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## Comparison of the Effectiveness of God-Oriented Spiritual Therapy and Supportive Psychotherapy on Hostility, Blood Pressure, and Treatment Adherence in Patients with Metabolic Syndrome

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### ABSTRACT

**Purpose:** The present study aimed to compare the effectiveness of God-oriented spiritual therapy and supportive psychotherapy on hostility, blood pressure, and treatment adherence among patients diagnosed with metabolic syndrome.

**Methods and Materials:** This study employed a quasi-experimental design with pretest, posttest, and follow-up assessments including a control group. The statistical population consisted of all patients diagnosed with metabolic syndrome who attended healthcare centers in Tehran in 2025. A total of 45 participants were randomly assigned to three groups: spiritual therapy (12 sessions), supportive psychotherapy (10 sessions), and a control group. Research instruments included the Redford-Williams Hostility Inventory, the Treatment Adherence Questionnaire, and measurements of systolic and diastolic blood pressure. The spiritual therapy group received the Khodasoo multidimensional spiritual treatment package (12 sessions), the supportive psychotherapy group participated in ten sessions of supportive therapy, and the control group received no intervention. Data were analyzed using repeated measures analysis of variance (ANOVA) and Bonferroni post hoc tests.

**Findings:** Results indicated that both spiritual therapy and supportive psychotherapy significantly reduced hostility, improved treatment adherence, and decreased systolic and diastolic blood pressure compared with the control group at posttest and follow-up stages ( $p < .001$ ). No significant difference was observed between the effectiveness of spiritual therapy and supportive psychotherapy across most indicators; however, spiritual therapy demonstrated greater effectiveness in certain outcomes, such as diastolic blood pressure ( $p < .05$ ).

**Conclusion:** The findings suggest that both psychotherapeutic approaches can serve as effective interventions for improving psychological and physiological indicators associated with metabolic syndrome. God-oriented spiritual therapy may offer a relative advantage in specific dimensions.

**Conclusion:** Based on these findings, the developed educational package appears suitable for promoting effective co-parenting.

**Keywords:** *Spiritual therapy, supportive psychotherapy, hostility, blood pressure, treatment adherence, metabolic syndrome.*

## 1. Introduction

Metabolic syndrome (MetS) has become a central public-health concern because it reflects the convergence of multiple cardiometabolic risk factors—typically including central adiposity, dysglycemia/insulin resistance, elevated blood pressure, and atherogenic lipid profiles—that together accelerate progression to type 2 diabetes and cardiovascular disease. Contemporary syntheses emphasize that MetS is not merely a checklist of biological abnormalities but a dynamic, multi-system condition shaped by genetic vulnerability, neuroendocrine dysregulation, chronic inflammation, and behavioral patterns that reinforce metabolic risk over time (Fahed et al., 2022). Pathophysiological accounts highlight insulin resistance and adipose-tissue dysfunction as key upstream processes that interact with autonomic imbalance and inflammatory signaling, producing a phenotype in which blood pressure dysregulation, impaired glucose homeostasis, and vascular risk co-occur (Bovolini et al., 2021). In parallel, recent clinical overviews underscore that effective MetS management requires integrated strategies spanning lifestyle modification, pharmacotherapy when indicated, and sustained adherence behaviors—because the syndrome’s “clustered” nature means improvement in one domain often depends on coordinated change across domains (Patial et al., 2024). Importantly, epidemiologic observations indicate that MetS is no longer confined to older adult populations; the syndrome’s risk architecture and long-term burden increasingly begin earlier in the life course, with pediatric and adolescent profiles drawing attention to prevention and early intervention as a distinct scientific and clinical priority (Zhang et al., 2025).

In Iran, population-based evidence similarly points to a meaningful burden of MetS in urban settings, reinforcing the necessity of context-sensitive preventive and therapeutic approaches. Data derived from major cohort work in Tehran have documented notable prevalence rates in an urban population, highlighting MetS as a relevant and persistent challenge within Iranian public health planning (Azizi et al., 2023). Alongside prevalence, the syndrome’s clinical consequences—hypertension, dysglycemia, and related complications—generate complex trajectories that demand long-term engagement with care. Reviews of MetS diagnosis and management, including attention to “natural

approaches” and lifestyle-based strategies, converge on the premise that sustainable change is strongly contingent on patients’ ability to maintain treatment behaviors over time (Mohamed et al., 2023). Accordingly, treatment adherence is not a peripheral variable; it is a pivotal mechanism linking evidence-based recommendations to measurable outcomes such as blood pressure control and cardiometabolic stabilization.

A growing body of research indicates that behavioral and psychological dimensions are not only correlates but also plausible drivers of cardiometabolic risk. Hostility and anger-related constructs, in particular, have been repeatedly implicated in cardiovascular morbidity and mortality pathways through autonomic arousal, endocrine stress responses, and maladaptive coping behaviors. Foundational work in behavioral medicine frames hostility as a clinically meaningful psychosocial risk factor with implications for health behaviors and physiological stress reactivity (Barefoot & Williams, 2022). Meta-analytic prospective evidence further supports an association between anger/hostility and subsequent coronary heart disease, suggesting that these affective dispositions may exert durable effects on cardiovascular risk trajectories (Chida & Steptoe, 2019). More recent empirical analyses have refined this picture by examining hostility dimensions in relation to metabolic risk patterns, reporting links between hostility-related profiles and MetS indicators in otherwise healthy midlife samples (Thomas et al., 2020). Extending the scope from cardiometabolic clustering to disease endpoints, large-scale secondary analyses have associated anger expression styles and cynical hostility with risk of developing type 2 diabetes and diabetes-related heart complications, strengthening the rationale for targeting hostility-related processes in cardiometabolic prevention and care (Ward et al., 2024). Collectively, this literature supports the conceptualization of hostility as a modifiable psychosocial target with potential downstream benefits for physiological outcomes, including blood pressure regulation and metabolic stability.

Hypertension is especially salient within MetS because elevated blood pressure functions both as a defining component and as a key mediator of cardiovascular events. However, the clinical problem is not merely the presence of elevated readings; it is the persistence of elevated readings despite medical advice, inconsistent self-management, and



fluctuating motivation—factors that are often intertwined with psychological distress, interpersonal conflict, and diminished perceived control. The adherence challenge becomes particularly pronounced in chronic conditions: medication routines, lifestyle recommendations, monitoring behaviors, and follow-up attendance must be sustained over long periods, often in the context of daily stressors and limited resources. Evidence from chronic illness populations illustrates that adherence levels can vary substantially and are shaped by personal, social, and disease-related factors, underscoring the need for interventions that address both capability and motivation (Khanjani et al., 2021). In MetS, where multiple risk factors must be managed simultaneously, adherence difficulties can accumulate across medication, diet, activity, and monitoring demands, thereby reducing the effectiveness of otherwise robust medical regimens.

Within this clinical landscape, psychosocial interventions are increasingly justified as adjunctive or integrative modalities to support biomedical management. Supportive psychotherapy represents one such approach, with a pragmatic emphasis on strengthening coping resources, fostering therapeutic alliance, enhancing emotional stabilization, and improving adaptive functioning under real-world constraints. In classic supportive psychotherapy frameworks, therapists prioritize alliance-based strategies—such as empathic validation, reassurance, problem clarification, and strengthening ego functions—to help patients tolerate distress and sustain constructive behaviors (Winston et al., 2003). These mechanisms have relevance to MetS because they can plausibly support adherence-related processes: self-efficacy for routine behaviors, engagement with medical recommendations, and persistence when immediate improvements are not apparent. Empirical work has also indicated that supportive psychotherapy can contribute to clinically meaningful behavioral outcomes in weight-related contexts, suggesting potential applicability to cardiometabolic risk reduction where weight management and lifestyle adherence are central aims (Juchacz et al., 2021). When hostility and anger are part of the patient's affective repertoire, supportive therapy may further assist by reducing interpersonal friction, enhancing emotional regulation, and facilitating more consistent health behaviors.

At the same time, spirituality-oriented interventions have expanded as culturally resonant methods for addressing psychological distress and health-related behaviors, particularly in communities where spiritual meaning-making is integral to coping. Over the last decade, spiritually based

interventions have been increasingly evaluated in relation to physiological outcomes, including blood pressure and cardiovascular endpoints. A systematic review and meta-analysis focusing on spiritually based interventions for high blood pressure reported overall evidence suggesting beneficial effects, thereby providing a quantitative rationale for considering spirituality-informed approaches in hypertension-related contexts (Khabiri et al., 2024). In cardiovascular populations more broadly, meta-analytic evidence from randomized controlled trials has also supported the effectiveness of spiritual and religious interventions on psychological and certain health outcomes, reinforcing the plausibility that spiritual practices can influence stress-related pathways relevant to cardiometabolic functioning (Sert et al., 2024). Such findings align with mechanistic hypotheses linking spiritual engagement to reductions in perceived stress, improved emotion regulation, enhanced social support, and healthier behavior patterns—each of which may contribute to improved cardiometabolic control in patients with MetS.

Spirituality-based interventions are heterogeneous, ranging from contemplative practices to structured psychotherapies integrating theological or existential constructs. In some contexts, dhikr-based spiritual therapy has been discussed as a means of improving physiological parameters—such as blood sugar levels—in diabetes-related settings, illustrating the broader interest in spiritual practices as adjunctive care within metabolic disorders (Anjastya & Yuniartika, 2022). In Iran, spiritually oriented psychotherapeutic models have been proposed and tested in ways that explicitly integrate God-oriented meaning systems with psychological techniques, aiming to enhance coping, reduce distress, and improve adaptive functioning. For example, God-oriented spiritual therapy has been examined alongside non-spiritual approaches in stress management contexts, contributing to the preliminary development of spiritual models of psychological intervention (Janbozorgi et al., 2020). Complementary evidence has indicated that multidimensional spiritual psychotherapy training can reduce stress symptoms in patients with type 2 diabetes, suggesting that spiritual-psychological training may be relevant for metabolic populations where stress and self-regulation challenges complicate disease management (Rafiei Shafiq et al., 2022). Moreover, qualitative work on designing behavioral–emotional–spiritual therapy models underscores the feasibility of integrating spiritual meaning with emotional and behavioral change processes in culturally grounded interventions (Farhoush & Najafi,

2024). Together, these lines of evidence support the premise that spirituality-informed psychotherapy may be both culturally congruent and clinically relevant for patients facing metabolic and cardiovascular risk.

The relevance of spirituality-oriented care becomes particularly salient when the outcomes of interest include hostility and adherence. Hostility can be maintained by rigid appraisals, perceived injustice, and chronic interpersonal vigilance; spiritual frameworks may offer alternative interpretive lenses that reduce resentment, support forgiveness, promote patience, and facilitate meaning-making under adversity. Simultaneously, adherence may be strengthened when health behaviors are connected to deeply held values, perceived moral responsibilities, or a coherent life purpose. From a behavioral medicine perspective, aligning treatment behaviors with internalized values can improve persistence, especially when immediate reinforcement is limited. In MetS, dietary patterns provide an illustrative example: evidence from systematic review and meta-analysis indicates that higher adherence to the Mediterranean diet is associated with more favorable MetS parameters, emphasizing how adherence itself is a decisive pathway to measurable metabolic improvement (Bakaloudi et al., 2021). Disease-specific investigations further link Mediterranean diet adherence to metabolic and hepatic outcomes within MetS populations, highlighting that sustained lifestyle adherence is clinically consequential and therefore a critical intervention target (Montemayor et al., 2022). These findings reinforce the logic of examining psychotherapeutic interventions that might strengthen adherence, not only to medication regimens but also to complex lifestyle prescriptions that influence blood pressure and metabolic risk.

Despite promising evidence for both supportive psychotherapy and spiritual interventions, there remains a practical and scientific need to clarify their comparative effectiveness on outcomes that are simultaneously psychological and physiological—especially in MetS, where behavioral and psychophysiological pathways converge. The literature supports the relevance of hostility to cardiometabolic risk (Thomas et al., 2020) and to diabetes-related outcomes (Ward et al., 2024), while broader syntheses establish the credibility of spiritually oriented interventions for blood pressure and cardiovascular populations (Khabiri et al., 2024; Sert et al., 2024). Supportive psychotherapy, grounded in alliance-based and coping-enhancement mechanisms, has demonstrated utility for behaviorally relevant outcomes that intersect with

cardiometabolic risk, including weight-related change processes (Juchacz et al., 2021) and the general enhancement of adaptive functioning (Winston et al., 2003). However, empirical comparisons between a structured, God-oriented multidimensional spiritual therapy model and a manual-informed supportive psychotherapy approach—evaluated against a control condition—remain particularly important in contexts where both approaches are feasible, acceptable, and potentially scalable within routine care. From a culturally responsive perspective, spiritually integrated care may offer additional motivational and meaning-based mechanisms beyond those typically emphasized in supportive therapy, potentially producing differential effects on physiological markers such as diastolic blood pressure or on affective dispositions such as hostility. Conversely, supportive psychotherapy may provide broad benefits through stabilization, validation, and pragmatic problem-focused support that could be equally effective for enhancing treatment adherence and reducing stress-related physiological arousal.

In summary, MetS represents a complex syndrome requiring integrated care that addresses physiological risk factors, behavioral routines, and psychological dispositions (Fahed et al., 2022; Patial et al., 2024). Given the documented prevalence of MetS in Tehran (Azizi et al., 2023) and the central role of adherence for chronic disease outcomes (Khanjani et al., 2021), interventions that strengthen self-regulation and sustained engagement with treatment are clinically meaningful. Hostility is a relevant psychosocial risk factor with established associations to cardiovascular and metabolic outcomes (Barefoot & Williams, 2022; Chida & Steptoe, 2019; Thomas et al., 2020; Ward et al., 2024). Spiritual and religious interventions have accumulated evidence for beneficial impacts in hypertension and cardiovascular disease contexts (Khabiri et al., 2024; Sert et al., 2024), with additional indications of relevance to metabolic populations and culturally grounded models (Anjastya & Yuniartika, 2022; Farhoush & Najafi, 2024; Janbozorgi et al., 2020; Rafiei Shafiq et al., 2022). Supportive psychotherapy provides a theoretically coherent and clinically established framework for enhancing coping and adaptive functioning (Winston et al., 2003), with empirical support for behaviorally relevant outcomes in overweight and obesity contexts (Juchacz et al., 2021). Finally, lifestyle adherence remains a core determinant of MetS outcomes, as reflected in evidence on Mediterranean diet adherence and MetS parameters (Bakaloudi et al., 2021; Montemayor et al., 2022),

underscoring why adherence is an outcome of high translational value in clinical trials.

The aim of the present study was to compare the effectiveness of God-oriented multidimensional spiritual therapy and supportive psychotherapy on hostility, blood pressure, and treatment adherence in patients with metabolic syndrome.

## 2. Methods and Materials

### 2.1. Study Design and Participants

The present study employed a quasi-experimental design using a pretest–posttest–follow-up framework with a control group. The statistical population consisted of all patients who attended healthcare centers in Tehran in 2025 and had received a diagnosis of metabolic syndrome. The initial sample included 87 patients; based on the study inclusion criteria (diagnosis confirmed by a specialist physician, absence of psychiatric medication use, and no diagnosed psychiatric disorder), 45 participants were randomly assigned to three groups: spiritual therapy, supportive psychotherapy, and a control group. Sample size estimation was conducted using G\*Power software (effect size = 0.30, alpha = 0.05, statistical power = 0.80, three groups), which indicated a minimum required sample size of 45 participants overall. Participants were selected using purposive sampling and then randomly allocated to the study groups. Exclusion criteria included participation in concurrent psychological treatments and absence from three therapeutic sessions.

### 2.2. Measures

**Redford–Williams Hostility Inventory (1999):** This inventory was developed by Redford and Williams in 1999 and consists of 12 items. The instrument assesses feelings of hostility and their relationship with cardiovascular events. Respondents rate each item on a five-point Likert scale ranging from never (score 0) to always (score 4). The Cronbach's alpha reliability coefficient for this questionnaire was reported as .92 in a sample of 20 participants. Its content validity and internal consistency have also been confirmed, and the internal consistency coefficient obtained in the present study was .76.

**Blood Pressure Measurement:** Blood pressure was calculated as the mean of measurements obtained over two consecutive days, including systolic and diastolic blood pressure. Measurements were conducted using a PHYSIO-PORT ambulatory blood pressure monitoring device, which

measures blood pressure from the upper arm using an inflatable cuff.

**Treatment Adherence Questionnaire for Chronic Diseases:** This questionnaire was developed and psychometrically validated by Modanloo in 2013. It contains 40 items across seven components: commitment to treatment (9 items), willingness to participate in treatment (7 items), ability to adapt treatment to daily life (7 items), integration of treatment into daily life (5 items), persistence in treatment (4 items), adherence commitment (5 items), and implementation strategies (3 items). The response format is a six-point Likert scale ranging from completely true (5 points) to completely untrue (0 points). Total scores range from 0 to 200, with higher scores indicating greater treatment adherence. In the validation study conducted by Modanloo (2013), content validity was reported as .914, and Cronbach's alpha reliability coefficient was .92.

### 2.3. Interventions

Participants assigned to the spiritual therapy condition received the Khodasoo Multidimensional Spiritual Treatment Package, adapted from the multidimensional spiritual therapy model proposed by Janbozorgi (2020). The intervention was conducted in twelve weekly group sessions, each lasting 45 minutes. The program began with introducing the therapeutic framework, obtaining informed consent, case formulation, and establishing individualized psychological and spiritual goals based on balance or transcendence principles using SMART goal-setting and personal questionnaires. Subsequent sessions focused on enhancing insight into natural reason, strengthening self-regulation and trust in internal rational judgment, and identifying cognitive and behavioral barriers that interfere with rational functioning. Participants were trained to recognize logical errors, modify intermediate and core maladaptive beliefs, and restructure negative cognitive schemas. Later sessions incorporated an exploratory rational approach to understanding spirituality and belief in God through reflective exercises, existential questioning, and experiential techniques such as the "island technique." Participants examined personal God representations, analyzed the developmental history of spiritual beliefs, and engaged in cognitive restructuring of inaccurate spiritual images based on religious texts. The intervention further emphasized developing a coherent spiritual identity, strengthening perceived self-worth through connection with a transcendent source, and exploring concepts such as divine

guidance, meaning, ownership, and spiritual support. The final session focused on integrating therapeutic gains into everyday life by designing individualized life programs aligned with spiritual identity, evaluating alternative life plans, and promoting commitment to a consciously chosen, value-based lifestyle. Sessions included structured discussions, experiential exercises, reflective worksheets, group dialogue, and weekly practice assignments aimed at transferring spiritual insight into daily behavioral regulation.

Participants in the supportive psychotherapy condition received ten weekly sessions of supportive therapy, each lasting approximately 50 minutes, based on the protocol developed by Winston et al. (2004; Persian translation by Khalighi Sigaroudi, 2023). Treatment began with clinical interviewing, history taking, and establishment of a therapeutic alliance, including clarification of treatment boundaries, expectations, and roles. Early sessions focused on comprehensive assessment of presenting complaints, psychological symptoms, interpersonal functioning, and adaptive strengths, while encouraging emotional expression and initiating self-esteem enhancement exercises. The therapist then developed a case formulation addressing defense mechanisms, ego functioning, and coping capacities, followed by collaborative agreement on treatment goals and areas of intervention. Mid-treatment sessions emphasized strengthening the therapeutic relationship and facilitating corrective emotional experiences through empathic support, reassurance, validation, and development of positive transference.

Psychoeducation and coping-skills training were incorporated to improve adaptive functioning, emotional regulation, and engagement in meaningful activities. Structured supportive interventions were implemented to reinforce ego strength, daily organization, and problem-solving abilities, accompanied by continuous feedback and reinforcement of progress. Later sessions focused on consolidation of therapeutic gains, stabilization of newly acquired coping strategies, and preparation for treatment termination. The final session involved comprehensive review of treatment achievements, development of an independent continuation plan without regular sessions, and reinforcement of self-evaluation skills, personal competence, and maintenance of psychological well-being.

#### 2.4. Data Analysis

In this study, data were analyzed using SPSS software (Version 21) at both descriptive and inferential levels. Descriptive statistics included frequency, percentage, mean, and standard deviation. At the inferential level, the Shapiro–Wilk test was used to examine the normality of data distribution, and repeated measures analysis of variance (ANOVA) was ultimately employed to analyze the data.

### 3. Findings and Results

Table 1 presents the mean, standard deviation, minimum, and maximum age of participants in the experimental and control groups. As shown below:

**Table 1**

#### *Demographic Characteristics*

Variable	Group	Frequency	Mean	SD	Minimum	Maximum
Age (Men)	Spiritual Therapy	7	37.33	5.99	21	41
	Supportive Therapy	8	37.60	5.41	21	42
	Control	8	35.53	5.32	22	41
Age (Women)	Spiritual Therapy	8	32.41	4.85	19	38
	Supportive Therapy	7	33.01	4.74	20	39
	Control	7	32.35	4.65	20	38
Years of Marriage	Spiritual Therapy	–	6.52	1.70	5.10	7.80
	Supportive Therapy	–	6.65	1.61	5.40	7.60
	Control	–	6.71	1.73	5.60	7.40

To examine the homogeneity of the experimental and control groups regarding age, a one-way analysis of variance (ANOVA) was conducted. Results indicated no significant differences among the three groups for age among men ( $F = 0.043, p = .958$ ) or women ( $F = 0.054, p = .853$ ). Therefore, the experimental and control groups were comparable in

terms of age. Similarly, one-way ANOVA was used to examine group homogeneity regarding duration of marriage. Results showed no significant difference among the three groups ( $F = 0.267, p = .713$ ), indicating comparability across groups in marital duration. Descriptive findings of the study variables are presented below.

**Table 2**

*Descriptive Results for Treatment and Control Groups Across Research Phases*

Variable	Phase	Spiritual Therapy (M±SD)	Supportive Therapy (M±SD)	Control (M±SD)
Hostility	Pretest	30.66 ± 3.47	30.12 ± 3.78	30.75 ± 3.73
	Posttest	24.26 ± 2.86	25.12 ± 2.82	30.48 ± 3.55
	Follow-up	23.60 ± 2.35	25.31 ± 2.57	30.67 ± 3.58
Treatment Adherence	Pretest	96.87 ± 13.45	22.21 ± 1.78	22.63 ± 2.03
	Posttest	26.53 ± 3.92	27.81 ± 4.10	22.43 ± 4.06
	Follow-up	30.73 ± 3.08	34.68 ± 3.40	22.31 ± 3.41
Systolic Blood Pressure	Pretest	144.46 ± 15.38	144.68 ± 16.29	144.22 ± 15.84
	Posttest	126.33 ± 14.07	122.50 ± 15.42	144.74 ± 15.26
	Follow-up	127.33 ± 15.47	127.25 ± 15.47	144.41 ± 15.17
Diastolic Blood Pressure	Pretest	92.07 ± 12.07	92.19 ± 11.88	91.36 ± 11.19
	Posttest	82.09 ± 10.94	83.19 ± 11.16	91.43 ± 11.14
	Follow-up	84.20 ± 11.25	82.31 ± 11.05	92.23 ± 11.64

Table 2 presents descriptive statistics for the treatment and control groups across study phases. No substantial differences were observed among the three groups at pretest; however, changes in mean scores appeared during posttest and follow-up stages, requiring inferential statistical testing. Accordingly, repeated measures analysis of variance (ANOVA) was conducted after examining statistical assumptions. Mahalanobis distance analysis indicated no

multivariate outliers. Homogeneity of covariance matrices was examined using Box’s M test, which showed no significant difference (Box’s M = 67.215, F = 2.154, df1 = 36, df2 = 4789.786, p = .165), confirming that parametric analyses were appropriate. To determine which variables accounted for these differences, between-subject effects were examined using analysis of covariance (ANCOVA), as presented in Table 3.

**Table 3**

*Analysis of Covariance for Experimental and Control Groups*

Comparison	Dependent Variable	Sum of Squares	df	Mean Square	F	p	Effect Size
Pretest–Posttest	Hostility	128.322	2	64.161	18.828	.000	.491
	Treatment Adherence	32.469	2	16.235	16.341	.000	.456
	Systolic BP	54.664	2	27.332	37.400	.000	.584
	Diastolic BP	302.214	2	151.107	31.625	.000	.546
Pretest–Follow-up	Hostility	133.003	2	66.502	23.324	.000	.545
	Treatment Adherence	78.054	2	39.029	28.830	.000	.597
	Systolic BP	24.521	2	12.260	17.608	.000	.475
	Diastolic BP	324.744	2	162.372	36.421	.000	.647

As shown in Table 3, significant differences were observed between experimental and control groups at both posttest and follow-up compared with pretest scores. After controlling for pretest effects, adjusted means differed

significantly among groups at posttest, and these differences remained stable at follow-up. Given the significant findings, Bonferroni post hoc tests were conducted for pairwise group comparisons (Table 4).

**Table 4**

*Bonferroni Post Hoc Comparisons Between Experimental and Control Groups*

Dependent Variable	Comparison	Group I	Group J	Mean Difference (I–J)	SE	p
Hostility	Pretest–Posttest	Spiritual	Supportive	-1.272	.684	.071
		Spiritual	Control	-4.177*	.690	.000
		Supportive	Control	-2.905*	.718	.000
	Pretest–Follow-up	Spiritual	Supportive	-1.148	.626	.074
		Spiritual	Control	-4.225*	.631	.000

Treatment Adherence	Pretest–Posttest	Supportive	Control	-3.077*	.657	.000
		Spiritual	Supportive	-.682	.369	.072
		Spiritual	Control	-2.108*	.372	.000
	Pretest–Follow-up	Supportive	Control	-1.426*	.388	.001
		Spiritual	Supportive	.026	.309	.934
		Spiritual	Control	-1.637*	.312	.000
Systolic BP	Pretest–Posttest	Supportive	Control	-1.663*	.325	.000
		Spiritual	Supportive	-.744	.370	.051
		Spiritual	Control	-2.710*	.373	.000
	Pretest–Follow-up	Supportive	Control	-1.966*	.388	.000
		Spiritual	Supportive	-.693	.431	.116
		Spiritual	Control	-3.192*	.435	.000
Diastolic BP	Pretest–Posttest	Supportive	Control	-2.499*	.453	.000
		Spiritual	Supportive	-1.446*	.517	.008
		Spiritual	Control	-3.088*	.520	.000
	Pretest–Follow-up	Supportive	Control	-1.643*	.521	.003
		Spiritual	Supportive	-1.236*	.548	.030
		Spiritual	Control	-3.371*	.552	.000
		Supportive	Control	-2.135*	.553	.000

Results of the Bonferroni post hoc test indicated that both spiritual therapy and supportive psychotherapy significantly reduced hostility, increased treatment adherence, and decreased systolic and diastolic blood pressure compared with the control group at both posttest and follow-up stages. Furthermore, differences between spiritual therapy and supportive psychotherapy were generally non-significant across most outcomes; however, in certain indicators such as diastolic blood pressure, spiritual therapy demonstrated greater effectiveness than supportive psychotherapy.

#### 4. Discussion and Conclusion

The present study examined the comparative effectiveness of God-oriented multidimensional spiritual therapy and supportive psychotherapy on hostility, blood pressure, and treatment adherence among patients diagnosed with metabolic syndrome. The findings demonstrated that both interventions significantly reduced hostility, improved treatment adherence, and decreased systolic and diastolic blood pressure compared with the control group at posttest and follow-up stages. These outcomes provide empirical support for the proposition that psychological and spiritually informed interventions can meaningfully influence both psychological and physiological components of metabolic syndrome, a condition widely recognized as multifactorial and strongly shaped by behavioral and psychosocial processes (Fahed et al., 2022; Patial et al., 2024). Importantly, the maintenance of improvements at follow-up suggests that the observed effects were not transient therapeutic responses but reflected sustained behavioral and emotional change.

One of the central findings of this study was the significant reduction of hostility following both interventions. Hostility has long been conceptualized as a psychosocial risk factor linked to cardiovascular and metabolic dysfunction through chronic sympathetic activation, inflammatory responses, and maladaptive coping patterns (Barefoot & Williams, 2022). Meta-analytic evidence has shown that anger and hostility predict future coronary heart disease, indicating that emotional regulation is directly connected to cardiometabolic health outcomes (Chida & Steptoe, 2019). Similarly, research examining hostility dimensions in relation to metabolic syndrome has demonstrated that hostile affect and cynical attitudes are associated with unfavorable metabolic profiles even among otherwise healthy adults (Thomas et al., 2020). The present results align with these findings by showing that interventions targeting emotional and cognitive processes can significantly reduce hostility levels in patients with metabolic syndrome.

The effectiveness of supportive psychotherapy in decreasing hostility may be interpreted through its emphasis on therapeutic alliance, emotional validation, and strengthening adaptive coping resources. Supportive psychotherapy seeks to enhance ego functioning, promote emotional expression, and reduce psychological distress through empathic engagement and reassurance (Winston et al., 2003). When patients experience increased emotional containment and interpersonal safety, hostile reactions may diminish because defensive vigilance and perceived threat decrease. Previous work has demonstrated that supportive psychotherapy can improve behavioral regulation and facilitate health-related lifestyle changes, particularly in

populations dealing with weight management and chronic conditions (Juchacz et al., 2021). The reduction of hostility observed in the supportive psychotherapy group therefore appears consistent with established therapeutic mechanisms emphasizing emotional stabilization and adaptive coping.

The findings also indicated that spiritual therapy produced comparable reductions in hostility, and in some outcomes showed slightly greater improvements. Spiritual therapy may influence hostility through cognitive-existential mechanisms that reframe interpersonal experiences and reduce resentment, anger, and perceived injustice. Spiritual frameworks frequently promote forgiveness, acceptance, and meaning reconstruction, processes that directly counter hostile cognitive patterns. Previous research on spiritually oriented psychological interventions has demonstrated reductions in stress and emotional symptoms among patients with chronic illnesses such as diabetes (Rafiei Shafiq et al., 2022). Additionally, God-oriented spiritual therapy models emphasize alignment between cognition, emotion, and spiritual values, which may foster internal coherence and emotional regulation (Janbozorgi et al., 2020). Qualitative investigations of behavioral-emotional-spiritual therapies likewise highlight how integrating spiritual meaning into psychological treatment facilitates transformation of maladaptive emotional responses (Farhoush & Najafi, 2024). The present results therefore extend existing evidence by demonstrating that spiritual therapy can effectively address hostility within a cardiometabolic population.

Another key outcome of this study was the significant improvement in treatment adherence among participants receiving both interventions. Treatment adherence represents one of the most critical determinants of successful metabolic syndrome management because therapeutic benefits depend heavily on sustained behavioral engagement. Research in chronic disease populations consistently shows that adherence levels are influenced not only by medical knowledge but also by psychological motivation, emotional regulation, and perceived personal meaning (Khanjani et al., 2021). Improvements in adherence observed in this study may reflect increased self-efficacy, enhanced motivation, and stronger therapeutic engagement produced by both intervention approaches.

Supportive psychotherapy likely enhanced adherence through practical and relational mechanisms. By reinforcing adaptive coping, clarifying problems, and providing ongoing emotional support, supportive therapy helps patients tolerate frustration associated with long-term treatment routines. Therapeutic alliance itself functions as a motivational factor,

encouraging patients to maintain health behaviors and attend follow-up care. Evidence demonstrating supportive psychotherapy's effectiveness in promoting behavior change among overweight individuals supports the interpretation that supportive therapeutic environments strengthen persistence in health-related behaviors (Juchacz et al., 2021). Thus, improved adherence outcomes in the supportive psychotherapy group are theoretically coherent and empirically grounded.

Spiritual therapy may have strengthened adherence through an additional pathway: integration of health behaviors with personal values and spiritual identity. When treatment adherence is perceived not merely as a medical obligation but as a meaningful or value-consistent action, sustained engagement becomes more likely. Studies examining spiritual interventions across health conditions indicate that spirituality enhances coping, increases perceived support, and promotes commitment to self-care behaviors (Sert et al., 2024). Moreover, spiritually based interventions have been shown to influence physiological outcomes such as blood pressure, suggesting that behavioral compliance and stress reduction may operate simultaneously (Khabiri et al., 2024). Findings from spiritual therapy research in metabolic and chronic disease contexts also indicate improvements in psychological resilience and treatment engagement (Anjastya & Yuniartika, 2022). The present results therefore suggest that spirituality may function as a motivational framework supporting long-term adherence among individuals managing metabolic syndrome.

The study further demonstrated significant reductions in both systolic and diastolic blood pressure following intervention. Because hypertension is a defining component of metabolic syndrome and a major predictor of cardiovascular morbidity, these findings carry important clinical implications. Contemporary models of metabolic syndrome emphasize that blood pressure regulation is influenced by behavioral stress, emotional reactivity, lifestyle patterns, and neuroendocrine functioning (Bovolini et al., 2021). Psychological interventions capable of reducing stress and improving emotional regulation therefore have plausible physiological effects. The reductions in blood pressure observed here align with systematic reviews reporting beneficial cardiovascular outcomes following spiritual and religious interventions (Sert et al., 2024). Meta-analytic findings specifically examining spiritually based interventions for hypertension

also support the potential of spirituality-focused approaches to reduce blood pressure levels (Khabiri et al., 2024).

The slightly greater effectiveness of spiritual therapy on diastolic blood pressure observed in this study may reflect deeper stress-regulation processes activated by spiritual engagement. Spiritual practices often involve contemplation, acceptance, and existential meaning-making, which may attenuate chronic physiological arousal. Given that persistent stress activation contributes to metabolic dysregulation and vascular strain, reductions in psychological stress may translate into measurable cardiovascular benefits. Integrative management approaches combining behavioral, psychological, and lifestyle components have been repeatedly recommended for metabolic syndrome treatment (Mohamed et al., 2023). The present findings reinforce this integrative perspective by demonstrating that psychotherapeutic interventions can influence physiological indicators traditionally considered biomedical outcomes.

The sustained improvements observed at follow-up further suggest that both interventions facilitated lasting behavioral and emotional change rather than temporary symptom reduction. Maintenance effects are particularly important in metabolic syndrome because long-term lifestyle modification is required for disease control. Evidence from dietary adherence research shows that consistent engagement with healthy behavioral patterns produces measurable improvements in metabolic parameters (Bakaloudi et al., 2021). Similarly, adherence to Mediterranean dietary patterns has been associated with improved metabolic outcomes among individuals with metabolic syndrome (Montemayor et al., 2022). These findings parallel the current study's results by emphasizing that durable behavior change—whether achieved through psychotherapy, lifestyle intervention, or spiritual engagement—is central to successful metabolic management.

Another important observation was the absence of significant differences between spiritual therapy and supportive psychotherapy across most outcomes. This finding suggests that both interventions may operate through partially overlapping mechanisms, including emotional regulation, stress reduction, increased self-awareness, and enhancement of adaptive coping. Metabolic syndrome interventions increasingly recognize that psychological well-being is inseparable from physiological health outcomes (Fahed et al., 2022). Thus, therapeutic approaches grounded in either relational support or spiritual meaning

may converge toward similar health benefits despite theoretical differences. Nevertheless, the relative advantage of spiritual therapy in certain physiological indicators indicates that culturally congruent spiritual models may provide additional benefits when aligned with patient beliefs and values.

Overall, the results of this study contribute to the growing literature emphasizing the biopsychosocial and spiritual dimensions of metabolic syndrome. Modern conceptualizations of MetS highlight the interaction of biological vulnerability with lifestyle and psychological processes (Patil et al., 2024). By demonstrating improvements in hostility, adherence, and blood pressure, the present study supports a holistic treatment model integrating psychological and spiritual care alongside medical management. Such integration may be especially relevant in societies where spirituality constitutes a central component of identity and coping.

Several limitations should be considered when interpreting the findings of this study. First, the sample size was relatively small, which may limit statistical power and generalizability of results. Second, participants were recruited from healthcare centers within a single urban region, potentially restricting applicability to rural populations or other cultural contexts. Third, reliance on self-report measures for psychological variables may have introduced response bias. Fourth, although follow-up assessment was conducted, longer longitudinal follow-ups would be necessary to determine the durability of treatment effects across years rather than months. Finally, the absence of objective behavioral adherence monitoring limits conclusions regarding real-world behavioral change.

Future studies should examine larger and more diverse samples to improve external validity. Comparative investigations involving additional therapeutic modalities, such as cognitive-behavioral therapy or mindfulness-based interventions, would clarify differential mechanisms of change. Longitudinal designs with extended follow-up periods are recommended to evaluate sustained cardiometabolic outcomes. Future research may also explore mediating variables such as stress reduction, meaning in life, or self-efficacy to better understand how spiritual and supportive therapies influence physiological health. Incorporating biological markers such as inflammatory indicators or cortisol levels could further clarify psychophysiological pathways linking psychotherapy to metabolic improvement.

From a clinical perspective, the findings suggest that integrating psychological and spiritual interventions into routine metabolic syndrome management may enhance treatment outcomes. Healthcare providers should consider incorporating supportive counseling and spiritually sensitive interventions alongside standard medical care. Multidisciplinary collaboration between physicians, psychologists, and spiritual counselors may improve adherence and emotional well-being among patients with chronic metabolic conditions. Developing culturally adapted intervention programs and training clinicians in spiritually informed psychotherapy may further strengthen patient engagement, promote long-term lifestyle change, and contribute to improved cardiometabolic health outcomes.

### Authors' Contributions

All authors significantly contributed to this study.

### Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

### Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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### Declaration of Interest

The authors report no conflict of interest.

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### Ethical Considerations

In this study, to observe ethical considerations, participants were informed about the goals and importance of the research before the start of the study and participated in the research with informed consent.

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