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# Effectiveness of Medical Coaching in Enhancing Periodontal Health and Lifestyle: A Clinical Trial

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## ABSTRACT

**Objective:** Periodontitis is a chronic inflammatory disease affecting tooth-supporting tissues, primarily due to bacterial plaque and host response. Traditional therapy relies on oral hygiene instruction (OHI) and risk factor control, though adherence is challenging. This randomized controlled trial aimed to evaluate the effectiveness of Medical Coaching on Oral Health (MCOH) in improving plaque control (PCR) and gingival bleeding index (GBI) after 1 month, compared to conventional OHI.

**Materials and Methods:** Sixty-four patients with periodontitis at the University Hospital of Bari (Italy) were randomized into MCOH ($n = 32$) and control ($n = 32$) groups. Baseline assessments included periodontal status, PCR, GBI, and a lifestyle questionnaire (smoking, alcohol, nutrition, physical activity, sleep, stress). The MCOH group received personalized sessions, including goal-setting, emotional barrier assessment, and action planning, while the control group received standard OHI.

**Results:** After 4 weeks, the MCOH group showed greater improvements in GBI (−47.5 vs. −24.5, $p < 0.001$) and PCR (−44.0 vs. −32.0, $p = 0.003$). The composite clinical outcome was significantly higher in the MCOH group (75.0% vs. 34.4%, $p = 0.001$). Lifestyle improvement, particularly smoking cessation, alcohol reduction, and stress management, was greater in the MCOH group. MCOH improved periodontal outcomes and promoted healthier lifestyle behaviors compared to OHI.

**Registration:** NCT06887946

## 1 | Introduction

Periodontitis is a chronic inflammatory disease that has a destructive effect on the tooth-supporting tissues, mainly due to bacterial plaque accumulation and host immune response. Although personal habits are significant in oral health and in the prevention of periodontitis, awareness alone is not enough to initiate behavioral change that will be sustainable in the long term (Papapanou et al. 2018; Miller and Rollnick 2012). Studies show that people should drive the change process within themselves through the combination of both awareness and motivation (Michie et al. 2014). Traditional treatments of periodontitis are essentially based on the teaching and reinforcement of oral hygiene instructions through interventions aiming at reducing bacterial load and controlling local and systemic risk factors (Loos and Van Dyke 2020). However, this approach is not always enough in order to guarantee a stable behavioral change over time, limiting both patient concordance and clinical outcomes (Nieuwlaat et al. 2014).

However, in recent years, a need has emerged for implementing strategies that are more than the transfer of information and actively engage patients in the process of self-awareness and motivation (He et al. 2024). The scientific literature has reaffirmed that behavioral change in oral health is optimally achieved through patient-led change by empowerment, rather

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than external imposition. Hence, new psychologic and communicative methodologies have been created to provide personalized support and to achieve individualized changes in oral hygiene behavior (Ho et al. 2024). Among these interventions, Medical Coaching and Motivational Interviewing (MI) have been shown to be essential skills in enabling patient autonomy and active participation in health management (Chunda et al. 2023). The National Health Service in England has described health coaching as a patient-centered communication approach with the aim of empowering patients to make significant changes in their lifestyle (NHS England 2020). Likewise, motivational interviewing is effective in enhancing the patient's internal motivation and consequently helps them in overcoming obstacles to change (Natanek et al. 2023). These techniques are in accordance with Carl Rogers' person-centered principles of care that emphasize empathy, respect, and encouragement (Miller et al. 2017). Moreover, the efficacy of these techniques has been corroborated in a range of clinical practices, such as cardiovascular rehabilitation, cancer patient support, and metabolic and autoimmune disorder management (Baumeister et al. 2023).

Based on this evidence, this article proposes a novel approach to improving oral health: Medical Coaching on Oral Health (MCOH). This innovative method combines health coaching and motivational techniques, providing structured and personalized guidance for patients with periodontitis.

MCOH stands out from conventional methods by being able to transcend the one-way delivery of instructions from health professionals, thereby promoting active patient engagement in the treatment process (Suvan et al. 2022). In addition, it also enables a personalized model of treatment, tailoring support based on the specific needs of each patient and ensuring consistent monitoring based on ongoing feedback from patients, which enables modification based on their progress and difficulties. Besides, this approach is holistic: alongside the enhancement of oral health, it pays attention to some other aspects of overall well-being, including stress management, diet, and exercise (Xu et al. 2024). This study aims at comparing the effectiveness of MCOH and conventional oral hygiene education, focusing on how a personalized intervention with continuous support can significantly improve the control of periodontitis through patient compliance and less resistance to behavior change.

## 2 | Materials and Methods

From October 2024 to January 2025, patients who had been recognized with periodontitis were enlisted to take part in this study at the Department of Interdisciplinary Medicine, Bari Hospital, Italy. The baseline evaluation included the examination of participants based on pre-established inclusion and exclusion criteria. Eligible patients needed to have a confirmed diagnosis of periodontitis and be between 20 and 75 years old. Exclusion criteria were subjects with active cancers, a history of psychiatric disease or organ transplant, pregnant females, and subjects who declined to enroll in the study. Written consent was taken from all the participants. The present study was carried out according to the Declaration of Helsinki, and the research protocol was approved and registered with the Local Ethical Committee of Hospital "IRCCS Giovanni Paolo II" (Study No. 1983/CEL). All of the subjects were given a letter of information describing the research plan, data assessment procedures, and data protection prior to the commencement of the study. For purposes of confidentiality, a different identification number was assigned to all the subjects.

The study was designed as a pilot randomized controlled trial (RCT) to evaluate the effectiveness of Medical Coaching in improving periodontal health and lifestyle factors. Participants were randomly assigned to either the Medical Coaching group or the control group. Blinding was implemented to maintain impartiality, meaning that participants were unaware of their group allocation, whereas outcome assessors were aware of the group assignments. As a result, this study follows a single-blind design. Simple randomization with a random number generator was used. No blocks or stratifications were used. Assignment to the groups was performed by means of opaque, numbered, and sealed envelopes prepared by an external researcher not involved in data collection.

The sequence was generated by an independent researcher. A second operator opened the envelopes and assigned the patients to the group, while the clinical assessors were different and trained for data collection. The study adheres to CONSORT guidelines for non-pharmacological interventions. The control group ($n = 32$) received traditional oral hygiene instructions (OHI), following standard guidelines for maintaining oral health. In contrast, the intervention group ($n = 32$) was exposed to the MCOH technique, a specialized approach designed to enhance oral hygiene practices through a structured methodology.

Medical anamnesis of each patient was conducted to investigate general remote pathologies, specialistic anamnesis (past dental treatments, periodontitis familiarity, and other oral conditions), the updated pharmacological therapy, and the current pathology.

To ensure the reliability of measurements and uniformity of procedures, all operators involved in the study underwent a preliminary calibration process. Two experienced periodontists performed independent evaluations on 10 patients not included within the study sample for the clinical parameters of periodontal probing, Plaque Control Record and Gingival Bleeding Index, following the same operating protocol. The clinicians also underwent a Medical Coaching training process to ensure uniform application of the motivational protocol through simulations with standardized clinical cases to assess consistency in conducting sessions, identifying emotional barriers and planning personalized strategies.

During the course of the study, no changes were made to the original protocol, including inclusion criteria, outcomes, and follow-up times.

### 2.1 | Phase 1: Data Collection (T0)

Patients were received a panorex. Then, two expert clinicians performed periodontal charting using the periodontal probe, "North Carolina." The diagnosis of the stage of periodontitis



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was conducted according to the new classification of periodontitis of the World Workshop of the European Federation of Periodontology (EFP) and the American Academy of Periodontology (AAP) 2017 (Tonetti et al. 2018).

The operators have been previously calibrated to ensure accurate data collection and the effective execution of motivational interventions, in order to optimize the support and monitoring process.

The following clinical data were collected for each patient:

- Plaque Control Record (PCR)

  The percentage value was calculated as follows: Number of surfaces with plaque/Total number of surfaces examined × 100. The lower the percentage, the better the plaque control; the higher the percentage, the worse the oral hygiene.

- Gingival Bleeding Index (GBI)

  The calculation to the GBI was as follows: number of bleeding sites/number of evaluated sites × 100. The percentage value was as follows: number of bleeding sites/number of evaluated sites × 100.

For the assessment of lifestyles in relation to general and oral health, a structured questionnaire based on scientifically validated instruments was administered. The questionnaire consisted of 13 questions covering key areas such as smoking and alcohol consumption, diet and nutrition, physical activity, sleep quality, and stress levels.

Questionnaire items were meticulously modified from empirically validated measurement instruments to provide both accuracy and reliability of all measurements for diverse lifestyle variables. The quantification of smoking habits was accomplished with the Fagerström Test for Nicotine Dependence (FTND), a tested instrument for quantifying the degree of physical nicotine addiction, as explained by Heatherton et al. (1991). Patterns of alcohol consumption were assessed using the Alcohol Use Disorders Identification Test (AUDIT), a screening instrument designed by the World Health Organization (WHO 2001) for detecting excessive or dangerous patterns of drinking. Diet was measured by the Healthy Eating Index (HEI), a tool developed by Kennedy et al. (1995) for measuring compliance with nutritional recommendations and the quality of one's diet. Physical activity was quantified by the International Physical Activity Questionnaire (IPAQ), a standard tool validated by Craig et al. (2003) for determining activity levels among various populations. Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI), a widely used tool developed by Buysse et al. (1989) to examine sleep disturbances and the general condition of sleep health. In addition, the perceived stress levels were evaluated using the Perceived Stress Scale (PSS), a questionnaire developed by Cohen et al. (1983) for the purpose of measuring the degree to which people view situations as stressful in their daily lives (Heatherton et al. 1991; World Health Organization 2001; Kennedy et al. 1995; Craig et al. 2003; Buysse et al. 1989; Cohen et al. 1983).

The questionnaire utilizes a scoring system that yields both a total score, which is helpful in assessing the participant's overall lifestyle profile, and subscores for each domain, allowing for the identification of risk behaviors and possible changes.

The full questionnaire is shown in Appendix A.

## 2.2 | Phase 1: Interventions and Monitoring

The control group received traditional OHI using the tell-show-do method, which was personalized based on the individual PCR and GBI. The recommendations were tailored to each participant, based on personalized instructions to improve plaque control, decrease gingival inflammation, and facilitate optimal patient compliance, contributing to oral hygiene performance.

In the experimental group, Medical Coaching was conducted according to a structured protocol that integrated the principles of the GROW Model (Goal, Reality, Options, Will), promoting guided reflection on the starting situation, the identification of emotional barriers, the definition of SMART objectives and the planning of personalized strategies. This approach allowed patients to be actively involved in the development of a motivational action plan aimed at improving oral hygiene and lifestyles related to periodontal health.

Both groups received the same amount of clinical contact, both in terms of number and duration of meetings. In particular, the control group also benefited from an empathetic and motivational approach, albeit in a more traditional manner. The main difference between the groups was not in the time or attention received but in the methodology adopted.

Both groups underwent intermediate checks at 2 weeks to address any issues. In the control group, traditional oral hygiene instructions were reinforced, with positive reinforcement and encouragement to adhere to oral hygiene practices, respecting the principles of effective communication and patient care, while in the Medical Coaching group, a strengthening intervention was carried out with a short follow-up session to assess progress and difficulties. Where necessary, objectives, options, and barriers were recalibrated, adapting the action plan to the patient's individual journey.

## 2.3 | Phase 2: Reevaluation (T1—After 4-Week)

Four weeks later both groups were reassessed, specifically with:

- The measurement of plaque index (PCR) and gingival bleeding index (GBI).
- The repetition of lifestyle questionnaires.

The full study protocol is available on request from the corresponding author.

## 2.4 | Statistical Analysis

Data were analyzed using appropriate statistical methods to assess the effects of the Medical Coaching (MOCH) intervention



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on clinical and behavioral outcomes. The normality of continuous variables was assessed using the Shapiro–Wilk test. Since data did not follow a normal distribution, continuous variables were expressed as medians and interquartile ranges (IQR) and compared using the Mann–Whitney *U* test. Categorical variables were presented as absolute and relative frequencies and analyzed using the Chi-squared or Fisher's exact test, as appropriate.

Between-group comparisons were conducted both at baseline (T0) and after 1 month (T1). Additionally, changes in clinical and lifestyle parameters at T1 relative to T0 were calculated for each participant, and the differences between groups in these variations were analyzed using the Mann–Whitney *U* test.

To evaluate the primary outcome, the achievement of the composite outcome at 1 month (PCR < 30% and GBI < 10%), a univariate analysis was first performed to identify potential predictors. Then, a multivariate logistic regression model was performed to assess the independent effect of the MOCH intervention while adjusting for confounders. Variables associated with the composite outcome in univariate analysis ($p < 0.20$) were included as covariates, including baseline PCR and GBI values. Collinearity among predictors was checked using variance inflation factors (VIF). Adjusted odds ratios (OR) with 95% confidence intervals (CI) were reported.

For the secondary analysis on lifestyle modifications, changes in individual lifestyle sub-scores (smoking and alcohol consumption, diet, physical activity, sleep, and stress) from T0 to T1 were dichotomized. Participants were classified based on whether they had an increase of at least one point in each sub-score. Between-group differences in lifestyle improvements were assessed using Chi-squared or Fisher's exact tests.

To complement the analysis of statistical significance, we also calculated Cliff's Delta ($\delta$) as a non-parametric measure of effect size for the main outcomes (PCR, GBI, and Lifestyle Score) (Meissel and Yao 2024). Cliff's $\delta$ quantifies the degree of non-overlap between two distributions and is particularly suitable for non-normally distributed data (Meissel and Yao 2024; Cliff 1993). Effect sizes were interpreted according to established thresholds (Cliff 1996), where $\delta$ values of 0.15, 0.33, and 0.47 correspond to small, medium, and large effects, respectively. Confidence intervals for Cliff's $\delta$ were estimated using bootstrap resampling.

The sample size was determined based on the expected difference in the composite outcome between the treatment and control groups. Preliminary data indicated that the composite outcome occurs in 40% of the control group. The intervention was hypothesized to increase this proportion to 80%. A power analysis was performed using Fisher's exact test in G*Power (version 3.1) with a two-tailed $\alpha$ of 0.05 and 80% power ($1-\beta = 0.80$). The analysis determined that 27 participants per group (total 54 participants) would be required to detect a statistically significant difference.

All statistical tests were two-tailed, and a $p$-value < 0.05 was considered statistically significant. $p$-values from the five behavioral outcomes were adjusted using the Benjamini–Hochberg method to control the false discovery rate (FDR = 0.05). Statistical analyses were performed using Jamovi Computer Software (version 2.6).

## 3 | Results

A total of 64 patients were analyzed, with 32 assigned to the Medical Coaching group and 32 to the control group. Of the participants, 36 (56.3%) were women. The median age was 52 years [45–62], with the youngest patient being 26 years old and the oldest 70. The most frequently observed periodontal stage was stage III, with 40 patients (62.5%), followed by stage II with 9 patients (28.1%), and stage IV with 4 patients (12.5%).

All participants completed the 1-month follow-up; no participant losses or drop-outs were recorded. The flow of participants throughout the trial is illustrated in Figure 1, in accordance with CONSORT 2010 guidelines.

### 3.1 | Baseline Characteristics and Clinical Parameters at 1-Month Follow-Up

At baseline (T0), the two study groups were comparable in terms of age, sex distribution, and periodontal stage (Table 1). Although a higher proportion of male patients was observed in the control group, the difference was not statistically significant. The median Plaque Control Record (PCR) value at T0 was 67.0 [48.8; 88.0] in the Medical Coaching group and 66.5 [52.3; 71.5] in the control group. After 1 month (T1), PCR decreased to 23.0 [14.0; 27.0] and 27.0 [21.5; 35.3], respectively. Similarly, the Gingival Bleeding Index (GBI) at baseline was higher in the Medical Coaching group (59.0 [43.8; 76.3]) than in the control group (37.0 [18.8; 53.8]); at T1, values decreased to 7.5 [6.0; 9.0] and 10.5 [6.8; 15.5], respectively (Table 1).

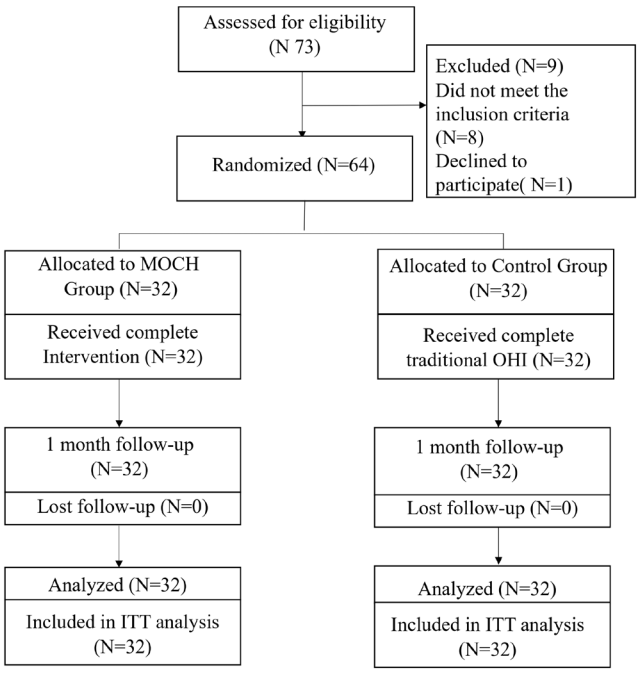



**FIGURE 1** | CONSORT 2010 flowchart.



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**TABLE 1** | Baseline characteristics and clinical outcomes of patients undergoing Medical Coaching versus Control group.

| Parameter | Group | | *p* |
|---|---|---|---|
| | MOCH ($n=32$) | Control ($n=32$) | |
| Age | 51.5 [44.5; 58.0] | 52.5 [45.0; 65.0] | 0.282 |
| Sex | | | |
| Female | 21 (65.6%) | 15 (46.9%) | 0.131 |
| Male | 11 (34.4%) | 17 (53.1%) | |
| Periodontitis stage | | | |
| II | 7 (21.9%) | 9 (28.1%) | 0.932 |
| III | 21 (65.6%) | 19 (59.4%) | |
| IV | 4 (12.5%) | 4 (12.5%) | |
| Plaque Control Record (PCR) | | | |
| Baseline (T0) | 67.0 [48.8; 88.0] | 66.5 [52.3; 71.5] | 0.192 |
| One month (T1) | 23.0 [14.0; 27.0] | 27.0 [21.5; 35.3] | 0.021 |
| Gingival Bleeding Index (GBI) | | | |
| Baseline (T0) | 59.0 [43.8; 76.3] | 37.0 [18.8; 53.8] | $<0.001$ |
| One month (T1) | 7.50 [6.00; 9.00] | 10.5 [6.75; 15.5] | 0.037 |

*Note:* Data show as median [interquartile range] or frequency (percentages).
Abbreviation: MOCH: Medical Coaching on Oral Health.

The change in PCR from baseline to 1 month (T1–T0) was significantly greater in the Medical Coaching group compared to the control group (−44.0 vs. −32.0; $p=0.003$). The between-group difference in the change was 14.5 percentage points [95% CI: 1.8–31.8], with a medium effect size (Cliff's $\delta=0.39$; 95% CI: 0.12–0.64). For GBI, the reduction from baseline was −47.5 in the Medical Coaching group and −24.5 in the control group, resulting in a significant difference of 28.0 percentage points (95% CI: 14.0–45.8; $p<0.001$), also with a medium effect size ($\delta=0.41$; 95% CI: 0.13–0.66) (Figure 2, Table 2).

## 3.2 | Achievement of the Composite Outcome at 1 Month

Regarding the composite outcome, defined as achieving both PCR <30% and GBI <10%, no patients in the Medical Coaching group and only two in the control group met this target at baseline (0% vs. 6.3%, $p=0.492$), confirming comparable starting conditions. After 1 month, a significantly greater proportion of patients in the Medical Coaching group achieved the composite outcome compared to controls (75.0% vs. 34.4%, $p=0.001$), indicating a marked clinical benefit associated with the intervention for the primary endpoint of the study.

Since a significant difference was found between cases and controls in achieving the composite outcome at T1, we further analyzed potential factors associated with reaching this outcome.

Patients who achieved the composite outcome at T1 were significantly younger, with a median age of 47 years [39.5; 56.5], compared to 57 years [47.0; 65.0] in those who did not ($p=0.002$). Additionally, a higher proportion of female patients reached the composite outcome (68.6% vs. 41.4%, $p=0.029$). Although periodontal stage distribution did not show a statistically significant association with the composite outcome ($p=0.152$), a trend was observed where stage II periodontitis was more frequent among patients who achieved the outcome (34.3% vs. 13.8%), while stage IV was more common among those who did not (17.2% vs. 8.6%). Baseline PCR and GBI were not significantly different between groups ($p=0.065$ and $p=0.613$, respectively), suggesting that initial levels of plaque and gingival bleeding did not strongly influence outcome achievement. Finally, the Lifestyle Score at baseline was similar between groups (25.0 [23.0; 26.0] in non-achievers vs. 25.0 [23.0; 27.0] in achievers, $p=0.613$), indicating that initial lifestyle differences did not play a major role in determining the composite outcome at T1 (Table 3).

To assess the independent effect of the Medical Coaching intervention on achieving the composite outcome at 1 month, a multivariate logistic regression analysis was performed. Variables associated with the outcome in univariate analysis with a $p$-value <0.20 and GBI at baseline were included in the model to control for potential confounding factors. A multivariate logistic regression confirmed that Medical Coaching significantly increased the odds of achieving the composite outcome (OR = 14.67; 95% CI: 3.01–71.48), even after adjusting for age, sex, baseline PCR, periodontal stage, and lifestyle score. Younger age (OR = 0.90 per year; 95% CI: 0.82–0.98), female sex (OR = 0.22; 95% CI: 0.05–0.97), and lower baseline PCR (OR = 0.96; 95% CI: 0.92–0.99) were also independently associated with greater success.

Figure 3 shows the predicted probability of achieving the Composite Outcome at 1 month by age, sex, and treatment group estimated with the multivariate logistic model.

These findings confirm that Medical Coaching significantly increases the likelihood of achieving optimal oral hygiene outcomes at 1 month, even after adjusting for demographic and clinical characteristics.

## 3.3 | Analysis of Treatment Effects on Lifestyle Changes

The Lifestyle Score improved significantly in the Medical Coaching group. At T0, patients in the Medical Coaching group had a median score of 24.5 [23.0; 26.0], which increased to 26.5 [25.0; 28.0] at T1, with a median change of +2.00 [1.00; 3.00]. In the control group, the score remained relatively stable, from 26.0 [24.0; 27.0] to 25.5 [24.0; 27.0], with a median change of +0.00 [0.00; 0.00]. The difference in the changes between the two groups was statistically significant ($p<0.001$) and the effect size was large ($\delta=0.84$; 95% CI: 0.69–0.95), indicating that Medical Coaching had a positive impact on improving lifestyle compared to the controls.



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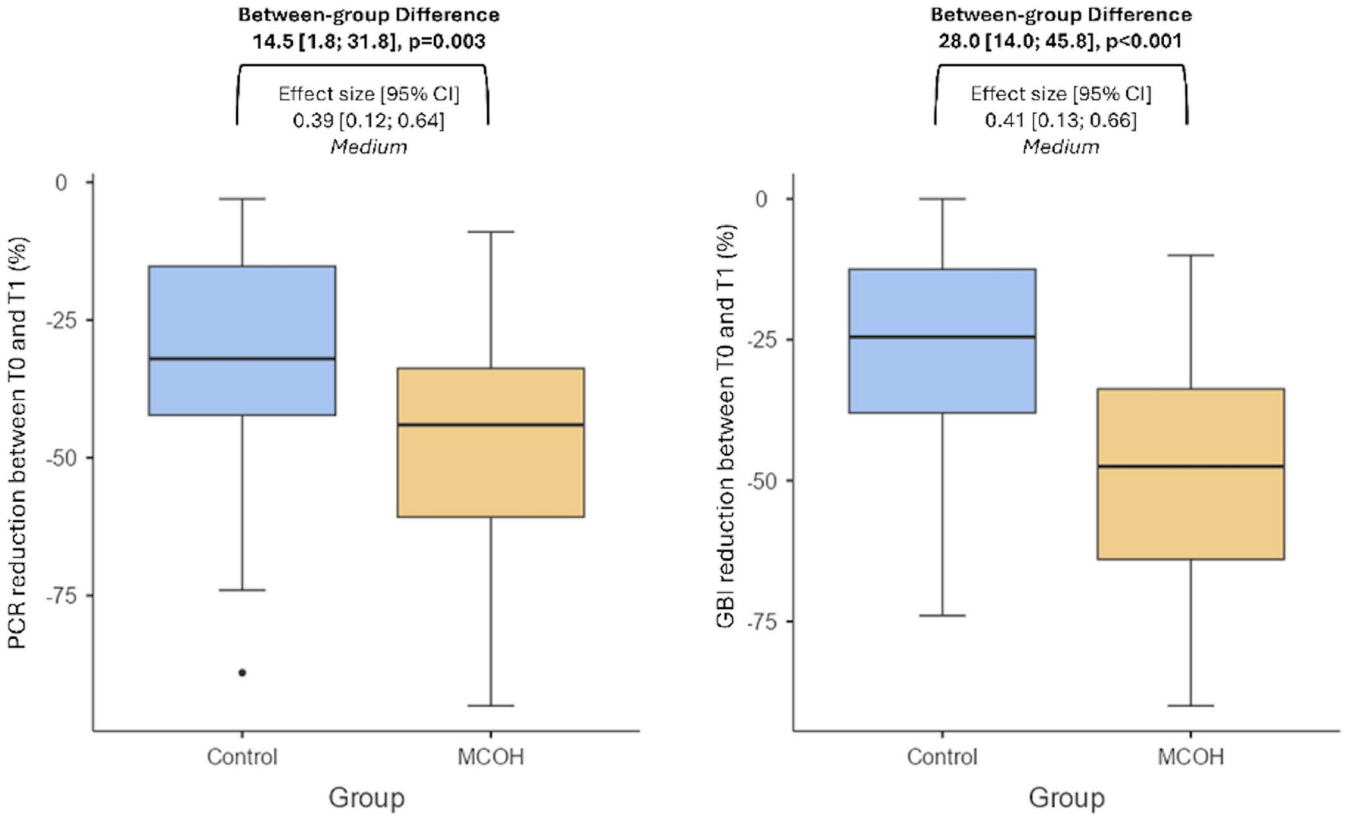



**FIGURE 2** | Change in clinical outcomes (baseline to 1 month) by treatment group. Boxplots showing the change in full-mouth Plaque Control Record (PCR) and Gingival Bleeding Index (GBI) from baseline (T0) to 1 month (T1), stratified by treatment group (Medical Coaching vs. Control). Negative values for PCR and GBI indicate clinical improvement.

**TABLE 2** | Between-group differences in outcome changes from baseline to 1 month for PCR and GBI, with effect size estimates (Cliff's Delta).

| Outcome | Δ (T1–T0) MOCH group | Δ (T1–T0) Control group | Between-group difference | Effect size[a] [95% CI] |
|---|---|---|---|---|
| PCR (reduction) | −44.0 [−60.8; −33.8] | −32.0 [−42.3; −15.3] | 14.5 [1.8; 31.8] | 0.39 [0.12; 0.64] *Medium* |
| GBI (reduction) | −47.5 [−64.0; −33.8] | −24.5 [−38.0; −12.5] | 28.0 [14.0; 45.8] | 0.41 [0.13; 0.66] *Medium* |

[a]Non-parametric effect size (Cliff's Delta, $\delta$) (0.15–0.33 small, 0.33–0.47 medium, > 0.47 large effects).

To better understand the impact of the Medical Coaching intervention on lifestyle behavior, we analyzed changes across five subdomains: smoking and alcohol, diet, physical activity, sleep, and stress. A positive change was defined as an increase of at least one point in the sub-score from T0 to T1. Significant improvements were observed in the Medical Coaching group in terms of smoking/alcohol behavior (40.6% vs. 3.1%; $p = 0.001$) and stress management (68.8% vs. 6.2%; $p < 0.001$). No significant differences were observed in diet, physical activity, or sleep between groups (Table 4).

## 4 | Discussion

The collected data indicate that dental practitioners need to actively involve patients in behavioral modification processes (Kay et al. 2016). This tendency is supported by our research, which shows that when compared to traditional education, MOCH has greatly enhanced the clinical outcomes. According to the study's findings, following a month of intervention, the MOCH group's members showed noticeably larger declines in their GBI and PCR compared to the control group. This implies that long-lasting behavioral adjustments can be facilitated by a customized strategy built on motivational support.

These results are consistent with other research showing that motivational coaching techniques can greatly enhance health-related behaviors when compared to oral health education alone. Goal-setting, planning for behavioral changes, and self-monitoring are the methods used to accomplish this (Newton and Asimakopoulou 2021). Personalization of support, which enables instructional tactics to be tailored to each patient's unique needs, is one of MOCH's unique features. This method is founded on Carl Rogers' person-centered care principles, which prioritize support, empathy, and respect.



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According to Buchanan et al. (2021), adopting the COM-B model and TDF framework in oral and dental research for goal setting has increased patient motivation and adherence, making it easier to reach progressive and sustainable milestones (Buchanan et al. 2021).

These findings imply that, in contrast to conventional teaching approaches, the combination of individualized intervention, support techniques, and motivational coaching may be a successful way to manage periodontitis.

**TABLE 3** | Comparison of baseline characteristics between patients who achieved versus did not achieve the composite outcome at 1 month.

| | Composite outcome at 1 month | | |
|---|---|---|---|
| **Parameter** | **No ($n=29$)** | **Yes ($n=35$)** | ***p*** |
| Age | 57 [47.0; 65.0] | 47 [39.5; 56.5] | 0.002 |
| Sex | | | |
| Female | 12 (41.4%) | 24 (68.6%) | 0.029 |
| Male | 17 (58.6%) | 11 (31.4%) | |
| Periodontitis stage | | | |
| II | 4 (13.8%) | 12 (34.3%) | 0.152 |
| III | 20 (69.0%) | 20 (57.1%) | |
| IV | 5 (17.2%) | 3 (8.6%) | |
| PCR at baseline | 67 [61.0; 80.0] | 63 [37.0; 76.5] | 0.065 |
| GBI at baseline | 53 [34.0; 64.0] | 45 [28.0; 71.0] | 0.613 |
| Treatment | | | |
| MOCH | 8 (27.6%) | 24 (68.6%) | 0.001 |
| Control | 21 (72.4%) | 11 (31.4%) | |
| Lifestyle Score at baseline | 25 [23.0; 26.0] | 25 [23.0; 27.0] | 0.613 |

*Note:* Data shows as median [interquartile Range] or frequency (percentages).
Abbreviations: GBI, Gingival Bleeding Index; MOCH, Medical Coaching on Oral Health; PCR, Plaque Control Record.

This observation aligns with findings from other chronic care settings. Health and medical coaching approaches have been successfully applied in the management of chronic conditions such as type 2 diabetes, cancer, and hypertension, improving adherence, stress regulation, and patient empowerment (Wolever et al. 2020; Hackett et al. 2022). These cross-disciplinary results reinforce the idea that the MCOH model represents not just a technical innovation in periodontology, but also part of a broader cultural and clinical shift toward a more person-centered, biopsychosocial, and customized approach to chronic disease management.

A randomized clinical trial examined how well an educational program grounded in person-centered care and behavioral theory could help adolescents with their oral hygiene (add reference). A control group that got traditional instructions and an intervention group that received behaviorally based oral health education comprised the 312 teenagers with poor oral hygiene who participated in the trial. Gum bleeding and plaque ratings significantly improved in both groups after 6 months, with the intervention group showing the biggest gains.

Our findings reinforce this pattern, indicating that motivational support and active patient involvement encourage better adherence to oral hygiene habits and lower the chance of relapse, providing a substantial benefit over conventional teaching strategies. This study does not, however, offer long-term findings that would support its importance over time. In reality, the frequency and continuity of the intervention, in addition to its quality, determine how effective motivational coaching is.

According to Huang et al., behavioral change-oriented motivational treatments are more successful than oral hygiene education; however, in order to produce longer-lasting effects, they should be short and repeated over time rather than in isolated sessions (Huang et al. 2018). Although the 1-month

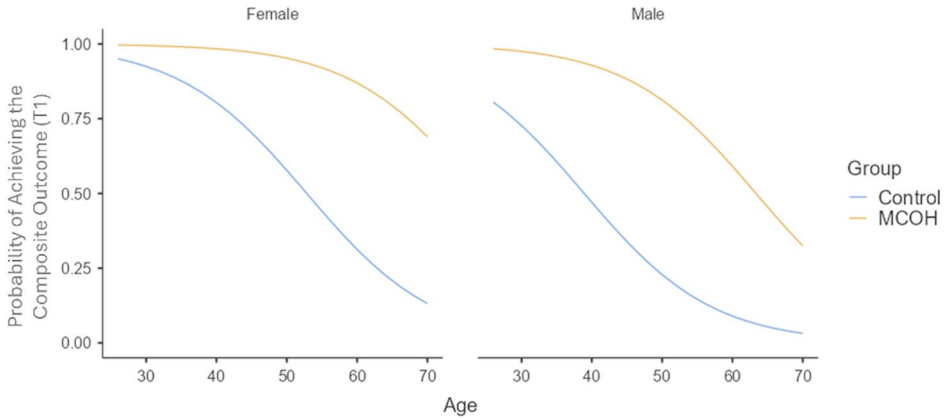



**FIGURE 3** | Predicted probability of achieving the composite Outcome at 1 month by age, sex, and treatment group. Logistic regression model predicting the probability of achieving the composite outcome (defined as simultaneous reduction in Plaque Control Record [PCR] and Gingival Bleeding Index [GBI]) at 1 month. Curves are stratified by sex and treatment group and adjusted for baseline variables. The horizontal axis represents age, and the vertical axis represents predicted probability. The figure illustrates higher predicted probabilities in the Medical Coaching group across age and sex strata.



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**TABLE 4** | Treatment effects on lifestyle changes by thematic areas.

| Parameter | Group | | *p* |
|---|---|---|---|
| | MOCH ($n=32$) | Control ($n=32$) | |
| Smoking and alcohol | | | |
| Yes | 13 (40.6%) | 1 (3.1%) | <0.001 |
| Not | 19 (59.4%) | 31 (96.9%) | |
| Diet | | | |
| Yes | 0 (0%) | 2 (6.2%) | 0.492 |
| Not | 32 (100%) | 30 (93.8%) | |
| Physical activity | | | |
| Yes | 4 (12.5%) | 2 (6.2%) | 0.672 |
| Not | 28 (87.5%) | 30 (93.8%) | |
| Sleep | | | |
| Yes | 0 (0%) | 1 (3.1%) | 1.000 |
| Not | 32 (100%) | 31 (96.9%) | |
| Stress | | | |
| Yes | 22 (68.8%) | 2 (6.2%) | <0.001 |
| Not | 10 (31.2%) | 30 (93.8%) | |

*Note:* "Yes" indicates an increase of at least 1 point in the sub-score at T1 compared to T0, while "not" indicates no increase.

follow-up may have been insufficient to detect cumulative effects, our investigation supports qualitative evidence.

The improvement in lifestyle habits among patients who adhered to the MOCH protocol, a shift not seen in the control group, was another noteworthy finding of the study. According to an examination of the treatment's impact on lifestyle adjustments, the intervention successfully encouraged behavioral changes in the areas of "smoking and alcohol consumption" and "stress," which in turn improved general health (Macrì et al. 2024). This research shows how Medical Coaching can improve psychological health, which may help people stick to their oral hygiene routines and make lifestyle changes.

Only a small portion of participants in both groups reported improvements in their sleep and physical activity patterns, while the MOCH group did not show any improvements in their diet. According to these findings, Medical Coaching was successful in changing certain lifestyle-related habits, although over the 1-month trial period, its effects on sleep, exercise, and nutrition were minimal. Whether a longer intervention period could result in more notable changes in these areas would require more investigation. According to earlier research, changing these factors necessitates a longer-term intervention, as the paper regarding sleep (Simon et al. 2023).

### 4.1 | Study Restrictions and Prospects for the Future

In spite of the favorable results, this research has some limitations that need to be considered in future studies.

One of the significant limitations identified is the shortness of the follow-up duration coupled with the small sample size. The observation period of 1 month precludes an adequate assessment of the effectiveness of Medical Coaching in the long term. In order to establish if the benefits observed are maintained over a longer duration, future research should both enlarge the sample size and lengthen the follow-up period to improve the validity of the results.

Additionally, a lifestyle questionnaire was used to evaluate behavioral change, which has not been officially validated. The use of a non-validated instrument could influence data reliability. The use of standardized and validated measurement tools would increase data precision and reproducibility in future trials.

Another issue is the absence of longitudinal evaluations of changes in lifestyle. While improvement in stress management, alcohol use, and smoking was detected in the study, it remains uncertain if such changes in behavior are maintained in the long term and if these will translate to beneficial impacts on general and oral health in the long term. Future research must place high priority on examining the duration of such changes in behavior and their impacts in the long run.

Additionally, one of the keen limitations of the present study is that blinding of outcome assessors was absent, and this could have impacted the measurement of clinical and behavioral outcomes. While participants were unaware of the groups to which they had been allocated, the failure to blind the outcome assessors provides one avenue for bias. To help maximize the validity of future findings, it is advised that outcomes should be blinded before being assessed in order to minimize the potential of subjective influences on data interpretation. We also recognize that the coaching intervention involves greater patient activation and a more person-centered communication style. These non-specific effects may have contributed to the outcomes independently of the content of the intervention. For this reason, we suggest that future studies include a control group receiving structured attention, in order to better isolate the specific effects of medical coaching. The study was conducted in a single center with a specific demographic, which limits the generalizability of the findings. Future multicenter trials with more diverse populations are needed to evaluate the broader applicability of the intervention. Additionally, no cost-effectiveness analysis was included in this study. Future research should consider assessing the economic sustainability and scalability of medical coaching in clinical settings.

## 5 | Conclusion

The results of this study show that medical coaching is more potentially promising than traditional education alone to improve oral health in people with periodontitis by lowering plaque and gum bleeding. Additionally, the intervention helped to enhance some areas of lifestyle, including stress management, alcohol intake, and smoking decrease.

These findings suggest the value of a multidisciplinary approach in the management of chronic illnesses, combining motivational support with instructional tactics to increase treatment efficacy and adherence. To assess whether these advantages will last



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over time and how they affect the development of periodontitis, more research is necessary.

### Author Contributions

**Anna Antonacci:** conceptualization, investigation, writing – original draft, methodology, validation, visualization. **Giuseppe D'Albis:** conceptualization, investigation, writing – original draft, methodology, validation, visualization, writing – review and editing, formal analysis, data curation. **Nicola Bartolomeo:** writing – original draft, validation, formal analysis. **Maria Teresa Agneta:** investigation, visualization, methodology. **Antonia Abbinante:** investigation, visualization, methodology. **Lorenzo Marini:** writing – review and editing, data curation, formal analysis. **Andrea Pilloni:** resources, supervision, project administration, writing – review and editing. **Saverio Capodiferro:** writing – review and editing, visualization, validation, methodology, writing – original draft, project administration, resources, supervision, data curation, formal analysis, software.


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### Conflicts of Interest

The authors declare no conflicts of interest.

### Data Availability Statement

The data that supports the findings of this study are available in the Supporting Information of this article.

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## Appendix A

### Lifestyle Questionnaire

1. How many cigarettes do you smoke on average per day? (Adapted from the Fagerström Test for Nicotine Dependence—FTND)
   - I do not smoke (3 points)
   - 1–5 cigarettes (2 points)
   - 6–10 cigarettes (1 point)
   - More than 10 cigarettes (0 points)

2. Have you reduced the number of cigarettes in the last month? (Adapted from the Transtheoretical Model—TTM)
   - Yes, I have quit completely (3 points)
   - Yes, I have reduced the number of cigarettes (2 points)
   - No, I smoke the same number of cigarettes (1 point)
   - No, I have increased the number of cigarettes (0 points)

3. How often do you consume alcohol in large quantities (6 or more drinks on one occasion)? (Adapted from the AUDIT—Alcohol Use Disorders Identification Test)
   - Never (3 points)
   - Less than once a month (2 points)
   - 1–3 times a month (1 point)
   - Once a week or more (0 points)

4. How many portions of fruit and/or vegetables do you consume on average per day? (Adapted from the Healthy Eating Index—HEI)
   - 5 or more (3 points)
   - 3–4 (2 points)
   - 1–2 (1 point)
   - None (0 points)

5. How often do you consume foods high in sugar (sweets, soft drinks)? (Adapted from the Healthy Eating Index—HEI)
   - Never or rarely (3 points)
   - 1–2 times a week (2 points)
   - 3–5 times a week (1 point)
   - Almost every day (0 points)

6. How many minutes/week do you devote to moderate or intense physical activity? (Adapted from the International Physical Activity Questionnaire—IPAQ)
   - 150+ minutes (more than 2 h 30 min) (3 points)
   - 60–149 min (2 points)
   - Less than 60 min (1 point)
   - None (0 points)

7. How many days a week do you walk for at least 10 consecutive minutes? (Adapted from the International Physical Activity Questionnaire—IPAQ)
   - 5 or more days (3 points)
   - 3–4 days (2 points)
   - 1–2 days (1 point)
   - Never (0 points)

8. How many hours do you sleep on average per night? (Adapted from the Pittsburgh Sleep Quality Index—PSQI)
   - 7–8 h (3 points)
   - 6–7 h (2 points)
   - 5–6 h (1 point)
   - Less than 5 h (0 points)

9. Do you feel rested when you wake up? (Adapted from the Pittsburgh Sleep Quality Index—PSQI)
   - Always (3 points)
   - Often (2 points)
   - Rarely (1 point)
   - Never (0 points)

10. In the last month, how often have you felt nervous and stressed? (Adapted from the Perceived Stress Scale—PSS)
    - Never (3 points)
    - Rarely (2 points)
    - Often (1 point)
    - Always (0 points)

11. How often have you had difficulty relaxing? (Adapted from the Perceived Stress Scale—PSS)
    - Never (3 points)
    - Rarely (2 points)
    - Often (1 point)
    - Always (0 points)

12. How often have you felt that everything was going the right way? (Inversely correlated with stress level)
    - Always (3 points)
    - Often (2 points)
    - Rarely (1 point)
    - Never (0 points)

13. In the last month, how often have you found that you could not cope with all the things that you had to do? (Adapted from the Perceived Stress Scale—PSS)
    - Never (3 points)
    - Rarely (2 points)
    - Often (1 point)
    - Always (0 points)



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