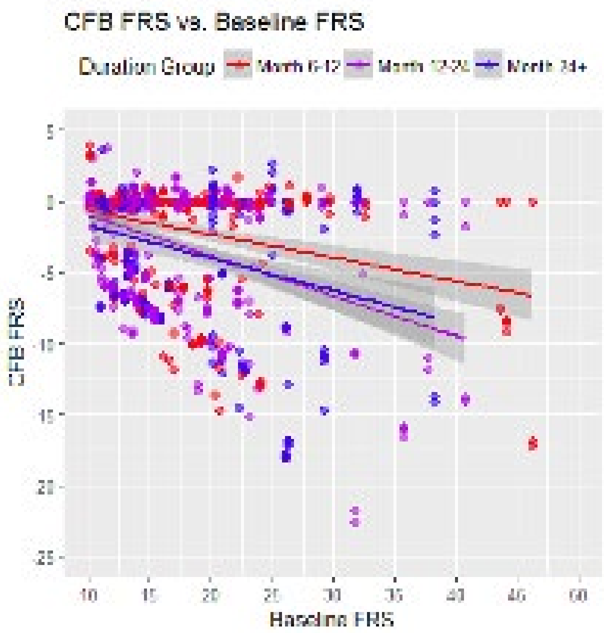


Figure 4. Changes in intermediate and high risk score participants by program duration.



Conclusion

Since the risk for developing cardiovascular disease increases with age, it is important to prevent its onset as early as possible and remedy any early signs of risk, especially considering that prevention is more effective in lowering mortality due to cardiovascular disease compared to treatment[43,44]. Improving one's health through dietary changes and increased levels of physical activity can be difficult for many[45], so finding strategies to guide and support people in accessible ways is key to promoting longevity and disease prevention. Precision health is a consideration that is gaining more attention in relation to the management and prevention of heart disease and related risk factors[46-49]. However, interventions that provide holistic, individualized approaches to disease prevention and management tend to be costly, as they require regular monitoring and care of a multidisciplinary approach in a healthcare setting[50,51]. Therefore, considering the global burden of cardiovascular disease, affordable and accessible programs that address this disease in its multifaceted nature is paramount[52].

The results from this study show that the Shae health and wellness program effectively assisted male and female participants of all ages in losing fat mass and improving body measurements. Also, many transitioned from high to low cardiovascular risk, demonstrated by a significant reduction in risk factors for cardiovascular disease with short term use of the program, and continued improvements and stable health benefits demonstrated over time. Particularly encouraging is the observation that the longer a person stayed in the program, the greater the improvement is seen in body composition, underlining the long term viability of this program. Though the sample size was rather small and it would be beneficial to repeat this study with a larger group, the results from this four-year study provides strong evidence on significant improvements for those with intermediate or high cardiovascular risk. By offering support and tools needed to inform and motivate participants, this program significantly contributes to making lasting lifestyle changes that result in improvement in weight, fat mass and cardiovascular health.

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