

Attempted Weight Loss or Regular Exercise: Impact on Quality of Life Among Adults With and Without Type 2 Diabetes Mellitus

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BACKGROUND

- Weight management and regular exercise are key self-management treatments for individuals with T2DM
 - A cornerstone of the ADA's Clinical Practice Recommendations and Standards of Medical Care in Diabetes is medical nutrition therapy, which includes both dietary and exercise guidance¹
- The increasing prevalence of T2DM is directly related to an increasing rise in the prevalence of obesity and physical inactivity, with an estimated 97 million US adults being overweight or obese^{2,3}
- Increased weight is associated with worsening of cardiovascular risk factors as well as exacerbation of diabetes, while weight loss is associated with reduced insulin resistance and improvements in glycemia⁴
- Individuals are often counseled by their physicians and other healthcare providers regarding weight management and exercise. However, the extent to which these recommendations are incorporated into daily life among individuals with T2DM and whether they impact their quality of life are unknown

OBJECTIVE

- Examine the association between trying to lose weight or exercising regularly and health-related quality of life among individuals with and without T2DM

METHODS

Study Design

- Data were derived from the **Study to Help Improve Early evaluation and management of risk factors Leading to Diabetes (SHIELD)**, a 5-year population-based survey conducted to better understand the risk for the development of diabetes, as well as disease burden
 - Based upon a screening questionnaire mailed to 200,000 nationally representative households, responses were obtained for 211,097 adults from 127,420 households (64% response rate)
 - A baseline survey was sent in 2004 to a stratified random and representative sample of 22,001 individuals from the screening respondents (80.2% response rate). Annual follow-up surveys were sent to individuals responding to the baseline survey
- This investigation is a longitudinal analysis of the respondents who completed the baseline survey and the first follow-up survey (2005)
 - The first follow-up survey was sent to 22,001 individuals, with a response rate of 72% (n = 15,921)

Study Population

- Respondents were categorized as having T2DM based upon self-report of having been told by a doctor, nurse or other healthcare professional that they had T2DM
- A comparison cohort was identified as respondents **not** having T2DM, those who reported no diagnosis of either T2DM, T1DM, gestational or unspecified diabetes

Study Measures

- Weight management:
 - Respondents answered a survey question in the baseline survey worded as "During the last 12 months, have you tried to lose weight?" with response options of "yes" or "no"
- Regular exercise:
 - Respondents were asked to check one of the following statements about exercise in the baseline survey:
 - I currently exercise regularly and have done so for longer than 6 months
 - I currently exercise regularly, but have only begun doing so in the last 6 months
 - I currently exercise some, but not regularly
 - I currently do not exercise, but I am thinking about starting to exercise in the next 6 months
 - I currently do not exercise, and I do not intend to start exercising in the next 6 months

METHODS (Continued)

Study Measures (Continued)

- Quality of life assessed at the first follow-up survey
 - MOS SF-12
 - 12-item measure of overall health status with a recall period of 4 weeks
 - Scale ranges from 0–100, with norm-based scoring (population mean = 50) for PCS and MCS scores
 - Higher scores indicate better QoL

Statistical Analyses

- This analysis assessed respondents who reported intentionally trying to lose weight separate from respondents who reported regularly exercising for more than 6 months
- The proportion of respondents reporting attempts to lose weight or exercise regularly was computed
- Comparisons between respondents with and without T2DM were made using chi-square tests
- Multivariate linear regression models were constructed to adjust for baseline differences between groups

RESULTS

- There were 2,419 respondents with T2DM and 6,750 respondents without diabetes who completed the baseline survey and first follow-up survey
 - 1,722 respondents (71%) with T2DM reported trying to lose weight
 - 4,288 respondents (64%) without diabetes reported trying to lose weight
 - 472 respondents (20%) with T2DM reported regularly exercising for more than 6 months
 - 1,687 respondents (25%) without diabetes reported regularly exercising for more than 6 months

Table 1. Characteristics of SHIELD respondents with and without T2DM who reported trying to lose weight or regularly exercised

Characteristics	T2DM who tried to lose weight (n = 1,722)	No DM who tried to lose weight (n = 4,288)	T2DM who regularly exercised (n = 472)	No DM who regularly exercised (n = 1,687)
Age, years, mean (SD)	58.3 (12.0)**	53.7 (15.2)	63.1 (11.9)**	56.3 (16.1)
Women, %	64	65	50	54
Race, % white	86*	90	87*	90
Income, % < \$35,000/year	52**	40	44**	31
Education, % high school degree or less	35**	27	28**	19
Baseline weight, lbs, mean (SD)	225.4 (56.6)**	201.7 (48.0)	197.4 (49.6)**	178.0 (41.4)
Body mass index (BMI) category, %	**		**	
Normal weight (BMI <25.0 kg/m ²)	4	12	17	35
Overweight (BMI = 25.0–29.9 kg/m ²)	23	31	39	36
Obese (BMI ≥30 kg/m ²)	73	57	44	29

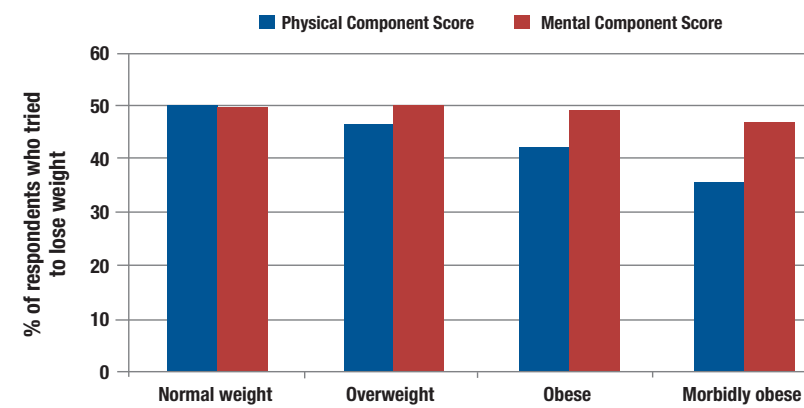
**p < 0.001 for comparison of T2DM vs. No DM; *p < 0.05 for comparison of T2DM vs. No DM

- A significantly larger proportion of T2DM respondents who attempted weight loss were older, had lower income, had less education, and had higher baseline weight and obesity compared with No DM respondents who attempted weight loss (Table 1)
- Significantly more T2DM respondents who exercised regularly were older, had lower income, had less education, and had higher baseline weight and obesity compared with No DM respondents who exercised regularly (Table 1)

RESULTS (Continued)

Attempted Weight Loss

Figure 1. SF-12 scores for respondents who intentionally tried to lose weight by BMI category for all respondents

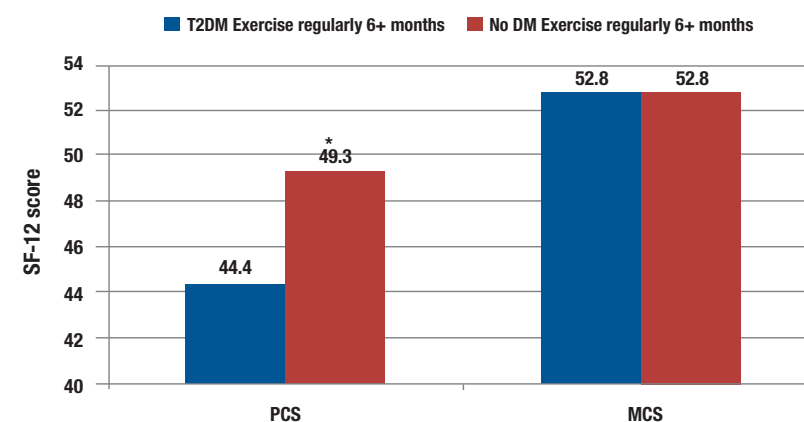


p < 0.001 for comparison across BMI category

- Among those who intentionally tried to lose weight, unadjusted findings indicate that both physical and mental health component scores decreased from normal weight group to morbidly obese group, especially for physical health (Figure 1)
- Multivariate regression model was done to adjust for baseline differences (Tables 2 and 3)

Regular Exercise

Figure 2. SF-12 scores for respondents who regularly exercised by diabetes status



*p < 0.05 for comparison of T2DM vs. No DM

- Comparing T2DM group with No DM group, physical component scores were significantly lower among T2DM respondents and mental component scores were equivalent for both groups (Figure 2)
- Physical and mental health component scores decreased across BMI category, with higher scores for normal weight individuals and lowest scores for morbidly obese individuals (p < 0.001) (data not shown)
- Multivariate regression model was done to adjust for baseline differences (Tables 2 and 3)

Table 2. Multivariate linear regression for SF-12 Physical Component Score

	Beta coefficient	p-value
Tried to lose weight (reference = no)	0.041	0.87
Exercise regularly for >6 months (reference = no)	2.10	<0.0001
Type 2 diabetes mellitus (reference = no DM)	-2.41	<0.0001
Age, years	-0.26	<0.0001
Gender (reference = men)	-2.21	<0.0001
White (reference = other race)	-0.02	0.92
Education (reference = ≤ high school diploma)	0.24	<0.0001
Income (reference = ≤\$35,000/year)	1.52	<0.0001
BMI, kg/m ²	-0.44	<0.0001

R-square = 0.31, Model F statistic = 446, p < 0.0001

- After adjusting for baseline demographics, BMI, and diabetes status, trying to lose weight was not associated with higher physical health component score (p = 0.87) (Table 2)
- After adjustment, exercising was significantly associated with higher subsequent physical component scores, indicating better physical quality of life (p < 0.0001) (Table 2)
- After adjusting for demographics and BMI, T2DM respondents had lower physical component scores than respondents without diabetes (p < 0.0001) (Table 2)

Table 3. Multivariate linear regression for SF-12 Mental Component Score

	Beta coefficient	p-value
Tried to lose weight (reference = no)	0.59	0.013
Exercise regularly for >6 months (reference = no)	1.43	<0.0001
Type 2 diabetes mellitus (reference = no DM)	-0.52	0.034
Age, years	0.13	<0.0001
Gender (reference = men)	-1.69	<0.0001
White (reference = other race)	-0.09	0.55
Education (reference = ≤ high school diploma)	0.15	0.022
Income (reference = ≤\$35,000/year)	1.05	<0.0001
BMI, kg/m ²	-0.07	<0.0001

R-square = 0.10, Model F statistic = 117, p < 0.0001

- After adjusting for demographics, BMI, and diabetes status, trying to lose weight was independently associated with higher mental component scores in the subsequent year, indicating better mental quality of life (p = 0.01) (Table 3)
- After adjustment, exercising regularly was significantly associated with higher mental component scores, indicating better mental quality of life (p < 0.0001) (Table 3)
- After adjusting for demographics and BMI, T2DM respondents had lower mental component scores than respondents without diabetes (p = 0.034) (Table 3)

LIMITATIONS

- The determination of T2DM was made based upon self-report rather than clinical or laboratory measures
- Household panels, like the SHIELD study, tend to under-represent the very wealthy and very poor segments of the population and do not include military or institutionalized individuals
- Self-selection bias may be present because respondents were those who could read and comprehend the survey

SUMMARY

- After adjusting for baseline characteristics and diabetes status, trying to lose weight was not associated with higher physical component scores, but exercising regularly was significantly associated with higher PCS scores, indicating that exercising regularly for more than 6 months was associated with better physical QoL
- After adjusting for demographic features, BMI, and diabetes status, trying to lose weight and exercising regularly were both independently associated with higher mental component scores, indicating that trying to lose weight or exercising regularly for more than 6 months was associated with better mental QoL

CONCLUSIONS

- Respondents who reported exercising regularly had significantly better physical and mental quality of life, compared with respondents who did not exercise regularly
- Respondents with T2DM who exercised regularly had significantly worse quality of life, compared with respondents without diabetes who exercised regularly
- Respondents who reported trying to lose weight had better mental quality of life, compared with respondents who did not try to lose weight

REFERENCES

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LIST OF ABBREVIATIONS

ADA	American Diabetes Association
BMI	Body mass index
MCS	Mental Component Summary Score
PCS	Physical Component Summary Score
QoL	Quality of Life
SHIELD	Study to Help Improve Early evaluation and management of risk factors Leading to Diabetes
SF-12	Short Form-12 version 2
T2DM	Type 2 diabetes mellitus
US	United States

This research was supported by AstraZeneca LP.

Presented at the ISPOR 15th Annual International Meeting, Atlanta, GA, May 15–19, 2010