Mental Health and Lifestyle Journal

Year 2027
Volume 5
Issue 5

Comparison of the Effectiveness of Reality Therapy and Logotherapy on Character Strengths and Health-Promoting Internal Self-Talk in Patients with Diabetes

Samane. Besharatian[1], Ali. Khademi[1*], Ali. Jalili[2]

1 Department of Psychology, Ur.C., Islamic Azad University, Urmia, Iran
2 Department of Sport Psychology, Allameh Tabataba'i University, Tehran, Iran
*Correspondence: Ali.khademi@iau.ac.ir

Article type:
Original Research

Article history:
Received 28 July 2026
Revised 31 October 2026
Accepted 05 November 2026
Initial Publish 14 November 2026
Published online 01 September 2027

ABSTRACT

The present study aimed to compare the effectiveness of reality therapy and logotherapy in enhancing character strengths and health-promoting internal self-talk among individuals with diabetes. The study employed a quasi-experimental method with a multigroup pretest–posttest design, a three-month follow-up, and a control group. The statistical population consisted of all individuals with diabetes who attended the Taban Diabetes Center in Tehran. Using purposive and convenience sampling, 45 participants who had a history of type 2 diabetes for at least three years were selected and randomly assigned to three groups of 15 participants each. Data were collected using the Self-Talk Questionnaire developed by Calvete et al. (2005) and the Values in Action Inventory of Strengths developed by Peterson and Seligman (2004). Following the pretest, the first experimental group received eight group sessions of Glasser's reality therapy based on a structured intervention protocol. Following the pretest, the second experimental group received eight group sessions of Frankl's logotherapy based on a structured intervention protocol. The control group received no intervention after completion of the pretest. After the completion of the eight intervention sessions, all three groups completed the posttest, and three months after the intervention, the follow-up assessment was conducted through readministration of the research questionnaires. Data analysis using repeated-measures analysis of variance showed that reality therapy significantly reduced negative self-talk and increased positive self-talk among individuals with diabetes. Logotherapy also increased positive self-talk and reduced negative self-talk among patients with diabetes. Logotherapy was more effective than reality therapy in increasing positive self-talk among patients with diabetes. Furthermore, a significant difference was found between the effectiveness of reality therapy and logotherapy on character strengths in patients with diabetes, with logotherapy demonstrating greater effectiveness than reality therapy in enhancing character strengths.

Keywords: reality therapy, logotherapy, character strengths, positive internal self-talk, diabetes.

How to cite this article:
Besharatian, S., Khademi, A., & Jalili, A. (2027). Comparison of the Effectiveness of Reality Therapy and Logotherapy on Character Strengths and Health-Promoting Internal Self-Talk in Patients with Diabetes. *Mental Health and Lifestyle Journal, 5*(5), 1-20. https://doi.org/10.61838/mhlj.355

Introduction

Diabetes mellitus is one of the most prevalent chronic metabolic diseases worldwide and constitutes a major public health challenge because of its increasing prevalence, long-term complications, treatment burden, and effects on physical, psychological, and social functioning. Global estimates indicate that the prevalence of diabetes has increased substantially over recent decades and is projected to continue rising, with type 2 diabetes accounting for the majority of diagnosed cases (1). In Iran, epidemiological evidence

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has similarly documented a growing prevalence of diabetes and impaired fasting glucose, particularly in association with increasing rates of obesity and other metabolic risk factors (2). The chronic course of diabetes requires patients to engage continuously in self-management behaviors, including adherence to medication, dietary regulation, physical activity, blood glucose monitoring, and regular medical follow-up. These demands can create a substantial psychological burden, particularly when individuals perceive the disease as limiting, threatening, or difficult to control. The psychological consequences of living with diabetes may include persistent stress, anxiety, depressive symptoms, reduced quality of life, diminished motivation for self-care, and maladaptive emotional responses. Recent clinical research has therefore increasingly emphasized the importance of integrating psychological interventions into diabetes care rather than limiting treatment to biomedical management alone. Evidence from patients with type 2 diabetes has shown that targeted psychological treatments can improve emotional functioning, reduce maladaptive psychological responses, and enhance adaptation to disease-related demands (3). Likewise, transdiagnostic cognitive-behavioral interventions have been found to improve depression, anxiety, quality of life, and medication adherence among adults with type 2 diabetes, further demonstrating the clinical relevance of psychological treatment in this population (4). Studies involving individuals with diabetes have also shown that interventions focusing on psychological flexibility, acceptance, and adaptive coping may be feasible and beneficial across different age groups and types of diabetes (5). More broadly, interventions designed to enhance mental health and ego strength have demonstrated beneficial effects in people living with both type 1 and type 2 diabetes, suggesting that the development of intrapersonal psychological resources may be an important component of comprehensive diabetes care (6).

One psychological construct that may be particularly important in adaptation to chronic illness is character strength. Character strengths refer to relatively stable but developable positive psychological capacities that enable individuals to respond constructively to challenges, regulate behavior in accordance with personally meaningful values, maintain resilience, and pursue adaptive goals despite adversity. In the context of chronic illness, strengths such as wisdom, courage, humanity, justice, temperance, transcendence, perseverance, hope, self-regulation, and social connectedness may help patients manage treatment demands and cope more effectively with uncertainty and illness-related limitations. Diabetes management often requires sustained self-control, repeated decision-making, tolerance of frustration, persistence in lifestyle modification, and the ability to maintain motivation despite fluctuating outcomes. Consequently, patients with stronger positive psychological resources may be better positioned to comply with treatment, maintain adaptive routines, and preserve a sense of agency. The broader literature on chronic disease and psychosomatic functioning also suggests that psychological states and physical health are closely interconnected and that unresolved emotional strain can contribute to maladaptive somatic responses and diminished well-being (7). Within this framework, interventions that strengthen positive psychological capacities rather than focusing exclusively on symptom reduction may be especially useful for patients who must live with an enduring medical condition. Meaning in life has also been identified as an important psychological resource in individuals facing physical illness, acting as a protective factor against despair and maladaptive psychological outcomes (8). Similarly, research has shown that meaning in life is closely associated with self-compassion and adaptive coping processes, which can facilitate more constructive responses to stress and adversity (9). These findings suggest that strengthening positive psychological

resources may improve not only emotional adjustment but also the individual's broader capacity to live effectively with a chronic disease.

Another important psychological process in diabetes is internal self-talk. Self-talk refers to the ongoing internal verbal dialogue through which individuals interpret events, evaluate themselves, anticipate future outcomes, regulate emotions, and guide behavior. Internal self-talk may be positive and adaptive, supporting self-efficacy, hope, emotional regulation, and constructive problem solving, or negative and maladaptive, reinforcing fear, helplessness, self-criticism, pessimism, and avoidance. In patients with diabetes, maladaptive internal dialogue may emerge in response to treatment failures, changes in blood glucose, dietary restrictions, fear of complications, or perceived inability to maintain recommended health behaviors. Repetitive negative self-talk may therefore increase psychological distress and weaken motivation for disease management, whereas positive self-talk may enhance confidence, self-regulation, and persistence in health-promoting behaviors. The relevance of this construct has recently been supported by research directly comparing reality therapy and logotherapy in patients with diabetes, in which both approaches were investigated in relation to internal self-talk and health-promoting lifestyle behaviors (10). Because internal dialogue influences the interpretation of illness experiences and behavioral choices, interventions that modify self-evaluation, personal responsibility, perceived meaning, and future orientation may be particularly useful for changing maladaptive self-talk patterns. This is consistent with a growing body of psychological intervention research in diabetes demonstrating that cognitive, emotional, and acceptance-based treatments can positively affect mental health, self-care, adherence, and quality of life (11, 12). Accordingly, positive self-talk may represent both a clinically meaningful treatment target and a mechanism through which broader improvements in psychological adjustment can occur.

Reality therapy is one therapeutic approach that may be well suited to the psychological needs of patients with diabetes. Rooted in choice theory, reality therapy emphasizes personal responsibility, present-focused evaluation of behavior, identification of basic psychological needs, and the development of more effective choices for meeting those needs. According to Glasser's theoretical framework, behavior reflects an individual's attempt to satisfy fundamental needs, including survival, love and belonging, power, freedom, and fun, and psychological problems may arise when individuals rely on ineffective or maladaptive strategies to meet these needs (13). Reality therapy therefore encourages clients to clarify what they want, evaluate what they are currently doing, assess whether their behaviors are helping them obtain desired outcomes, and develop practical plans for more effective action. This orientation has particular relevance to diabetes, because successful disease management depends heavily on everyday choices and sustained behavioral responsibility. Patients must repeatedly decide whether to follow dietary recommendations, monitor blood glucose, take medication, engage in exercise, and respond adaptively to stress. Reality therapy may help individuals shift attention away from perceived helplessness and toward controllable behaviors, thereby strengthening self-regulation, personal agency, and constructive internal dialogue. Previous studies have shown that group reality therapy can reduce psychological distress, including anxiety, and can improve adaptive functioning in different populations (14). In patients with type 2 diabetes, reality therapy has also been compared with acceptance and commitment therapy and has demonstrated beneficial effects on self-care behaviors (12). These findings support the assumption that a choice-based therapeutic model may

improve illness management by strengthening behavioral accountability and encouraging more adaptive responses to disease-related demands.

Logotherapy, developed within the existential tradition, represents another potentially valuable approach for individuals living with chronic illness. Its central premise is that the search for meaning is a fundamental human motivation and that individuals can maintain psychological freedom and dignity even when they cannot eliminate suffering or change external circumstances. Logotherapy emphasizes meaning, freedom of attitude, responsibility, values, and purposeful action, particularly in situations characterized by limitation, loss, suffering, or uncertainty. Existential psychotherapy more broadly conceptualizes psychological growth as emerging from engagement with fundamental concerns such as freedom, responsibility, isolation, mortality, and meaning (15). Frankl-inspired interventions encourage individuals to discover meaning through creative values, experiential values, and attitudinal values, including the capacity to adopt a meaningful stance toward unavoidable suffering. Meaning-centered therapeutic exercises may therefore be particularly relevant for people with chronic diseases who cannot simply remove the source of their distress but can change how they interpret, respond to, and integrate the illness into their lives. Structured meaning-centered therapy protocols translate these principles into practical exercises involving values clarification, life review, goal formation, attitudinal change, and responsibility for future-oriented action (16). In patients with diabetes, such processes may help reduce feelings of futility, improve acceptance of disease-related limitations, strengthen personal values, and facilitate engagement in meaningful self-care. Through restructuring the person's relationship with suffering and responsibility, logotherapy may also promote more positive internal self-talk and strengthen broad dimensions of character.

A substantial body of research supports the beneficial effects of logotherapy and related meaning-centered approaches across a range of populations experiencing psychological distress or chronic medical conditions. Group logotherapy has been shown to reduce depression in patients with cancer, suggesting that meaning-oriented interventions can facilitate psychological adjustment even in the context of serious illness (17). Research with individuals who are blind or visually impaired has likewise indicated that group logotherapy can reduce anxiety and improve illness acceptance (18). Among older women living in nursing homes, group logotherapy has been associated with increased life expectancy and psychosocial well-being, suggesting that meaning-oriented work can strengthen positive psychological resources under conditions of dependency and reduced autonomy (19). Logotherapy has also been found to improve self-esteem and psychological well-being in individuals experiencing emotionally distressing interpersonal events (20). In patients with multiple sclerosis, comparisons between logotherapy and dialectical behavior therapy have shown that logotherapy can contribute to improvements in general health and quality of life (21). More recent evidence has similarly demonstrated beneficial effects of logotherapy on life expectancy and temporal perspective among families affected by bereavement related to COVID-19 (22). At a broader evidence-synthesis level, systematic review and meta-analytic findings indicate that meaning-centered therapies can improve psychological health, spirituality, and quality of life among patients with cancer (23). These findings collectively suggest that meaning-focused interventions may foster psychological adaptation by strengthening values, hope, purpose, and the capacity to reinterpret adversity.

The potential value of meaning-oriented interventions is also consistent with evidence supporting spiritual and existential resources in patients with serious illness. Spiritual group therapy has been shown

to improve quality of life and spiritual well-being in patients with breast cancer, underscoring the importance of addressing existential and meaning-related dimensions of health rather than limiting intervention to symptom management (24). Such evidence is particularly relevant to diabetes because chronic disease may disrupt assumptions about control, identity, bodily integrity, future plans, and personal effectiveness. When patients experience repeated restrictions or fear future complications, a purely behavioral approach may not fully address the existential dimensions of illness. Logotherapy may therefore have a particular advantage in strengthening character-related capacities such as hope, perspective, perseverance, gratitude, spirituality, and self-regulation because it explicitly organizes therapeutic work around meaning, values, and responsibility. At the same time, reality therapy may exert its effects through a different pathway by helping individuals identify needs, recognize controllable choices, evaluate current behaviors, and construct more adaptive action plans. The two approaches therefore share an emphasis on personal responsibility and active change but differ in their primary therapeutic mechanisms: reality therapy is more strongly centered on choice, need satisfaction, present behavior, and behavioral effectiveness, whereas logotherapy places greater emphasis on existential meaning, values, attitudes toward suffering, and purposeful engagement with life.

Although both reality therapy and logotherapy have demonstrated therapeutic benefits, direct comparative evidence regarding their effects on character strengths and health-promoting internal self-talk in patients with diabetes remains limited. Existing research has compared the two approaches in relation to self-talk and health-promoting lifestyle, providing important preliminary evidence that both interventions may be useful for individuals with diabetes (10); however, character strengths represent a broader positive psychological outcome that may capture changes in the person's enduring capacities for adaptive functioning beyond symptom reduction or lifestyle behavior alone. Moreover, contemporary diabetes research increasingly supports psychological interventions that enhance emotional flexibility, responsibility, coping, adherence, and quality of life rather than focusing only on glycemic control (4, 5, 11). Findings from emotion-focused treatment in patients with type 2 diabetes further indicate that psychological interventions can reduce maladaptive emotional processes that may otherwise interfere with adaptation and self-management (3). Similarly, interventions aimed at increasing ego strength and mental health in patients with diabetes highlight the importance of strengthening psychological resources that support long-term adaptation (6). From this perspective, comparing reality therapy and logotherapy may clarify whether a choice-based behavioral framework or a meaning-centered existential framework produces stronger and more durable changes in positive psychological capacities and internal dialogue. Such a comparison is clinically relevant because the two approaches may have different strengths: reality therapy may be especially useful for modifying ineffective behaviors and increasing perceived control, whereas logotherapy may more strongly affect meaning, values, hope, resilience, and positive self-evaluation. Determining whether these theoretical differences translate into differential treatment outcomes could inform the selection of more targeted psychological interventions for patients with type 2 diabetes and contribute to the development of integrative psychosocial care models.

Accordingly, the present study aimed to compare the effectiveness of reality therapy and logotherapy in enhancing character strengths and health-promoting internal self-talk among patients with type 2 diabetes.

Methods and Materials

Study Design and Participants

The present study employed a quasi-experimental design with a multigroup pretest–posttest structure, a control group, and a three-month follow-up assessment. The statistical population consisted of all patients with diabetes who attended the Taban Diabetes Center in Tehran. Participants were recruited through purposive and convenience sampling. A total of 45 patients with type 2 diabetes who had been diagnosed with the disease for at least three years were selected from the list of patients attending the center. The selected participants were then randomly assigned, using a lottery method, to three groups of 15 participants each, including a reality therapy group, a logotherapy group, and a control group. The sample size was determined with reference to methodological recommendations for experimental and quasi-experimental studies, according to which a minimum of 15 participants per group is considered acceptable for such research designs (Delavar, 2017). The inclusion criteria were having a diagnosis of type 2 diabetes for at least three years, providing written informed consent to participate in the study, having no acute or severe psychological disorder, and possessing at least lower-secondary-level literacy sufficient to understand and complete the questionnaires. The exclusion criteria included absence from more than two intervention sessions and the presence of a comorbid psychological disorder alongside diabetes. Before the commencement of the interventions, participants in all three groups completed the study questionnaires as the pretest. The first experimental group subsequently received the reality therapy intervention, while the second experimental group received the logotherapy intervention. The control group received no psychological intervention during the study period. Immediately after completion of the eight intervention sessions, all participants completed the posttest measures, and the same questionnaires were administered again three months later to evaluate the maintenance of treatment effects during the follow-up phase.

Data Collection Tools

The **Values in Action Inventory of Strengths**, developed by Peterson and Seligman (2004), was used to assess character strengths. This self-report instrument was originally developed to evaluate six broad universal virtues, including wisdom and knowledge, courage, humanity, justice, temperance, and transcendence, as well as 24 specific character strengths associated with these virtues. These strengths include creativity, curiosity, judgment, love of learning, perspective, bravery, perseverance, honesty, zest, love, kindness, social intelligence, teamwork, fairness, leadership, forgiveness, prudence, humility, self-regulation, appreciation of beauty and excellence, gratitude, hope, humor, and spirituality. Each of the six overarching virtues is represented by a particular set of behavioral and psychological strengths. The original version of the instrument contains 240 items, with each character strength assessed through 10 items. Respondents indicate the extent to which they agree or disagree with each statement using a five-point Likert-type scale. The instrument has demonstrated satisfactory psychometric properties in previous studies, with internal consistency coefficients generally exceeding .70 and test–retest reliability coefficients also reported above .70. Because of the considerable length of the original version, a shorter 48-item form was subsequently developed and has been widely used in psychological research (Linley et al., 2004). Previous investigations have reported satisfactory reliability and validity for the instrument across different

populations, including studies conducted in European samples. Peterson and Seligman (2004) reported Cronbach's alpha coefficients of approximately .70 for the scale, while Sahami and Mazloom (2012) reported a mean Cronbach's alpha of .77 across its components in an Iranian sample. All items in the short form are rated on a five-point Likert scale, with higher scores reflecting greater endorsement and expression of the corresponding character strengths.

The **Self-Talk Questionnaire**, developed by Calvete et al. (2005), was used to assess participants' positive and negative internal self-talk. This self-report instrument was designed for adults and includes two major dimensions, namely positive self-talk and negative self-talk. The questionnaire contains 52 items, which participants rate using a four-point Likert-type response format after being asked to imagine or consider particular situations and then indicate the extent to which each statement reflects their typical internal dialogue. Twenty-six items assess negative self-talk, yielding scores ranging from 26 to 104, while the remaining items assess positive self-talk. Higher scores on each subscale indicate greater frequency or intensity of the corresponding type of internal self-talk. Calvete et al. (2005) reported a Cronbach's alpha coefficient of .90 for the negative self-talk subscale and .80 for the positive self-talk subscale, demonstrating strong internal consistency. Evidence of convergent validity was also reported through significant associations between questionnaire scores and measures of depression, anxiety, and stress. Calvete et al. (2005) further indicated that scores of 60 or higher on the negative self-talk scale were commonly observed among clinical populations. The psychometric properties of the questionnaire have also been examined in Iran. Jolai Majidi (2014) and Alavi et al. (2013) confirmed the validity and reliability of the instrument in Iranian samples. Alavi et al. (2013) reported Cronbach's alpha coefficients of .81 for the negative self-talk subscale and .72 for the positive self-talk subscale and found that negative self-talk was significantly and positively correlated with symptoms of depression and anxiety.

Interventions

The **reality therapy intervention** was implemented in eight 90-minute group sessions based on the principles of Glasser's reality therapy and choice theory. The first session was devoted to introducing the therapist and group members, facilitating initial interpersonal familiarity, explaining the structure and objectives of the intervention, and introducing the basic concepts of reality therapy and choice theory. In the second session, the five basic human needs identified within choice theory, including survival, love and belonging, power, freedom, and fun, were explained, and participants were encouraged to examine the relative importance and expression of these needs in their own lives. The third session focused on teaching the four components of total behavior, including thinking, acting, feeling, and physiology, and introduced the behavioral car metaphor as a means of clarifying the relationship between these components; participants also practiced identifying their emotional and physiological responses. The fourth session further developed participants' understanding of total behavior by reinforcing the relationships among thoughts, actions, emotions, and physiological reactions and by practicing the evaluation of behavioral choices and their consequences in everyday situations, particularly those associated with diabetes management. The fifth session began with a review of homework assignments and continued with an examination of major forms of conflict, with particular attention to identifying participants' interpersonal and intrapersonal conflicts and understanding how ineffective behavioral choices could contribute to

persistent distress. The sixth session introduced the concept of the quality world, helped participants identify their personal wants, desired relationships, values, and preferred life circumstances, and encouraged them to distinguish between areas that were within their control and those that could not be directly controlled; participants also evaluated discrepancies between their present circumstances and desired outcomes. The seventh session focused on the WDEP system, which includes identifying Wants, examining current Doing or behavior, Evaluating the effectiveness of existing choices, and Planning more effective behaviors; participants practiced using this framework to identify ineffective choices and develop realistic alternative behaviors. The eighth session involved a comprehensive review of the concepts and skills learned throughout the intervention, an examination of psychological challenges associated with living with diabetes, discussion of practical strategies for applying reality therapy principles to daily life and disease management, and completion of a "note to self" exercise designed to consolidate learning, strengthen personal commitment, and facilitate continued use of the acquired skills following termination of the intervention.

The **logotherapy intervention** was delivered in eight 90-minute group sessions based on the principles of Frankl's logotherapy and an existential approach to meaning, values, freedom, and responsibility. The first session focused on introducing the therapist and participants, facilitating acquaintance among group members, explaining the goals and rules of the group, and creating a supportive atmosphere characterized by trust, safety, and interpersonal engagement. The second session addressed the concept of self-awareness from an existential perspective and assisted participants in identifying personal values through exploration of enjoyable activities, meaningful relationships, positive interpersonal experiences, and personally significant artistic or cultural experiences. The third session began with a review of the previous session's assignments and focused on extracting and clarifying personal values from important life experiences, influential individuals, and meaningful artistic works, while also initiating the exploration of attitudinal values, particularly the individual's capacity to choose an attitude toward difficult or unchangeable life circumstances. In the fourth session, participants were assisted in constructing an individualized hierarchy of values, examining their short-term and long-term goals, and reconsidering these goals in light of the limited nature of time, personal priorities, and the existential significance of purposeful living. The fifth session focused on evaluating the degree of congruence between participants' stated goals and their hierarchy of values and on identifying personally important values that had not been sufficiently represented in their short-term, medium-term, or long-term goals. The sixth session included a review of homework assignments, formulation of new goals corresponding to previously neglected values, and assessment of the degree to which these newly defined goals were consistent with participants' core personal values and broader sense of meaning. The seventh session addressed existential concepts including loneliness, meaning and purpose in life, freedom, personal responsibility, and the experience of existential emptiness; group members were encouraged to reconsider feelings of meaninglessness, recognize their capacity to choose attitudes and responses even under restrictive circumstances, and accept greater responsibility for their decisions and behaviors. The eighth session reviewed the major concepts and exercises covered during the intervention, evaluated changes that participants had experienced, reconsidered their newly formulated goals, strengthened motivation for translating meaning-oriented insights into practical action, and guided

participants in developing an initial step-by-step action plan for pursuing personally meaningful goals; the session concluded with an overall synthesis of the intervention and formal termination of the group process.

Data Analysis

The collected data were analyzed using descriptive and inferential statistical procedures. Descriptive statistics, including means and standard deviations, were calculated to summarize participants' scores on character strengths, positive self-talk, and negative self-talk across the pretest, posttest, and three-month follow-up assessments. To evaluate changes in the dependent variables over time and compare the effectiveness of reality therapy, logotherapy, and the control condition, repeated-measures analysis of variance was employed, with time as the within-subject factor and group as the between-subject factor. The analysis was designed to determine the main effect of time, the main effect of group, and the group-by-time interaction, with particular emphasis on whether changes from pretest to posttest and follow-up differed significantly across the three study groups. When statistically significant effects were observed, appropriate pairwise comparisons were used to identify differences between the intervention conditions and to determine whether one therapeutic approach demonstrated greater effectiveness than the other. Statistical assumptions required for repeated-measures analysis were examined before interpreting the inferential results, and statistical significance was evaluated at the conventional alpha level of .05.

Findings and Results

The mean age of participants was 37.67 years (SD = 7.14) in the reality therapy group, 38.23 years (SD = 6.30) in the logotherapy group, and 38.95 years (SD = 7.32) in the control group. One-way analysis of variance indicated that there was no statistically significant difference among the three groups in terms of age, suggesting baseline comparability with respect to this demographic characteristic. Regarding sex distribution, the reported data indicated that the reality therapy group consisted of 12 women and 6 men, the logotherapy group consisted of 10 women and 7 men, and the control group consisted of 7 women and 13 men. Pearson's chi-square test showed no statistically significant difference among the groups in terms of sex distribution. Thus, according to the reported demographic analyses, the groups were comparable with respect to age and sex before the interventions.

Table 1. Descriptive Statistics for Character Strengths and Self-Talk Across the Pretest, Posttest, and Follow-Up Assessments

Variable	Component	Group	Pretest M (SD)	Posttest M (SD)	Follow-Up M (SD)
Character strengths	Wisdom and knowledge	Reality therapy	10.00 (2.54)	14.39 (2.93)	15.50 (3.13)
		Logotherapy	11.82 (2.13)	15.88 (3.30)	16.41 (3.47)
		Control	10.15 (2.39)	11.20 (2.26)	10.65 (2.72)
Character strengths	Courage	Reality therapy	8.89 (2.94)	13.33 (2.45)	11.28 (2.78)
		Logotherapy	8.47 (2.43)	12.35 (3.08)	13.35 (2.23)
		Control	8.75 (2.29)	8.35 (2.76)	8.65 (2.43)
Character strengths	Humanity	Reality therapy	6.72 (2.24)	9.39 (2.12)	9.94 (2.48)
		Logotherapy	6.65 (2.64)	11.41 (2.27)	11.65 (2.15)
		Control	7.00 (2.41)	7.35 (1.87)	7.10 (2.02)
Character strengths	Justice	Reality therapy	7.89 (2.37)	8.94 (2.07)	8.61 (2.03)
		Logotherapy	7.06 (2.01)	11.82 (2.46)	10.47 (2.15)
		Control	7.40 (2.16)	7.00 (2.05)	6.70 (2.20)
Character strengths	Temperance	Reality therapy	10.28 (2.27)	13.83 (2.87)	13.22 (2.67)
		Logotherapy	10.71 (2.54)	15.18 (3.13)	15.59 (3.06)

		Control	10.10 (2.29)	10.35 (2.23)	10.35 (2.74)
Character strengths	Transcendence	Reality therapy	13.78 (2.90)	16.83 (3.59)	16.39 (3.48)
		Logotherapy	14.06 (3.21)	18.65 (4.11)	18.82 (4.50)
		Control	13.15 (3.12)	13.55 (2.96)	13.35 (3.15)
Character strengths	Total score	Reality therapy	57.56 (9.18)	76.17 (8.51)	74.94 (8.03)
		Logotherapy	58.76 (9.32)	85.29 (9.97)	86.29 (9.18)
		Control	56.55 (9.48)	57.80 (8.60)	56.85 (8.64)
Self-talk	Positive self-talk	Reality therapy	56.17 (7.18)	69.17 (8.67)	65.39 (9.54)
		Logotherapy	55.53 (7.95)	74.59 (9.06)	75.88 (9.37)
		Control	52.25 (7.38)	56.00 (9.88)	55.85 (8.57)
Self-talk	Negative self-talk	Reality therapy	56.55 (9.09)	45.00 (8.09)	48.50 (8.69)
		Logotherapy	60.76 (9.75)	41.88 (7.13)	39.00 (7.57)
		Control	57.60 (9.61)	55.05 (7.90)	58.00 (9.17)

As shown in Table 1, the two intervention groups generally demonstrated favorable changes in character strengths and self-talk from pretest to posttest, whereas relatively limited changes were observed in the control group. For the total character strengths score, the mean increased from 57.56 at pretest to 76.17 at posttest in the reality therapy group and from 58.76 to 85.29 in the logotherapy group, whereas the control group showed only a slight change from 56.55 to 57.80. These improvements were largely maintained at the three-month follow-up, with mean total scores of 74.94 and 86.29 in the reality therapy and logotherapy groups, respectively. Similar patterns were observed across wisdom and knowledge, courage, humanity, justice, temperance, and transcendence. With respect to self-talk, positive self-talk increased in both intervention groups, from 56.17 to 69.17 in the reality therapy group and from 55.53 to 74.59 in the logotherapy group, while the control group demonstrated only a modest increase. At follow-up, the mean positive self-talk score remained substantially higher than baseline in both intervention groups, particularly in the logotherapy group. Negative self-talk declined from 56.55 to 45.00 in the reality therapy group and from 60.76 to 41.88 in the logotherapy group, whereas comparatively little change was evident in the control group. The follow-up findings also suggested maintenance of the reduction in negative self-talk, particularly among participants who received logotherapy.

Before conducting the main inferential analyses, the normality of the distributions was examined using the Shapiro–Wilk test separately for each group and assessment phase. The findings generally supported the assumption of normality, as the majority of Shapiro–Wilk tests were nonsignificant at the .05 level. Nevertheless, a small number of distributions yielded values close to or below the conventional significance threshold, including posttest courage in the logotherapy group ($W = .886$, $p = .039$), posttest courage in the control group ($W = .903$, $p = .047$), follow-up temperance in the logotherapy group ($W = .889$, $p = .045$), posttest positive self-talk in the reality therapy group ($W = .893$, $p = .043$), and follow-up negative self-talk in the logotherapy group ($W = .889$, $p = .045$). Given that deviations were limited to a small number of cells and the remaining distributions largely satisfied the normality assumption, the data were considered sufficiently appropriate for proceeding with the repeated-measures analyses. The multivariate analyses further showed statistically significant intervention effects for wisdom and knowledge, Wilks' $\Lambda = .717$, $F(4, 102) = 4.62$, $p = .002$, $\eta^2 = .153$; courage, Wilks' $\Lambda = .598$, $F(4, 102) = 7.47$, $p = .001$, $\eta^2 = .226$; humanity, Wilks' $\Lambda = .680$, $F(4, 102) = 5.43$, $p = .001$, $\eta^2 = .176$; justice, Wilks' $\Lambda = .629$, $F(4, 102) = 6.66$, $p = .001$, $\eta^2 = .207$; temperance, Wilks' $\Lambda = .699$, $F(4, 102) = 4.99$, $p = .001$, $\eta^2 = .164$; transcendence, Wilks' $\Lambda = .828$, $F(4, 102) = 2.53$, $p = .045$, $\eta^2 = .090$; and the total character strengths score, Wilks' $\Lambda = .408$, $F(4, 102) =$

14.45, p = .001, η^2 = .362. Significant multivariate effects were also observed for positive self-talk, Wilks' Λ = .647, F(4, 102) = 6.21, p = .001, η^2 = .196, and negative self-talk, Wilks' Λ = .663, F(4, 102) = 5.82, p = .001, η^2 = .186.

Table 2. Repeated-Measures Analysis of Variance for Character Strengths and Self-Talk

Variable	Effect	Sum of Squares	Error Sum of Squares	F	p	ηp^2
Wisdom and knowledge	Group	471.52	425.18	28.83	< .001	.526
	Time	341.01	393.81	45.03	< .001	.464
	Group × Time	142.76	782.25	4.75	.002	.154
Courage	Group	278.21	314.91	22.97	< .001	.469
	Time	156.43	270.92	30.02	< .001	.366
	Group × Time	196.21	707.33	7.21	< .001	.217
Humanity	Group	211.44	271.14	20.28	< .001	.438
	Time	210.67	274.46	39.92	< .001	.434
	Group × Time	138.73	517.92	6.96	< .001	.211
Justice	Group	209.86	342.04	15.95	< .001	.380
	Time	35.87	181.96	10.25	.002	.165
	Group × Time	141.98	393.61	9.38	< .001	.265
Temperance	Group	359.50	199.15	46.94	< .001	.644
	Time	198.43	419.23	24.61	< .001	.321
	Group × Time	132.23	897.09	3.83	.008	.128
Transcendence	Group	414.98	805.73	13.39	< .001	.340
	Time	174.58	504.27	18.01	< .001	.257
	Group × Time	121.25	1061.51	2.97	.025	.103
Total character strengths	Group	11145.12	4999.69	57.96	< .001	.690
	Time	6219.45	4119.36	78.51	< .001	.602
	Group × Time	4463.56	7619.01	15.23	< .001	.369
Positive self-talk	Group	5596.84	4431.80	32.84	< .001	.558
	Time	3347.72	3396.89	51.25	< .001	.496
	Group × Time	1695.47	7283.89	6.05	< .001	.189
Negative self-talk	Group	2789.82	3702.46	19.59	< .001	.430
	Time	2632.79	4797.40	28.54	< .001	.354
	Group × Time	2489.32	7891.06	8.20	< .001	.240

As presented in Table 2, repeated-measures analysis of variance revealed statistically significant group, time, and group-by-time interaction effects for all dimensions of character strengths. For wisdom and knowledge, significant effects were found for group, F = 28.83, p < .001, ηp^2 = .526; time, F = 45.03, p < .001, ηp^2 = .464; and the group-by-time interaction, F = 4.75, p = .002, ηp^2 = .154. Corresponding significant interaction effects were also obtained for courage, F = 7.21, p < .001, ηp^2 = .217; humanity, F = 6.96, p < .001, ηp^2 = .211; justice, F = 9.38, p < .001, ηp^2 = .265; temperance, F = 3.83, p = .008, ηp^2 = .128; and transcendence, F = 2.97, p = .025, ηp^2 = .103. The strongest effect was observed for the total character strengths score, for which significant group, F = 57.96, p < .001, ηp^2 = .690; time, F = 78.51, p < .001, ηp^2 = .602; and group-by-time interaction effects, F = 15.23, p < .001, ηp^2 = .369, were found. These findings indicate that changes in character strengths across the three assessment occasions differed significantly as a function of treatment condition. Significant effects were likewise observed for positive self-talk, including group, F = 32.84, p < .001, ηp^2 = .558; time, F = 51.25, p < .001, ηp^2 = .496; and the group-by-time interaction, F = 6.05, p < .001, ηp^2 = .189. For negative self-talk, the effects of group, F = 19.59, p < .001, ηp^2 = .430; time, F = 28.54, p < .001, ηp^2 = .354; and group-by-time interaction, F = 8.20, p < .001, ηp^2 = .240, were also statistically significant. Overall, these findings demonstrate that both interventions produced significant changes in character strengths and self-talk over time compared with the control condition.

Table 3. Bonferroni Post Hoc Pairwise Comparisons for Character Strengths and Self-Talk

Variable	Comparison	Mean Difference	SE	p
Wisdom and knowledge	Pretest vs. posttest	-3.17	0.49	< .001
	Pretest vs. follow-up	-3.53	0.53	< .001
	Posttest vs. follow-up	-0.36	0.56	1.000
	Reality therapy vs. logotherapy	-1.41	0.56	.044
	Reality therapy vs. control	2.63	0.54	< .001
	Logotherapy vs. control	4.04	0.55	< .001
Courage	Pretest vs. posttest	-2.64	0.52	< .001
	Pretest vs. follow-up	-2.39	0.44	< .001
	Posttest vs. follow-up	0.25	0.53	1.000
	Reality therapy vs. logotherapy	-0.23	0.48	1.000
	Reality therapy vs. control	2.58	0.46	< .001
	Logotherapy vs. control	2.81	0.47	< .001
Humanity	Pretest vs. posttest	-2.59	0.45	< .001
	Pretest vs. follow-up	-2.77	0.44	< .001
	Posttest vs. follow-up	-0.18	0.39	1.000
	Reality therapy vs. logotherapy	-1.22	0.45	.026
	Reality therapy vs. control	1.54	0.43	.002
	Logotherapy vs. control	2.75	0.44	< .001
Justice	Pretest vs. posttest	-1.81	0.42	< .001
	Pretest vs. follow-up	-1.15	0.36	.007
	Posttest vs. follow-up	0.66	0.34	.163
	Reality therapy vs. logotherapy	-1.30	0.50	.036
	Reality therapy vs. control	1.45	0.48	.012
	Logotherapy vs. control	2.75	0.49	< .001
Temperance	Pretest vs. posttest	-2.76	0.49	< .001
	Pretest vs. follow-up	-2.69	0.54	< .001
	Posttest vs. follow-up	0.07	0.64	1.000
	Reality therapy vs. logotherapy	-1.38	0.38	.002
	Reality therapy vs. control	2.18	0.37	< .001
	Logotherapy vs. control	3.56	0.37	< .001
Transcendence	Pretest vs. posttest	-2.68	0.67	< .001
	Pretest vs. follow-up	-2.53	0.60	< .001
	Posttest vs. follow-up	0.16	0.56	1.000
	Reality therapy vs. logotherapy	-1.51	0.77	.165
	Reality therapy vs. control	2.32	0.74	.008
	Logotherapy vs. control	3.83	0.75	< .001
Total character strengths	Pretest vs. posttest	-15.46	1.41	< .001
	Pretest vs. follow-up	-15.07	1.70	< .001
	Posttest vs. follow-up	0.39	1.77	1.000
	Reality therapy vs. logotherapy	-7.23	1.92	< .001
	Reality therapy vs. control	12.49	1.84	< .001
	Logotherapy vs. control	19.72	1.87	< .001
Positive self-talk	Pretest vs. posttest	-11.94	1.54	< .001
	Pretest vs. follow-up	-11.06	1.55	< .001
	Posttest vs. follow-up	0.88	1.71	1.000
	Reality therapy vs. logotherapy	-5.09	1.80	.020
	Reality therapy vs. control	8.87	1.73	< .001
	Logotherapy vs. control	13.97	1.76	< .001
Negative self-talk	Pretest vs. posttest	10.99	1.75	< .001
	Pretest vs. follow-up	9.81	1.84	< .001
	Posttest vs. follow-up	-1.19	1.38	1.000
	Reality therapy vs. logotherapy	2.80	1.65	.285
	Reality therapy vs. control	-6.87	1.58	< .001
	Logotherapy vs. control	-9.67	1.61	< .001

The Bonferroni post hoc comparisons presented in Table 3 showed that, for all character strength dimensions and the total character strengths score, scores at posttest and follow-up differed significantly from pretest, whereas differences between posttest and follow-up were not statistically significant. This pattern indicates that the improvements observed following the interventions were generally maintained throughout the three-month follow-up period. Between-group comparisons showed that both reality therapy and logotherapy were significantly more effective than the control condition in improving wisdom and knowledge, courage, humanity, justice, temperance, transcendence, and total character strengths. Direct comparisons between the two active treatments demonstrated that logotherapy produced significantly greater improvements than reality therapy in wisdom and knowledge, $p = .044$, humanity, $p = .026$, justice, $p = .036$, temperance, $p = .002$, and the total character strengths score, $p < .001$. However, the two interventions did not differ significantly in their effects on courage, $p = 1.000$, or transcendence, $p = .165$. For positive self-talk, both intervention groups differed significantly from the control group, and logotherapy resulted in a significantly greater increase than reality therapy, with a mean difference of 5.09 points in favor of logotherapy, $p = .020$. Positive self-talk scores at both posttest and follow-up were significantly higher than pretest scores, while the posttest-to-follow-up difference was not significant, indicating maintenance of the intervention effects. For negative self-talk, both reality therapy and logotherapy produced significantly lower scores than the control condition, whereas the difference between the two active treatments was not statistically significant, $p = .285$. Negative self-talk decreased significantly from pretest to posttest and from pretest to follow-up, with no significant difference between posttest and follow-up. Taken together, these findings indicate that both interventions were effective in enhancing character strengths and improving patterns of internal self-talk among patients with type 2 diabetes, while logotherapy demonstrated superior effectiveness for overall character strengths and positive self-talk.

Discussion and Conclusion

The present study compared the effectiveness of reality therapy and logotherapy in improving character strengths and health-promoting internal self-talk among patients with type 2 diabetes. The findings showed that both interventions were effective in improving the overall character strengths score and its components, including wisdom and knowledge, courage, humanity, justice, temperance, and transcendence, compared with the control group. In addition, both reality therapy and logotherapy significantly increased positive self-talk and reduced negative self-talk, and these changes were largely maintained at the three-month follow-up. However, the magnitude of improvement was not identical across the two interventions. Logotherapy produced significantly greater improvements than reality therapy in wisdom and knowledge, humanity, justice, temperance, and the total character strengths score, whereas the two interventions did not differ significantly in their effects on courage and transcendence. Moreover, logotherapy was significantly more effective than reality therapy in increasing positive self-talk, while no significant difference was observed between the two approaches in reducing negative self-talk. These findings indicate that both treatments can be regarded as useful psychological interventions for patients with type 2 diabetes, but logotherapy may have a particular advantage when the therapeutic objective involves strengthening positive psychological capacities, meaning-related personal resources, and constructive internal dialogue.

The effectiveness of both interventions in improving psychological functioning is consistent with the growing body of evidence demonstrating the value of psychological treatment in diabetes care. Living with diabetes requires continuous behavioral regulation, adherence to medical recommendations, adjustment to limitations, and management of uncertainty regarding future complications. These demands can produce emotional strain and maladaptive cognitive patterns, making psychological intervention an important complement to medical care. Previous studies have shown that structured psychological interventions can improve mental health, quality of life, emotional functioning, and treatment adherence among patients with diabetes (4, 11). Similarly, interventions targeting emotional processes have been shown to reduce anxiety-related maladaptive responses in patients with type 2 diabetes (3), while other approaches have demonstrated benefits for mental health and ego strength among patients with type 1 and type 2 diabetes (6). The present findings therefore reinforce the broader conclusion that psychological adjustment in diabetes is modifiable and that interventions aimed at cognitive, emotional, existential, and behavioral processes can contribute meaningfully to patients' adaptation to chronic illness.

The observed effectiveness of reality therapy can be interpreted within the framework of choice theory. Reality therapy emphasizes personal responsibility, present-focused behavior, satisfaction of basic needs, evaluation of current choices, and development of realistic plans for change. According to Glasser's conceptualization, individuals can improve psychological well-being by examining whether their current behaviors effectively meet their needs and by replacing ineffective behavioral patterns with more adaptive choices (13). This process is particularly relevant to diabetes because successful disease management depends heavily on repeated daily decisions involving diet, medication use, physical activity, symptom monitoring, and coping with treatment-related stress. By helping patients distinguish between controllable and uncontrollable aspects of their lives, reality therapy may reduce helplessness and increase perceived personal agency. This can encourage patients to evaluate their existing behavioral patterns, assume responsibility for modifiable aspects of disease management, and engage in more adaptive health behaviors. Previous evidence showing the effectiveness of group reality therapy in reducing anxiety supports the capacity of this approach to modify maladaptive psychological responses (14). Similarly, the beneficial effect of reality therapy on self-care among individuals with type 2 diabetes provides direct support for its applicability to chronic disease management (12).

The effect of reality therapy on character strengths may also be understood through its emphasis on responsible choice, self-evaluation, planning, and behavioral control. Several character strengths measured in the present study involve capacities that can be strengthened through repeated engagement in deliberate choice and self-regulation. Temperance, for example, is closely related to self-control and the regulation of impulses, while courage involves acting constructively despite uncertainty or discomfort. Wisdom and knowledge may be enhanced when individuals reflect on their behavioral patterns and learn to evaluate the consequences of their choices, whereas justice and humanity may benefit from improved interpersonal responsibility and awareness of relational needs. Reality therapy also encourages participants to clarify their "quality world," recognize important relationships and personal values, and evaluate whether current behavior is consistent with desired life outcomes. In this regard, the observed improvement in character strengths is theoretically compatible with the mechanisms of reality therapy, even though character strengths are not necessarily its direct or primary treatment target.

The findings regarding logotherapy were particularly notable because this intervention produced greater improvements in several dimensions of character strengths and in positive self-talk. These findings can be interpreted in light of the central concepts of meaning, responsibility, values, freedom of attitude, and purposeful living that characterize logotherapy. Meaning-centered approaches assume that individuals can retain psychological freedom even when they cannot change difficult external circumstances and that well-being can be strengthened by identifying personally meaningful values and adopting a constructive attitude toward suffering (15, 16). For patients with diabetes, whose condition requires long-term adaptation rather than a definitive cure, the ability to reinterpret illness in a meaningful framework may be particularly important. Logotherapy may help patients move from a passive experience of restriction toward a more active process of values-based living, thereby strengthening hope, perspective, personal responsibility, self-regulation, and commitment to meaningful goals. The stronger effect of logotherapy on the total character strengths score may therefore reflect its direct engagement with existential resources that overlap conceptually with several dimensions of positive character.

The superiority of logotherapy in improving wisdom and knowledge can be explained by the reflective and meaning-oriented nature of the intervention. Participants are encouraged to examine life experiences, clarify values, reconsider priorities, and derive meaning from difficult circumstances. Such reflective processes can facilitate broader perspective taking, judgment, self-awareness, and constructive interpretation of adversity. Similarly, the stronger improvement in humanity may result from increased attention to relationships, experiential values, compassion, and interpersonal meaning. The greater effect on justice may be related to increased responsibility for choices and heightened awareness of values that govern relationships with others, while the effect on temperance may be associated with increased self-regulation through value-consistent goal setting. These mechanisms are consistent with findings from research indicating that meaning-oriented interventions can improve psychosocial well-being, self-esteem, illness acceptance, and general health (18, 20, 21). The effectiveness of logotherapy in diverse clinical and nonclinical populations suggests that its benefits are not limited to reduction of negative symptoms but may extend to the strengthening of positive psychological capacities.

The present findings also align with studies showing that meaning and purpose can function as protective psychological resources in the context of illness and adversity. Meaning in life has been identified as a protective factor among individuals with physical illness, particularly in relation to severe psychological outcomes such as suicidal ideation (8). In addition, meaning in life has been associated with self-compassion through adaptive coping processes, suggesting that a stronger sense of meaning may support constructive responses to stress (9). Such findings help explain why logotherapy may have produced stronger effects on character strengths. By helping participants identify meaningful values and goals, the intervention may have increased their capacity to interpret diabetes as one part of life rather than as the defining element of personal identity. This shift can create psychological space for hope, responsibility, gratitude, perseverance, and self-regulation, all of which are relevant to positive character functioning.

The significant effect of logotherapy is also consistent with evidence from patients with serious medical conditions. Group logotherapy has been found to reduce depression in patients with cancer (17), improve anxiety and illness acceptance in individuals with visual impairment (18), and enhance psychosocial well-being and life expectancy among older women living in institutional settings (19). In addition, meaning-

centered interventions have demonstrated beneficial effects on psychological health, spirituality, and quality of life among patients with cancer (23). These outcomes suggest that meaning-focused treatment may be particularly relevant when individuals face circumstances that cannot be fully controlled and therefore require psychological adaptation rather than elimination of the stressor. Diabetes is a comparable condition in this respect, as patients must learn to coexist with long-term treatment demands and uncertainty. The findings of the present study extend this literature by indicating that logotherapy may also strengthen positive character resources in patients with diabetes.

The observed increase in positive self-talk in both intervention groups is another important finding. Positive self-talk represents an adaptive internal dialogue that can reinforce confidence, emotional regulation, persistence, and constructive behavioral choices. Reality therapy may increase positive self-talk by shifting attention toward controllable behavior and emphasizing the individual's capacity to make more effective choices. As patients learn to evaluate their actions and formulate realistic plans, internal dialogue may become less self-defeating and more solution-focused. Logotherapy, in contrast, may enhance positive self-talk through a deeper reinterpretation of suffering, values, and personal identity. When individuals perceive themselves as capable of choosing their attitude and pursuing meaningful goals despite illness, their internal dialogue may become more hopeful, purposeful, and self-supportive. The present finding that logotherapy was more effective than reality therapy in increasing positive self-talk is consistent with earlier research directly comparing the two approaches in patients with diabetes, where beneficial effects were observed for internal self-talk and health-promoting lifestyle (10).

The greater effect of logotherapy on positive self-talk may also reflect the explicit emphasis of meaning-centered interventions on hope, values, and future orientation. Positive internal dialogue is not merely the absence of negative thoughts; rather, it reflects the presence of constructive, encouraging, and adaptive self-statements. Logotherapy may be especially well suited to developing this form of internal language because it asks individuals to identify reasons for continuing purposeful action, clarify what remains meaningful despite limitation, and recognize their freedom to adopt a particular stance toward unavoidable circumstances. These processes can produce affirmative internal narratives centered on responsibility, possibility, dignity, and purpose. Evidence showing the effectiveness of meaning-oriented interventions in improving life expectancy, psychological well-being, and temporal perspective supports this interpretation (19, 22). Likewise, the effectiveness of spiritual and existentially oriented group interventions in improving quality of life and spiritual well-being suggests that interventions engaging meaning systems can produce broader positive psychological changes (24).

Both interventions also significantly reduced negative self-talk, yet their effects did not differ significantly. This finding suggests that reality therapy and logotherapy may reach similar outcomes through different therapeutic mechanisms. Reality therapy may reduce negative self-talk by decreasing helplessness, externalization of control, and ineffective self-evaluation, whereas logotherapy may reduce it by changing the meaning attributed to suffering and by weakening interpretations based on hopelessness or existential emptiness. Both approaches may therefore reduce maladaptive internal verbal patterns, even though logotherapy appears more effective in generating explicitly positive self-dialogue. This distinction is theoretically important. Reducing negative self-talk and increasing positive self-talk are related but not necessarily identical processes. An intervention may successfully diminish self-critical or pessimistic

internal statements without producing the same degree of increase in hopeful and affirming self-statements. The present findings suggest that both therapies are effective for the former outcome, whereas logotherapy may have an advantage for the latter.

The durability of the findings is also important. For most outcomes, significant differences were found between pretest and both posttest and follow-up, while differences between posttest and follow-up were nonsignificant. This pattern suggests that the therapeutic effects were maintained during the three-month follow-up period. Maintenance may be particularly relevant in diabetes because the psychological and behavioral demands of the disease are continuous. An intervention that produces only short-term improvement may have limited clinical value if gains rapidly diminish after treatment termination. Reality therapy provides participants with a practical framework for ongoing self-evaluation and behavioral planning, while logotherapy equips them with meaning-oriented principles that can continue to guide responses to difficult circumstances after formal treatment has ended. The persistence of gains is therefore theoretically plausible for both approaches.

The broader implications of the findings are also compatible with contemporary diabetes intervention research. Acceptance-based approaches have shown feasibility and promise in individuals with diabetes (5), and transdiagnostic cognitive-behavioral treatment has demonstrated improvements in depression, anxiety, quality of life, and medication adherence (4). These findings, together with evidence from emotion-focused treatment (3), indicate that different psychological models can contribute to diabetes care when they target relevant mechanisms of adaptation. The present study adds to this literature by highlighting character strengths and internal self-talk as meaningful outcomes. Rather than examining only symptom reduction, the findings suggest that psychological intervention may help patients develop more enduring personal resources for coping with chronic illness. In this sense, reality therapy and logotherapy may complement biomedical treatment by strengthening the psychological capacities needed for long-term self-management.

The findings should be interpreted in light of several limitations. The sample was relatively small and was drawn from patients attending a single diabetes center in Tehran, which may limit the generalizability of the findings to other populations, treatment settings, geographic regions, and patients with different socioeconomic or clinical characteristics. The use of purposive and convenience sampling may also have introduced selection bias, because individuals who agreed to participate in psychological group interventions may differ from other patients with diabetes in motivation, treatment engagement, or psychological readiness. The outcomes were assessed primarily through self-report questionnaires, which may be influenced by social desirability, recall bias, or participants' awareness of treatment expectations. The follow-up period was limited to three months, and therefore the long-term stability of the intervention effects remains uncertain. In addition, the study focused on psychological outcomes and did not include objective indicators of diabetes management, such as glycemic control, HbA1c, medication adherence, or physical activity. Therapist effects, treatment fidelity, and possible differences in group interaction may also have influenced the results.

Future studies should replicate these findings using larger and more diverse samples recruited from multiple clinical centers and different regions. Randomized controlled trials with more rigorous allocation and blinding procedures would strengthen causal inference. Longer follow-up periods, such as six months or one year, are recommended to determine whether improvements in character strengths and self-talk

persist over time. Future research should also combine psychological measures with objective clinical indicators, including HbA1c, fasting blood glucose, treatment adherence, dietary behavior, and physical activity, to examine whether psychological improvements translate into better disease management. Researchers may also investigate mediating mechanisms, such as meaning in life, psychological flexibility, self-efficacy, emotion regulation, or perceived control, in order to clarify how reality therapy and logotherapy produce their effects. Comparative studies involving other established approaches may further identify which patients benefit most from each intervention and whether combining reality therapy with logotherapy produces additive or synergistic effects.

In clinical practice, psychological services should be considered an important component of comprehensive diabetes care, particularly for patients who experience persistent psychological distress, maladaptive self-talk, reduced motivation, or difficulty adapting to long-term disease demands. Reality therapy may be particularly useful for patients who need support in improving responsibility, decision-making, self-regulation, and practical health behavior, whereas logotherapy may be especially appropriate for individuals struggling with loss of meaning, hopelessness, diminished purpose, or difficulty integrating chronic illness into their broader life narrative. Group-based delivery may be practical in diabetes clinics because it can provide peer support while reducing intervention costs. Clinicians may also consider integrating exercises on values clarification, constructive self-talk, personal responsibility, behavioral planning, and meaning-oriented goal setting into routine psychosocial care. Screening for character strengths and self-talk patterns may help identify patients who could benefit most from targeted psychological intervention and may facilitate more individualized treatment planning.

Acknowledgments

The authors express their deep gratitude to all participants who contributed to this study.

Authors' Contributions

All authors equally contributed to this study.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

Funding

This research was carried out independently with personal funding and without the financial support of any governmental or private institution or organization.

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