

# Стратегии совладания (копинг-стратегии) у больных сахарным диабетом 1 и 2 типа на инсулинотерапии: связь с эмоциональным благополучием и уровнем гликемического контроля

Мотовилин О.Г., Шишкова Ю.А., Суркова Е.В.

ФГБУ Эндокринологический научный центр, Москва

В условиях длительного течения сахарного диабета (СД) с его требованиями к ежедневному самоконтролю заболевания, копинг-стратегии (КС), то есть привычные для пациента способы для преодоления трудных ситуаций, могут быть связаны не только с психологическим благополучием, но и с гликемическим контролем.

**Цель.** Изучить взаимосвязи КС с гликемическим контролем и эмоциональным благополучием (ЭБ) больных СД 1 и 2 типа на инсулинотерапии.

**Материалы и методы.** В исследование были включены 84 пациента с СД 1 типа (СД1) и 56 пациентов с СД 2 типа (СД2) на инсулинотерапии (возраст  $22,5 \pm 3,3$  и  $61,0 \pm 8,9$  лет, м/ж: 29/55 и 11/45, длительность СД  $11,9 \pm 5,36$  и  $11,6 \pm 6,2$  лет,  $HbA_{1c}$   $9,1 \pm 2,2$  и  $9,0 \pm 1,4\%$  соответственно). Всем больным определялся уровень гликированного гемоглобина ( $HbA_{1c}$ ). Для исследования КС применялась методика «Стратегии преодоления стрессовых ситуаций» С. Хобфолла (СПСС). ЭБ оценивалось на основании выраженности у пациентов тревожности и депрессии при помощи методик «Реактивная и личностная тревожность» Спилбергера-Ханина (РЛТ) и «Шкалы депрессии» Центра эпидемиологических исследований (CES-D).

**Результаты.** У пациентов обеих групп КС ассертивных (настойчивых) действий была положительно связана с ЭБ. У больных СД2 ЭБ также повышается при использовании КС осторожных действий и вступления в социальный контакт. У пациентов обеих групп с ухудшением ЭБ связана КС агрессивных действий. У больных СД1 эмоциональное неблагополучие также связано со стратегией избегания, а у пациентов с СД2 — импульсивных действий. У пациентов с СД1 КС импульсивных действий ассоциированы с более высоким уровнем  $HbA_{1c}$ . У пациентов с СД2 КС осторожных действий, избегания и асоциальных действий ассоциированы с более низким уровнем  $HbA_{1c}$ .

**Заключение.** У пациентов с СД1 и СД2 КС ассоциированы как с ЭБ, так и с компенсацией углеводного обмена. С ЭБ и снижением уровня  $HbA_{1c}$  связаны КС ассертивных действий, осторожных действий, избегания и асоциальных действий, с эмоциональным неблагополучием и повышением уровня  $HbA_{1c}$  — КС агрессивных действий и импульсивных действий.

**Ключевые слова:** сахарный диабет; гликемический контроль; копинг-стратегии; стратегии совладания; эмоциональное благополучие

## Coping strategies in Type 1 and Type 2 diabetes patients using insulin: the relationship with emotional well-being and glycaemic control

Motovilin O.G., Shishkova Yu.A., Surkova E.V.

Endocrinology Research Centre, Moscow, Russia

**Background.** Over the long disease course of diabetes mellitus (DM), with its demands in terms of everyday self-management of the disease, individual psychological characteristics may be associated with both emotional well-being (WB) and glycaemic control. The former includes various types of coping strategies (CSs) of the patients, which comprise the common ways for patients to overcome difficult situations.

**Aim.** To study the relationships between CS and both glycaemic control and emotional WB in patients with Type 1 diabetes (T1D) and Type 2 diabetes (T2D) treated with insulin.

**Materials and methods.** The study included 84 patients with T1D and 56 patients with insulin-treated T2D [age,  $22.5 \pm 3.3$  and  $61.0 \pm 8.9$  years; men/women, 29/55 and 11/45; duration of DM,  $11.9 \pm 5.36$  and  $11.6 \pm 6.2$  years and glycated haemoglobin ( $HbA_{1c}$ ),  $9.1\% \pm 2.2\%$  and  $9.0\% \pm 1.4\%$ , respectively]. The  $HbA_{1c}$  levels were determined in all patients. The Strategic Approach to Coping Scale constructed by S. Hobfoll was used to study CS, and emotional WB was assessed based on the severity of anxiety and depression. Further, we used the State-Trait Anxiety Inventory developed by C.D. Spielberger and adapted by Y.L. Khanin and the Center for Epidemiologic Studies Depression Scale (CES-D). Only Russian validated versions of the questionnaires were used in the study.

**Results.** In both groups of patients, 'Assertive (Persistent) Actions' was positively associated with emotional WB. In patients with T2D, WB increases when using 'Cautious Action' and 'Social Joining'. The deterioration of emotional WB was associated with 'Aggressive

*Actions' in both groups of patients. In patients with T1D, negative WB was also associated with 'Avoidance', while in patients with T2D, negative WB was associated with 'Instinctive Actions'. In patients with T1D, 'Instinctive Action' was associated with higher HbA<sub>1c</sub> levels. In patients with T2D, 'Cautious Action', 'Avoidance' and 'Antisocial Action' were associated with lower HbA<sub>1c</sub> levels.*

**Conclusion.** *In patients with T1D and T2D, CSs are associated with both emotional WB and glycaemic control. Emotional WB and lower HbA<sub>1c</sub> levels are associated with 'Assertive Action', 'Cautious Action', 'Avoidance' and 'Asocial Action'. Negative WB and higher HbA<sub>1c</sub> levels are associated with 'Aggressive Action' and 'Instinctive Action'.*

**Key words:** *diabetes mellitus; glycaemic control; coping strategies; emotional well-being*

**DOI:** 10.14341/DM7550

**D**iabetes mellitus (DM) affects a patient's life in multiple ways, and various aspects of its impact are closely interlinked and directly influence each other. For example, an unfavourable disease course often results in a variety of psychological and psychosocial issues, and patients with DM experience emotional disorders, such as anxiety or depression, difficulties in social adjustment and behavioural disorders [1, 2]. In turn, these disorders have pronounced adverse effects on the course of disease [3, 4].

An endocrinologist's attempts to break this pathological circle do not always result in the desired outcomes. In contrast, sometimes if a physician enforces tighter control over a patient's behaviour, it only exacerbates many of these negative processes. The most important reason for the disparity between an endocrinologist's efforts to control diabetes and the outcome of his or her actions is because treatment outcomes for diabetes depend not only on health professionals but also on patients themselves.

The biopsychosocial model, which assumes active involvement of patients in the management of their disease, plays an increasingly prominent role in modern medicine [5]. This approach is more relevant to DM than to many other disorders. A physician analyses diabetes only in a hospital or on an outpatient basis and has only limited access to data for decision-making. In contrast, patients live with their disease and face its influence on nearly a daily basis. Health outcomes and psychological well-being depends on how well patients manage their disease. Conscious involvement of a patient during treatment is further developed into the concept in empowerment in which patients may assume a significant share of responsibility for their disease [6, 7].

The active involvement of patients with DM during treatment places high demands on their psychological features and, in particular, on their typical coping behaviour.

Initially, a concept of 'coping behaviour' was used to describe individual reactions to stress [8], although a more expansive interpretation was subsequently accepted [9]. A need for coping appears when patients encounter obstacles to fulfil their motives and achieve their goals.

Each person employs a limited range of behavioural patterns to overcome obstacles. Individual inherent patterns used to overcome these obstacles are called coping strategies (CSs).

*Coping strategies are typical characteristics of how people achieve their goals and cope with emerging challenges.*

CSs are stylistic characteristics that are relatively stable during a person's life. Each person possesses a specific and limited arsenal of CSs to employ in most situations, which are rarely exceeded. There is no consensus on the most effective strategy, but most authors agree that it is possible to identify more or less effective CSs for certain conditions [8, 9].

Strategies that are more efficient allow a person to achieve goals more easily under given conditions to improve emotions and performance and to overcome intrapersonal conflicts. The use of less efficient strategies leads to the development of adverse conditions, such as anxiety or depression, behavioural disorders and poor social adjustment.

We can assume that the use of certain CSs by patients with DM affects their ability to control the disease and therefore to achieve target clinical and metabolic parameters. There is a high probability of association between CSs and the psychological (emotional) well-being of patients.

To investigate CSs in patients with diabetes, there was conducted a study that involved patients with type 1 (T1D) and type 2 (T2D) on insulin therapy in the Endocrinology Research Center of the Ministry of Health of the Russian Federation. Enrollment of patients with different types of diabetes allowed us not only to identify typical CSs for these two groups but also to conduct a comparative analysis. Enrollment of patients with T2D on insulin therapy enabled the removal of the situational influence of treatment factors.

## Aim

To study the relationship among CSs, glycaemic control and emotional well-being of patients with T1D and T2D on insulin therapy.

## Materials and methods

The study population included patients with a verified diagnosis of T1D or T2D who were on insulin therapy for at least one year and who were admitted to the hospital or treated as an outpatient at the Endocrinology Research Center of the Ministry of Health of the Russian Federation. The exclusion criteria were as follows: advanced stages of complications [diabetic foot syndrome, pain or autonomic neuropathy, significant reduction in vision, chronic kidney disease (stages 4 and 5), glomerular filtration rate <30

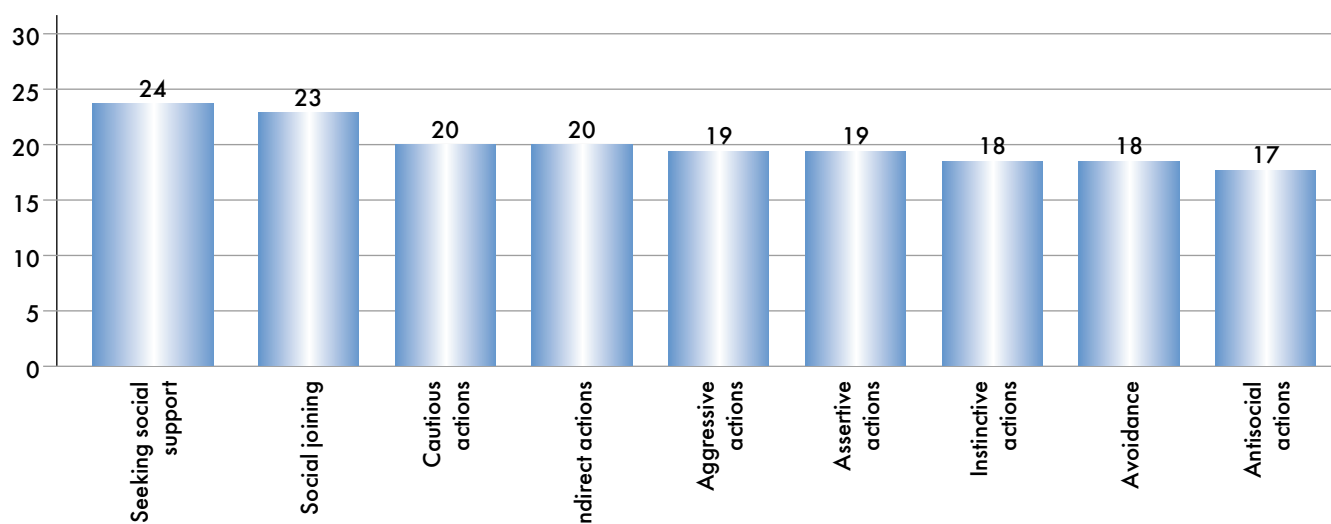


Fig. 1. Coping strategies of patients with T1D.

ml/min/1.73 m<sup>2</sup>, severe concomitant somatic disease, diagnosis of mental illness and/or ongoing therapy using psychotropic drugs].

The characteristics of the study population are presented in Table 1.

Patients in the two groups significantly differed in age and body mass index (BMI) ( $p < 0.001$ ) but did not differ in sex distribution, disease duration and glycated haemoglobin (HbA1c) levels. Other clinical characteristics, such as frequency of hypoglycaemia and concomitant cardiovascular disease, are not shown because they differ in patients with T1D and T2D.

### Research Methodology

The levels of glycated HbA1c were determined in all patients using high-pressure ion-exchange chromatography and a D-10 analyzer (Bio-Rad, USA).

CSs were assessed using the 'Strategic Approach to Coping Scale' by S. Hobfoll, as adopted by N.E. Vodopianova and E.S. Starchenkova. The S. Hobfoll model identifies CSs [10] as follows:

- **Assertive actions:** active, persistent and purposeful action to overcome a problematic situation.
- **Social joining:** involvement of other people in a joint effort to overcome a problematic situation.
- **Seeking social support:** search for support and sympathy from others in difficult situations.
- **Cautious actions:** long and careful consideration of potential challenges.
- **Instinctive actions:** a tendency to act on first impulse without deliberation and forecasting.
- **Avoidance:** avoiding addressing the problem, desire not to think about it.

- **Indirect actions:** covert manipulation of others to achieve one's goals.
- **Antisocial actions:** desire to fulfil needs without considering the interests of others.
- **Aggressive actions:** reacting to difficult situations with irritation, blaming others.

Emotional well-being was assessed according to the severity of a patient's anxiety and depression. The levels of two types of anxiety (state and trait) were examined using the State Trait Anxiety Inventory by Spielberg adapted by Khanin (STAI).

- **State anxiety** reflects a patient's present condition.
- **Trait anxiety** is a stable psychological trait that describes a typical individual level of readiness to respond with anxiety to different situations.

The level of depression was assessed using the Center for Epidemiologic Studies Depression Scale (CES-D).

All participants signed an informed consent agreement. The ethics committee of the Endocrinology Research Centre approved this study of the Ministry of Health of the Russian Federation (Protocol No. 17) on 18 September 2008.

The Student's t-test, the Mann-Whitney U test and the nonparametric Spearman correlation were used to analyse the data according to the distribution of the sample.

### Results

Let us first consider the frequency of various CSs in patients with T1D.

When confronted with difficult situations, patients with T1D actively sought interaction with other people (Fig. 1). This interaction was most often positive and was manifested in the search for external assistance or joint problem solving.

Table 1

Characteristics of the study population										
Groups	N	Age, years	$\sigma$ , years	Sex distribution, m/f	Duration of the DM, years	$\sigma$ , years	BMI, kg/m <sup>2</sup>	$\sigma$ , kg/m <sup>2</sup>	HbA1c, %	$\sigma$ , %
T1D	84	22.5	3.3	29/55	11.9	5.36	22.3	3.3	9.1	2.1
T2D	56	61.0	8.9	11/45	11.6	6.2	30.9	5.5	9.0	1.4

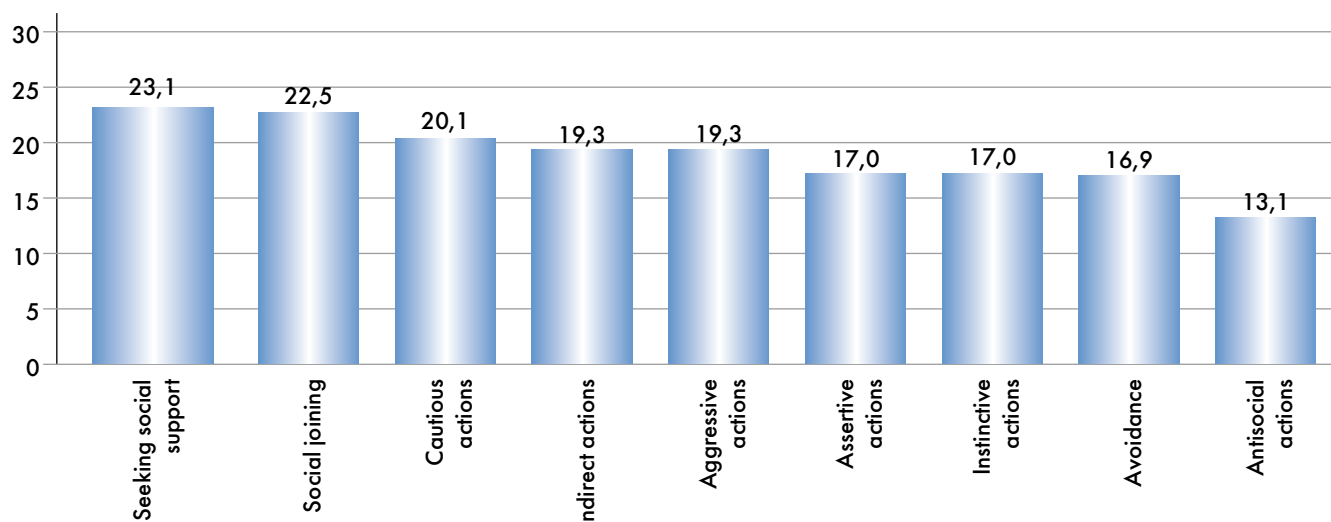


Fig. 2. Coping strategies in patients with T2D.

The first of these two CSs (Seeking social support and Social joining) is more passive in character because it involves reliance on external aid. Patients who used the second CS retained a relatively high level of autonomy and activity; therefore, they were ready for self-management of their diabetes and assumed a large part of responsibility for the treatment outcomes.

Patients with T1D rarely engaged in antisocial actions, which implies disregard for the interests of others to achieve their own goals. Moreover, they rarely used the avoidance strategy. When faced with challenges in life, patients with T1D, in most cases, tried to resolve them and only occasionally refused to overcome them.

Let us now examine the assessment of CSs in patients with T2D.

Patients with T2D had a similar distribution of CSs compared with patients with T1D (Fig. 2). They predominantly focused on interactions with others and were less likely to employ antisocial actions and avoidance.

The comparative analysis reveals the specifics of CSs in patients with T1D and T2D.

Fig. 3 presents CSs with significant differences between patients with T1D and T2D, and the majority were associated with strategies of medium and low frequencies.

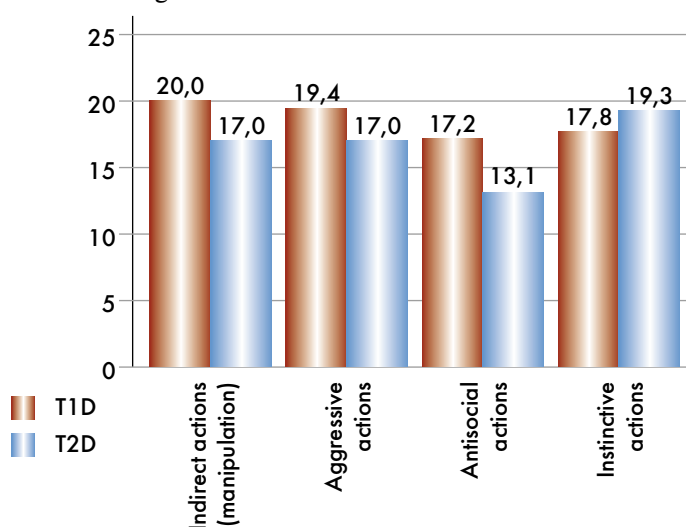
Although, as noted above, both groups of patients often resorted to prosocial strategies, patients with T1D were characterized by the greater use of antisocial strategies compared with patients with T2D. For example, they were more prone to manipulating others, often openly expressing dissatisfaction and anger and ignoring other people's interests. The use of these strategies can be associated with younger age, which is characterized by greater self-absorption and greater willingness to confront other people. For example, this may be due to the early onset of disease and an infantile tendency to manipulate people, which persisted in the overprotective environment, or to their use of greater amounts of energy to achieve goals by force.

Compared with patients with T1D, those with T2D were more likely to engage in instinctive actions as a CS.

They did not sufficiently consider the consequences of their actions, which can hinder achieving goals. Impulsivity reflects a low level of self-control and challenges self-management. The decreased impulsivity exhibited by T1D patients may be attributed to the early onset of the disease. For example, they became acclimated to monitoring their behaviours, which was reflected in the development of appropriate habits. In contrast, patients with T2D often become ill as adults because they have difficulty in developing new habits.

Therefore, there were differences in CSs between patients with T1D and T2D. To explore their relationship with emotional well-being<sup>1</sup>, one must first assess their levels of anxiety and depression (Fig. 4).

The level of trait anxiety in patients with T1D bordered between moderate and high zones, and in patients with T2D, it fell into the high zone. The level of state anxiety was in the moderate zone in patients with T1D and bordered between moderate and high in patients with T2D. The levels of depression in patients of both groups were not of clinical significance.

Fig. 3. Coping strategies of patients with T1D and T2D ( $p \leq 0.01$ ).

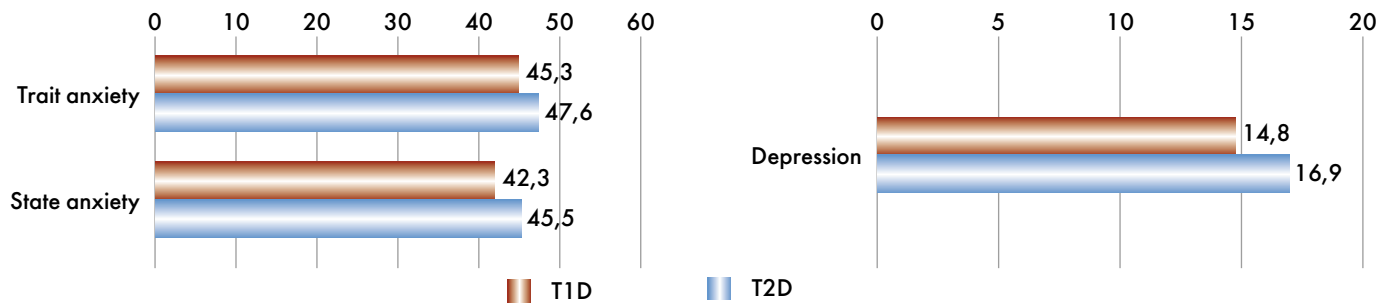


Fig. 4. Intensity of anxiety and depression in patients with T1D and T2D.

Although the data displayed in Fig. 4 reveal noticeable differences in the emotional status of the two groups, these differences are not significant. They merely suggest that there was a tendency for a higher level of anxiety and depression in patients with T2D than in patients with T1D.

Well-being is associated with the use of the type of CS. Because there were differences in CS between patients with T1D and T2D, we can assume that well-being was caused by a different CS. To test this hypothesis, we conducted a correlation study on CS and the levels of anxiety and depression.

The highest negative correlation between emotional state and anxiety in particular was observed for an assertive action strategy (active, persistent and purposeful action to overcome a problematic situation), and it was the only association reported for state anxiety.

The observed correlation does not reflect the direction of the influence. However, CSs are stable stylistic characteristics, whereas an emotional state is more volatile. Therefore, this connection most likely applied to patients with T1D who set goals for themselves and achieved them by actively overcoming encountered obstacles, which in turn significantly improved their well-being. The increased confidence in the ability to overcome the situation reduces decreases anxiety (including trait anxiety) and depression, although to a lesser extent.

In contrast, avoidance of problem-solving leads to the deterioration of well-being. People who prefer to

abandon any attempt to overcome challenges undermine their confidence in their ability to successfully achieve their objectives. This leads to an increase in anxiety and to depression in the future.

Patients who used an aggressive response to challenges (tantrums and resentment) found themselves in an unfavourable emotional state probably because they created a 'zone of tension' around themselves, worsened their relationships with other people and expected negative reactions.

Let us examine the analysis of correlations of CS with well-being in patients with T2D (Fig. 6).

There was only a partial overlap with correlations described for the previous group.

For example, the most important issue for the emotional state of young patients with T1D was how assertively (actively and purposefully) they were involved in overcoming challenges. For older people with T2D, assertiveness remained important for their well-being but to a smaller extent (as indicated by an absence of an association with depression and a lower significance of the correlation).

Concurrently, patients with T2D improved their emotional state using other strategies, such as careful planning of their actions (Cautious action as a CS) as well as by the widespread use of social resources (Social joining as a CS).

Significant correlations between aggressive actions and trait anxiety and depression persisted, indicating the age-independent inefficiency of this strategy.

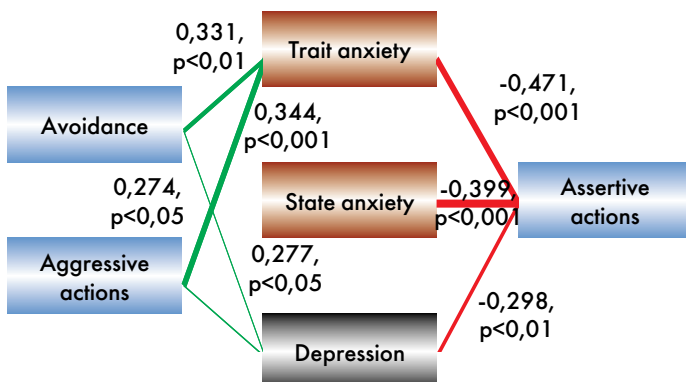


Fig. 5. Correlation between coping strategies and anxiety and depression in patients with T1D. Green and red indicate positive and negative correlations, respectively. The thickness of the line reflects the significance of the correlation.

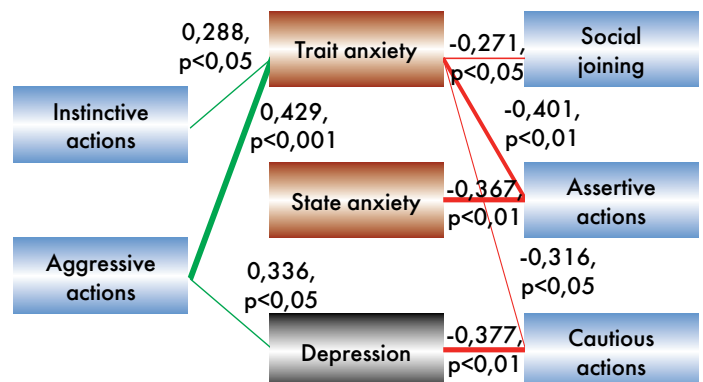


Fig. 6. Correlation of coping strategies with anxiety and depression in patients with T2D. Green and red indicate positive and negative correlations, respectively. The thickness of the line reflects the significance of the correlation.



Diabetes mellitus. 2015;18(4):41-47

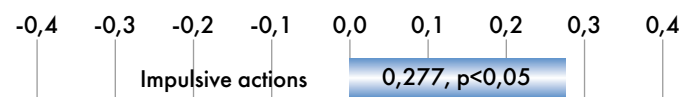


Fig. 7. Correlation of coping strategies with HbA1c in patients with T1D.

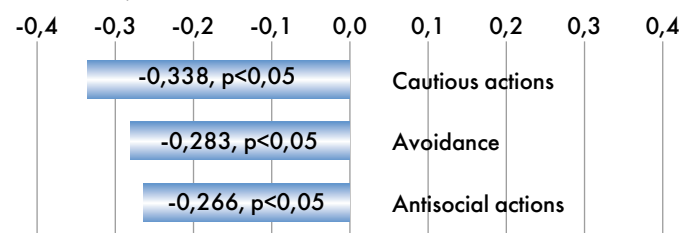


Fig. 8. Correlation of coping strategies with HbA1c levels in patients with T2D.

Interestingly, in contrast to patients with T1D, there was no significant correlation between anxiety and depression, on the one hand, and avoidance, on the other hand, in patients with T2D. Instead, there was a significant correlation between trait anxiety and instinctive actions as a CS. Therefore, in young patients with T1D, emotional well-being worsened when they avoided taking action to overcome the challenges, whereas in older patients with T2D, emotional well-being worsened if they acted rashly and impulsively. These findings are consistent with the importance of engaging in a strategy of cautious action for achieving well-being.

Thus, our study revealed a link between well-being and CSs in patients with T1D and T2D. The second important question is whether CSs are associated with the course of the disease. Do they affect the achievement of good glycemic control?

To answer this question we performed correlation analysis of the association of HbA1c levels with CS and found that the only positive correlation for patients with T1D was between HbA1c levels and an impulsive actions strategy (Fig. 7).

This CS primarily reflects human predisposition to fulfil transitory desires (e.g. eating) followed by a readiness for chaotic activity rather than purposeful actions. In both cases, patients did not effectively predict the consequences of their actions. Accordingly, we assumed that lack of prediction the consequences of their actions by young patients with T1D led to a deterioration in their blood glucose levels.

Let us now examine the analysis of the correlations between HbA1c and CS in patients with T2D (Fig. 8).

Analysis of patients with T2D revealed a rather different set of correlations. Impulsive actions did not lead to a significant decrease in glycaemic control, although cautious actions helped patients to improve over the course of their disease probably because they made informed decisions.

A link between the strength of avoidance and low HbA1c levels is unusual. This strategy allows people to ignore some of the problems rather than overcome them. Perhaps the improved compensation of diabetes can be attributed to the choice of inaction, such as refraining from undertaking medically unsound actions.

Finally, there was a correlation between an anti-social action strategy and low HbA1c levels. Patients who ignored the interests of others were more self-centred and therefore achieved better control of their disease.

## Conclusion

Therefore, this study suggests the following conclusions:

1. In general, patients with T1D and T2D employed a similar pattern of coping strategies. Most often they used prosocial strategies, including seeking social support and social joining, and only very rarely did they resort to avoidance and anti-social actions.
2. For all the similarities in coping strategies, their frequencies differed between the two groups. Younger patients who fell ill earlier were more likely to use egocentric strategies (manipulation, aggressive and antisocial actions). Patients with T2D with a later disease onset had diminished ability to control their behaviour, which was exhibited by engaging in more impulsive actions.
3. The emotional well-being of patients with T1D and T2D had similar and specific associations with CSs. Assertive (persistent and purposeful) behaviour positively affected the emotional well-being of both groups. Aggressive behaviour, in contrast, associated with higher levels of anxiety and depression.
4. Patients with T1D displayed a correlation between emotional distress (anxiety and depression) and avoidance strategy. Patients with T2D exhibited emotional distress associated with impulsive actions and emotional well-being, characterised by cautious actions and social joining.
5. The level of HbA1c was associated with different CSs in patients with T1D and T2D. In patients with T1D, the HbA1c level was higher if the strategy of impulsive actions forced a person to make unjustified decisions. In patients with T2D, HbA1c levels were lower and associated with cautious actions, avoidance and anti-social action strategies.

## Funding information and conflicts of interest

The authors declare no duality (conflict) of interest related to the manuscript. The work was conducted as part of research approved by the Endocrinology Research Center of the Ministry of Health of the Russian Federation.

## Список литературы

1. Ducat L, Rubenstein A, Philipson LH, Anderson BJ. A Review of the Mental Health Issues of Diabetes Conference. *Diabetes care*. 2015;38(2):333-338. doi: 10.2337/dc14-1383
2. Whittemore R, Kanner S, Singleton S, et al. Correlates of depressive symptoms in adolescents with type 1 diabetes. *Pediatric diabetes*. 2002;3(3):135-143. doi: 10.1034/j.1399-5448.2002.30303.x
3. Шишкова Ю.А., Мотовилин О.Г., Суркова Е.В., и др. Гликемический контроль, качество жизни и психологические характеристики больных сахарным диабетом 1 типа. // Сахарный диабет. – 2013. – Т. 16. – №4. С. 58-65. [Shishkova YA, Motovilin OG, Surkova EV, Mayorov AY. Evaluation of glycemic control, quality of life and psychological characteristics in patients with type 1 diabetes mellitus. *Diabetes mellitus*. 2013;16(4):58-65. (In Russ.)] doi: 10.14341/DM2013458-65
4. Shaban C. Psychological themes that influence self-management of type 1 diabetes. *World J Diabetes*. 2015;6(4):621-625. doi: 10.4239/wjd.v6.i4.621
5. Dixon-Fyle S, Gandhi Sh, Pellathy T, et al. Changing patient behavior: the next frontier in healthcare value. *Health International* 2012;12:65-73. Available from: [http://healthcare.mckinsey.com/sites/default/files/791750\\_Changing\\_Patient\\_Behavior\\_the\\_Next\\_Frontier\\_in\\_Healthcare\\_Value.pdf](http://healthcare.mckinsey.com/sites/default/files/791750_Changing_Patient_Behavior_the_Next_Frontier_in_Healthcare_Value.pdf)
6. Anderson RM, Funnell MM, Arnold MS. Using the empowerment approach to help patients change behavior. In Anderson BJ, Rubin RR (Eds). *Practical Psychology for Diabetes Clinicians*, 2nd edition. Alexandria: American Diabetes Association; 2002.
7. Anderson B, Funnell M. *The Art of Empowerment: Stories and Strategies for Diabetes Educators*. American Diabetes Association; 2nd edition, 2005.
8. Брайт Дж., Джонс Ф. Стресс. Теории, мифы, исследования. – СПб.: Прайм-ЕВРОЗНАК; 2003. [Bright J, Jones F. *Stress. Myth, Research and Theory*. Saint-Petersburg: Praim-EVROZNAK; 2003. (In Russ.)]
9. Ялтонский В.М., Сирота Н.А. Психология совладающего поведения: развитие, достижения, проблемы, перспективы. *Совладающее поведение: Современное состояние и перспективы*. – М.: Институт психологии РАН; 2008. [Yaltonskij VM, Sirota NA. *Psichologiya sovladayushchego povedeniya: razvitie, dostizheniya, problemy, perspektivy*. Sovladayushchee povedenie: Sovremennoe sostoyanie i perspektivy. Moscow: «Institut psihologii RAN»; 2008.]
10. Водопьянова Н.Е., Старченкова Е.С. Диагностика стратегий преодоления стрессовых ситуаций (SACS). С. Хобфолл (S.Hobfoll). Адаптация Н.Е. Водопьяновой, Е.С. Старченковой. Психология общения. Энциклопедический словарь. – М.: «Когито-Центр»; 2011. [Vodopjanova NE, Starchenkova ES. *Diagnostica strategij preodoleniya stressovyh situacij*. S. Hobfoll (S. Hobfoll). *Adaptacija NE Vodopjanovoj, ES Starchenkovoij. «Psychologia obshchenija»*. Enciclopedicheskij slovar. Moscow: «Kogito-tsentr»; 2011].

Oleg G. Motovilin

PhD in Psychology Associate professor, leading research associate, Department of Program Education and Treatment, Endocrinology Research Centre, Moscow, Russian Federation

Yulia A. Shishkova

MD Research fellow, Department of Program Education and Treatment, Endocrinology Research Centre, Moscow, Russian Federation

**E-mail: nozockomial@mail.ru**

Elena V. Surkova

MD, PhD leading research associate, Department of Program Education and Treatment, Endocrinology Research Centre, Moscow, Russian Federation