

## ЗДРАВООХРАНЕНИЕ И ПРОФИЛАКТИЧЕСКАЯ МЕДИЦИНА

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### EFFECTIVENESS OF ONLINE-INTERVENTIONS AIMED TO CORRECT EATING DISORDERS AND CHANGE WEIGHT: ASSESSMENT AND RECOMMENDATIONS FOR STUDYING AND IMPROVING EFFECTIVENESS

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*The paper summarizes the experience of Russian and foreign researchers in studying the effectiveness of online interventions to correct eating behavior and weight change. It formulates the scientific problem of the ambiguity of the quality of existing programs to work with multifactorial eating disorders. The research notes differences between the categories of efficacy and effectiveness, which consist of the quality assessment breadth degree. A meta-analysis evaluated the effectiveness of structured in-person and online eating behavior interventions without specifying a behavior change model. The paper outlines research limitations on the effectiveness of intervention programs in the eating disorders area (small sample size, which reduces the probability of detecting differences; unrepresented observation period for weight maintenance; different levels and types of motivation for weight loss among participants; high cost of participation in the program; highlighting weight loss as the main parameter; lack of data on the program's duration). It develops recommendations for overcoming these limitations (researching a sample of 60 or more people; performing measurements of body parameters before, during, after, and six months after the end of the program; consideration of participants' motivations; establishing a reasonable price for the program; including psychological indicators in the program; specifying the duration of the program and forms of work), respectively. The analysis of online programs developed recommendations*

*to improve the effectiveness of online interventions to correct weight and eating disorders, considering the factors affecting the effectiveness of online programs (personalized feedback, social support, the use of a large number of technologies for communication (video, audio, text), the opportunity for self-disclosure, the complexity of treatment, etc.).*

**Keywords:** *eating disorders; weight change; online interventions; effectiveness; online programs*

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## **РЕЗУЛЬТАТИВНОСТЬ ONLINE-ИНТЕРВЕНЦИЙ, НАПРАВЛЕННЫХ НА КОРРЕКЦИЮ ПИЩЕВЫХ НАРУШЕНИЙ И ИЗМЕНЕНИЕ ВЕСА: ОЦЕНКА И РЕКОМЕНДАЦИИ ПО ИЗУЧЕНИЮ И ПОВЫШЕНИЮ РЕЗУЛЬТАТИВНОСТИ**

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*Обнаружен дефицит в обобщении опыта отечественных и зарубежных исследователей по изучению результативности онлайн-интервенций, направленных на коррекцию пищевого поведения и изменения веса. Анализ состояния вопроса позволяет сформулировать научную проблему неоднозначности качества существующих программ по работе с многофакторными нарушениями пищевого поведения. С помощью метаанализа произведена оценка результативности структурированных очных и онлайн-интервенций в области пищевого поведения без указания модели изменения поведения. Обозначены ограничения исследований результативности интервенционных программ в сфере пищевых нарушений (малая выборка, которая снижает вероятность обнаружения различий; непредставленность периода наблюдения за поддержанием веса; различные уровни и виды мотивации для похудения между участниками; высокая стоимость участия в программе; выделение в качестве основного параметра – потери веса отсутствие данных о длительности программы) и разработаны рекомендации по преодолению этих ограничений (проведение исследования на выборке от 60-ти человек; осуществление замеров телесных*

параметров до, во время, после и через 6 месяцев после окончания программы; учет мотивов участников; установление разумной цены программы; включение в программу психологических показателей; указание длительности программы и форм работы), соответственно. В результате исследования выявлены различия между категориями эффективности и результативности, которая состоит в степени широты охвата оценки качества. В ходе анализа онлайн-программ разработаны рекомендации по повышению результативности онлайн-интервенций по коррекции веса и нарушений пищевого поведения с учётом факторов, влияющих на результативность онлайн-программ (персонализированная обратная связь, социальная поддержка, применение большого количества технологий для общения (видео, аудио, текст), возможность для самораскрытия, комплексность лечения и др.).

**Ключевые слова:** нарушения пищевого поведения; изменение веса, онлайн-интервенции; результативность; онлайн-программы

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## Introduction

The issue of healthy nutrition is very relevant for Russian citizens. If in 2014–2015, according to WCIOM (Russian Public Opinion Research Center) data, 21%–28% of people were respectively inclined to proper nutrition, then in 2019 the number of Russian citizens who watch their diet is 59% [3]. Thus, we can talk about the growth of “preoccupation” with proper nutrition, interest in controlling eating behavior. In addition, researchers point to a rapid increase in eating disorders (anorexia nervosa, bulimia nervosa, and compulsive over-eating) (A.V. Zanozin, 2002; E.V. Kamenetskaya, T.A. Rebeke, 2015), and according to data the prevalence of eating disorders among women is ten times higher than among men [5]. The difficulty in dealing with eating disorders is that eating disorders are multifactorial diseases resulting from the interaction of genetic, socio-cultural, and psychological factors.

Let us also note another trend related to the increase in the number of Internet users. As of 2018, there are 81% of Internet users in Russia, 65% of whom go online daily, with an increase in Internet activity due to the pandemic. Analysis of the literature has shown that individuals with eating disorders, face particular difficulties in finding help; but also, that online support eliminates these difficul-

ties [17]. The active development of digital technologies reveals the promise of exploring interventions delivered through various forms of digital means. The development of online programs and the validation of interventions seem to be a relevant issue in health psychology due to the epidemiological situation in the country and the need to shift from in-person practices to treatment through online interventions via phones, messages, video calls, etc. [24]. The consequence of this situation is that online interventions and remote work methods have become part of everyday life, but the question of their effectiveness compared to in person formats is still open. Let us clarify that psychological intervention can be understood as “an integrated and purposeful impact on various psychological personality structures” [9]. Interventions as a set of specific methods can be procedures for modifying (changing) health-related behavior and used to increase healthy behavior or to weaken unhealthy behaviors [8]. Online interventions delivered through online platforms can be structured (specific programs, courses) and unstructured (online interventions through websites, online platforms). This article analyzes the effectiveness of structured online interventions in the area of eating behavior without specifying a behavior change model.

Increasing levels of eating disorders, “preoccupation” with eating behavior, and Internet activity indicate the prospect of studying the effectiveness of online interventions, raising the question of the need to develop programs for eating disorders prevention and correction through online forms of support. Due to the inconsistency and heterogeneity of research results on the effectiveness of the online program to correct eating disorders and weight change [16; 18], the lack of study and heterogeneity of approaches to studying the effectiveness of the online program underline the need to study factors that increase the effectiveness of the online program. This problem can be solved by systematizing the research experience of online programs on eating behavior correction and weight correction, identifying indicators that improve the effectiveness of the online program, developing a system of recommended parameters to measure. The paper presents recommendations for studying the effectiveness of online interventions by summarizing the experience of domestic and foreign researchers, considering the factors that increase the effectiveness of online interventions and the limitations of online research programs.

### **Materials and methods**

Before we begin the analysis of programs aimed at correcting eating disorders, we should distinguish the definitions of “effectiveness” and “efficiency”. Efficiency can be understood as “the ratio between the achieved result and the used resources”, “the ability to perform work and achieve the necessary

or desired result with the least expenditure of time and effort” [2]. Effectiveness, being a measure of efficiency, determines the degree of implementation of the planned activities and the achievement of the planned results. The “effectiveness” definition, being a narrower concept that reveals the degree of goal achievement, is a more appropriate concept. We used the meta-analysis of relevant research on the indicated problem to assess the effectiveness.

When studying the effectiveness of programs in the eating disorders area, we can note the tendency of their conditional division according to the goals, the orientation of the programs. The purpose of programs can be weight correction, and we should note that such programs are more studied in foreign countries, which is explained by the fight against the “obesity epidemic” [13; 20; 25]. There are few recorded psychological parameters in such studies, and the outcomes of such studies are inconsistent, but the variety of studied forms of indirect interventions offers opportunities to explore factors that enhance program effectiveness. The main measurable parameters for comparison in foreign studies are weight and body mass index [BMI]. Foreign studies rarely mention differences in the dynamics of psychological parameters. The outcome of the research is measured through changes in a physical variable (weight) and its maintenance in the long term.

On the example of domestic studies of the effectiveness of in-person programs, we can note the difference in the choice of targets of interventions, recorded parameters for comparison. On the one hand, it demonstrates a variety of researchers’ approaches, on the other hand - a small number of bases for comparison. Some studies do not specify the program duration, the number of participants, or such parameters as weight and BMI, which complicate program evaluation. We note that the aims of the listed above studies are different, as are the instruments selected for them. Specifying weight, BMI, and program duration can be a tool for correctly comparing weight management and eating disorder programs.

## **Results**

Before we begin to analyze programs aimed at correcting eating disorders, we should distinguish the definitions of “effectiveness” and “efficiency”. Efficiency can be understood as “the ratio between the achieved result and the used resources”, “the ability to perform work and achieve the necessary or desired result with the least expenditure of time and effort” [2]. Effectiveness, being a measure of efficiency, determines the degree of implementation of the planned activities and the achievement of the planned results. The “effectiveness” definition, being a narrower concept that reveals the degree of goal achievement, is a more appropriate concept.

When studying the effectiveness of programs in the eating disorders area, we can note the tendency of their conditional division according to the goals, the orientation of the programs. The purpose of programs can be weight correction, and we should note that such programs are more studied in foreign countries, which is explained by the fight against the “obesity epidemic” [13; 20; 25]. There are few recorded psychological parameters in such studies, and the outcomes of such studies are inconsistent, but the variety of studied forms of indirect interventions offers opportunities to explore factors that enhance program effectiveness. The main measurable parameters for comparison in foreign studies are weight and body mass index [BMI]. Foreign studies rarely mention differences in the dynamics of psychological parameters. The outcome of the research is measured through changes in a physical variable (weight) and its maintenance in the long term.

On the example of domestic studies of the effectiveness of in-person programs, we can note the difference in the choice of targets of interventions, recorded parameters for comparison [1; 4; 10; 11]. On the one hand, it demonstrates a variety of researchers’ approaches, on the other hand - a small number of bases for comparison. Some studies do not specify the program duration, the number of participants, or such parameters as weight and BMI [1; 4], which complicates program evaluation. We note that the aims of the listed above studies are different, as are the instruments selected for them. Specifying weight, BMI, and program duration can be a tool for correctly comparing weight management and eating disorder programs.

When discussing the results of their research, the authors often mention (1) the limitations of their work and (2) factors that contribute to program effectiveness. The following will describe factors that increase the effectiveness of online programs to correct eating behaviors or weight loss.

According to the results of a meta-analysis based on 12 studies on the effectiveness of Internet interventions, A. Sherrington reports that when participants receive personalized feedback, the effectiveness of therapy is higher compared to groups that do not receive personalized feedback (BMI change, waist circumference change, and weight loss 5%) [21]. However, this difference remains only when the interventions last no longer than 12 months, after which time the rates even out and the efficacy is comparable. This suggests that personalized feedback may be an important behavior change technique to incorporate into online weight-loss interventions. Feedback can be defined as “providing the participant with data about their reported behaviors or commenting on an individual’s behavioral characteristics (e.g., identifying discrepancies between

behavioral characteristics and a goal or discrepancy between their own)” [15]. The feedback provided by the moderator in an online intervention can stimulate, motivate, and assist patients in completing a weight loss program [12]. One of the important constructs of control theory is “providing feedback”, and this process is considered key to self-regulation [7]. Self-regulation processes can be used to reduce the gap between intention and behavior and facilitate understanding the transition from intention to action [7]. According to research by Michie S. and colleagues, interventions based on self-regulation are twice as effective as interventions without self-regulation strategies [15]. We should note that the way personalized feedback is sent out can vary: online messaging, email, short message service, or personal message. Also, feedback can be computer-generated or written by program moderators, or it can be provided through these two methods.

The results of a pilot study by D.S. West describe technologies to improve online group obesity treatment. Research demonstrates greater effectiveness of in-person communication between patient and therapist, but the authors of the research note increased effectiveness of online programs that include video conferences with online group weight management combined with cell-connected communication compared to a text-only chat group [25]. D.S. West report that meeting in-person with other participants can stimulate social support for weight loss efforts, especially between individuals unknown to each other at the beginning of the group, and promote stronger bonds within the group [25]. Communicating through “text” group chats decreases social support perceptions. But group chat and real-time communication with counselors result in greater weight loss, with participants feeling more social support than in a text-only situation. In-person social support promotes greater weight loss; the more perceptual channels involved, the more effective the program. Thus, according to research, program outcomes are lower for text-based forms of programs, higher for audiovisual encounters (results are considered comparable to in-person meetings) [25].

Self-disclosure is an important component of online eating disorder support [23]; and lack of opportunity for self-disclosure is connected to denial and resistance to treatment, which reduces program effectiveness. Researchers construe self-disclosure as a positive action that develops self-care in participants and encourages help-seeking.

Another factor that enhances the effectiveness of weight management interventions is individual participant weighing, which allows for objective measurement of body weight, direct viewing of the weight trajectory, and providing

feedback to the testee [25]. In an online intervention setting, participants are asked to measure their weight on the day of an interactive group meeting and give it to the treating staff, which in turn can provide feedback.

A weakness of the online interventions is the decline in so-called retention rates, the number of participants staying and adhering to the program, participants staying in the research to collect data (comparison with the rates in the control group). In the meta-analysis, by A. Sherrington et al. intervention groups retained 73.5% of participants, while control groups retained 77.5% [21]. An important factor that increases retention rates is the monetary incentive [21]. In a 3-year intervention, researchers D.F. Tate et al. [22] asked intervention participants to send a monthly message indicating their weight, for which participants received an amount ranging from \$1 to \$15 [22]. In addition, a significant amount of investment in treatment also allows the participant to stick with the program until the end.

The research findings of D.S. West et al. show that more people quit early in the study in the text-based interaction group (31%) than in the video-based interaction group (12%) [25]. This suggests a relationship between retention rates and participant engagement levels.

Russian researchers, revealing the effectiveness factors of the programs, talk about the need to develop individual programs considering the peculiarities of the patient's diet, their psycho-emotional state, eating disorders specifics [6], ensuring a comprehensive and personalized approach to treatment [6; 10].

A comparative analysis of eating behavior interventions reveals several limitations, including a lack of indicators of program components. For example, British researchers R.M. Mackenzie et al. formulate a problem connected with the lack of trials directly comparing weight management programs in the United Kingdom, with a lack of data on which specific components of a weight management program provide effectiveness [14]. Researchers set out to develop a baseline set of parameters to measure the effectiveness of interventions for obese individuals. The evaluation of 10 experts helped to highlight the outcomes that the researchers believe should be considered essential for measuring the effectiveness of online weight management and eating disorder programs and reporting with behavioral weight management interventions.

Let us denote only some of them, namely:

1. Weight (initial, at follow-up, at program completion, and at follow-up);
2. BMI level (baseline, at follow-up);
3. Follow-up time (12 months), duration of the program;
4. Diabetic status (baseline, after the program);
5. Participants' satisfaction;



6. Participants' age;
7. Presence of adverse events / unintended consequences; referral to specialized services;
8. Cost-effectiveness;
9. Attendance of the program by participants.

Non-recommended parameters for comparison are confidence in ability to lose weight (at baseline, at follow-up); the importance of weight loss; daily fruit and vegetable intake; anxiety (at follow-up); anxiety level; family history of obesity, smoking status, alcohol use, baseline body image, suicidal thoughts, waist, hip, and neck circumference. Consideration of these parameters does not increase program outcomes, but it does provide more opportunities for comparative analysis.

Systematic review authors A.S. Richardson, C. Chen et al. emphasize the need for obesity prevention research to report information on subjects' energy intake and expenditure determining weight gain [19]. Among the limitations of research on the effectiveness of eating disorder prevention interventions, these researchers identified inconsistent effects, inconsistent data, use of different study designs when comparing data, lack of effective information, lack of statistically significant differences, etc.

Thus, to increase the effectiveness of online programs, we should consider the following factors: personalized feedback, social support, the use of a large number of technologies for communication (video, audio, and text), the opportunity for self-disclosure, and the complexity of treatment. It is also necessary to consider the factors influencing retention rates and the level of participants' involvement. To improve the quality of program analysis, it is necessary to consider the parameters that ensure their effectiveness, which may include weight, BMI level, the program duration, diabetic status, satisfaction and age of participants, program attendance. These factors' information can also be in processed form (tables, graphs, charts, photographs, drawings, etc.).

## **Discussion**

Based on the results of the research of the effectiveness of online interventions in the field of eating behavior, we formulated a series of recommendations for studying the effectiveness of online interventions aimed at the correction of eating disorders and weight correction, considering the factors that increase their effectiveness. Those include:

1. Choose the orientation of the program (for weight change or correction of eating disorders), formulate the goal of the study, and outline a list of parameters for the measure;

2. Provide participants with personalized feedback and the opportunity for self-disclosure;
3. Use several forms of reporting for self-monitoring data: SMS, text communication, and Internet communication;
4. Use a variety of interactive forms of work (video and audio connection) that promote greater engagement of participants in the program [25];
5. Provide a high level of social support (through text form of communication, audio, video connection, group communication, and individual communication of the counselor and the subject, etc.) considering the specifics of the chosen online platform;
6. Monitor retention rates through the quality engagement of participants, monetary parameter;
7. Provide a comprehensive, person-centered approach to treat, prevent, and correct eating disorders (psychotherapy, diet therapy, medication treatment);
8. Monitor the following parameters: weight (initial, at follow-up, at program completion, and at follow-up), BMI, age of participants, program duration, diabetic status, participant satisfaction, program attendance by participants;
9. Apply skills in moderating online processes based on principles of positive psychology [12];
10. Considering the limitations of the research, we can provide the following recommendations for evaluating the effectiveness of online programs (see Table 1).

*Table 1.*

**Limitations of research on the effectiveness of intervention programs  
in eating disorders and recommendations for their study**

Research limitations	Recommendation
Small sample size may not always allow differences between groups to be detected	Conducting research on a sample of 60 or more people
No follow-up period for weight maintenance	Measurements before, during, after, and 6 months after completion of the program
Potential differences in motivation to lose weight between participants	Consideration of participants' motives by means of questionnaires
High cost of program participation as a barrier to participation in an intervention	Setting a reasonable program price
Weight loss as a key measure of change	Inclusion of psychological indicators in the program
Lack of data on program duration	Indication of program duration and modalities

The use of these recommendations will provide better outcomes for online programs, provide a basis for comparison of online programs, and further enhance online programs in the provision of psychosocial care for individuals with eating disorders.

### **Conclusion**

The active introduction of online technologies, the growing number of eating disorders, and the existence of conflicting research on the effectiveness of online programs highlight the need to develop and investigate weight management and eating disorder programs through online forms of support.

The research resulted in the identification of the effectiveness factors of the online eating disorder correction programs, which include (1) personalized feedback, (2) social support, (3) the use of a large number of technologies for communication (video, audio, text), (4) the opportunity for self-disclosure, (5) the complexity of treatment. Based on these factors, recommendations were developed to improve the effectiveness of online programs to correct weight and eating disorders.

Based on the results of the analysis of online interventions of domestic and foreign authors, the limitations that hinder the comparative analysis of programs we identified and develop recommendations for the study of programs to correct weight and eating disorders in the context of online interventions. Thus, indicating such parameters as weight, BMI level, program duration, diabetic status, participants' satisfaction, age, and program attendance improves the quality of comparative analysis of interventions.

A vector for further research could be to explore ways to maintain weight in the long term through online interventions, develop a system for evaluating the effectiveness of online health behavior interventions.

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