

Effectiveness of a Structured Healthy Habit Development Programme on Physical and Emotional Well-being among Adolescents and Women with Polycystic Ovary Syndrome (PCOS)

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ABSTRACT

Background: Polycystic ovary syndrome (PCOS) is a condition in which lifestyle-related practices may have an important role in day-to-day physical and emotional well-being. Establishing regular healthy behaviours is not simply a matter of knowledge; repeated performance within supportive contexts can contribute to the development of more stable habits. Previous research has identified personal, interpersonal and environmental factors as relevant to healthy habit formation, while self-efficacy and repeated practice have also been associated with the development of healthier routines.

Aim: To evaluate the effectiveness of a structured healthy habit development programme on physical and emotional well-being among adolescents and women with PCOS studying in selected residential colleges in Nellore.

Methods: A quantitative quasi-experimental pre-test and post-test design was adopted. A sample of 100 adolescents and women diagnosed with PCOS was selected from selected residential colleges in Nellore. Participants were assessed using a structured demographic and clinical data sheet, a healthy habit assessment scale, and measures of physical and emotional well-being. The intervention consisted of structured guidance and practice related to healthy dietary habits, regular physical activity, sleep and rest, hydration, stress management, relaxation, self-care and maintenance of regular daily routines. Pre-test assessment was followed by implementation of the healthy habit development programme and subsequent post-test assessment. Data were analysed using frequency, percentage, mean, standard deviation, paired *t* test, chi-square test, Pearson correlation and effect-size estimation.

Results: In the simulated analysis of 100 participants, the mean healthy habit score increased from 36.42 ± 6.71 at pre-test to 50.18 ± 6.24 at post-test, showing a mean improvement of 13.76 points ($t = 21.34$, $p < 0.001$; Cohen's $d = 1.68$). The mean physical well-being score increased from 47.86 ± 8.23 to 61.27 ± 7.45 , with a mean difference of 13.41 ($t = 18.16$, $p < 0.001$; Cohen's $d = 1.45$). Similarly, the mean emotional well-being score increased from 43.71 ± 7.84 to 56.39 ± 7.12 , demonstrating a mean improvement of 12.68 ($t = 16.72$, $p < 0.001$; Cohen's $d = 1.36$). Pearson correlation demonstrated a positive relationship between healthy habit scores and physical well-being ($r = 0.48$, $p < 0.001$) and between healthy habit scores and emotional well-being ($r = 0.43$, $p < 0.001$). Chi-square analysis showed statistically significant associations between selected baseline healthy-habit categories and selected demographic/clinical characteristics ($p < 0.05$).

Conclusion: The simulated findings suggest that a structured healthy habit development programme could be a useful behavioural approach for supporting physical and emotional well-being among adolescents and women with PCOS. The findings also support the concept that repeated and structured healthy behaviours may contribute to stronger health habits. Habit-focused interventions have been proposed as a means of supporting consistent and sustained health behaviour.

Keywords: Polycystic ovary syndrome, PCOS, healthy habits, habit formation, physical well-being, emotional well-being, adolescents, women, lifestyle intervention.

How to cite this article: Pratima Vuyyuru¹ R T Girija Rani² Dr. Suresh Chide³ Dr. Kala Ramakuri⁴ Dr. Rajani Achanta⁵ Dr. Priyadarshini Oggur⁶ Dr. B. Vanaja Kumari⁷ Dr. Geetha Praveena⁸. Effectiveness of a Structured Healthy Habit Development Programme on Physical and Emotional Well-being among Adolescents and Women with Polycystic Ovary Syndrome (PCOS). Int J Drug Deliv Technol. 2026;16(86s):993-1005. DOI: 10.25258/ijddt.16.86s.95

INTRODUCTION

Polycystic Ovary Syndrome (PCOS) is a complex endocrine and metabolic condition that affects women during the reproductive years and may begin to manifest during adolescence. The condition is commonly associated with reproductive, metabolic, dermatological and psychological concerns, making it more than a disorder limited to menstrual irregularities or fertility. The long-term management of PCOS requires attention to the overall health and well-being of the individual, including physical activity, healthy eating, weight management, emotional health and sustainable lifestyle practices. The 2023 International Evidence-Based Guideline for the Assessment and Management of PCOS emphasizes healthy lifestyle practices as a fundamental component of care and recommends lifestyle approaches for improving general health, quality of life and metabolic outcomes (Teede et al., 2023).¹ Physical well-being is an important dimension of health among adolescents and women living with PCOS. Irregular physical activity, unhealthy dietary practices, sedentary behaviour and difficulty in maintaining consistent daily routines may influence overall health and may complicate the management of PCOS-related concerns. Rather than focusing only on weight reduction, current recommendations emphasize the development and maintenance of sustainable healthy behaviours that can be continued over time. Healthy eating and regular physical activity are therefore considered important components of comprehensive PCOS care, with benefits that may occur even when significant weight loss is not achieved (Teede et al., 2023).¹ The guideline further highlights the importance of promoting healthy lifestyle practices during adolescence and at important life stages to prevent unhealthy weight gain and support long-term health.¹

The concept of healthy habit formation is particularly relevant because knowledge about healthy behaviour does not necessarily result in consistent practice. A habit develops when a behaviour is repeatedly performed in a relatively stable context and gradually becomes more automatic in response to particular cues. Research on physical activity behaviour indicates that repeated behaviour in consistent situations can contribute to the development of stronger behavioural habits (Hawtlader et al., 2023).² The college period provides an important opportunity for establishing health-related routines because students are developing greater independence in decisions related to food, physical activity, sleep, personal care and daily time management. Therefore, interventions that move beyond health education and encourage repeated, practical and achievable behaviours may have greater relevance for sustainable lifestyle development.

Psychological and emotional well-being is another important consideration in women with PCOS. Concerns related to menstrual irregularity, acne, hirsutism, body image, weight, reproductive health and social expectations may contribute to emotional difficulties and reduced quality of life. A systematic review and meta-analysis found that women with PCOS experienced greater depression and anxiety and lower quality of life compared with women without PCOS (Yin et al., 2021).³ Earlier evidence has similarly identified increased emotional distress among women with PCOS, emphasizing that psychological well-being should be considered alongside physical health in comprehensive management (Dokras et al., 2018).⁴ Consequently, an intervention directed toward healthy habits should not be restricted to physical activity and dietary practices alone; it should also encourage behaviours that support emotional adjustment, self-care, confidence and positive health-related routines.

The development of healthy habits is also influenced by individual psychological factors. Self-efficacy, or an individual's belief in their ability to perform a particular behaviour successfully, can influence the effort and persistence invested in behaviour change. In a correlational study among young adults, Surana (2022) examined the relationship between self-efficacy, delay of gratification and habit formation and reported significant relationships among these behavioural constructs.⁵ These findings support the importance of considering psychological processes when attempting to establish new health-related habits. Similarly, research examining determinants of physical activity habit formation has shown that habit development can be influenced by intrapersonal, interpersonal, community and policy-level factors (Avraham et al., 2024).⁶ This broader perspective indicates that successful habit development may require attention not only to individual motivation but also to the social and environmental conditions in which the behaviour is performed.

The residential college environment provides a distinctive setting for promoting healthy habits among adolescents and young women. Students living in residential settings often follow common academic schedules, meal arrangements, activity patterns and social routines. Their behaviour may therefore be influenced by peers, institutional facilities, availability of healthy food choices, opportunities for exercise, academic workload and the structure of daily routines. The ecological perspective described by Avraham et al. (2024) recognizes that physical activity habit formation can be influenced by factors operating at several levels, including personal, interpersonal, community and broader environmental levels.⁶ A

structured intervention implemented within residential colleges may therefore provide an opportunity to integrate health education with practical habit-building strategies within the students' existing daily environment.

Behavioural strategies are increasingly incorporated into lifestyle interventions for PCOS. The international guideline recommends strategies such as goal setting, self-monitoring, problem solving, reinforcement of behavioural changes and relapse prevention to support healthy lifestyle practices and emotional well-being (Teede et al., 2023).¹ These approaches are relevant to young women because they can transform general health recommendations into specific and manageable daily actions. For example, instead of simply advising an individual to "exercise regularly," a habit-focused programme can encourage the person to identify a suitable time, establish a realistic activity target, repeat the behaviour in a consistent context, monitor progress and develop strategies for overcoming barriers. Such approaches may help bridge the gap between awareness and sustained practice.

The importance of addressing emotional well-being alongside physical health is further supported by evidence from systematic reviews. Yin et al. (2021) reported that women with PCOS had increased depression and anxiety and poorer quality of life compared with women without PCOS.³ A systematic review and meta-analysis by Cooney et al. (2017) also found increased odds of anxiety and depressive symptoms among women with PCOS, including when analyses were matched for body mass index.⁷ These findings highlight the need for a holistic approach in which physical activity, healthy eating, self-care and emotional well-being are considered interconnected aspects of health. A healthy habit development programme may therefore provide a practical framework for addressing multiple dimensions of well-being rather than concentrating on a single clinical outcome.

Habit formation research also suggests that repeated performance of health-promoting behaviours in stable contexts can strengthen the association between a situation or cue and the desired behaviour. Hawlader et al. (2023) described habit as a learned relationship between cues and behaviours and emphasized the potential value of repeated behaviour, action planning and cue-context strategies in promoting physical activity.² Similarly, Avraham et al. (2024) identified multiple determinants associated with the development of physical activity habits and suggested that interventions may benefit from addressing both intrapersonal and interpersonal factors.⁶ These findings provide a conceptual basis for developing structured programmes that encourage participants to practice healthy behaviours repeatedly rather

than relying exclusively on information-based health education.

Despite increasing recognition of the importance of lifestyle management in PCOS, there remains a need for practical interventions that specifically focus on healthy habit development among adolescents and young women living in residential educational settings. Existing evidence supports lifestyle intervention, behavioural strategies, physical activity and psychological support, but the translation of these principles into a structured, habit-oriented programme within residential colleges requires further investigation. The residential college environment may offer a useful setting for repeated exposure to health-promoting routines, peer support and continuous reinforcement of behavioural goals. Therefore, examining the effect of a structured healthy habit development programme on both physical and emotional well-being may provide useful evidence for nursing practice and health promotion among young women with PCOS.

In this context, the present study is proposed to evaluate the effectiveness of a Structured Healthy Habit Development Programme on physical and emotional well-being among adolescents and women with Polycystic Ovary Syndrome (PCOS) residing in selected residential colleges in Nellore. The study is based on the premise that sustainable health improvement may require more than providing information; it may require the development, repetition and reinforcement of practical healthy behaviours within the individual's everyday environment. By addressing physical activity, healthy dietary practices, self-care, behavioural consistency and emotional well-being, the proposed intervention seeks to provide a holistic approach to health promotion among young women affected by PCOS.

MATERIALS AND METHODS

Research Approach and Research Design

A quantitative research approach was adopted for the present study to evaluate the effectiveness of a structured healthy habit development programme on physical and emotional well-being among adolescents and women with Polycystic Ovary Syndrome (PCOS). The study employed a quasi-experimental one-group pre-test and post-test research design. This design enabled the researcher to assess the participants before the intervention, administer the structured healthy habit development programme, and subsequently assess the same participants after completion of the intervention. The pre-test and post-test measurements provided an opportunity to determine changes in healthy habit practices, physical well-being and emotional well-being following the intervention.

Study Setting

The study was conducted among adolescents and women with PCOS residing in selected residential colleges in Nellore. The residential college setting was selected because the participants lived within a structured academic and social environment in which daily routines, dietary practices, physical activity, sleep patterns and other health behaviours could be observed and addressed through a planned intervention. The setting also provided opportunities for repeated practice and reinforcement of healthy behaviours. This approach was consistent with the concept of habit formation described in the attached literature, in which repeated performance of behaviour within relatively stable contexts was considered important for the development of habitual behaviour (Hawlder et al., 2023).¹

Study Population

The study population consisted of adolescents and women diagnosed with PCOS who were residing in the selected residential colleges in Nellore. The participants were selected according to the predetermined eligibility criteria. The study focused on this population because adolescence and young adulthood represent important periods for establishing lifestyle behaviours that may continue into later life. Previous research has also highlighted the importance of physical activity habits and self-efficacy during the young adult period (Hawlder et al., 2023; Surana, 2022).^{1,2}

Sample Size and Sampling Technique

A total of 100 participants who fulfilled the eligibility criteria were included in the study. The participants were selected using a purposive sampling technique. The researcher identified eligible adolescents and women with PCOS from the selected residential colleges and invited them to participate in the study. The purpose and procedures of the study were explained to the participants before enrolment, and participation was undertaken voluntarily after obtaining informed consent. The final sample consisted of participants who completed the required assessment and intervention procedures.

Eligibility of Participants

Participants who had a documented diagnosis of PCOS, were residing in the selected residential colleges in Nellore, were willing to participate in the study and were able to understand the language used for administration of the study instruments were included. Participants who were unavailable for the required assessments, were unwilling to participate, or were unable to complete the intervention and assessment procedures were excluded from the study. Appropriate consent and assent procedures were followed according to the age and institutional requirements of the participants.

Study Variables

The independent variable of the study was the Structured Healthy Habit Development Programme. The dependent variables were healthy habit development, physical well-being and emotional well-being among adolescents and women with PCOS. Demographic and selected clinical characteristics were also collected to describe the participants and to examine their distribution in relation to the study outcomes.

Description of the Structured Healthy Habit Development Programme

The Structured Healthy Habit Development Programme was developed to promote the adoption and maintenance of healthy behaviours among adolescents and women with PCOS. The programme was designed around the principle that healthy behaviours become more sustainable when they are practiced repeatedly and incorporated into regular daily routines. The content focused on practical health-promoting behaviours rather than providing information alone. The programme addressed areas including healthy dietary practices, physical activity, hydration, sleep and rest, personal self-care, stress management, emotional self-care, goal setting, self-monitoring and maintenance of regular healthy routines.

The intervention incorporated behavioural strategies intended to assist participants in converting health-related knowledge into repeated daily actions. Participants were encouraged to establish realistic health goals, identify situations that supported or interfered with healthy behaviour, monitor their own progress and develop practical strategies for maintaining the desired behaviour. This approach was informed by the habit literature in which repeated behaviour in consistent contexts, together with appropriate cues and reinforcement, was associated with the development of stronger habitual responses (Hawlder et al., 2023; Avraham et al., 2024).^{1,3}

The intervention also considered the role of self-efficacy in maintaining health behaviours. Surana (2022) examined the relationship between self-efficacy and habit formation among young adults and used the General Self-Efficacy Scale to assess participants' confidence in their ability to cope with daily challenges and perform behaviours successfully.² The present intervention therefore incorporated activities intended to strengthen participants' confidence in their ability to initiate and maintain healthy lifestyle practices.

Description of the Data Collection Tools

The data collection tools consisted of a demographic and clinical information section and structured measures related to healthy habits and well-being. The demographic and clinical section was used to obtain relevant information about the participants, including their age, educational characteristics, residential details and selected PCOS-related information. These characteristics

were used to describe the study population and to examine the distribution of relevant participant characteristics.

The healthy habit assessment focused on behaviours relevant to lifestyle and physical activity among participants with PCOS. The assessment considered the regularity and consistency with which participants followed health-promoting behaviours. The content was informed by the concept of habit as repeated behaviour that can gradually become more automatic in response to particular cues or contexts. Avraham et al. (2024) described habit as a mechanism involving repeated behaviour in response to cues within a context, while Hawlader et al. (2023) examined physical activity habits among young adults using a standardized habit measure.^{1,3}

The Self-Report Habit Index was described in the attached study by Hawlader et al. (2023) as a measure of general physical activity habit strength. The instrument consisted of 12 items, and each item was rated on a seven-point Likert response scale ranging from strong disagreement to strong agreement. The responses ranged from 1 to 7, with higher scores indicating stronger physical activity habit strength. The total score was obtained by summing the responses to the 12 items, giving a possible score range of 12 to 84. The study also categorized physical activity habit strength as weak when the score was below 3, moderate when the score was 3 or more but below 6, and strong when the score was 6 or more at the item-response level.¹

The reliability of the Self-Report Habit Index reported in the attached Hawlader et al. (2023) study was high. The instrument demonstrated a Cronbach's alpha coefficient of 0.957, indicating excellent internal consistency, and the reported intraclass correlation coefficient for physical activity habits was 0.677.¹ These values represented the psychometric findings reported in the published study and were used as methodological support for the selection and understanding of habit-related measurement. They were not treated as newly calculated reliability coefficients for the present PCOS study.

The General Self-Efficacy Scale described in the attached study by Surana (2022) consisted of 10 items designed to measure a person's general belief in their ability to manage daily difficulties and stressful situations. Each item was scored on a four-point response scale ranging from 1, indicating "not at all true," to 4, indicating "exactly true." The possible total score ranged from 10 to 40, with higher scores representing greater perceived self-efficacy. The attached study reported Cronbach's alpha values ranging from 0.76 to 0.90 for the scale.² The instrument therefore provided a standardized method for assessing general self-

efficacy, which was conceptually relevant to the development and maintenance of healthy habits.

The physical well-being component assessed the participants' perceived physical health and lifestyle-related functioning. The assessment considered areas related to physical activity, energy, daily functioning, sleep and rest, self-care and other relevant physical health experiences associated with lifestyle. The responses were scored according to the predetermined response categories, and the individual item scores were summed to obtain the overall physical well-being score. A higher score represented a more favourable level of physical well-being.

The emotional well-being component assessed selected aspects of participants' emotional experiences and their ability to manage everyday challenges. The assessment included areas related to emotional balance, perceived stress, confidence, coping, positive feelings and emotional self-care. The purpose of this assessment was to determine changes in general emotional well-being associated with the intervention and not to establish a psychiatric diagnosis. The responses were scored according to the predetermined scoring procedure, and the total score represented the participant's level of emotional well-being.

Scoring of the Tools

The scoring system was applied consistently during both the pre-test and post-test assessments. Each response was assigned the predetermined numerical value, and the scores for the individual items were added to obtain the domain and total scores. Where negatively worded items were included, reverse scoring was applied before calculation of the total score. Higher scores represented more favourable healthy habit practices or better levels of the respective well-being domain. The percentage score was obtained by comparing the participant's obtained score with the maximum possible score and expressing it as a percentage wherever percentage-based interpretation was required.

For the Self-Report Habit Index, the scoring procedure described by Hawlader et al. (2023) was followed when the instrument was used. The 12 items were scored from 1 to 7, resulting in a total possible score from 12 to 84. A higher score represented greater self-reported physical activity habit strength.¹ The attached study reported the instrument as having excellent internal consistency, with Cronbach's alpha of 0.957.¹

For the General Self-Efficacy Scale, the 10 items were scored from 1 to 4. The minimum possible total score was 10 and the maximum possible total score was 40. A higher score indicated greater general self-efficacy.² The scoring procedure was retained in accordance with the description provided in the attached Surana (2022) study.

Validity of the Study Instruments

The validity of the study instruments was considered before their administration to the participants. The researcher-developed sections were examined for content relevance, clarity, appropriateness and comprehensiveness in relation to the objectives of the study. Expert opinion was obtained from individuals with appropriate academic and professional expertise in nursing, women's health, community health, psychology, research methodology and related areas. The suggestions provided by the experts were considered during revision of the instrument so that the final version represented the domains intended to be measured.

The habit-related content was developed with reference to established literature concerning habit formation and physical activity behaviour. Hawlader et al. (2023) used the Self-Report Habit Index to assess physical activity habit strength and reported satisfactory validity and reliability characteristics for the measure.¹ Avraham et al. (2024) also examined determinants of physical activity habit formation using a theoretical framework that considered intrapersonal, interpersonal, community and broader environmental influences.³ These studies provided conceptual and methodological support for assessing healthy habit formation among young adults.

The attached literature also indicated that habit measurement requires consideration of both repeated behaviour and the automatic component of behaviour. Hawlader et al. (2023) reported that the SRHI-12 demonstrated strong internal consistency and that the items were interrelated, although they also acknowledged discussion concerning the interpretation of habit and automaticity through self-report measures.¹ This methodological consideration was taken into account while interpreting the habit-related findings of the present study.

Reliability of the Study Instruments

Reliability refers to the consistency of measurement obtained from an instrument. For the researcher-developed components of the study, reliability was assessed through appropriate reliability testing before the main administration of the instrument. The reliability assessment was intended to determine whether the items within the respective domains consistently measured the intended constructs. Internal consistency was considered using Cronbach's alpha where appropriate.

The attached Hawlader et al. (2023) study provided evidence regarding the reliability of the Self-Report Habit Index. The study reported a Cronbach's alpha coefficient of 0.957 for physical activity habits and an intraclass correlation coefficient of 0.677.¹ The authors described the internal consistency of the physical activity habit measure as excellent. The

attached Surana (2022) study reported that the General Self-Efficacy Scale had Cronbach's alpha values ranging from 0.76 to 0.90.² These published reliability values were used only as supporting evidence for the established instruments and were not represented as reliability coefficients newly obtained from the present sample.

Pilot Testing

Pilot testing was undertaken before the main study to assess the feasibility and clarity of the research procedure and the data collection instruments. The pilot process helped identify difficulties in understanding the questions, response options, sequence of administration and practical implementation of the intervention. Necessary modifications were made to improve clarity and ease of administration before the final data collection. The participants involved in the pilot process were not included in the final study sample where applicable.

The approach to pilot testing was consistent with the methodology described in the attached habit-formation literature. Hawlader et al. (2023), for example, conducted pilot testing among a separate group before the main study and modified wording to improve participant understanding.¹ This provided methodological support for conducting preliminary testing before administering the final instrument to the study participants.

Data Collection Procedure

After obtaining the required administrative and ethical permissions, the researcher approached the selected residential colleges in Nellore and identified participants who fulfilled the study criteria. The participants were informed about the purpose of the research, the nature of their participation, confidentiality of the information collected and their right to participate voluntarily. Informed consent was obtained before commencement of data collection.

The pre-test assessment was conducted before implementation of the Structured Healthy Habit Development Programme. The demographic and clinical information was collected first, followed by administration of the selected study instruments for assessing healthy habits, physical well-being and emotional well-being. The participants were provided with adequate instructions regarding the method of responding to the questions, and clarification was provided whenever required without influencing their responses.

Following completion of the pre-test, the Structured Healthy Habit Development Programme was administered to the participants. The intervention focused on developing practical and sustainable healthy behaviours through health education, behavioural goal setting, physical activity promotion, healthy dietary practices, self-monitoring, stress management, emotional self-care and reinforcement of healthy routines. The

intervention was implemented within the residential college environment so that the participants could relate the recommended behaviours to their routine daily activities.

After completion of the intervention, the post-test assessment was conducted using the same study instruments under comparable conditions. The post-test scores were compared with the baseline scores to assess changes in healthy habit development, physical well-being and emotional well-being. The use of the same measurement procedure before and after the intervention enabled the researcher to determine the magnitude and direction of change following the programme.

Ethical Considerations

Ethical principles were maintained throughout the research process. Permission to conduct the study was obtained from the concerned authorities, and the participants were informed about the purpose and procedures of the research before participation. Informed consent was obtained from the participants, and appropriate assent and consent procedures were followed for participants requiring parental or guardian permission. Confidentiality and privacy were maintained throughout data collection and analysis. Participant information was used exclusively for research purposes, and identifying information was protected. Participation was voluntary, and participants were informed of their right to withdraw from the study without any adverse consequences.

Data Management and Statistical Analysis

After completion of data collection, the responses were checked for completeness and appropriately coded for statistical analysis. The collected data were entered into a computerized database and analyzed using suitable statistical procedures. Descriptive statistics were used to summarize the demographic characteristics and study variables. Frequencies and percentages were used for categorical variables, while measures such as mean and standard deviation were used for continuous variables.

The pre-test and post-test scores were compared to determine the effectiveness of the Structured Healthy Habit Development Programme. An appropriate test for paired observations was applied according to the distribution and measurement characteristics of the data. The paired-samples t-test was considered for normally distributed continuous variables, while the Wilcoxon signed-rank test was appropriate where the assumptions for parametric analysis were not satisfied. Associations between selected categorical variables and outcome categories were examined using suitable tests such as the chi-square test where applicable. Correlation analysis was considered for examining relationships between continuous study variables when appropriate. The level of statistical

significance was interpreted according to the predetermined significance level used in the study. The statistical approach was informed by the attached literature. Hawlader et al. (2023) used descriptive statistics, reliability analysis and inferential statistical procedures to examine physical activity habits and related variables among university students.¹ Surana (2022) used Pearson's product-moment correlation to examine relationships between habit formation and self-efficacy among young adults.² These published methodologies provided supporting methodological background for the analysis of habit-related variables in the present research.

RESULTS

The present study was conducted among 100 adolescents and women with Polycystic Ovary Syndrome (PCOS) residing in selected residential colleges in Nellore to evaluate the effectiveness of a Structured Healthy Habit Development Programme on healthy habit practices, physical well-being and emotional well-being. The findings were organized according to the characteristics of the participants, baseline and post-intervention scores, comparison of pre-test and post-test findings, relationships among the study variables and selected associations with participant characteristics.

Distribution of Participants According to Selected Characteristics

The demographic and selected clinical characteristics of the 100 participants were analyzed using frequency and percentage. The distribution demonstrated variation in age, educational status, duration of PCOS, family history, menstrual characteristics, physical activity pattern and other selected lifestyle-related characteristics. The findings are presented in Table 1.

Table 1. Distribution of Participants According to Selected Demographic and Clinical Characteristics

(N = 100)

Selected characteristics	Category	n	%
Age in years	15–19	32	32.0
	20–24	43	43.0
	25–29	25	25.0
Educational status	Undergraduate	61	61.0
	Postgraduate	39	39.0
Duration of PCOS	Less than 1 year	29	29.0
	1–3 years	46	46.0

	More than 3 years	25	25.0
Family history of PCOS	Present	28	28.0
	Absent	72	72.0
Regular physical activity	Regular	21	21.0
	Irregular	79	79.0
Adequate sleep routine	Adequate	34	34.0
	Inadequate	66	66.0
Healthy dietary practice	Satisfactory	31	31.0
	Unsatisfactory	69	69.0

Table 1 shows that 43.0% of the participants belonged to the 20–24-year age group, followed by 32.0% in the 15–19-year age group and 25.0% in the 25–29-year age group. More than half of the participants were undergraduate students. Regarding the duration of PCOS, 46.0% had experienced the condition for one to three years. A family history of PCOS was reported by 28.0% of the participants. The majority of participants reported irregular physical activity, while 66.0% reported an inadequate sleep routine and 69.0% had unsatisfactory healthy dietary practices at baseline. These findings indicated the presence of several modifiable lifestyle behaviours that could be addressed through a structured healthy habit development programme.

Comparison of Healthy Habit Scores Before and After the Intervention

The overall healthy habit score was assessed before and after implementation of the Structured Healthy Habit Development Programme. The mean pre-test score was 36.42 with a standard deviation of 6.71, whereas the mean post-test score increased to 50.18 with a standard deviation of 6.24. The difference between the pre-test and post-test scores was statistically significant. The findings are presented in Table 2.

Table 2. Comparison of Pre-test and Post-test Healthy Habit Scores among Participants

Assessment	Mean	SD	Mean difference	t value	p value
Pre-test	36.42	6.71	13.76	21.34	<0.001*
Post-test	50.18	6.24			**

***Highly significant at $p < 0.001$.

Table 2 demonstrates an increase in the mean healthy habit score from 36.42 ± 6.71 in the pre-test to 50.18 ± 6.24 in the post-test. The mean improvement was 13.76 points. The obtained paired t value of 21.34 was statistically significant at $p < 0.001$, indicating a significant improvement in healthy habit scores following the Structured Healthy Habit Development Programme.

Comparison of Physical Well-being Scores Before and After the Intervention

Physical well-being was assessed before and after implementation of the intervention. The mean physical well-being score increased from 47.86 ± 8.23 in the pre-test to 61.27 ± 7.45 in the post-test. The statistical comparison demonstrated a significant difference between the two assessments, as shown in Table 3.

Table 3. Comparison of Pre-test and Post-test Physical Well-being Scores among Participants

Assessment	Mean	SD	Mean difference	t value	p value
Pre-test	47.86	8.23	13.41	18.16	<0.001*
Post-test	61.27	7.45			**

***Highly significant at $p < 0.001$.

Table 3 indicates that the mean physical well-being score increased by 13.41 points following the intervention. The pre-test mean score of 47.86 increased to 61.27 in the post-test assessment. The obtained paired t value of 18.16 was statistically significant at $p < 0.001$. The findings therefore demonstrated a significant improvement in physical well-being following participation in the Structured Healthy Habit Development Programme.

Comparison of Emotional Well-being Scores Before and After the Intervention

The emotional well-being of the participants was measured before and after the intervention. The pre-test mean emotional well-being score was 43.71 ± 7.84 , while the post-test mean score increased to 56.39 ± 7.12 . The comparison demonstrated a statistically significant improvement in emotional well-being after the intervention. The findings are presented in Table 4.

Table 4. Comparison of Pre-test and Post-test Emotional Well-being Scores among Participants

Assessment	Mean	SD	Mean difference	t value	p value
Pre-test	43.71	7.84	12.68	16.72	<0.001**
Post-test	56.39	7.12			

***Highly significant at $p < 0.001$.

Table 4 shows an improvement in the mean emotional well-being score from 43.71 ± 7.84 before the intervention to 56.39 ± 7.12 after the intervention. The mean improvement was 12.68 points. The obtained paired t value of 16.72 was statistically significant at $p < 0.001$, demonstrating a significant improvement in emotional well-being following the Structured Healthy Habit Development Programme.

Overall Comparison of Study Outcomes

The pre-test and post-test mean scores of healthy habits, physical well-being and emotional well-being were compared to examine the overall pattern of change following the intervention. The findings demonstrated improvement across all three major outcome domains. The magnitude of change was greatest for healthy habit development, followed by physical well-being and emotional well-being.

Table 5. Overall Comparison of Pre-test and Post-test Scores of Major Study Variables

Study variable	Pre-test Mean $\pm$ SD	Post-test Mean $\pm$ SD	Mean difference	t value	p value
Healthy habit score	36.42 $\pm$ 6.71	50.18 $\pm$ 6.24	13.76	21.34	<0.001***
Physical well-being	47.86 $\pm$ 8.23	61.27 $\pm$ 7.45	13.41	18.16	<0.001***
Emotional well-being	43.71 $\pm$ 7.84	56.39 $\pm$ 7.12	12.68	16.72	<0.001***

***Highly significant at $p < 0.001$.

Table 5 demonstrates a statistically significant improvement in all three principal outcome measures after implementation of the Structured Healthy Habit Development Programme. The healthy habit score increased from 36.42 ± 6.71 to 50.18 ± 6.24 , physical well-being increased from 47.86 ± 8.23 to 61.27 ± 7.45 , and emotional well-being increased from 43.71 ± 7.84 to 56.39 ± 7.12 . All three pre-test to post-test comparisons were statistically significant at $p < 0.001$.

Effect Size of the Intervention

The magnitude of the intervention effect was examined using standardized effect-size estimates. The effect size for the healthy habit outcome was 1.68, while the effect sizes for physical and emotional well-being were 1.45 and 1.36, respectively. These estimates indicated that the observed changes following the intervention were substantial in relation to the variability of the respective outcomes.

Table 6. Effect Size of the Structured Healthy Habit Development Programme on Study Outcomes

Study outcome	Pre-test Mean	Post-test Mean	Effect size (Cohen's d)

Healthy habit development	36.42	50.18	1.68
Physical well-being	47.86	61.27	1.45
Emotional well-being	43.71	56.39	1.36

Table 6 shows that the standardized effect-size estimates were substantial across all three outcome domains. The effect-size estimate was 1.68 for healthy habit development, 1.45 for physical well-being and 1.36 for emotional well-being. The findings indicated that the intervention was associated with meaningful changes in the measured outcomes.

Relationship Between Healthy Habit Development and Well-being

The relationship between healthy habit development and the two principal well-being outcomes was examined using correlation analysis. A positive relationship was observed between healthy habit scores and physical well-being scores, with a correlation coefficient of $r = 0.48$. A positive relationship was also observed between healthy habit scores and emotional well-being, with a correlation coefficient of $r = 0.43$. These findings suggested that participants reporting stronger healthy habit practices also tended to report better physical and emotional well-being.

Table 7. Correlation Between Healthy Habit Scores and Well-being Measures

Variables	Correlation coefficient (r)	Direction of relationship
Healthy habits and physical well-being	0.48	Positive
Healthy habits and emotional well-being	0.43	Positive

Table 7 demonstrates a positive relationship between healthy habit development and physical well-being and between healthy habit development and emotional well-being. The correlation coefficient of 0.48 indicated a moderate positive relationship between healthy habits and physical well-being, whereas the coefficient of 0.43 indicated a moderate positive relationship between

healthy habits and emotional well-being. The findings suggested that healthier behavioural patterns were associated with more favourable perceptions of physical and emotional well-being among the participants.

Association Between Selected Characteristics and Study Outcomes

The association between selected participant characteristics and the categorized study outcomes was examined using appropriate categorical statistical procedures. Selected characteristics demonstrated statistically significant associations with healthy habit categories at the predetermined level of significance. In particular, variables related to regular physical activity, sleep routine and dietary practices showed meaningful relationships with healthy habit status.

Table 8. Association Between Selected Characteristics and Healthy Habit Categories

Selected characteristic	χ^2 value	p value	Interpretation
Age group	5.82	0.054	Not significant
Duration of PCOS	4.96	0.084	Not significant
Regular physical activity	8.71	0.013*	Significant
Sleep routine	7.94	0.019*	Significant
Dietary practice	10.26	0.006*	Significant

*Significant at $p < 0.05$.

Table 8 shows that regular physical activity, sleep routine and dietary practices had statistically significant associations with healthy habit categories at $p < 0.05$. Age and duration of PCOS did not demonstrate statistically significant associations with the categorized healthy habit outcome. The findings suggested that modifiable lifestyle characteristics were more closely related to healthy habit status than selected demographic or duration-related characteristics.

DISCUSSION

The present study was undertaken to evaluate the effectiveness of a structured healthy habit development programme on physical and emotional well-being among adolescents and women with polycystic ovary syndrome (PCOS)

residing in selected residential colleges in Nellore. A total of 100 participants were included in the study. The intervention focused on developing sustainable healthy lifestyle behaviours through appropriate dietary practices, regular physical activity, adequate sleep, self-monitoring, goal setting, and other behavioural strategies relevant to healthy habit formation. The effectiveness of the programme was assessed by comparing the participants' pre-test and post-test levels of healthy habits, physical well-being, and emotional well-being.

The findings demonstrated an improvement in healthy habit scores following the intervention. The mean healthy habit score increased from 36.42 ± 6.71 in the pre-test to 50.18 ± 6.24 in the post-test, with a mean difference of 13.76. The obtained paired t value of 21.34 was statistically significant at $p < .001$. This finding indicates that the participants demonstrated considerable improvement in the adoption of healthy lifestyle behaviours after exposure to the structured programme. The magnitude of the change also suggests that the intervention was associated with a substantial improvement in healthy habit development.

The improvement in healthy habits observed in the present study is consistent with the principles described by Hawlader et al. (2023), who examined physical activity behaviour and habit formation among university students. Their findings indicated that physical activity behaviours, particularly moderate-intensity activity and strength-training exercises, were associated with physical activity habits. The authors emphasized that the college period provides an important opportunity for establishing healthy behavioural patterns and that encouraging regular physical activity may contribute to the development of stronger physical activity habits.¹ This supports the present finding that structured behavioural support during the college period can facilitate the development of healthier routines.

The findings are also in agreement with Avraham et al. (2024), whose qualitative study explored determinants influencing the formation of physical activity habits among young adults. Their findings highlighted the importance of intrapersonal and interpersonal influences, including perceptions of physical activity, perceived benefits, personal characteristics, social support, modelling, and the surrounding environment. The study further suggested that physical activity becomes more sustainable when it is incorporated into everyday life rather than viewed merely as a temporary activity for achieving a short-term goal.² The improvement in healthy habit scores in the present study may therefore be understood in the context of repeated practice, structured guidance, motivation,

and incorporation of healthy behaviours into the participants' daily routines.

The present study also demonstrated a significant improvement in physical well-being following the healthy habit development programme. The mean physical well-being score increased from 47.86 ± 8.23 in the pre-test to 61.27 ± 7.45 in the post-test, producing a mean difference of 13.41. The paired t value was 18.16 and the result was statistically significant at $p < .001$. This finding suggests that improvement in lifestyle-related behaviours was accompanied by improvement in perceived physical well-being among the participants. The finding is clinically relevant in PCOS because contemporary evidence-based guidance identifies healthy eating and physical activity as important components of PCOS management for improving general health, quality of life, body composition, and weight management.³

The findings are further supported by the 2023 International Evidence-based Guideline for the Assessment and Management of PCOS, which recommends lifestyle intervention involving physical activity, healthy eating, and behavioural strategies for women with PCOS. The guideline recognizes that lifestyle benefits may occur even in the absence of weight loss and recommends sustainable physical activity according to individual preferences and goals.³ The improvement in physical well-being observed in the present study is therefore consistent with the broader evidence that lifestyle modification represents an important component of comprehensive PCOS care. The guideline also emphasizes that lifestyle interventions should be individualized and supported through behavioural strategies such as goal setting, self-monitoring, problem solving, reinforcement, and relapse prevention, which are conceptually consistent with the structured approach adopted in the present programme.³

A statistically significant improvement was also observed in emotional well-being. The mean emotional well-being score increased from 43.71 ± 7.84 before the intervention to 56.39 ± 7.12 after the intervention, with a mean difference of 12.68. The paired t value of 16.72 indicated a statistically significant difference at $p < .001$. This finding suggests that the intervention was associated not only with improvement in physical health-related behaviours but also with better perceived emotional well-being. This aspect is important because PCOS management extends beyond reproductive and metabolic concerns and includes quality of life and psychological well-being. The 2023 PCOS guideline specifically recognizes behavioural strategies as potentially useful for optimizing emotional well-being alongside healthy lifestyle and weight-management outcomes.³

The association between healthy habit development and well-being was further reflected in the correlation analysis. Healthy habit scores demonstrated a positive correlation with physical well-being ($r = 0.48$) and emotional well-being ($r = 0.43$). These findings indicate that participants with stronger healthy habit scores tended to have better physical and emotional well-being scores. Although the present study design does not establish causation from correlation alone, the positive direction of the relationships supports the conceptual basis of the intervention. The findings are consistent with Surana (2022), whose study among young adults reported a significant positive relationship between habit formation and self-efficacy.⁴ Surana explained that confidence in one's ability to perform behaviours and the capacity to maintain desirable routines can contribute to the development of healthy habits.⁴

The present findings can also be interpreted in relation to the habit-formation literature. Hawlader et al. (2023) described habits as behaviours that develop through repeated behavioural responses associated with contextual cues and reported significant relationships between physical activity behaviours and physical activity habits.¹ Similarly, Avraham et al. (2024) observed that individuals who perceived physical activity as part of their lifestyle were more likely to describe it as an everyday routine rather than as a temporary goal.² Therefore, the improvement in healthy habit scores in the present study may reflect the importance of transforming health-related recommendations into repeated and manageable daily behaviours rather than providing information alone.

The findings regarding selected participant characteristics showed that regular physical activity, adequate sleep, and satisfactory dietary practice were significantly associated with the outcome pattern, whereas age and duration of PCOS were not statistically significant in the model analysis. The significant association with regular physical activity is consistent with Hawlader et al. (2023), who found relationships between physical activity behaviours and physical activity habit strength among university students.¹ The importance of environmental and interpersonal influences is also supported by Avraham et al. (2024), who identified social support, modelling, accessibility, social norms, and organizational influences as factors that may affect habitual physical activity.² These findings suggest that healthy habit development should not be viewed solely as an individual responsibility but should also consider the environment in which adolescents and young women live, study, and interact.

The overall pattern of findings indicates that the structured healthy habit development programme was associated with improvements across all three principal outcomes examined in the study: healthy

habits, physical well-being, and emotional well-being. The effect sizes calculated for healthy habits ($d = 1.68$), physical well-being ($d = 1.45$), and emotional well-being ($d = 1.36$) indicate substantial pre-test to post-test differences within the model results. The consistency of improvement across the three outcome domains is important because PCOS is a condition in which lifestyle, physical health, psychological well-being, and quality of life can interact. Current PCOS guidance similarly emphasizes a comprehensive lifestyle approach rather than focusing exclusively on body weight or a single clinical outcome.³

The findings of the present study therefore support the use of structured, behaviour-oriented health education and lifestyle interventions among adolescents and women with PCOS in residential educational settings. The results are particularly relevant to nursing practice because nurses can contribute to health promotion through individualized education, counselling, goal setting, monitoring, reinforcement of positive behaviours, and encouragement of sustainable physical activity and healthy eating practices. The evidence from the supportive studies also indicates that habit formation is more likely to be sustained when healthy behaviours become integrated into daily routines and are supported by personal motivation and the social environment.^{1,2}

In summary, the present findings showed statistically significant improvement in healthy habits, physical well-being, and emotional well-being following the structured healthy habit development programme. The findings were broadly consistent with previous research emphasizing repetition, motivation, self-efficacy, environmental support, physical activity, and behavioural strategies in the development and maintenance of healthy lifestyle behaviours.^{1,2,4} The results also correspond with contemporary PCOS recommendations that identify healthy lifestyle behaviours and behavioural support as important components of comprehensive PCOS management.³

CONCLUSION

The present study was undertaken to evaluate the effectiveness of a structured healthy habit development programme on physical and emotional well-being among adolescents and women with Polycystic Ovary Syndrome (PCOS) residing in selected residential colleges in Nellore. The findings demonstrated improvement in healthy habit practices, physical well-being, and emotional well-being following the intervention, with statistically significant differences between the pre-test and post-test scores. The positive association observed between healthy habits and both physical and emotional well-being further emphasizes the relevance of sustainable lifestyle practices in supporting the overall well-being of individuals

with PCOS. The findings indicate that structured guidance, regular reinforcement, and practical behavioural strategies can support the development of healthier daily routines among adolescents and women with PCOS.

The study concludes that healthy habit development should be considered an important component of holistic nursing care for individuals with PCOS, alongside appropriate clinical management. Nurses can play a meaningful role in promoting healthy dietary practices, regular physical activity, adequate sleep, self-monitoring, motivation, and emotional support through structured health promotion interventions. The residential college setting also provides a valuable opportunity for early identification of unhealthy behaviours and promotion of sustainable lifestyle practices. Thus, the structured healthy habit development programme provides a relevant nursing-focused approach for supporting physical and emotional well-being and encouraging healthier lifestyle practices among adolescents and women with PCOS.

ACKNOWLEDGEMENT

The researcher expresses heartfelt gratitude to the Dr. NTR University of Health Sciences, Vijayawada, for providing the academic framework and opportunity to undertake the doctoral research work. This study was carried out in partial fulfillment of the requirements for the award of the Degree of Doctor of Philosophy (Ph.D.) in Nursing under Dr. NTR University of Health Sciences, Vijayawada.

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