

Behaviors Associated with 1-Year Weight Loss in SHIELD Survey Respondents

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Abstract

Although the benefits of changes in diet and exercise on the prevention or delay of diabetes are well known, there is great interest in determining which health-related behaviors may help lower cardiometabolic risk among people at high risk for diabetes. The Study to Help Improve Early evaluation and management of risk factors Leading to Diabetes (SHIELD) is a large, 5-year, longitudinal survey in the US with responses from 11,671 adults with diabetes or varying levels of cardiometabolic risk. SHIELD provides a unique opportunity to assess health-related knowledge, attitudes, and behavior changes in these populations, and the resultant impact on health status. Baseline data were collected in 2004; the 1-year follow-up survey in 2005 revealed a subgroup of 107 respondents who reported meaningful reductions in weight or waist size. This presentation reports on the attitudes and behaviors, particularly in regard to diet and exercise, associated with this positive transition in health status.

Introduction

- Weight management is important in treating diabetes, as people with diabetes are often overweight or obese.¹ Furthermore, BMI, abdominal fat distribution, and weight gain are important risk factors for T2D mellitus.²
- Despite the importance of weight management, recent national estimates indicate only 39% of adults with diabetes engage in regular physical activity, a rate significantly lower than the national population average of 56%.²
- As losing weight and maintaining weight loss are difficult to achieve, it is important to identify the attitudes and behaviors of those individuals who are successful at doing so.
- The Study to Help Improve Early evaluation and management of risk factors Leading to Diabetes (SHIELD) provides a unique opportunity to assess health-related knowledge, attitudes, and behavior changes in respondents who have lost weight.

Methods

SHIELD Survey

- SHIELD is a 5-year longitudinal survey of US adults (aged ≥ 18 years) with diabetes or varying levels of cardiometabolic risk.
- A screener questionnaire was mailed in April 2004 to a stratified random sample of 200,000 US households who were part of the TNS NFO household panel (a survey panel of >600,000 US households constructed to represent the US population in terms of geographic residence, age of head of household, and household size and income).

- Respondents were asked if they had ever been diagnosed as having each of several conditions, including diabetes. In addition, survey respondents reported the presence of several risk factors for a diabetes diagnosis: abdominal obesity, high BMI, dyslipidemia, hypertension, and CV events. Risk factor level was calculated as the unweighted number of risk factors reported by each respondent on the screener survey. Samples of respondents with diabetes and with varying numbers of risk factors were sent longer, more detailed surveys.
- The screener survey yielded 211,097 responses from 127,420 households (64% response rate). A baseline questionnaire was mailed in 2004 to 22,001 screener respondents with self-reported diabetes or various cardiometabolic risk factors. Responses were received from 17,640 adults (80% response rate). A 1-year follow-up survey was conducted in 2005, yielding 15,925 responses (72% response rate).

Dependent Variable

- The dependent variable in this analysis was the occurrence (yes or no) of a reduction in *either* weight *or* waist size between baseline and follow-up.
- Outliers were dropped from analysis using the following thresholds:
 - Weight at either baseline or follow-up: Minimum 50 pounds, maximum 500 pounds
 - Waist size at either baseline or follow-up: Minimum 20 inches, maximum 120 inches
 - Maximum change in weight from baseline to follow-up: ± 100 pounds
 - Maximum change in waist size from baseline to follow-up: ± 15 inches

Statistical Analyses

- Bivariate relationships between each predictor and the occurrence of a reduction in either weight or waist size were assessed using cross-tabulations and the χ^2 test (p value < 0.05 considered statistically significant).
- Simultaneous impacts of all predictors on the occurrence of a reduction in either weight or waist size were assessed using multinomial logistic regression analysis, with "No reduction" as the reference category. Predictors that had at least a marginally significant bivariate association with the occurrence of a reduction in either weight or waist size (χ^2 p value < 0.20) were included in the regression analyses.
- The statistical significance of each regression model was based on a p value < 0.05 for the likelihood ratio χ^2 test, comparing the model with the predictors included versus the model with intercept only.
- The statistical significance of each predictor, adjusting for the influence of all of the other included predictors, was based on a p value < 0.05 for its regression coefficient (Wald χ^2 test). Odds ratios and their 95% confidence intervals are also reported for each predictor.
- All computations and analyses were performed using SPSS version 13.0.1.

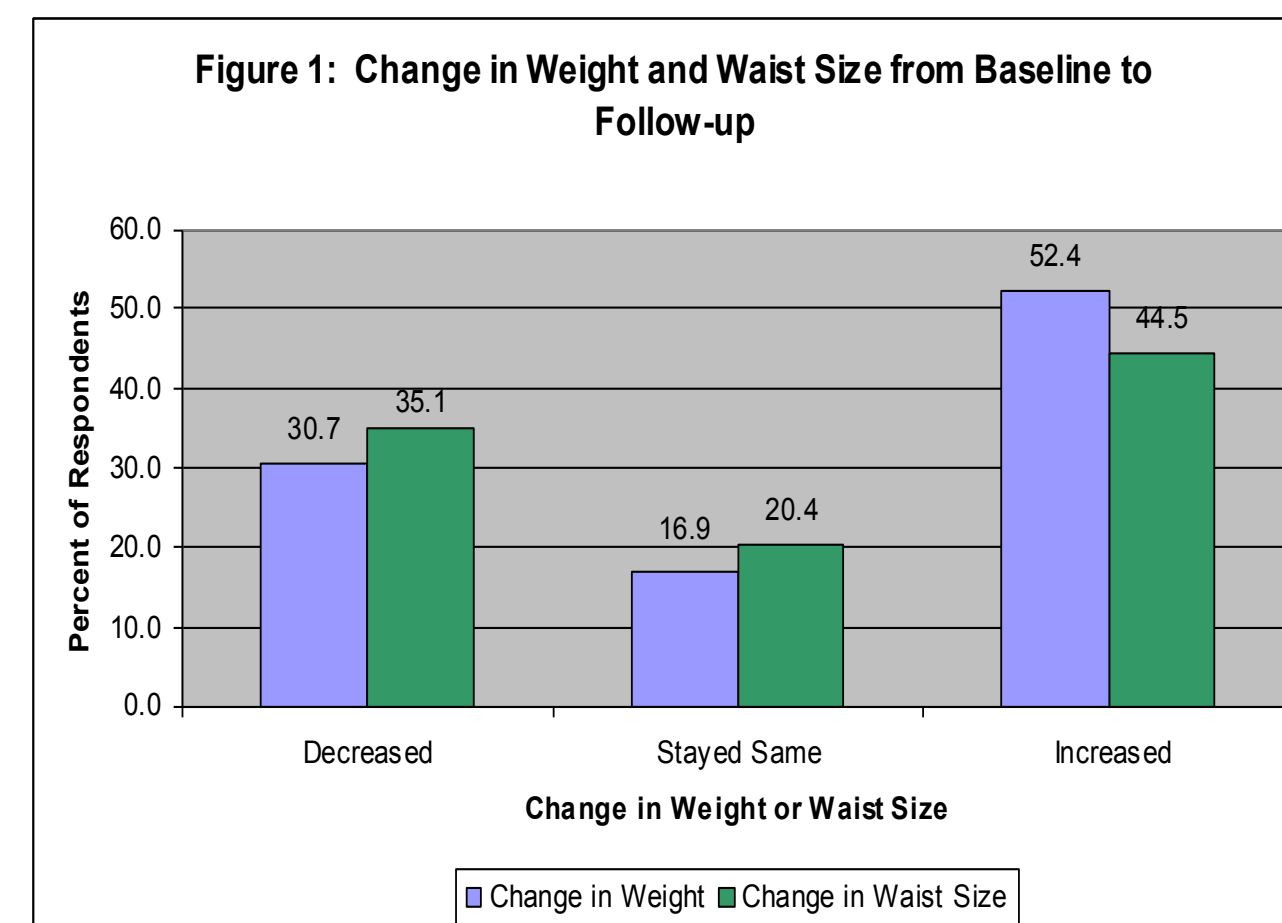
Results

Characteristics of the Study Population

- Of the 11,671 respondents with matched baseline and follow-up data, 11,570 had non-missing data on the occurrence of a reduction in either weight or waist size.
- 62% of baseline respondents were women, and 75% were aged 45 years or older. The largest group was aged 45 to 64 years (44%); 32% were aged 65 years or older, and 14% were aged 75 years or older.

Changes in Weight and Waist Size

- 52% of all respondents with complete data experienced a *reduction* in *either* weight or waist size, while 48% did not; 10% of all respondents lost $\geq 10\%$ on either measure.
- Among all respondents with complete data, 52% gained weight, 31% lost weight, and 17% stayed the same (Figure 1); 10% of all respondents gained $\geq 10\%$ in weight and 4% lost $\geq 10\%$. The mean weight at baseline was 197.5 (SD 51.7) lbs, and the mean weight at follow-up was 200.7 (SD 53.7) lbs.
- Among all respondents with complete data, 45% gained in waist size, 35% lost, and 20% stayed the same (Figure 1); 12% increased $\geq 10\%$ in waist size and 8% decreased $\geq 10\%$. The mean waist size at both baseline and follow-up was 41.2 inches (SD at baseline 8.9 inches, SD at follow-up 7.5 inches).



Baseline Predictors of Reduction in Weight or Waist Size

Cross-tabulation Analysis:

- More respondents who agreed that their inability to keep weight off was due to diet and exercise had a reduction in either weight or waist size than in those who disagreed (55% vs. 51%, respectively).

- Respondents were *less likely* to have a reduction in either weight or waist size if they self-reported:
 - Exercising more regularly
 - 52% in those exercising regularly for ≥ 6 months vs. 57% in those not exercising now but planning to start in next 6 months
 - Exercising more vigorously
 - 47% in the most active respondents vs. 53% in inactive respondents
 - Better health status
 - 48% of those in very good or excellent health vs. 60% of those in poor health
 - Expectation of better health next year
 - 51% of those who expected better or about the same health vs. 62% of those expecting much worse health
- No significant bivariate association was found between the occurrence of a reduction in either weight or waist size and the following predictors:
 - The general belief that the inability to keep weight off is due to a yet undiagnosed hormone or metabolism problem.
 - Self-reported past level of regular exercise.

Multivariable Binomial Logistic Regression Analysis:

- The following baseline predictors had a statistically significant impact on the occurrence of a reduction in either weight or waist size from baseline to follow-up (Table 1), listed in approximate order of decreasing magnitude of impact. (Predictors with a positive impact on reduction of weight or waist size have an OR > 1.00 ; predictors with a negative, inverse impact on reduction of weight or waist size have an OR < 1.00 .)
 - Current health status, with the categories of Excellent, Very Good, and Good having a significant and positive impact, compared with the Poor category; that is, respondents in those categories were more likely to have experienced a reduction in either weight or waist size.
 - Current level of exercise (IPAQ), with only the HEPA active category being significantly more likely to have a reduction compared with the Inactive category.
 - Belief that the respondent's own inability to keep weight off was due to their diet and exercise habits, although here the direction of impact was *negative* (inverse); that is, respondents who agreed with that belief were *less likely* to have experienced a reduction in either weight or waist size than were respondents who did not share that belief.
- Even though the overall variable of self-reported current level of exercise was not statistically significant, the category of "Does not exercise but planning to start in the next 6 months" did show a significant impact in the negative direction; that is, respondents who were not exercising but were planning to start were *less likely* to experience a reduction in weight or waist size.

Table 1: Adjusted Odds Ratios (AOR) for Baseline Predictors of Reduction in Weight or Waist Size from Baseline to Follow-Up: Binomial Logistic Regression Analysis (Statistically significant predictors are in bold.)

Baseline Predictor	AOR (95% CI)
Current health status	—
Excellent	1.50 (1.06, 2.12)
Very good	1.62 (1.25, 2.09)
Good	1.34 (1.05, 1.71)
Fair	1.13 (0.89, 1.44)
Poor	1.00 (— —)
Current level of exercise (IPAQ)	—
Inactive	1.00 (— —)
Minimally active	0.99 (0.82, 1.20)
HEPA active	1.30 (1.09, 1.56)
Belief that own inability to lose weight is due to diet and exercise	0.85 (0.73, 0.98)
Belief that own inability to lose weight is due to hormone problem	0.90 (0.79, 1.03)
Self-reported current level of exercise	—
Not exercising now and not planning to start	1.00 (— —)
Does not exercise but planning to start in the next 6 months	0.78 (0.63, 0.96)
Exercises some, but not regularly	0.89 (0.77, 1.06)
Exercises regularly, but only began in last 6 months	0.90 (0.69, 1.17)
Exercises regularly, and started more than 6 months ago	0.93 (0.72, 1.18)
Expected health status next year	—
Much better	1.18 (0.94, 1.47)
Somewhat better	1.11 (0.97, 1.27)
About the same	0.98 (0.80, 1.20)
Somewhat worse	0.68 (0.41, 1.14)
Much worse	1.00 (— —)
Regular exercise in the past	—
Yes, a lot	0.89 (0.75, 1.06)
Yes, a few times	1.01 (0.88, 1.16)
No	1.00 (— —)

Conclusions

- A reduction in weight or waist size occurred in about one-half of the respondents, with 1 in 10 reducing weight or waist size $\geq 10\%$. Health status, level of exercise and personal beliefs had a statistically significant impact on the occurrence of a reduction. However, the direction of impact of those factors and others was complicated.
- These findings highlight the complexity of the factors that influence a person's behavior regarding diet and exercise and the ultimate impact of those behaviors on reduction in either weight or waist size.
- Subsequent SHIELD surveys will track weight and waist size annually, allowing us to determine if these respondents were able to maintain their weight loss, and if so, which attitudes and behaviors were associated with maintaining weight loss.

References

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- Morrato EH, et al. Are health care professionals advising patients with diabetes or at risk for developing diabetes to exercise more? *Diabetes Care* 2006;29:543–48.
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Abbreviations

AOR = adjusted odds ratio; BMI = body mass index; CV = cardiovascular; HEPA = Health-Enhancing Physical Activity; IPAQ = International Physical Activity Questionnaire; OR = odds ratio; SHIELD = Study to Help Improve Early evaluation and management of risk factors Leading to Diabetes; SPSS = Statistical Product and Service Solutions; T2D = type 2 diabetes; TNS NFO = Taylor Nelson Sofres National Family Opinion