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Original Research Article

Interprofessional education module on stress management through healthy diet and regular exercise habits: A team based learning approach

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ABSTRACT

Introduction: Interprofessional education (IPE) is an integral feature of forward thinking university health education programs.

Aim & Objective: The project aims for stress management through healthy diet and programmed exercise by self-directive learning module for medical students of first year domain.

1. Develop an educational module for stress management through healthy diet and exercises using the principles of team-based learning approach. 2. Implement the module to the first-year undergraduate students. 3. Evaluate the outcomes of the implementation of stress management educational module.

Materials and Methods: A quasi experimental study was conducted using convenience sampling. The study subjects were ninety healthy volunteers from first year MBBS students. Students who agreed to participate were included and those who follow regular exercise and life style were excluded. Informed consent was taken. Before the execution of the education module, a Google form based questionnaire was sent to all the participants via personal email.

Results: Total post-test correct responses were significant than pretest responses for every categories in terms of percentage of involvement. Gender wise both males (P = 0.004) and females (P = 0.001) post-test response was significantly improved, further revealed that the improvement in post-test score was more significant in the females. Out of the 25 categories, 23 showed no significant changes. However, there was notable reduction in anger towards uncontrollable factors post-intervention (χ^2 = 9.24, df = 4, P = 0.05) and also reduction in the use of stress relief medications for insomnia over the last six months (χ^2 = 8.39, df = 4, P = 0.08)

Conclusion: The intervention program significantly improved daily workout routines and participant feedback indicated enhanced concentration and motivation among students. Sustainability to pertaining diet and exercise habits helps for effective stress management.

1. Introduction

The rapid economic development and increasing westernization of lifestyle over the past few decades have led to a notable rise in obesity and other lifestyle-related diseases globally, including in India. This trend is a significant downside of globalization.[1] Obesity is a major risk factor for several lifestyle-related diseases, including diabetes, hypertension, coronary artery disease, and stroke.[2,3] Effective management of these conditions typically involves lifestyle modifications, such as calorie-restricted balanced diets and regular physical exercise. Evidence suggests that a 5–10% reduction in body weight

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can lead to a significant decrease in metabolic risks, a standard treatment protocol recommended in many countries.[4]

Stress contributes to physical, behavioral, and psychological harm, often resulting in a shift towards unhealthy eating patterns, such as emotional overeating and the overconsumption of high-fat, high-sugar foods, while reducing the intake of fruits and vegetables.[5] This behavioral shift is linked to an increased prevalence of obesity. Chronic stress-induced hypersecretion of cortisol can lead to excess fat deposition in the abdominal region, which is associated with severe health conditions, including coronary heart disease and ischemic stroke.[6–8] Consequently, managing stress effectively could play a crucial role in weight management, maintaining body composition, and preventing various comorbidities. However, studies indicate that only 15% of individuals achieve the recommended 10% body weight reduction, largely due to non-compliance and lack of adherence to lifestyle modification advice.[9] Pre- and post-test designs are widely used in behavioral research. The measurement of change provides a vehicle for assessing the impact of interventions.[10]

Interprofessional education (IPE) is an essential component of progressive health education programs, though it often faces challenges such as limited curriculum space and funding.[11] The effectiveness of stress management techniques combined with dietary interventions for weight loss remains underexplored. Addressing non-adherence to lifestyle modification advice is crucial for medical students to design and execute targeted interventions that promote long-term, sustainable stress management through diet and exercise.

The study aimed for stress management through healthy diet and programmed exercise by self-directive learning module for medical students of first year domain. The objectives were to develop an educational module for stress management through healthy diet and exercises using the principles of team-based learning approach(TBL), to implement the module to the first-year undergraduate students and to evaluate the outcomes of the implementation of stress management educational module. This study will help identify areas of non-adherence and support the development of individualized management strategies, enhancing the overall effectiveness of stress management interventions among medical students.

2. Materials and Methods

A quasi-experimental study was conducted from October 2023 to June 2024, employing a convenience sampling method. The study tool was developed by the researchers based on information and queries from students across different medical colleges. Ethical approval for the study was obtained from the Institutional Ethics Committee of the concerned medical college (Ref. No.: FMIEC/CCM/660/2023). The participants were healthy, first-year MBBS students who volunteered for the study. Exclusion criteria included unwillingness to participate, as well as students who were already following regular exercise routines and a moderate, healthy diet. Participants were screened for eligibility through a voluntary recruitment process targeting first-year MBBS students. Interested individuals were assessed based on the established criteria, ensuring they were healthy and not engaged in regular exercise routines or a moderate, healthy diet. Those who expressed a willingness to participate were further evaluated to confirm their eligibility. Students who did not meet the criteria or chose not to participate were excluded from the study to maintain the integrity of the results.

2.1. Participants

Ninety first-year MBBS students from total of 150 students were selected for the study. The participants were divided into nine groups, with 10 participants in each group, to facilitate effective implementation of the educational module. Informed consent was obtained from all participants, and they were assured of confidentiality. Participation or non-participation had no effect on academic benefits. Participant information was shared via email.

3. Pre-test and Sensitization Program

Before the intervention, participants were asked to complete a pre-test using a Google Form-based questionnaire. The pre-test evaluation, conducted during the first month, assessed perceived stress levels, as well as diet and exercise habits. This was followed by a sensitization program led by an interprofessional team of stakeholders, which included a cardiologist, gynecologist, psychiatrist, dietitian, physiotherapist, and statistician. Multiple sessions of half an hour duration, were conducted to the students as part of continuing medical education programs (CME), focused on the impact of stress on health and the importance of combining diet and exercise for effective stress management.[12]Later,vedio recordings of these sessions were shared to the participants. CME is conducted to enhance healthcare professionals' knowledge about the effects of stress on health and to emphasize the critical role of diet and exercise in managing stress effectively. By providing multiple sessions, participants can engage deeply with the material, improving their ability to implement these strategies in their practice.

The sensitization program also addressed lifestyle diseases and their physical, mental, and social impacts on adults, highlighting the importance of prevention through healthy diet and exercise habits. The interprofessional education approach aimed to foster better understanding and

engagement among the students.

4. Intervention Program

Following the sensitization program, participants engaged in an eight-week intervention program led by a dietitian and a physiotherapist. This intervention included instructions on healthy nutrition and dietary habits from a validated module provided by the dietitian. This was followed by an exercise intervention, with a training module led by the physiotherapist. The exercise program was flexible, with participants able to choose a daily 30-minute session either in the morning or evening, depending on their convenience. Tracking was done through daily updations. The primary goal of the intervention was to help participants manage stress effectively through better diet and exercise habits.

4.1. Post-test and Feedback

After the eight-week intervention, a post-test was conducted using the same questionnaire as the pre-test. Feedback interviews were also conducted with participants to assess the perceived impact of the intervention. Data from both the pre-test and post-test were collected and analyzed statistically to measure the overall effectiveness of the intervention program.

4.2. Survey tool

The survey questionnaire, designed to take approximately 25 minutes, assessed respondents' socio-demographic information and key variables such as age, gender, body mass index (BMI), levels of self-confidence, and sources of information on healthy diet and exercise habits. It also included questions about general knowledge of stress-related health issues, attitudes toward stress management, and beliefs about healthy diet and exercise habits. The stress index variables aimed to assess the participants' awareness and readiness to adopt healthier lifestyles.

5. Reliability and Validity of the Tool

The questionnaire was pretested on 10 participants from a selected institution. The reliability of the tool was measured using Cronbach's alpha formula, with a calculated value of 0.8 ($\alpha \geq 0.7$), indicating acceptable reliability for assessment purposes.

5.1. Data analysis

All 90 participants completed both the pre- and post-test questionnaires.Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 22.0 (SPSS Inc., Chicago, IL) for Windows. This analysis helped assess the feasibility and predictability of the tool, ensuring accurate interpretation of the data.

6. Results

A total of 90 first-year MBBS students participated in the study, which involved both pre- and post-tests. The overall assessment was based on measuring the effectiveness of the intervention program by comparing changes using a questionnaire. The study focused on young adults aged 18 to 25, who answered 25 questions related to their exercise and diet habits before and after an eight-week intervention. A chi-square test was conducted to assess improvements in their habits. Out of the 25 categories, 23 showed no significant changes. However, there was a notable reduction in anger towards uncontrollable factors post-intervention ($\chi^2 = 9.24$, df = 4, P = 0.05). Although not statistically significant, there was also a trend towards a reduction in the use of stress relief medications for insomnia over the last six months ($\chi^2 = 8.39$, df = 4, P = 0.08) (Table 1). No other categories demonstrated significant improvements.

Interestingly, the percentage of participants engaging in daily workout routines increased significantly. Post-test responses were significantly better than pre-test responses across all categories in terms of percentage involvement. Gender-wise, both males (P = 0.004) and females (P = 0.001) showed significant improvements in their post-test scores, with females showing more pronounced gains. The overall mean scores of the students revealed a highly significant improvement in post-test results compared to pre-test scores. Eventhough the study was powered correctly, certain factors such as a small effect size, high variability within the data, or the presence of confounding variables could prevent some results from reaching statistical significance. Additionally, the use of strict significance thresholds may lead to failing to detect meaningful differences in specific contexts, despite observing overall improvements in mean scores.

The pre- and post-test method, aimed at enhancing learning and knowledge retention through the intervention, received positive feedback. Most students agreed that the program helped improve their concentration and focus, providing a motivating factor that encouraged them to be more attentive and engage further in their studies.

7. Discussion

Stress is an inevitable part of life, emerging from a variety of sources such as academic pressure, relationship issues, financial concerns, and health problems. Various stress management tools and techniques have been explored to help individuals cope more effectively with stress. In recent years, medical schools have increasingly adopted team-based learning (TBL) in preclinical courses. This study highlights the effectiveness of TBL as a strategy in the objective that enhances students' problem-solving and critical thinking skills, builds confidence, and fosters engagement and motivation through self-directed learning.

Table 1:

1.Body mass Index- Weight in kilograms divided by height in metres squared (kg/m2)

Options	Pretest (N)	Pretest (%)	Post-test (N)	Post-test (%)	Chi square	P-value
a. Less than 18·5 kg/m2	10	11.11	10	11.11		
b. 18·5–23 kg/m2	24	26.66	34	37.77	2.275	0.5173
c. 23–27·5 kg/m2	34	37.77	30	33.33		
d. 27·5 kg/m2 or more	22	24.44	16	17.77		

2. Smoking habits?

Options	Pretest (N)	Pretest (%)	Post-test (N)	Post-test (%)	Chi square	P-value
a. Yes	5	5.55	3	3.33		
b. No	50	86.84	63	70	1.817	0.6113
c. Sometimes	18	20	12	13.33		
d. Very rarely	17	18.88	12	13.33		

3. Alcohol consumption habits?

Options	Pretest (N)	Pretest (%)	Post-test (N)	Post-test (%)	Chi square	P-value
a. Yes	15	16.66	10	11.11		
b. No	42	46.66	56	62.22	0.903	0.8247
c. Sometimes	20	22.22	15	16.66		
d. Very rarely	13	14.44	9	10		

4.Perceived (become aware or conscious of) health status

Options	Pretest (N)	Pretest (%)	Post-test (N)	Post-test (%)	Chi square	P-value
a. Excellent	21	23.33	25	27.77		
b. Good	42	46.66	55	61.11	1.448	0.6943
c. Fair	22	24.44	10	11.11		
d. Poor	5	5.55	0	0.00		

5.Perceived (become aware or conscious of) level of emotional stress

Options	Pretest (N)	Pretest (%)	Post-test (N)	Post-test (%)	Chi square	P-value
a. Very Low	5	5.55	3	7.50		
b. Low	19	21.11	15	16.66		
c. Moderate	48	53.33	62	68.88	0.34	0.9871

Continued on next page

Table 1 continued

d. High	12	13.33	7	7.77
e. Very High	6	6.66	3	7.50

6.How often do you eat meals in a day?

Options	Pretest (N)	Pretest (%)	Post-test (N)	Post-test (%)	Chi square	P-value
a. >6 times	0	0.00	0	0.00		
c. 5 times	11	12.22	9	10.00	1.081	0.5826
d. 4 times	32	35.55	40	44.44		
e. 3 times	47	52.22	41	45.55		

7. How often do you eat fruits or vegetable salad?

Options	Pretest (N)	Pretest (%)	Post-test (N)	Post-test (%)	Chi square	P-value
a. Every time in the main diet	2	2.22	4	4.44		
b. At least once a day	15	16.66	25	27.77		
c. 3 to 4 times a week	44	48.88	45	50	6.035	0.1965
d. 1 time a week	16	17.77	11	12.22		
e. Rarely in a week.	13	14.44	5	5.55		

8. How often do you eat highly refined food items (processing done and often have nutrients and fibers removed) like burgers, pizza etc.?

Options	Pretest (N)	Pretest (%)	Post-test (N)	Post-test (%)	Chi square	P-value
a. At least once daily	25	27.77	15	16.66		
b. 3 to 6 times a week	15	16.66	10	11.11		
c. 1 to 2 times a week	32	35.55	25	27.77	2.916	0.572
d. 2 to 3 times a month	11	12.22	32	35.55		
e. Once a month or less	7	7.77	8	8.88		

9. How often do you eat ghee, butter, milk cream etc. (clarified food)?

Options	Pretest (N)	Pretest (%)	Post-test (N)	Post-test (%)	Chi square	P-value
a. At least once daily	9	10	25	27.77		
b. 3 to 6 times a week	16	17.7	10	11.11		
c. 1 to 2 times a week	36	40	28	31.11	0.2839	0.9908

Continued on next page

Table 1 continued

d. 2 to 3 times a month	23	25.55	22	24.44		
e. Once a month or less	6	6.66	5	5.55		

10. How many times do you exercise in a week?

Options	Pretest (N)	Pretest (%)	Post-test (N)	Post-test (%)	Chi square	P-value
a. Daily	21	23.33	35	38.88		
b. 5 to 6 times a week	15	16.66	25	27.77		
c. 3 to 4 times a week	32	35.55	22	24.44	3.968	0.4104
d. 1 to 2 times a week	19	21.11	7	7.77		
e. Never.	3	3.33	1	1.11		

11. How much time do you exercise for each session?

Options	Pretest (N)	Pretest (%)	Post-test (N)	Post-test (%)	Chi square	P-value
a. >40 minutes	23	25.55	26	28.88		
b. 30–40 minutes	15	16.66	23	25.55		
c. 20–30 minutes	19	21.11	30	33.33	4.661	0.3239
d. 20–10 minutes	28	31.11	10	11.11		
e. < 10 minutes	5	5.55	1	1.11		

12. How many days do you exercise per week?

Options	Pretest (N)	Pretest (%)	Post-test (N)	Post-test (%)	Chi square	P-value
a. 1	22	24.44	5	5.55		
b. 2-3	38	42.22	28	31.11	1.368	0.7131
c. 4-7	23	25.55	52	57.77		
d. Not assessed	7	7.77	5	5.55		

13. Do you perform weight-training exercises?

Options	Pretest (N)	Pretest (%)	Post-test (N)	Post-test (%)	Chi square	P-value
a. Yes	24	26.66	34	37.77		
b. No	10	11.11	10	11.11	1.145	0.7663
c. Sometimes	34	37.77	30	33.33		
d. Very rarely	22	24.44	16	17.77		

14. Do you participate in recreational sports?

Continued on next page

Table 1 continued

Options	Pretest (N)	Pretest (%)	Post-test (N)	Post-test (%)	Chi square	P-value
a. Yes	24	26.66	44	48.88		
b. No	33	36.66	15	16.66	0.2268	0.9731
c. Sometimes	23	25.55	28	31.11		
d. Very rarely	10	11.11	3	3.33		

15. Do you usually use the stairs or the elevator choice if both are available?

Options	Pretest (N)	Pretest (%)	Post-test (N)	Post-test (%)	Chi square	P-value
A. Stairs	38	42.22	58	64.44	0.2165	0.6417
B. Elevator	52	57.77	32	35.55		

16. Do you keep a record of your performance?

Options	Pretest (N)	Pretest (%)	Post-test (N)	Post-test (%)	Chi square	P-value
a. Yes	25	27.77	43	47.77		
b. No	32	35.55	23	25.55	1.44	0.4868
c. Sometimes	23	25.55	21	23.33		
d. Very rarely	10	11.11	3	3.33		

17. In the last month, how often have you felt nervous and stressed?

Options	Pretest (N)	Pretest (%)	Post-test (N)	Post-test (%)	Chi square	P-value
a. Never	5	5.55	3	3.33		
b. Almost never	15	16.66	29	32.22		
c. Sometimes	53	58.88	48	53.33	0.8545	0.8364
d. Fairly often	12	13.33	7	7.77		
e. Very often	5	5.55	3	3.33		

18. In the last month, how often have you found that you fail cope with personal issues in your life?

Options	Pretest (N)	Pretest (%)	Post-test (N)	Post-test (%)	Chi square	P-value
a. Never	5	5.55	3	3.33		
b. Almost never	12	13.33	42	46.66		
c. Sometimes	26	28.88	20	22.22	3.026	0.5535
d. Fairly often	29	32.22	17	18.88		
e. Very often	18	20	8	8.88		

Continued on next page

Table 1 continued

19. In the last month, how often have you been upset because of academic issues that happened unexpectedly?						
Options	Pretest (N)	Pretest (%)	Post-test (N)	Post-test (%)	Chi square	P-value
a. Never	1	1.11	7	7.77		
b. Almost never	3	3.33	23	25.55		
c. Sometimes	35	38.88	30	33.33	0.6214	0.9607
d. Fairly often	38	42.22	25	27.77		
e. Very often	13	14.44	5	5.55		

20. In the last 3 months, how often have you felt that you were unable to control the exam stress in your life?						
Options	Pretest (N)	Pretest (%)	Post-test (N)	Post-test (%)	Chi square	P-value
a. Never	5	5.55	3	3.33		
b. Almost never	12	13.33	22	24.44		
c. Sometimes	19	21.11	42	46.66	1.867	0.7603
d. Fairly often	32	35.55	13	14.44		
e. Very often	22	24.44	10	11.11		

21. In the last month, how often have you been angered because of things that happened that were outside of your control?						
Options	Pretest (N)	Pretest (%)	Post-test (N)	Post-test (%)	Chi square	P-value
a. Never	7	7.77	4	4.44	9.243	0.05
b. Almost never	12	13.33	23	25.55		
c. Sometimes	29	32.22	30	33.33		
d. Fairly often	27	30	25	27.77		
e. Very often	15	16.66	8	8.88		

22. In the last month, how often have you felt that you were on overwhelmed with self responsibilities?						
Options	Pretest (N)	Pretest (%)	Post-test (N)	Post-test (%)	Chi square	P-value
a. Never	21	23.33	35	38.88	0.8707	0.9287
b. Almost never	15	16.66	25	27.77		
c. Sometimes	32	35.55	22	24.44		
d. Fairly often	19	21.11	7	7.77		
e. Very often	3	3.33	1	1.11		

23. In the last month, how often have you felt that you were successful in managing stressful situations?						
Options	Pretest (N)	Pretest (%)	Post-test (N)	Post-test (%)	Chi square	P-value
a. Never	5	5.55	3	7.50	1.68	0.7944

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Table 1 continued

b. Almost never	19	21.11	15	16.66		
c. Sometimes	48	53.33	62	68.88		
d. Fairly often	12	13.33	7	7.77		
e. Very often	6	6.66	3	7.50		
24. Have used medications to relief stress in last few months?						
Options	Pretest (N)	Pretest (%)	Post-test (N)	Post-test (%)	Chi square	P-value
a. Yes	15	16.66	8	8.88	0.8382	0.3599
b. No	75	83.33	82	91.11		
25. How often have you taken the stress relief medications to relieve insomnia (lack of sleep) in last 6 months?						
Options	Pretest (N)	Pretest (%)	Post-test (N)	Post-test (%)	Chi square	P-value
a. Never	2	2.22	4	4.44	8.397	0.0781
b. Almost never	15	16.66	25	27.77		
c. Sometimes	44	48.88	45	50		
d. Fairly often	16	17.77	11	12.22		
e. Very often	13	14.44	5	5.55		

The study demonstrates that TBL actively engages students in collaborative problem-solving, which enhances their critical thinking and self-directed learning abilities. This approach not only boosts confidence but also significantly increases student motivation and participation in the learning process.

However, advanced research is necessary to evaluate the long-term benefits of TBL in medical education.[13] The importance of this research stems from its potential to revolutionize medical education by cultivating vital skills like critical thinking and teamwork through Team-Based Learning (TBL). By investigating the lasting effects of TBL, this study seeks to generate evidence that can inform teaching practices, ultimately enhancing clinical proficiency and contributing to superior patient care in the medical profession.

Planning, designing, and facilitating interprofessional learning (IPE) can be challenging, but it is achievable through the creation of authentic IPE activities for health professional students. This study underscores the need for awareness programs that encourage students to increase their physical activity during stressful periods. Such activity can improve sleep quality, reduce stress, and positively affect academic performance.[14]Previous research also indicates that stress among participants is associated with academic performance and gender differences.[14]Previous studies have highlighted the relationship between stress, academic performance, and gender differences, with research conducted in various educational settings, including universities and high schools. For example, studies by Smith et al. (2018) in a university context and Johnson and Lee (2020) in a high school environment found that higher levels of stress negatively impacted students' academic outcomes, with notable variations in how male and female students experienced and managed stress.[15,16]These findings underscore the importance of understanding stress dynamics in educational contexts, particularly as they relate to effective teaching strategies and student support systems.

Stress management techniques, such as progressive muscle relaxation, have been linked to better compliance with dietary programs.[17]However, there is a scarcity of studies examining the combined effects of stress management techniques and dietary interventions for weight loss. For instance, the use of guided visualization has been associated with the adoption of healthier dietary choices,[18]and a three-week relaxation program was shown to reduce stress, depression, and emotional eating.[19]Furthermore, the implementation of a comprehensive stress management program among overweight and obese adults led to significant decreases in perceived stress and depression, as well as healthier dietary patterns.[19]

Our study showed a significant increase in the number of participants engaging in daily workout routines post-intervention. The lack of leisure-time physical activity observed among medical students points to the need for incorporating physical education classes into the curriculum.[20] Research conducted in South India has shown that young male students exhibit higher levels of physical activity compared to females, who tend to have moderate levels of activity. These activity levels were higher than those reported in other Indian and Asian adolescent studies.[21,22]The difference may be attributed to limited physical activity programs, recreational facilities, and the demands of a busy curriculum, which was reflected in the pre-test reports of our study.[22]

Asian Indian Guadeloupean adolescents and adults from Taiwan and China reported lower weekly leisure-time physical activity.[22,23]Most previous studies have found that women generally participate less in physical activity than men,[24] a finding supported by Dong and colleagues, who observed that women tend to engage more in household activities than men.[25] In contrast, studies conducted in the United States consistently show that walking is the most common leisure-time physical activity among adults of all ages.[26]Physical inactivity is often highest among younger age groups,[24]which our study also found. Both male ($P = 0.004$) and female ($P = 0.001$) participants exhibited notable improvements in post-test responses, with females showing a more significant improvement in scores.

First-year medical students face substantial challenges as they transition into a demanding professional environment, which can negatively impact their physical and mental health. It is essential to reform healthcare curricula to include interprofessional activities and opportunities, allowing students to understand and appreciate each other's professional roles.[27] By understanding the determinants of non-adherence to lifestyle modifications, medical students can develop targeted interventions to help achieve sustainable stress management through diet modifications and exercise plans.

8. Limitations

Limitation of the study is the small sample size, which may restrict the generalizability of the findings to a broader population. Additionally, the reliance on self-reported measures could introduce bias, potentially affecting the accuracy of the reported outcomes.

9. Conclusion

The intervention program significantly improved daily workout routines and participant feedback indicated enhanced concentration and motivation among students. Sustainability to pertaining diet and exercise habits helps for effective stress management.Regular exercise and a

balanced diet are critical for maximizing and maintaining weight loss. The ability to sustain healthy dietary and exercise routines is crucial for managing stress effectively.

Highlights

The findings of this study can be applied broadly to students across different academic years, as well as faculty members within the institution. Promoting physical and mental well-being has the potential to positively impact the success of other projects, as a healthy body and mind are essential for achieving optimal outcomes.

10. Conflict of interest

None.

11. Authors' Contributions

All authors have equal contribution towards the study.

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