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Impact of baseline patient characteristics on interventions to reduce diabetes distress: the role of personal conscientiousness and diabetes self-efficacy

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Abstract

Aims—To improve patient-centred care by determining the impact of baseline levels of conscientiousness and diabetes self-efficacy on the outcomes of efficacious interventions to reduce diabetes distress and improve disease management.

Methods—Adults with Type 2 diabetes with diabetes distress and self-care problems (*N*=392) were randomized to one of three distress reduction interventions: computer-assisted self-management; computer-assisted self-management plus problem-solving therapy; and health education. The baseline assessment included conscientiousness and self-efficacy, demographics, diabetes status, regimen distress, emotional burden, medication adherence, diet and physical activity. Changes in regimen distress, emotional burden and self-care between baseline and 12 months were recorded and ANCOVA models assessed how conscientiousness and self-efficacy qualified the significant improvements in distress and management outcomes.

Results—Participants with high baseline conscientiousness displayed significantly larger reductions in medication adherence and emotional burden than participants with low baseline conscientiousness. Participants with high baseline self-efficacy showed greater improvements in diet, physical activity and regimen distress than participants with low baseline self-efficacy. The impact of conscientiousness and self-efficacy were independent of each other and occurred across all three intervention groups. A significant interaction indicated that those with both high self-efficacy and high conscientiousness at baseline had the biggest improvement in physical activity by 12 months.

Conclusions—Both broad personal traits and disease-specific expectations qualify the outcomes of efficacious interventions. These findings reinforce the need to change from a one-size-fits-all

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Competing interests
None declared.

Supporting information
Additional supporting information may be found in the online version of this article: Appendix S1

approach to diabetes interventions to an approach that crafts clinical interventions in ways that fit the personal traits and skills of individual people. (Clinical Trials Registry No: NCT-00714441)

Introduction

Diabetes distress refers to the emotional concerns, worries and fears that often accompany the management of a demanding chronic disease like diabetes. Diabetes distress is associated with poor glycaemic control and poor self-management [1,2], and its incidence over 18 months is as high as 45.4% [3]. Studies indicate that females, and those who have high general life stress or high negative life events, complications or poor diet and exercise habits are at risk of experiencing high diabetes distress [4].

Several reports have described how a variety of individual patient-coping measures, health beliefs and other personal characteristics qualify and/or moderate the effects of interventions such as those that target diabetes distress [5,6]. These results emphasize the need to tailor efficacious interventions in ways that meet the specific characteristics of individuals, countering the philosophy that one-size-fits-all. For example, in the Translating Research Into Action for Diabetes (TRIAD) study, poorer intervention outcomes occurred for individuals who were younger, female, depressed, obese, had low income and those who lived in ‘problem’ neighbourhoods [5]. In the real world of clinical care, individuals who meet these criteria may require additional assistance, different kinds of interventions, or more tailored interventions to reach clinical goals [7]. As programmes to reduce diabetes distress become more widespread, it will be important to document which fixed and potentially malleable patient characteristics should be considered to maximize the effectiveness of interventions.

Two widely studied patient characteristics from different conceptual domains have shown consistent associations with behavioural outcomes in studies of chronic disease. First, ‘conscientiousness’ is a non-diabetes-specific personal trait that is part of the five-factor model of personality [8]. It is defined as a planned, orderly and self-disciplined approach to life problems. Low conscientiousness has been found to be significantly associated with increased risk of mortality [9], poor diabetes self-management [10], occurrence of comorbidities, and decline in physical functioning in several chronic conditions [11]. Second, ‘diabetes self-efficacy’, a construct from social cognitive theory, refers to confidence in one’s ability to perform diabetes-specific self-care behaviour [12], and a host of studies has shown its crucial impact on diabetes management [13].

The Reducing Distress and Enhancing Effective Management (REDEEM) study was a 12-month, three-arm, randomized controlled trial to reduce diabetes distress among adults with Type 2 diabetes who reported at least moderate diabetes distress and problems with disease management, but who were not clinically depressed [6]. One arm sought to improve diet, physical activity and medication adherence, a second to enhance diabetes-distress-specific problem-solving, and a third to provide health risk education. Significant and clinically meaningful reductions in diabetes distress and improvements in diet, physical activity and medication adherence occurred in all three intervention arms (P <0.001) with no between-group differences. Participants with high baseline diabetes distress in the diabetes-distress-

specific problem-solving arm, however, displayed significantly larger reductions in diabetes distress than did participants in the high baseline diabetes distress group in the other two arms. Significant time-varying associations between changes in diabetes distress and changes in medication adherence, physical activity and HbA_{1c} concentration occurred over the course of the study.

In the present study, in an effort to shape diabetes distress interventions to better fit the needs of individual people, we report the effects of baseline conscientiousness and self-efficacy on significant REDEEM study outcomes. We asked: over the course of the 12-month trial, which of these patient characteristics, individually or together, significantly qualified the observed changes in diabetes distress and behavioural management (medication adherence, diet, physical activity) across the sample; whether their impact differed by study arm; and whether self-efficacy mediated the effect of conscientiousness on intervention outcomes.

Subjects and methods

Participants

Details of subjects and methods have been presented elsewhere [6]. People with Type 2 diabetes and diabetes distress were recruited from the patient registries of several community medical groups in the San Francisco Bay Area, USA. Inclusion criteria were a registry-recorded diagnosis of Type 2 diabetes for ≥ 12 months; a mean score of ≥ 1.5 on the two-item Diabetes Distress Screener scale [14] (confirmed later by the full scale) to indicate at least moderate diabetes distress [3]; age ≥ 21 years; ability to read and speak English; at least moderate computer use facility; availability of a computer with Internet access; and self-reported problems with diabetes management (healthy eating or exercise plan not followed in 3 of 4 days during the previous week, or medications not taken on ≥2 days during the previous week, based on the Summary of Diabetes Self-Care Activities [15]). Exclusion criteria included clinical depression (Patient Health Questionnaire 8 score ≥ 15 [16]) and severe diabetes complications (Appendix S1) or functional deficits (e.g. dialysis, blindness).

Procedure

Prospective participants received a letter from their healthcare facility informing them of the study. They were told that a REDEEM study representative would telephone them to explain the project further unless they opted out by calling a toll-free number or by returning an enclosed postcard. During a follow-up call, individuals were screened on eligibility criteria and eligible individuals were invited to a personal meeting. At the meeting, eligibility requirements were confirmed, informed consent was obtained, and a 1.5-h baseline assessment was completed that included: height and weight, questionnaires, interview and collection of biological data. Participants were then randomized to one of the three study arms using a computer-generated algorithm, and an intervention visit was scheduled within 2 weeks. Assessments were repeated at 4 and 12 months after the intervention. Three non-professional college graduate interventionists were trained and supervised by the investigators to deliver each of the three interventions and the telephone calls. A separate

team of non-professional college graduates undertook the baseline, 4- and 12-month assessments in an effort to reduce assessment bias based on previous intervention experience with participants.

Computer-assisted self-management

Participants randomized to computer-assisted self-management were introduced to 'My Path To A Healthy Life', a 40-min, web-based diabetes self-management programme [17]. Participants selected achievable goals for medication adherence, diet or exercise, and were shown how to monitor their daily progress. After 6 weeks, participants completed an 'action plan' for each previously prioritized management problem. Participants received live phone calls from their interventionist at weeks 2, 4, 7 and 12 to check progress. At month 5, participants received an automated booster programme to identify and reduce potential barriers. Finally, participants received live 15-min phone calls at weeks 24, 28, 34 and 48.

Computer-assisted self-management and problem-solving

Participants randomized to computer-assisted self-management and problem-solving received a 60-min in-person intervention that included computer-assisted self-management plus PST. PST is an eight-step process to identify and define diabetes distress, establish realistic goals, generate ways to meet these goals, weigh the pros and cons of each, choose solutions, create a diabetes distress action plan, evaluate outcome, and engage in pleasant activities [18,19]. Participants randomized to computer-assisted self-management and problem-solving received the same number of phone calls and assessments as participants in the computer-assisted self-management intervention, and a live supplemental booster session at month 5 (a review of the PST steps).

Leap Ahead

Participants randomized to Leap Ahead, a minimal intervention in comparison with the other two interventions, received a 20-min, computer-delivered health risk appraisal (e.g. seat-belt, sunscreen use) along with diabetes information regarding healthy living, diet, and physical activity [20] preceding each of the eight calls between the baseline and 12-month assessments. The programme delivered diabetes information only and participants were not directed to use the information to engage in a specific or structured programme of self-management or diabetes distress change. Participants received a repeat of the risk appraisal at month 5 and had similar assessments to participants in computer-assisted self-management and computer-assisted self-management and problem-solving.

The University of California, San Francisco institutional review board and the committees of collaborating institutions approved the present study. Procedures followed were in accordance with the ethical standards of the Helsinki Declaration of 1975, as revised in 1983. Data were collected between 2008 and 2011, and analysed in 2013.

Measures

Control subjects—Patient demographic variables included age (continuous variable), gender, race (white/non-white) and education (years); diabetes status included use of insulin (yes/no), years since diagnosis, and number of self-reported comorbidities and

complications derived from a list of 22 common diabetes-related health problems (e.g. angina, kidney or eye problems, hypertension).

Qualifiers—Conscientiousness was assessed using a nine-item scale (α =0.80), rated on a four-point strongly agree to strongly disagree scale [21]. Items included: 'I see myself as someone who does a thorough job; is a reliable worker'. Diabetes self-efficacy, was assessed using a 14-item diabetes self-efficacy scale developed by Lorig *et al*. [22](α = 0.89), with each item rated on a 10-point scale from 'not at all confident' to 'totally confident'. Questions included: 'How confident do you feel that you can choose appropriate foods when hungry?' and 'How confident do you feel that you can take diabetes medications at times directed by your doctor'.

Outcomes—One primary dependent variable was diabetes distress, which was assessed by two subscales of the Diabetes Distress Scale [23]: the five-item Regimen Distress subscale [α=0.90] and the five-item Emotional Burden subscale [α = 0.88]. Regimen distress and emotional burden were selected because they were directly targeted by the interventions. Items are rated on a six-point scale (range 1–6) from 'not a problem' to a 'very serious problem'. Regimen distress items include feeling that I am often failing with my diabetes regimen and feeling that I am not sticking closely enough to a good meal plan. Emotional burden items include feeling overwhelmed by the demands of living with diabetes and feeling that diabetes controls my life. A second set of outcomes assessed disease management. 'Physical activity' was assessed using the Community Health Activity Program for Seniors (CHAMPS) [24]. It measures weekly caloric expenditure of light, moderate and heavy physical activity. Only the low-intensity physical activity variable was used because it most frequently reflected levels reported by participants (range 1–6000). 'Healthy eating' was assessed using the National Cancer Institute Percent Energy From Fat Screener [25], which estimates percent energy (calories) from fat, based on consumption of 14 foods (range in the present study: 19.4–27.4). It has been shown to be a good dietary exemplar that is sensitive to change [6]. 'Medication non-adherence' was assessed using the eight-item Hill–Bone Compliance Scale (α = 0.80)[26], which assesses how often respondents miss taking medications, rated on a four-point scale (range 1–4) from 'none of the time' to 'all of the time'.

Data analyses

Missing data were multiply imputed using NORM version 2 software [27]. This was an iterative, two-step process carried out by first drawing values from their original, conditional distribution and second simulating new values drawn from a Bayesian posterior distribution. The two steps were repeated until convergence was reached [28]. For both the steps, a maximum of 1000 iterations were allowed. Final imputations were saved from the last cycle of 10 separate data augmentation procedures and values were averaged for analysis. Variables within a limited range were logit-transformed to assure that imputed values also fell within that range. The same imputed dataset was used for all analyses, and differences in results based on imputed and non-imputed datasets were negligible. Differences in demographics and diabetes status variables across arms were analysed using one-way ANOVA and a chi-squared test.

Difference scores were calculated for each outcome (regimen distress, emotional burden, physical activity, healthy eating, medication non-adherence), with baseline values subtracted from 12-month follow-up scores. For each difference-scored outcome, ANCOVA models tested for main effects, first in separate models for conscientiousness and self-efficacy, and second in models that included both variables to test for independence. Interactions between intervention group and conscientiousness and self-efficacy and between conscientiousness and self-efficacy also were computed. All control variables, including baseline level of the dependent variable [29], were included in each analysis. Statistical analyses were performed using SPSS 19.0 (SPSS Inc., Chicago, IL, USA).

Results

A complete description of the sample and the Consolidated Standards of Reporting Trials (CONSORT) diagram have been presented elsewhere [6]. Briefly, of those identified as eligible, 66.6% agreed to participate and total attrition across the 12 months was 18.7%. There were no significant differences in patient baseline characteristics across study arms, between those who participated and those who refused, or between those who dropped out and those who did not. The diverse sample had a mean (SD; range) age of 56 (9.6; 21–75) years, 53.8% of the sample was female and the mean (SD) baseline HbA_{1c} was 57.0 (17.6) mm/mol or 7.4 (1.61)% (Table 1). The zero-order correlation between baseline conscientiousness and diabetes self-efficacy was r=0.11 (P=0.03; N=392).

The mean rate of missing data across all dependent variables was 2.6% at baseline and 26.4% at follow-up. Had complete-case analyses been used, data were available for 289 participants for the distress outcomes, 274 participants for the fat intake outcome, 299 participants for the light physical activity outcome, and 290 participants for the medication non-adherence outcome.

Main and interaction effects

Controlling for covariates, conscientiousness was a significant predictor of change in emotional burden and MEDAD (Table 2). Participants with high baseline conscientiousness showed significantly larger positive changes as a result of the intervention on emotional burden (effect size [partial eta-squared] = 0.019) and medication adherence (effect size = 0.041) than participants with low baseline conscientiousness. Controlling for covariates, baseline level of diabetes self-efficacy was a significant predictor of change in regimen distress (effect size = 0.016), diet (effect size = 0.039), and CHAMPS (effect size = 0.010). Those with high initial self-efficacy were found to have greater reductions in diabetes regimen distress and fat intake, and greater increases in low-intensity physical activity as a result of the interventions than those with initially lower self-efficacy. Furthermore, even in conservative analyses that included the baseline level of the dependent variable and six controls, effect sizes for conscientiousness and self-efficacy were significant, were small to moderate (variance range 1–4%), and were greater in all cases than the sum of variance accounted for by all controls combined.

There was no significant interaction between intervention group and conscientiousness or diabetes self-efficacy for any outcome variable, suggesting that the strength of these associations occurred equally across participants in all three arms.

Interaction between conscientiousness and self-efficacy

When both conscientiousness and self-efficacy were entered into the same equation, an identical pattern of results was found: all effects from initial analyses remained significant, thus providing no support for mediation. Only one significant interaction effect between conscientiousness and self-efficacy occurred, and this was for the physical activity outcome variable (F=4.43, P=0.04). Results indicated that those with both high baseline conscientiousness and high baseline diabetes self-efficacy showed the greatest improvements in physical activity as a result of intervention.

Discussion

Regarding the first research question, results indicate that conscientiousness and diabetes self-efficacy significantly qualified the effects of a diabetes distress intervention on different diabetes distress and self-management outcomes. Specifically, those with higher baseline conscientiousness were found to have greater improvements in emotional burden and medication adherence than those with lower baseline conscientiousness, and those with higher baseline self-efficacy had a greater improvement in regimen distress, fat intake and physical activity than those with lower baseline self-efficacy.

Both general personality and diabetes-specific variables independently qualified the effects of the interventions on outcomes, and they did so differentially. Conscientiousness is a general trait that refers to a careful, planned and thorough approach to tasks over time. In contrast, diabetes self-efficacy refers to confidence, beliefs and expectations regarding specific diabetes management behaviours. Each had a different effect on outcomes: conscientiousness on managing and structuring the emotional burdens of diabetes and organizing medications over time [30]; diabetes self-efficacy on dealing with routine, day-to-day management behaviours, such as diet and exercise, and their associated stressors over time. Interestingly, these two patient characteristics interacted with respect to physical activity: those with both high conscientiousness and self-efficacy at baseline showed the largest improvements in physical activity as a result of intervention.

Taken together, these findings highlight the potential impact of initial patient characteristics on intervention outcomes. They show that above and beyond patient demographics, both broad personal traits and disease-specific beliefs and expectations qualify intervention outcomes. Although in very conservative analyses that may underestimate the true effects, the effect sizes are low to moderate, yet they account for more variance in outcomes than all of the controls combined. Furthermore, in some cases (e.g. physical activity) baseline levels of both general traits and disease-specific expectations combine to significantly affect diabetes distress and disease-related management behaviours.

These findings reinforce the need to change from a one-size-fits-all approach to diabetes interventions to an approach that crafts clinical interventions in ways that fit the personal

traits and skills of each individual. This suggests that some individuals may require modifications to interventions to increase the likelihood of positive outcomes. For example, one study showed that poor planners benefitted from pre-intervention training in a programme to reduce snacking [7]. Without such training, these participants did not benefit from the snack-reduction intervention. Other modifications may include providing individuals with intervention choices geared to skills and preferences, changing the pace, emphasis or sequence of intervention components, adding external supports and structures to counter less malleable personal styles and traits, increasing the frequency of live or automated feedback, or changing the method of intervention. Even interventions that address specific behavioural skills, such as problem-solving in the computer-assisted self-management and problem-solving intervention, may not be effective if they are not crafted to meet individuals' styles and preferences.

A greater focus on this kind of patient-centred care may make programmes of self-management support more complex, but it may also deliver care in ways that are more successful, and more time- and cost-effective. Crucial clinical research now needs to be directed toward identifying not only which interventions are effective overall, but also for which kinds of individuals are these interventions most and least efficacious. Such efforts will provide clinicians with greater flexibility to join with people with diabetes to tailor efficacious interventions to meet the unique styles, preferences, skills and social contexts of each individual.

We also find that no qualifier by study arm interaction term reached or approached statistical significance. Thus, the effects of conscientiousness and self-efficacy apply equally across all interventions studied. This bodes well for diabetes distress interventions insofar as the same essential skills, beliefs and expectations identified before intervention may apply generally to different kinds of diabetes distress interventions. Thus, it is apparent that what people bring to diabetes distress and disease management interventions is as important as what kinds of interventions they receive.

The strengths of the present study include: its evaluation of two very different well-researched and influential qualifiers; its use of a large, community-based sample of adults with Type 2 diabetes; and the inclusion of both self-care- and diabetes-distress-specific interventions. Also, Internet access and computer skills were not a limiting factor: only 1.5% of otherwise eligible individuals were excluded because of a lack of skills or access. Several limitations, however, need to be considered. First, the interventions were additive such that computer-assisted self-management was added to problem-solving and the effects of problem-solving were not tested separately. Second, conscientiousness, self-efficacy and the outcomes were assessed by self-report scales that may not have adequately reflected the complexities of these constructs. Third, only the conscientiousness construct of the five-factor model of personality was assessed. Last, we conducted multiple comparisons, which increases risk of type 1 error: specifically, 15 models (three models for each of five outcomes) were specified. Assuming a study-wide error rate of 5%, however, we expected 0–3 significant effects at $P < 0.05$ (95% CI) to be attributable to chance alone; however, we found 10 significant effects at $P < 0.05$, so we concluded that the observed effects were not attributable to chance.

The present study highlights the need to address both general and diabetes-specific personal characteristics before delivering diabetes-distress-related interventions. The frequent practice of only exploring contrasts among intervention arms without addressing variations in outcomes based on initial patient characteristics within each arm limits the specificity of findings and increases the risk of type I error.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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What's new?

- The traits and beliefs that people with diabetes bring with them to clinical interventions influence the outcomes of interventions, even those previously shown to be efficacious.
- Conscientiousness, a personal trait, and diabetes self-efficacy, a set of beliefs and expectations about management, are independent predictors of the success of interventions in improving management and reducing distress.

Table 1

Baseline characteristics of participants randomized across three interventions

Characteristic or Variable	All	Intervention			*P**
		Leap Ahead	Computer-assisted self-management	Computer-assisted self- management and problem-solving	
	N=392	*n*=96	*n*=150	*n*=146	
Mean (SD) age, years	56.11 (9.55)	55.23 (10.88)	56.96 (8.78)	55.82 (9.36)	0.34
Gender: female, %	53.8	59.4	48.0	56.2	0.17
Race, %					0.64
Amer Indian/Alaska Native	0.8	0	1.3	0.7	
Asian	19.4	18.8	22.0	17.1	
African-American	16.6	24.0	11.3	17.1	
Hispanic	11.2	10.4	12.7	10.3	
Pacific Islander	1.8	1.0	1.3	2.7	
White, non-Hispanic	40.1	35.4	41.3	41.8	
Multiple ethnicities	5.9	6.3	4.7	6.8	
Other	4.3	4.2	5.3	3.4	
Income, %					0.44
< $49,999	31.3	34.3	32.0	28.8	
$50,000-- $100,000	40.3	44.8	38.7	39.0	
> $100,000	28.3	20.8	29.3	32.2	
Education, %					0.93
≤High school level	8.7	10.4	8.0	8.2	
Technical school	30.4	28.1	30.0	32.2	
College	61.0	61.5	62.0	59.6	
Percent taking insulin	17.9	19.8	15.3	19.2	0.59
Mean (SD) years since diagnosis	6.90 (5.93)	7.60 (6.44)	6.89 (6.04)	6.46 (5.46)	0.34
Mean (SD) no. comorbidities/complications	3.35 (2.58)	3.55 (2.75)	3.35 (2.62)	3.21 (2.43)	0.61
Mean (SD) BMI, kg/m^2	33.07 (7.78)	33.25 (8.41)	32.13 (7.17)	33.93 (7.90)	0.13
Mean (SD) regimen distress score	3.04 (1.19)	3.17 (1.30)	2.99 (1.08)	3.02 (1.22)	0.50
Mean (SD) emotional burden score	2.56 (1.18)	2.65 (1.19)	2.52 (1.72)	2.53 (1.18)	0.68
Mean (SD) percent energy from fat	31.42 (3.87)	32.08 (4.21)	31.46 (3.95)	30.94 (3.50)	0.08

Characteristic or Variable	All	Intervention			*P**
		Leap Ahead	Computer-assisted self-management	Computer-assisted self- management and problem-solving	
	N=392	*n*=96	*n*=150	*n*=146	
Low-intensity exercise, calories/week	1401.67 (1073.80)	1368.61 (1112.91)	1508.55 (1017.33)	1313.60 (1203.51)	0.31
Medication non-adherence	1.20 (0.28)	1.19 (0.27)	1.18 (.23)	1.23 (0.32)	0.18
Self-efficacy	6.51 (1.60)	6.50 (1.53)	6.65 (1.57)	6.37 (1.68)	0.34
Conscientiousness	3.93 (0.78)	3.87 (0.81)	4.01 (0.73)	3.90 (0.82)	0.34

* One-way ANOVA or chi-squared test, as appropriate.

Table 2

Effects of self-efficacy and conscientiousness on changes in diabetes outcomes

	Diabetes regimen distress	Diabetes emotional burden	Light physical activity	Percent calories from fat	Medication non-adherence
Results of ANCOVA models with self-efficacy (*N* = 392)					
	F (*P*)	*F* (*P*)	*F* (*P*)	*F* (*P*)	*F* (*P*)
Group	1.84 (0.16)	0.49 (0.61)	4.05 (0.02)	0.32 (0.73)	2.86 (0.06)
Gender	0.35 (0.55)	0.08 (0.77)	0.05 (0.82)	0.92 (0.34)	1.97 (0.16)
Insulin	0.53 (0.47)	0.15 (0.70)	0.00 (0.99)	0.29 (0.59)	2.71 (0.10)
Ethnicity	0.03 (0.86)	3.51 (0.06)	0.01 (0.93)	2.91 (0.09)	5.97 (0.02)
Education	3.56 (0.03)	0.16 (0.85)	0.09 (0.91)	0.69 (0.50)	0.55 (0.58)
Years since diagnosis	0.44 (0.51)	0.01 (0.91)	0.15 (0.70)	1.51 (0.22)	1.45 (0.23)
Comorbidities/complication	0.65 (0.42)	3.50 (0.06)	0.18 (0.67)	0.16 (0.69)	0.99 (0.32)
Age	0.27 (0.61)	1.98 (0.16)	0.06 (0.80)	9.54 (0.002)	1.30 (0.26)
Baseline value of outcome	224.61 (0.001)	136.95 (0.001)	24.32 (0.001)	527.88 (0.001)	344.60 (0.001)
Self-efficacy	6.13 (0.01)	0.49 (0.48)	3.70 (0.05)	15.25 (0.001)	1.26 (0.26)
Results of ANCOVA models with conscientiousness (*N* = 392)					
Group	1.62 (0.20)	0.55 (0.58)	3.97 (0.02)	0.36 (0.70)	3.01 (0.05)
Gender	0.29 (0.59)	0.12 (0.73)	0.01 (0.92)	0.56 (0.46)	1.75 (0.19)
Insulin	0.47 (0.49)	0.24 (0.62)	0.00 (.1.00)	0.18 (0.68)	3.26 (0.07)
Ethnicity	0.004 (0.95)	3.56 (0.06)	0.01 (0.94)	2.55 (0.11)	6.02 (0.02)
Education	3.78 (0.02)	0.42 (0.66)	0.10 (0.90)	0.97 (0.38)	0.22 (0.80)
Years since diagnosis	0.87 (0.35)	0.001 (0.97)	0.03 (0.86)	0.57 (0.45)	1.00 (0.32)
Comorbidities/complication	0.40 (0.53)	3.79 (0.05)	0.69 (0.42)	0.97 (0.33)	0.80 (0.37)
Age	0.26 (0.61)	2.63 (0.11)	0.01 (0.93)	11.54 (0.001)	2.32 (0.13)
Baseline value of outcome	232.21 (0.001)	148.69 (0.001)	21.98 (0.001)	538.82 (0.001)	364.04 (0.001)
Conscientiousness	2.00 (0.16)	7.23 (0.008)	0.20 (0.66)	2.72 (0.10)	16.24 (0.001)
Results of ANCOVA models with both self-efficacy and conscientiousness (*N* = 392)					

	Diabetes regimen distress	Diabetes emotional burden	Light physical activity	Percent calories from fat	Medication non-adherence
Self-efficacy	5.82 (0.01)	0.29 (0.59)	3.87 (0.05)	14.27 (0.001)	0.66 (0.42)
Conscientiousness	1.70 (0.19)	7.00 (0.008)	0.38 (0.54)	1.80 (0.18)	15.58 (0.001)