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Exploring Perceived Stress Among Clinical & Non-clinical Students in Mumbai: A Cross-Sectional Study from India

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Abstract

Objective: Mental health has become a global concern. Therefore, this study aimed to assess perceived stress among students from Mumbai, India and to explore its association with socioeconomic, demographic, lifestyle, academic and work-related factors.

Methods: A cross-sectional study was conducted among college students from various co-ed colleges in Mumbai from March 2023 to June 2023. The Perceived Stress Scale (PSS-10) questionnaire was used to measure the perceived stress. Descriptive statistics, chi-square tests, t-tests, and multivariable linear regression analyses were performed to analyze the data. P-values < 0.05 were considered significant.

Results: A total of 1230 students enrolled in the study, with a mean age of 20.24 ± 2.39 years. The mean PSS score was 21.51 ± 5.73. Gender, residence, health problems, sleep duration, and non-practice of meditation were significantly associated with higher perceived stress scores, whereas, the type of course pursued did not show a significant association.

Conclusion: This study highlights the prevalence of moderate perceived stress among college students in Mumbai, India. This emphasizes the need for interventions such as promoting healthy lifestyle habits, encouraging participation in extracurricular activities, organizing yoga and meditation sessions and conducting regular screenings for timely identification and management of stress and related conditions.

Keywords: clinical; college; non-clinical; mental health; perceived stress; students

Introduction

Mental health has become a point of concern worldwide. The fast-paced and complex lifestyles with multiple demands at work and in personal lives results in anxiety and stress experienced in today's world.(Dasgupta et al. 2020) Stress is defined as a situation that an individual perceives as uncontrollable, unpredictable, and beyond its coping (behavioral and cognitive) abilities.(Cooper C L, Quick J C 2017; Lazarus RS, Folkman S 1884; Baik et al. 2019; Cohen, Kamarck, and Mermelstein 1983; Faro 2015)Statistics have revealed a higher increase in mental health conditions among college students.(Lipson, Lattie, and Eisenberg 2019) Young adults are especially prone to this as they experience a drastic change in environment and lifestyle from high school to college/university life. They are transitioned into a new learning environment and a social circle, making it stressful especially in the initial years.(Krutarth R Brahmbhatt et al. 2013) This environment and lifestyle can be handled by some students in a positive way; a motivation to achieve their goals, while others may develop negative conditions like anxiety, depression,(Shankar and Park 2016; Rebello, Kallingappa, and Hegde 2018)suicidal thoughts(Cooper C L, Quick J C 2017; Dogra A, Basu S, Das S. 2011), conflicts in interpersonal relationships(Baik et al. 2019), poor academic and clinical performance(Faro 2015) sleep disturbances(Cohen, Kamarck, and Mermelstein 1983), and alcohol and substance abuse.(Ball and Bax 2002) Additionally, chronic stress has been linked with reduced self-esteem and can hinder academic achievement as well as personal and professional development.(Oku et al. 2015) Stress has also been found to impair sustained attention, decision-making abilities, and overall judgment.(Satpathy et al. 2021)

College students experience stress mainly due to high academic demands, high expectations from parents, family problems, financial burden, peer-pressure, relationships with opposite gender, worries about future job placements, etc.(Aselton 2012; Hefner and Eisenberg 2009; Satpathy et al. 2021) Apart from this, higher screen time usage(Wu et al. 2016; Zhai et al. 2020) and worry about marriage, can also contribute to stress. From diverse nationalities to diverse courses, students from the younger age group (specifically 18-24 years) experience moderate to severe stress.(Ramón-Arbués et al. 2020)- (C. H. Liu et al. 2019)Therefore, it is essential to address this issue publicly. One widely used tool for assessing stress is the Perceived Stress Scale (PSS-10) developed by Cohen et al. in 1983.(Cohen, Kamarck, and Mermelstein 1983) It consists of six negatively worded items (e.g., How often have you felt that you were on top of things?) and four positively worded items (e.g., How often have you been able to control irritations in your life?). These items are rated using a 5-point Likert scale.(Cohen, Kamarck, and Mermelstein 1983)

Although there is limited trend data on mental health problems related to stress specifically in Indian college students, existing research suggests that mental health issues have become a significant burden

for them, with the COVID-19 pandemic further increasing the number. For instance, a recent study by Bijoy Chhetri et al. found a prevalence rate of 31.2% of depressive symptoms among Indian students during the COVID-19 outbreak, which was higher than the general population.(Chhetri et al. 2021) The majority of the studies are focussed on stressors and coping mechanisms among medical undergraduates in India(Krutarth R Brahmbhatt et al. 2013; Rebello, Kallingappa, and Hegde 2018; Dasgupta et al. 2020; Satpathy et al. 2021; Neufeld and Malin 2021; Sen et al. 2020), however, there remains a lack of comprehensive research among non-clinical students in this area.

Therefore, to address this research gap, the objective of this study is to assess perceived stress in students enrolled for clinical and non-clinical courses in Mumbai, India. This study also aims to explore how stress is related to different socio-economic and demographic factors, lifestyle related factors, and academic and work-related factors. This study will contribute to the growing evidence that emphasizes the need to incorporate strategies in the college curriculum to enhance students' mental well-being.

Materials and Methods

Study Design and Setting: This was a cross-sectional, large population-based study conducted among students from different co-ed colleges in Mumbai, India, from March 2023 to June 2023.

Participants: This study included students from a heterogenous population i.e. different co-ed colleges offering courses in various fields such as medical, dental, nursing, physiotherapy, allied health sciences, engineering and art colleges in Mumbai, India. The P.I. invited students for this study through emails and social media platforms like WhatsApp which explained in detail about the study. A total of 1230 individuals enrolled in the survey. These students were from the age group of 18-24 years, who understood English, and had internet as well as cell phone/computer access.Those students who declined to provide informed consent were excluded from the study. No form of incentive was provided for participating in this study.

Study Tool:The study tool was designed using a Google Form, which was electronically circulated among participants. The online form consisted of two parts: 1. socio-demographic, lifestyle, academic and work-related characteristics, 2. perceived Stress Test (PSS-10) questionnaire. PSS-10; a classic stress assessment instrumentis a 10-item scale that categorises perceived stress levels into three different levels based on scores- low (scores 0-13), medium (score 14-26) and high (scores 27-40).(Cohen, Kamarck, and Mermelstein 1983) As, English was the medium of education in these colleges, the English version of PSS was used. The Ethical Committee for Research on Human Subjects (Ref.No. MGMIHS: Res.:02:2022: 645) of MGMIHS, Navi Mumbai approved this study. All participants gave their informed consent before filling out the questionnaire.

Statistical analysis: IBM SPSS software (version 25.0) for data analysis, while Microsoft Excel was employed for data entry. Descriptive statistics such as frequency, percentages, mean, and standard deviation were calculated. Cronbach's alpha was used to test the reliability of PSS-10. Continuous variables were analyzed using t-test and ANNOVA, and categorical variables by using Chi square test. Multivariable linear regression model was used to identify the factors associated with PSS. P-values < 0.05 were considered significant.

Results

Descriptive Statistics

The descriptive analysis of selected variables studied for college students in Mumbai, India is depicted in Table 1. A total of 1230 university students were a part of this study; the average age of the students was 20.24 (SD ± 2.39) years and 70% were female. The majority of participants were pursuing Bachelor's degree (78.5%), followed by Master's (20.5%) and a few of them (1%) were pursuing Ph.D. degree. More than half of the participants (79.4%) were day scholars, 20.6% were hostellers or paying guests and 81.9% of the participants resided in urban area. 70.8 % of the participants had a non-vegetarian diet and 14.1% of the participants reported health-related problems. 94.1% of the participants reported no substance abuse, whereas, 2.4% reported alcohol abuse. 76.3% of this population were not practicing any form of meditation.

Table 1. Socioeconomic and demographic characteristics of participants.

Characteristics	Number	Percentage
I. Socioeconomic and Demographic Characteristics		
Age group (in years)		
Up to 18	287	23.3
19 to 22	758	61.6
≥ 23	185	15.0
Gender		
Female	861	70.0
Male	369	30.0
Body Mass Index (BMI)		
Underweight	311	25.3
Normal	491	40.0
Overweight	137	11.2
Obese	289	23.5
Place of Residence		
Rural	232	18.9
Urban	998	81.1
Type of Residence		
Living in a hostel/ paying guest	253	20.6
Living with parents/ relatives	977	79.4

II. Lifestyle-related Characteristics		
Type of Diet		
Vegetarian	359	29.2
Non-vegetarian	871	70.8
Substance Abuse		
Alcohol	30	2.4
Smoking	20	1.6
Alcohol and Smoking	16	1.3
None	1157	94.1
Prescribed drugs	7	0.6
Health Problems		
No	1057	85.9
Yes	173	14.1
Duration of Sleep		
Below 6 hours	386	31.4
6 hours and above	844	68.6
Practicing Meditation		
Yes	291	23.7
No	939	76.3
III. Academics and work-related Characteristics		
Course		
Clinical	636	51.7
Non-clinical	594	48.3
Employment Status		
Not working	1101	89.5
Part-Time	129	10.5
Educational Level		
UG	966	78.5
PG	252	20.5
PhD	12	1.0

Reliability and Validity analysis of PSS-10

The reliability of the PSS-10 scale was 0.60 as determined by Cronbach's alpha, indicating good internal consistency of items within the scale. The validity of all 10-items of PSS is displayed in Table 2. Most of the items on the PSS scale had a significant correlation with the overall PSS score.

Table 2. Reliability and Validity of PSS

1.	**Reliability**									
Cronbach's Alpha					.60					
2.	**Validity**									
Spearman's rank correlation	PSS-Item 1	PSS-Item 2	PSS-Item 3	PSS-Item 4	PSS-Item 5	PSS-Item 6	PSS-Item 7	PSS-Item 8	PSS-Item 9	PSS-Item 10
PSS Score	.741**	.730**	.731**	.314**	.347**	.472**	.472**	.271**	.661**	.694**

**** p-value > 0.05**

Perceived Stress

The mean PSS-10 score among college students was 21.51 ± 5.73. The PSS score was significantly higher in females (22.21 ± 5.55) than in males (19.87 ± 5.81; p-value<0.05), as shown in Table 3. The participants living in urban areas (21.71 ± 5.76) had significantly higher perceived stress than rural areas (20.62 ± 5.50; p-value<0.05). As expected, significantly higher perceived stress scores were observed in participants who reported having health problems (23.05 ± 5.92) than those who didn't report any health problems (21.25 ± 5.66; p-value<0.05). The PSS score was also significantly higher in participants who didn't practice any form of meditation (21.93 ± 5.66) than in those who practiced some form of meditation (20.13 ± 5.73; p-value<0.05). Participants with a sleep cycle of less than six hours (23.36 ± 5.82) had significantly more perceived stress than those who slept for more than six hours per day (20.66 ± 5.48; p-value<0.05). Additionally, the students pursing clinical (21.28 ± 5.79) and non-clinical courses (21.75 ± 5.66) showed similar stress perception, though the latter tend to have a higher mean score.

Table 3. PSS Score by Socioeconomic, Demographic, Lifestyle, Academics and Work-related characteristics

Characteristics	**Mean PSS Score (SD)**	**Test-statistics**
I. Socioeconomic and Demographic Characteristics		
Age group (in years)		
Up to 18	21.39 (5.50)	Kruskal Wallis Statistics = 0.41
19 to 22	21.62 (5.77)	
≥ 23	21.23 (5.96)	
Gender		
Female	22.21 (5.55)	Mann-Whitney U Statistics = 6.91**
Male	19.87 (5.81)	
Body Mass Index (BMI)		
Underweight	21.39 (5.47)	Kruskal Wallis Statistics = 0.57
Normal	21.62 (5.84)	

Overweight	21.75 (5.71)	
Obese	21.28 (5.80)	
Place of Residence		
Rural	20.62 (5.50)	Mann-Whitney U Statistics = 2.94**
Urban	21.71 (5.76)	
Type of Residence		
Living in a hostel/ paying guest	21.60 (5.86)	Mann-Whitney U Statistics = 0.50
Living with parents/relatives	21.48 (5.70)	
II. Lifestyle-related Characteristics		
Type of Diet		
Vegetarian	21.45 (5.94)	Mann-Whitney U Statistics = 0.26
Non-vegetarian	21.53 (5.64)	
Substance Abuse		
Alcohol	24.63 (4.66)	
Smoking	22.70 (6.65)	
Alcohol and Smoking	23.31 (5.95)	Kruskal Wallis Statistics = 13.97**
None	21.39 (5.72)	
Prescribed drugs	20.14 (3.89)	
Health Problems		
No	21.25 (5.66)	Mann-Whitney U Statistics = 4.27**
Yes	23.05 (5.92)	
Duration of Sleep		
Below 6 hours	23.36 (5.82)	Mann-Whitney U Statistics = 7.53**
6 hours and above	20.66 (5.48)	
Practicing Meditation		
Yes	20.13 (5.73)	Mann-Whitney U Statistics = 4.72**
No	21.93 (5.66)	
III. Academics and work-related Characteristics		
Course		
Clinical	21.28 (5.79)	Mann-Whitney U Statistics = 1.22
Non-clinical	21.75 (5.66)	
Educational Level		
UG	21.53 (5.81)	
PG	21.58 (5.43)	Kruskal Wallis Statistics = 4.49
PhD	18.50 (4.62)	

Employment Status		
Not working	21.52 (5.83)	Mann-Whitney U Statistics = 0.03
Part-Time	21.42 (4.84)	

Among the 1230 students in our study, 78.2% showed moderate levels of stress. The categorization of perceived stress is depicted in Table 4.

Table 4: Categorisation of Perceived Stress based on scores

Sr. No.	Category of Perceived Stress	Percentage (%)
1.	Low	8.9
2.	Moderate	78.2
3.	High	12.9

Linear Regression Model

Multivariate linear regression analysis was carried out to show the association of socioeconomic, demographic, lifestyle, academic, and work-related characteristics with PSS score (Table 5). It revealed the gender of participants and the place of residence among socioeconomic and demographic characteristics were statistically associated with the PSS score. Female participants had 2.12 units higher PSS scores than male participants (β_{unadj}= 2.12; 95% CI: 1.43 – 2.80). The PSS score increased by 0.96 units among participants belonging to the urban areas compared to those belonging to rural areas (β_{unadj}= 0.96; 95% CI: 0.17 – 1.75). Among lifestyle-related characteristics, health problems, duration of sleep, and meditation practice had a significant association with PSS scores. The PSS score was 1.36 units higher in participants with any health problems compared with their counterparts (β_{unadj}= 1.36; 95% CI: 0.47 – 2.25). Participants with < 6 hours of sleep had 2.51 units higher PSS scores than those with ≥ 6 hours of sleep (β_{unadj}= 2.51; 95% CI: 1.85 – 3.17). Similarly, the PSS score increased by 1.90 units among participants who are not practicing meditation than those practicing meditation (β_{unadj}= 1.90; 95% CI: 1.17 – 2.62).

Table 5: Results of multivariate linear regression showing the association of socioeconomic, demographic, lifestyle, academics and work-related characteristics with PSS score

Characteristics	Unstandardized Beta Coefficients (β_{unadj})	p-value	95% Confidence Interval	
			Lower	Upper
I. Socioeconomic and demographic characteristics				
Age of participants (in years)				
≥ 23	Ref.			
≤ 18	0.35	0.51	- 0.70	1.40
19 – 22	0.54	0.24	- 0.36	1.44
Gender of participants				
Male	Ref.			
Female	2.12	0.00	1.43	2.80
Body mass index				
Normal	Ref.			
Underweight	- 0.42	0.29	- 1.12	0.36
Overweight	0.18	0.74	- 0.86	1.21
Obese	- 0.39	0.33	- 1.19	0.40

Place of residence				
Rural	Ref.			
Urban	0.96	0.02	0.17	1.75
Type of residence				
Living with parents/ relatives	Ref.			
Living in a hostel/ paying guest	0.50	0.90	- 0.72	0.82
II.Lifestyle-related characteristics				
Type of diet				
Non-vegetarian	Ref.			
Vegetarian	0.01	0.97	- 0.66	0.68
Health Problems				
No	Ref.			
Yes	1.36	0.00	0.47	2.25
Duration of sleep				
≥ 6 hours	Ref.			
< 6 hours	2.51	0.00	1.85	3.17
Practicing meditation				
Yes	Ref.			
No	1.90	0.00	1.17	2.62
III.Academics and work-related characteristics				
Type of course				
Clinical	Ref.			
Nonclinical	0.58	0.07	- 0.05	1.20
Working status				
Nonworking	Ref.			
Part-time	0.48	0.38	- 0.58	1.54
Constant	16.25	0.00	14.82	17.67
Model Fit Statistics				
Adjusted R^2	0.10			
F – value	11.02**			

* Due to the existence of multicollinearity, the variables such as substance abuse and educational level were excluded from the study.

DISCUSSION

The present study was conducted to assess the prevalence of perceived stress among participants aged between 18-24 years pursuing clinical and non-clinical courses, across various colleges in Mumbai. It also explored the association of various socioeconomic, demographic, lifestyle-related, and academic/work-related factors with perceived stress. Based on our knowledge, this is the first study to compare the levels of perceived stress among students from clinical and non-clinical courses in this population. The findings from this study provide insights into the factors contributing to stress in this population. The larger sample size was one of the strengths of this study. The validity and reliability of the PSS-10 were also investigated.

Table 1 provides the basic profile of the students involved in the study. Out of the 1230 students enrolled in this study, 70% were female. The students were all aged between 18 and 24 years old and were pursuing a clinical or non-clinical program in the various colleges in Mumbai, Maharashtra. Our findings show a mean perceived stress score of 21.51 ± 5.73. A significant

portion of the participants, comprising 78.2%, experienced moderate levels of stress. This was followed by 12.9% of respondents falling into the high stress category. Only a small percentage of participants (8.9%), were classified under the low-level stress category. This adds to the existing evidence that young individuals are under stress.

The linear regression analysis revealed that gender and place of residence were significantly associated with perceived stress. Female participants had significantly higher PSS scores compared to males, even after adjusting for other variables. This gender difference in stress levels aligns with previous research.(Satpathy et al. 2021; Makhubela 2019) This could be because females are better at recognizing and labelling their experiences and emotions.(M. Zhang et al. 2018) They have more emotional intelligence.(Sen et al. 2020) Whereas, males are generally reluctant to label their emotions because of the stigma attached.(Adam G. Horwitz, Taylor McGuire, Danielle R. Busby, Daniel Eisenberg, Kai Zheng, Jacqueline Pistorello, Ronald Albucher, William Coryell, Cheryl A. King 2020) Furthermore, participants residing in urban areas exhibited significantly higher levels of perceived stress compared to those in rural areas. The urban environment may bring about unique stressors, such as increased competition and a faster-paced lifestyle. This disparity in stress levels between urban and rural populations has been consistently observed across different research studies.(Evans, G. W. 2003; Nieuwenhuijsen et al. 2014). Factors such as urbanization, noise, pollution, social density could be some of the reasons. Moreover, young adults residing in rural areas demonstrate a greater emphasis on family values and a stronger focus on maintaining harmonious relationships compared to their urban counterparts.(Sun and Liang 2022)Several lifestyle-related characteristics were also found to be associated with perceived stress. Participants who reported having health problems and those with a sleep duration of less than six hours per day had significantly higher levels of perceived stress as predicted by regression analysis. These findings are consistent with previous research, highlighting the impact of health issues(Humbel et al. 2020; Håkansson and Ahlborg 2018) and inadequate sleep on stress levels.(Y. Zhang, Peters, and Chen 2018; Y. Liu et al. 2017; Majeno et al. 2018; Du et al. 2021) When individuals experience stress, it can disrupt their normal sleep patterns and contribute to difficulties falling asleep, staying asleep, or achieving restful sleep. Their body's stress response system can lead to heightened alertness, which can make it challenging to relax and fall asleep. Stress can also initiate intrusive thoughts, making it difficult to quiet the mind and initiate sleep. These findings emphasize the importance of promoting healthy sleep habits among college students to mitigate stress levels.

In line with our expectations, participants who did not engage in any form of meditation had significantly higher perceived stress compared to those who practiced meditation. Previous studies have demonstrated the stress-reducing benefits of meditative practices.(Philip et al. 2023; Iyer, Iyer, and Kumar 2021; Thakur et al. 2023)Among the academic and work-related characteristics, the type of course pursued by the students did not show a significant association with perceived stress.

However, notably, the participants in non-clinical courses had a slightly higher mean PSS score than those in clinical courses. The students pursuing clinical courses had a mean stress score of 21.28 ± 5.79. Few studies have shown more perceived stress and others have shown less perceived stress than the current findings. For instance, a study on dental college students of a college in Hyderabad, India showed a mean score of 23.55 ± 7.40.(Veeraboina et al. 2022) Whereas, a study on MBBS students in Southern India showed a mean score of 20.7 ± 6.7.(Jeyashree, Sathiavadivu, and Suliankatchi 2021) Similarly, another study on MBBS students reported 17.78 ± 5.03.(Akhil D. Goel, Sulbha V. Akarte, Sumita P. Agrawal,Vikas Yadav 2016) In our study, the students pursuing non-clinical courses had a mean score of 21.75 ± 5.66. This is slightly less than a recent study that reported a mean score of 21.43 ± 5.24.(Makhubela 2019) Another study in South African students reported M = 21.3, SD = 5.2.(Makhubela 2022) The difference in the mean PSS score, compared to other studies, could be due to our categorization of various medical courses, including MBBS and Dental, under the umbrella of clinical courses. Non-medical courses, on the other hand, were categorized as non-clinical courses. No other studies have conducted this type of comparison, which may account for the disparity.

In a student's life, academic stress is one of the major reasons that can deteriorate their mental health. This could include academic performance, curriculum, frequency of the examinations, lack of time for recreation, insufficient guidance from faculty, improper quality of lectures, inadequate availability of notes and leaning materials, competition with peers in terms ofacademics, extracurricular activities, etc, attendance in lectures and practical(Krutarth R Brahmbhatt et al. 2013; Rebello, Kallingappa, and Hegde 2018; Aselton 2012; Hefner and Eisenberg 2009; Satpathy et al. 2021), oral presentations, assignments, reports, etc. Other factors that could have added to the stress in student's life could be loneliness, high expectations from parents regarding academics(Krutarth R Brahmbhatt et al. 2013; Satpathy et al. 2021), nutritional deficits, lack of physical activity.(Rebello, Kallingappa, and Hegde 2018; Zhai et al. 2020)

Limitations

This study has several limitations. Firstly, the study did not evaluate academic performance, which is a significant factor contributing to students' stress. Student's scores in the examinations can influence stress, such as failures and ATKTs. Therefore, it is also important to consider factors such as academic performance, the number of ATKTs, etc., while evaluating stress among college students. Secondly, the use of a self-administered questionnaire introduces the possibility of students altering their responses, potentially resulting in response or information bias. Lastly, since this study focused on a specific region, its findings cannot be readily generalized to other populations. To address these limitations, future research could explore the study habits and patterns of students, such as the number of hours spent studying, their level of interest in studying,

their academic performance, etc. Similar studies can also be conducted in other regions of India etc, to provide an accurate status of perceived stress among Indian students.

Conclusion

This study was conducted to investigate the prevalence of perceived stress among college students in Mumbai, India, and to compare this stress based on their socioeconomic and demographic characteristics such as; gender, age, BMI, place and type of residence, lifestyle-related characteristics; type of diet, substance abuse, health problems, sleep duration, meditation pattern, academic and work-related characteristics; course, educational level and employment status. This study highlights the high levels of stress encountered by young adults, emphasizing the need for proper management to prevent negative impacts on their health. To the best of our knowledge, this is the first study to compare the levels of perceived stress among students from clinical and non-clinical courses in colleges in Mumbai, India. Non-clinical college students demonstrated a slightly higher degree of perceived stress. To effectively assist students in managing stress, it is crucial to implement various strategies, such as encouraging the participation of students in extracurricular activities (sports, dance, skating, music, etc.). Moreover, organizing sessions on traditional techniques such as yoga and meditation, as well as conducting workshops on mental health and coping mechanisms, can be highly beneficial. To ensure the smooth execution and management of these activities, colleges can also establish special committees dedicated to addressing the mental health needs of students. Another effective approach is to establish mentor-mentee programs, allowing for personalized attention and support for students. It is also important to appoint certified therapists in colleges who can provide proper guidance regarding students' mental health conditions. Conducting regular screenings for stress and related conditions in a timely manner can also enable better identification and thereby appropriate management. Given that the future of our nation depends on young and aspiring students, it is imperative to prioritize their mental well-being and ensure that they receive the necessary care and support they need.

Conflict of interest

The authors have no conflict of interest to declare.

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