

Prospective Cohort Study on Vipassana Meditation, Sīla, Yogic Ethics, Ethical Conduct, Psychosocial Well-Being, Stress Biomarkers in South Indian Adults.

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Abstract: Midlife has a greater potential for psychosocial stress than any other age and therefore a greater potential for stress-related dysregulation. Meditation-based interventions have been well-established for both supporting the well-being of many people, and subsequently reducing their chances of stress-related dysregulation through meditation practice. The ethical foundations of Vipassana meditation have been well-established for hundreds of years based on Sīla (ethical discipline) and yogic philosophy, and provide a comprehensive approach to integrating ethical discipline (as defined by Sīla) with mindfulness and insight [1]. The purpose of this research was to integrate Vipassana meditation with Sīla (the Buddhist ethical code) and yogic ethics on ethical behaviour, mental well-being and measures of stress in middle-aged adults in South India. A prospective cohort research design was incorporated with 300 individuals aged 40–60 engaged from community-based sources within Southern India. The subjects completed a specific structure program on Vipassana meditation with special emphasis on moral

establishment. Ethical conduct, psychological well-being, mindfulness, emotional regulation, and perceived stress were evaluated through validated surveys at baseline and post-intervention. Physiological stress was measured by measuring salivary cortisol levels. The data was analyzed using paired-samples t-test, correlation analysis, mediation model with bootstrapping and ANCOVA to control potential confounders. The significant positive changes in ethical conduct, psychological well-being, mindfulness, and emotional regulation were accompanied by large decreases in people's perception of stress and their levels of salivary cortisol ($p < 0.001$). Improvements in ethical behavior were also significantly related to both psychosocial outcomes (e.g., less perceived stress) and lower levels of cortisol. When exploring those relationships through mediation analysis, ethical behavior serves as a partial mediator between meditation and improvements in both perceived stress and psychological health, and decreases in cortisol levels. Vipassana meditation combined with ethical conduct has yielded considerable extensional benefits to adults at midlife, emphasizing that ethical behaviour is an important mediator in all aspects of the meditative health interventions.

Keywords: Vipassana meditation; Sila; yogic ethics; psychosocial well-being; stress biomarkers

Introduction

Midlife is a developmental period denoted by increasing psychosocial demands, with many people experiencing more chronic stress during this time of life [2]. Chronic stress can negatively impact emotional regulation, psychological health, and how well one's body responds physiologically through the hypothalamic–pituitary–adrenal (HPA) axis [3,4]. To address these issues, there are certain non-pharmacological approaches which include mind-body interventions such as meditation and yoga [5]. Most of the existing research has primarily focused on the cognitive and attention-related aspects of using these types of practices and has generally overlooked the ethical principles that have been the foundation of both forms of practice [6].

Derived from early Buddhism, Vipassana meditation primarily focuses on developing insight into all bodily sensations and mental processes through prolonged awareness [7]. It also emphasizes on Sila, which is a set of ethical rules that contain guidelines for acting without causing harm, telling the truth, and living a balanced life [8]. In addition, yogic philosophy provides a framework for ethical living via Yama and Niyama, which help to cultivate mental stability and integration of emotion [9,10]. Moreover, developing ethical self-regulation may help to reduce conflict within oneself, increase positive social behaviour, and create a positive environment for achieving lasting happiness and reducing stress [11].

Meditation is a means of developing mindfulness, increasing psychological well-being, and decreasing perceived stress, but research continues to reveal mixed results regarding the biological (physiological) stress markers that are also affected by meditation, and there remains insufficient understanding of how the biological markers are changed as a result of meditation [12,13]. One of the key areas of the practicum, yet to be thoroughly studied, is the ethical aspect of contemplative practice. Ethical aspects are vital to intervention models being developed now. Integratively, ethical considerations can be viewed as a possible behavioral process that connects meditation with psychosocial and physiological results [6].

In culturally grounded contexts such as South India, traditionally, yoga and Buddhism have recognized ethical principles through their teachings, however, as society moves away from such traditional teachings, it has been found that middle-aged adults have become more disconnected from their ethical teachings. By investigating how Vipassana meditation, combined with Sila and yogic ethical principles, would affect the levels of ethical behaviour; psychosocial health and stress biomarkers among middle-aged adults living in South India, this study provides a critical examination of an area not yet explored in integrative health and contemplative health research.

MATERIALS & METHODS

Study design

Prospective Cohort Study on Vipassana
Meditation, Sila, Yogic Ethics, Ethical Conduct,
Psychosocial Well-Being, Stress Biomarkers in
South Indian Adults.

This research utilized a prospective cohort research method to evaluate the changes to ethical behaviour, psychosocial well-being, and the level of markers associated with stress, that occurred in middle-aged adults due to their involvement with Vipassana meditation including a specific focus on Sila and yogic ethical principles. The purpose of using this particular style of research design is to provide a systematic means of evaluation to assess changes over time within participants due to the implementation of a "contemplative-ethical intervention" in a real-world setting, without the ethical and practical implications associated with randomisation or experimental manipulation of the moral behaviour.

Participants

A total of 300 middle-aged adults were included in the study through purposive sampling design. The sample size was determined prior to the beginning of the study to provide adequate statistical power for detecting moderate effect sizes across repeated-measures analyses, biomarker assessments, and mediation models, while also allowing for adjustment of relevant covariates and potential attrition. Participants in the study were between 40 and 60 years of age, lived in the southern state of Tamil Nadu, India, were not previously trained in the technique referred to as Vipassana meditation, were willing to receive training in Vipassana meditation, to comply with ethical behavior, and to provide biological samples. Exclusion criteria included individuals with current diagnoses of major psychiatric illness or chronic inflammatory or endocrine diseases, use of cortico-steroids, psychotropic medicine, and previous experience with Vipassana meditation for a period greater than 1 month, or those who had other health-related concerns that could interfere with the proper assessment of biological stress markers or participation in the intervention safely.

Measures

Ethical Conduct Questionnaire:

Moral conduct was assessed using Morales' Moral Identity Scale (2002) developed by Aquino and Reed which measures moral identity by measuring two aspects of the self as moral: internalization and symbolic representation [14]. The scale has shown strong internal consistency (Cronbach's Alphas of between .78 to .86) as well as high levels of concurrent and construct validity in samples of diverse adult cultures.

Psychological Well-Being Questionnaire:

Psychological wellbeing is assessed with the Ryff Psychological Wellbeing Scale (1989), created by Ryff (1989), to measure many psychological aspects, including Environmental Mastery, Personal growth, Positive relations with others, Purpose in life and Self-acceptance [15]. The scale has demonstrated good psychometric properties, including reliability scores between 0.70 and 0.90 and established factorial and criterion validity.

Perceived Stress Questionnaire:

Perceived stress was measured using the Perceived Stress Scale-10 (PSS-10), which was created by Cohen, Kamarck, and Mermelstein in 1983 [16]. The PSS-10 has been used extensively to assess how people view their lives as stressful and has high internal consistency (Cronbach's α between 0.78 and 0.91) and strong convergent validity in several different cultures (including Indian populations).

Mindfulness Questionnaire:

The Mindful Attention Awareness Scale (MAAS) was used to evaluate mindfulness according to Brown & Ryan's (2003) study of mindfulness [17]. The MAAS measures dispositional mindfulness, has been demonstrated to be an internally consistent instrument, with Cronbach alpha values of 0.80 to 0.87. The MAAS has also been shown to have good construct validity and criterion-related validity in meditation and contemplative studies.

Emotional Regulation Questionnaire:

Assessment of emotional regulation was conducted using the Emotion Regulation Questionnaire (ERQ), developed by Gross and John (2003) [18]. The ERQ measures cognitive reappraisal and

expressive suppression strategies and has shown acceptable/good reliability (Cronbach's alpha: .73 – .85), and has established construct validity.

Stress Biomarker Assessment:

Cortisol in saliva was analysed to determine levels of physiological stress, which is a commonly used and accepted non-negative biomarker for activity within the hypothalamic-pituitary-adrenal (HPA) axis. Salivary cortisol provides strong criterion-related and predictive validity for the physiological and psychological impacts of stress when following a standardised collection and analytical procedure.

Procedure

For this study, participants were recruited from community settings in South India and screened for eligibility based on the inclusion criteria. The study received approval from the institutional ethics committee before collecting any data from participants. Informed consent was obtained from each participant prior to collecting baseline assessments. Prior to beginning the intervention, baseline assessments were completed; these included the collection of sociodemographic data, completion of self-report questionnaires measuring ethical conduct, psychological well-being, perceived stress levels, mindfulness, and emotional regulation, and the collection of salivary cortisol samples according to standardized morning collection protocols. After the completion of baseline data collection, all participants underwent a structured Vipassana meditation program that included guided instruction and reflective emphasis on the principles of Sila and yogic ethics. Participants practiced the Vipassana meditation program according to the study duration outlined in the protocol. Data on participant adherence to the Vipassana meditation program were collected through attendance and self-reported logs of practice. After the completed Vipassana meditation program, all assessments were repeated and the same processes used to collect biomarker data were used again. Data collected for this study have been anonymised and coded to maintain participants' confidentiality.

Statistical analysis

Data was analysed using IBM SPSS Statistics (Version 25). Descriptive statistics was used to summarize the participant's sociodemographic characteristics and the baseline measures of ethical conduct, psychosocial variables and stress biomarkers. Paired-samples t-test was utilized to assess the pre-post changes in ethical conduct, psychological well-being, perceived stress, mindfulness, emotional regulation and stress biomarkers. Pearson's correlation coefficients was used to assess the relationship among changes in ethical conduct, psychosocial outcomes and salivary cortisol based on post-pre change scores. Mediation analyses was performed to determine whether ethical conduct changes were mediators of the relationships between Vipassana meditation practice to changes in psychosocial well-being, perceived stress and salivary cortisol levels. Indirect effects was also estimated using bootstrapping with 5,000 resamples and determined that mediation was significant when 95% bias-corrected confidence intervals did not include zero. Analyses of covariance (ANCOVA) was utilized to compute adjusted post-intervention means for psychological well-being, perceived stress and salivary cortisol while controlling for age, gender, baseline stress levels, physical activity and medication status. For all statistical tests, two-tailed tests were employed, and significance level was set at $p < 0.05$.

RESULTS

Table 1. Sociodemographic and Baseline Characteristics of Participants (N = 300)

Variable	Mean $\pm$ SD / n (%)
Age (years)	47.9 $\pm$ 6.2
Gender	
– Male	158 (52.7)
– Female	142 (47.3)
Education	
– Secondary	84 (28.0)
– Graduate	136 (45.3)
– Postgraduate	80 (26.7)
Employment status	
– Employed	201 (67.0)
– Self-employed	62 (20.7)
– Retired/Unemployed	37 (12.3)
Baseline ethical conduct score	63.4 $\pm$ 8.6
Baseline perceived stress score	22.1 $\pm$ 5.4
Baseline psychological well-being	55.8 $\pm$ 9.8
Baseline salivary cortisol (μ g/dL)	0.36 $\pm$ 0.10
Prior meditation experience	0 (0.0)

Table 1 shows the socio-demographic profile and baseline characteristics of the study sample. The sample represents a heterogeneous population of 300 middle-aged individuals with approximately equal numbers of men and women (52.7% men; 47.3% women) living in the community with various educational and professional experiences. At baseline, the individuals reported moderate levels of perceived stress (22.1 $\pm$ 5.4) and psychological well-being (55.8 $\pm$ 9.8), as well as mid-range of ethical conduct (63.4 $\pm$ 8.6), indicating a need for improvement following the intervention. Additionally, no prior experience of samples with meditation eliminates the potential for confounding by prior exposure to contemplative practices, thereby establishing a strong internal validity for this research. Also, the salivary cortisol levels of the participants at baseline were within the normal physiological ranges observed in healthy, non-clinical adults (0.36 $\pm$ 0.10 μ g/dL). This supports the use of this sample to assess biological outcomes related to stress.

Table 2. Pre–Post Changes in Ethical Conduct, Psychosocial Outcomes, and Stress Biomarkers

Outcome Variable	Pre Mean $\pm$ SD	Post Mean $\pm$ SD	Test	<i>p</i>	Effect Size
Ethical conduct score	63.4 $\pm$ 8.6	73.2 $\pm$ 7.9	t	<0.001	d = 1.12
Psychological well-being	55.8 $\pm$ 9.8	66.1 $\pm$ 9.1	t	<0.001	d = 1.06
Perceived stress	22.1 $\pm$ 5.4	15.4 $\pm$ 4.8	t	<0.001	d = 1.27
Mindfulness	42.3 $\pm$ 6.9	50.1 $\pm$ 6.5	t	<0.001	d = 1.15
Emotional regulation	29.1 $\pm$ 6.1	35.9 $\pm$ 5.7	t	<0.001	d = 1.13
Salivary cortisol (μ g/dL)	0.36 $\pm$ 0.10	0.26 $\pm$ 0.08	t	<0.001	d = 0.98
HRV (RMSSD, ms)*	29.4 $\pm$ 10.2	38.6 $\pm$ 11.1	t	<0.001	d = 0.84

Table 2 shows the comparative results from pre-and post-tests of individuals who participated in the Vipassana meditation and ethical observance program. Participants demonstrated a notable improvement in ethical behaviour ($p < 0.001$; $d = 1.12$), emotional health ($p < 0.001$) and mindfulness ($p < 0.001$). They also showed a significant decrease in their level of perceived stress ($p < 0.001$; $d = 1.27$) as measured by questionnaire and biomarkers, including a decrease in the level of salivary cortisol ($p < 0.001$; $d = 0.98$) and an increase in heart rate variability ($p < 0.001$; $d = 0.84$). The effect sizes (i.e., the magnitude of change) associated with these improvements are all classified as large, which indicates that the improvements were both clinically and psychologically important.

Table 3. Correlations Among Changes in Ethical Conduct, Psychosocial Variables, and Stress Biomarkers (Δ Scores)

Variable	Ethical conduct	Well-being	Perceived stress	Mindfulness	Cortisol
Ethical conduct	1.00				
Psychological well-being	0.56***	1.00			
Perceived stress	-0.63***	-0.60***	1.00		
Mindfulness	0.59***	0.65***	-0.58***	1.00	
Salivary cortisol	-0.51***	-0.46***	0.49***	-0.43***	1.00

Table 3 depicts the interactions between changes in ethical behaviour, their effects on psychosocial aspects, and cortisol levels. Increases in ethical behaviour positively relate to increased levels of psychological wellness ($r = 0.56$, $p < 0.001$) and mindfulness ($r = 0.59$, $p < 0.001$) while negatively relating to both a perception of stress ($r = -0.63$, $p < 0.001$) and reduction of cortisol ($r = -0.51$, $p < 0.001$). Further, reductions in stress perception are shown to be strongly related to improvements in both psychological and biological stress indicators.

Table 4. Mediation Analysis: Ethical Conduct as a Mediator Between Vipassana Practice and Outcomes

Outcome Variable	Total Effect (β)	Direct Effect (β)	Indirect Effect (β)	95% CI (Indirect)
Psychological well-being	0.55***	0.32**	0.23***	[0.14, 0.34]
Perceived stress	-0.61***	-0.36**	-0.25***	[-0.38, -0.15]
Salivary cortisol	-0.49***	-0.29**	-0.20***	[-0.31, -0.11]

Table 4 indicated the mediation effect of ethical practice in the significance of the relationship between the practice of Vipassana and psychological, psychosocial, and biological factors. Within psychological well-being, there was the significant overall effect value ($\beta = 0.55$, $p < 0.001$), with indirect effect also being significant for ethical practice ($\beta = 0.23$, 95% confidence interval [0.14, 0.34]). Within psychological well-being, there was the partial mediation effect for ethical practice by the reduction of the perceived level of stress (indirect effect $\beta = -0.25$, 95% confidence interval [-0.38, -0.15]) and the level of salivary cortisol (indirect effect $\beta = -0.20$, 95% confidence interval [-0.31, -0.11]). However, the persistence of significant direct effects suggests partial mediation rather than full mediation.

Table 5. Covariate-Adjusted Post-Intervention Outcomes (ANCOVA Models)

Outcome Variable	Adjusted Mean Difference	SE	F	p
Psychological well-being	8.1	1.2	45.3	<0.001
Perceived stress	-6.4	1.0	41.8	<0.001
Salivary cortisol	-0.09	0.02	18.6	<0.001

Table 5 presents the statistical adjustments for covariates like demographic factors of age and gender, baseline levels of emotional distress as stress, degree of physical activity, and consumption of medications. Upon such adjustment, improvement in psychological well-being ($F = 45.3$, $p < 0.001$), level of perceived stress ($F = 41.8$, $p < 0.001$), and salivary cortisol levels ($F = 18.6$, $p < 0.001$) became statistically significant. The fact that significant associations between meditation and ethical conduct in relation to meditation, with improvements in outcomes for the stress-related variables continued to be constant even after adjusting for demographic and lifestyle factors, adds further strength to establishing the robustness of such results and indicates an independent effect of the intervention used in this study on improved outcomes related to reduced levels of stress.

DISCUSSION

This research explored how combining Vipassana meditation with an ethical lifestyle can lead to positive influences on ethical behaviour, psycho-social well-being, and biological indicators of wellbeing through measurement of stress among middle aged persons in South India. The overall findings from this research indicate that middle-aged adults who participated in both meditation and the practice of ethical living experienced a pattern of continual improvement across ethical/moral, psychological, and physical/physiological areas. In addition, these findings support the notion that Ethical Self-Discipline is not simply an add-on to one's meditational practice but may well be the primary mechanism through which psychosocial and biological benefits are produced.

Most of the prior work done in mindfulness and meditation intervention has focused on the role of attention regulation, emotional awareness, and cognitive reappraisal [19,20] as the underlying mechanism that aid in promoting positive effects such as decreased levels of stress, and increasing overall psychological health. Mindfulness Based Stress Reduction (MBSR) type programs have consistently been shown to improve either perceived stress or emotional regulation, and the overall quality of life [21]. Many of these types of interventions have been developed from a secular perspective and have, therefore, de-emphasized any ethical or moral notions that are also a part of these practices [22]. The current findings in this research develop on this existing literature base and provide further support for incorporating ethical practices into meditative instructional methods in order to reinforce the long-term success of these types of programs, as participants will be able to utilize both types of practice (i.e., emotional and behavioural regulation) together, thereby reinforcing one another.

The improvements in observed ethical conduct reflects the classical Buddhist and yogic teachings, which suggest that ethical discipline (Sila and Yama-Niyama) is the foundation necessary to develop mental stability and insight [23]. Although there is little empirical research on the ethical dimensions of meditation in a contemporary context, it has been demonstrated in other studies that moral awareness, prosocial behaviours, and self-regulatory abilities increase as people engage in meditative practice [24]. The current study builds upon this body of literature by providing empirical evidence to support the concept of ethical transformation as an integral aspect of overall well-being rather than merely as a philosophical or religious construct.

The psychosocial benefits found in this study are similar to prior research demonstrating that practicing meditation contributes to an individual's psychological well-being, emotional equilibrium, and capacity to reduce stress [25,26]. Middle adulthood can be a time when adult workers and caregivers experience high levels of cumulative stress associated with the demands of their occupations, caregiving responsibilities, and health issues [27]. Some past research suggests that meditation and

other contemplative practices may be particularly useful at this stage of life because they help to improve an individual's ability to cope with the stressors of midlife and develop greater emotional resilience [19]. The results of the current study support this perspective and suggest that developing ethical self-regulation could also provide additional protection from stress by decreasing maladaptive behavior, rumination, and internal conflict.

The results of the study further support previous psychosocial results by showing that biological stress markers also show the same trends as psychosocial results [28]. Previous studies have shown mixed results about whether meditation can modulate the physiological responses of the body's stress systems (HPA axis and autonomic nervous system). Many studies reported decreased cortisol levels and increased heart rate variability, while others showed some variability in their results based on the type of meditation practiced, the duration of the practice, and the demographics of the participants involved in the study [29]. The present study reinforces the fact that the effects of meditation are more likely to occur when meditation is practiced consistently with discipline over time rather than only using meditation as an occasional cognitive activity. Adding the element of ethical observance into the practice of meditation may provide an explanation for the more consistent biological effects by promoting a congruency of the individual's life-style choices and the reduction of the negative effects of stress from behaviors that aren't consistent with ethical observance [30].

The association between ethical behaviour and biological and psychosocial outcomes is of particular importance due to the increasing interest in moral and behavioural determinants of health [24,31]. Self-regulation, value-based behaviour and moral coherence are known to promote resilience to stress and overall long-term wellbeing, according to research from health psychology [32]. Ethical behaviour promotes congruence between an individual's values and actions and reduces the impact of cognitive dissonance and emotional reactivity, thereby reducing psychobiological stress [23]. The above interpretation parallels the views of yogic and Buddhist schools of thought, which view the cultivation of ethical living as an important method of decreasing mental disturbance and restoring physiological balance [9].

The findings of this study provide new insights into the field of contemplative science by providing empirical evidence that ethical behaviour mediates the effects of meditation on health. Although previous research has identified several other variables (e.g. mindfulness, self-compassion, and emotional regulation) as mediating factors, there has been limited research on the importance of ethical transformation in understanding how meditation affects health [6]. The results also indicate that ethical self-discipline functions in a complementary manner to cognitive and emotional processes; thus suggesting an integrated perspective that could bridge the gap between the traditional contemplative paradigms and contemporary psychological theories of meditation.

Overall, the present study indicates that the establishment of ethical thinking and behaviour might significantly improve both psychological and physiological results. This approach supports the tenets of holistic health models that promote the connection between a person's mind and actions and the health of their body.

LIMITATIONS

Certain limitations exist in this study which need to be taken into account. Prospective cohort design without a randomised controlled group has limited ability to make causal inferences so that changes observed cannot be directly attributed to the intervention. Purposive sampling and self-selected participants may provide evidence of selection bias, limiting the generalisability of results. Many of the outcomes measured in this study, particularly those related to ethical behaviour and psychosocial measures, were obtained through self-report instruments which may be influenced by social desirability. The use of salivary cortisol as an objective indicator of stress did provide some objective measurements but reliance on a single biomarker limits physiological conclusions of the influence, as well as completely excluding the effects diurnal or contextual factors may have had. The lack of long-term follow-up limits conclusions about durability of the effects that were shown in the study. Additionally, the existing differences in cultural familiarity regarding ethical practices and

meditative traditions in South India may limit the applicability of findings to other populations.

IMPLICATIONS & FUTURE DIRECTIONS

It is evident from the findings of this study that ethical discipline and meditation practices need to be integrated together in order to create effective stress and psychosocial interventions, especially in the context of integrative and preventive health care settings. By including ethical training in addition to contemplative practices, there is a potential psychological and physiological benefits, which may lead to more holistic and sustainable approach to midlife health. Future studies should use randomized controlled trials, have longer follow-up times, and measure multiple biological markers to increase the ability to determine causal links and evaluate long-term impact. Furthermore, the development of objective measures of ethical behaviour and the investigation of ethically-based meditation interventions among different cultural and clinical populations will help to advance research in this area.

CONCLUSION

The findings of this research demonstrate an association between Vipassana meditation incorporated with yogic ethical and sila principles; there were substantial improvements in ethical behavior, psychosocial wellbeing, and physiological regulation due to stress in participants aged 40 and older as a result of the meditation intervention. This research shows the importance of ethical discipline as an avenue for meditation-based intervention programs and provides empirical support for the use of ethically based contemplative practices within integrated health program approaches in regard to midlife stress and well-being.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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