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Title: Educational Pressure and Stockholm Syndrome-Like Attitudes in Medical Training: A Behavioral Neuroscience Perspective

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Abstract

Background: Medical education is characterized by hierarchical structures and substantial academic pressure, which may influence students' attitudes and behaviors. In such environments, prolonged exposure to authority and dependence on supervisors may be associated with attitudes resembling Stockholm syndrome, including the rationalization or acceptance of unfair or harmful educational practices. This study aimed to examine the association between perceived educational pressure and Stockholm syndrome–like attitudes among medical students and residents.

Methods: This cross-sectional analytical study was conducted among 190 medical students and residents at Kermanshah University of Medical Sciences, Iran. Participants were recruited using convenience sampling. Data were collected using two researcher-developed 15-item questionnaires: the Perceived Educational Pressure Questionnaire and the Stockholm Syndrome–Like Attitudes toward Hierarchical Educational Structures Questionnaire. Cronbach's alpha coefficients were 0.84 and 0.86, respectively. Data were analyzed using descriptive statistics, independent-samples t-tests, one-way analysis of variance (ANOVA), Pearson's correlation coefficient, and multiple linear regression in SPSS version 26. Statistical significance was set at $p < 0.05$.

Results : Perceived educational pressure was moderately and positively correlated with Stockholm syndrome–like attitudes ($r = 0.462$, $p < 0.001$). Compared with medical students, residents reported significantly higher perceived educational pressure (55.63 ± 8.88 vs. 50.91 ± 8.34, $p < 0.001$) and Stockholm syndrome–like attitudes (46.01 ± 7.45 vs. 42.91 ± 6.82, $p = 0.003$). Female participants reported higher perceived educational pressure than male participants ($p = 0.046$), whereas the sex difference in Stockholm syndrome–like attitudes was not statistically significant ($p = 0.063$). In the multivariable regression model, perceived educational pressure ($\beta = 0.438$, $p < 0.001$) and resident status ($\beta = 0.214$, $p = 0.002$) were significantly associated with Stockholm syndrome–like attitudes. The model explained 30.0% of the variance in the outcome (adjusted $R^2 = 0.285$).

Conclusion: Higher perceived educational pressure was associated with stronger Stockholm syndrome–like attitudes toward hierarchical educational structures among medical students and residents. These findings underscore the importance of supportive learning environments, fair evaluation practices, and educational policies that promote psychological safety, professionalism, and educational justice. Further research using validated measurement instruments and longitudinal designs is needed to clarify these associations

Keywords: Stockholm syndrome-like attitudes; Educational pressure; Behavioral neuroscience; Social cognition; Medical education; Hierarchical learning environment

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Highlights

- Educational pressure was associated with Stockholm syndrome-like attitudes.
- Residents reported higher educational pressure than medical students.
- Residents showed higher Stockholm syndrome-like attitude scores.
- Educational pressure significantly predicted these attitudes.
- Educational pressure and academic status explained 28.5% of score variance.

Plain Language Summary

Medical students and residents often work and study in educational environments where senior staff have considerable authority over their training, evaluations, and professional development. Although supervision is an essential part of medical education, excessive educational pressure and unequal power relationships may affect how trainees perceive and respond to these environments. This study explored the relationship between perceived educational pressure and Stockholm syndrome-like attitudes among medical students and residents. A total of 190 medical students and residents from Kermanshah University of Medical Sciences participated in this cross-sectional study. Participants completed questionnaires assessing perceived educational pressure and attitudes resembling Stockholm syndrome in hierarchical educational settings.

The findings showed a moderate positive association between perceived educational pressure and Stockholm syndrome-like attitudes. In other words, participants who reported greater educational pressure also tended to report higher levels of these attitudes. Residents reported higher levels of both educational pressure and Stockholm syndrome-like attitudes than medical students. Regression analysis further indicated that educational pressure and academic status were significant predictors of these attitudes.

These findings suggest that the psychological and interpersonal effects of hierarchical educational environments deserve greater attention in medical training. Educational institutions may benefit from promoting supportive supervision, respectful communication, and learning environments in which trainees can express concerns without fear of negative consequences.

However, this study was cross-sectional and relied on self-reported questionnaire data. Therefore, it cannot establish cause-and-effect relationships. The term “Stockholm syndrome-like attitudes” is used as an exploratory research concept and does not represent a clinical diagnosis. Further studies are needed to investigate the psychological and behavioral processes underlying these associations.

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Introduction

Medical education in Iran, particularly within universities of medical sciences, takes place within a context characterized by hierarchical structures and asymmetrical power relationships among faculty members, residents, and medical students. Although these structures are intended to support educational quality, professional development, and patient safety, they may also create conditions in which educational pressure, restricted opportunities for self-expression, and mistreatment occur. Previous research has highlighted the influence of institutional culture and hierarchical relationships on medical students' educational experiences, particularly through the hidden curriculum and the culture of student mistreatment (Hafferty, 1998; Kassebaum & Cutler, 1998; Bursch et al., 2013).

Medical students and residents may be particularly vulnerable to these pressures because of their dependence on supervisors for clinical guidance, academic evaluation, and professional progression. International studies have documented experiences of mistreatment, including verbal humiliation, discrimination, and other forms of inappropriate behavior during medical training (Bursch et al., 2013; Siller et al., 2017). The Association of American Medical Colleges (AAMC, 2014) has also documented student-reported experiences of mistreatment in its Medical School Graduation Questionnaire. Such experiences may become normalized within educational environments, particularly when inappropriate behaviors are repeatedly observed or perceived as unavoidable components of professional training. Research on the hidden curriculum suggests that institutional norms and informal interactions can shape learners' perceptions of professional behavior, authority, and acceptable workplace practices (Lempp & Seale, 2004; Wear & Skillicorn, 2009). More recently, qualitative research has further demonstrated how medical students learn to understand and manage unprofessional behavior through the hidden curriculum (Doherty et al., 2025). In addition, fear of negative consequences and concerns about hierarchical relationships may discourage students from reporting mistreatment or challenging inappropriate practices (Chung et al., 2018).

Educational pressure and psychological distress are also important concerns in Iranian medical education. Aghajani Liasi et al. (2021) reported educational burnout, depression, anxiety, and stress among medical students at the Islamic Azad University of Tehran. Similarly, Rafati et al. (2020) documented perceived stress among Iranian nursing students in clinical learning environments, highlighting the relevance of clinical educational conditions to psychological well-being among healthcare learners. Although these studies provide evidence of psychological distress in Iranian medical and nursing education, they do not directly establish how educational pressure relates to students' attitudes toward hierarchical authority or the normalization of mistreatment. Furthermore, context-specific evidence examining these relationships among medical students and residents in Iran, particularly at Kermanshah University of Medical Sciences, remains limited.

Conceptually, the acceptance, justification, or defense of practices associated with perceived threats or unequal power relationships may resemble certain features commonly associated with the phenomenon referred to as Stockholm syndrome. The term has been used in discussions of situations in which individuals exposed to coercive or threatening circumstances may develop affiliative or sympathetic responses toward those perceived as sources of threat. However, the scientific status of Stockholm syndrome remains controversial, and it is not recognized as an established independent psychiatric diagnosis (Namnyak et al., 2008). Graham et al. (1994) also discussed the development of affiliative responses toward a perceived source of threat within broader theoretical accounts of captivity and survival. Therefore, its application to medical

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education should be considered a conceptual analogy rather than a clinical or diagnostic classification. In the present study, the term Stockholm syndrome-like attitudes refers to an exploratory set of attitudes that may involve the justification of, identification with, or sympathetic responses toward hierarchical educational authority, particularly when such authority is associated with perceived educational pressure or inappropriate practices. This conceptual approach does not imply that students who demonstrate these attitudes have experienced Stockholm syndrome in a clinical sense.

Furthermore, quantitative investigation of these relationships may provide an initial empirical foundation for more in-depth qualitative research exploring students' lived experiences, interpretations, and responses to educational pressure. Given the importance of medical learners' psychological well-being and the limited availability of context-specific evidence in Iran, the present study was conducted at Kermanshah University of Medical Sciences to examine the relationship between perceived educational pressure and Stockholm syndrome-like attitudes among medical students and residents. The findings may contribute to a better understanding of the psychological and educational dimensions of hierarchical learning environments and inform the development of evidence-informed educational policies, supportive interventions, and strategies to improve the quality of medical education.

Behavioral Neuroscience Perspective on Educational Stress and Hierarchical Learning

From a behavioral and cognitive neuroscience perspective, educational pressure may be considered within the broader framework of stress appraisal, adaptation, and social cognition. The brain plays a central role in evaluating environmental demands and organizing behavioral and physiological responses to potentially stressful experiences. Evidence from neuroscience indicates that stress-related processes involve interactions among neural systems associated with threat evaluation, memory, emotional regulation, and executive functioning. In particular, chronic stress and stress-related signaling can affect brain regions involved in adaptation and cognitive control, including the prefrontal cortex and hippocampus (McEwen, 2007; Arnsten, 2009).

In hierarchical medical learning environments, repeated exposure to supervisory authority, performance evaluation, and perceived interpersonal or academic threats may influence how learners interpret institutional expectations and develop coping responses. Stress-related alterations in prefrontal cortical functioning may also be relevant to executive control, decision-making, and emotional regulation under demanding conditions (Arnsten, 2009). Furthermore, social learning and the internalization of institutional norms may contribute to the acceptance or rationalization of established hierarchical practices. These processes may provide a theoretical basis for exploring how sustained educational pressure relates to students' attitudes toward authority and institutional practices. However, the proposed neurobehavioral mechanisms were not directly assessed in the present study and should therefore be interpreted as a theoretical framework rather than demonstrated biological pathways.

Accordingly, examining the association between perceived educational pressure and Stockholm syndrome-like attitudes may contribute to a broader behavioral neuroscience understanding of stress adaptation and social responses within medical training environments. The proposed conceptual framework linking educational pressure, stress-related adaptation, and attitudes toward hierarchical educational authority is illustrated in Figure 1

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Figure 1. A Proposed Behavioral and Cognitive Framework Linking Educational Pressure to Stockholm Syndrome-Like Attitudes in Medical Training

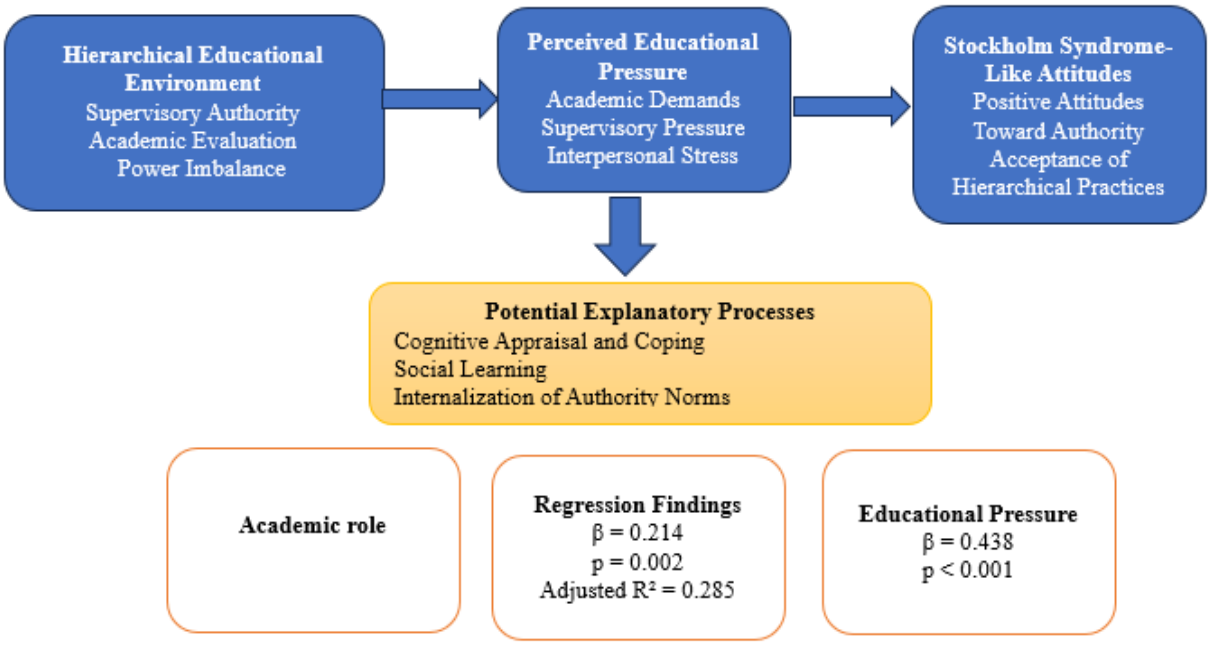

Figure 1. A proposed behavioral and cognitive framework linking hierarchical educational environments, perceived educational pressure, and Stockholm syndrome-like attitudes in medical training. The observed association between perceived educational pressure and Stockholm syndrome-like attitudes is supported by the present study ($r = 0.462$, $p < 0.001$). Cognitive appraisal, coping processes, and social learning are presented as potential explanatory mechanisms that require further empirical investigation. These mechanisms were not directly measured in the present study.

Study Objectives

General Objective

To examine the relationship between perceived educational pressure and Stockholm syndrome–like attitudes among medical students and residents at Kermanshah University of Medical Sciences.

Specific Objectives

1. To determine the level of perceived educational pressure among medical students across theoretical and clinical learning environments.
2. To assess Stockholm syndrome–like attitudes toward hierarchical educational structures among medical students.
3. To examine the correlation between perceived educational pressure and Stockholm syndrome–like attitudes.
4. To compare perceived educational pressure and Stockholm syndrome–like attitudes across educational stages, sex, and academic status (basic sciences, clinical clerkship, and clinical internship).
5. To investigate the associations between perceived educational pressure and sociodemographic characteristics among medical students.

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6. To compare perceived educational pressure and Stockholm syndrome–like attitudes between medical students and residents.

Methods

Study Design

This study employed a cross-sectional analytical design to investigate the relationship between perceived educational pressure and Stockholm syndrome–like attitudes among medical students and residents.

Study Population and Sampling

The target population comprised medical students enrolled in the basic sciences, pathophysiology, clinical clerkship, and clinical internship stages, as well as residents enrolled at Kermanshah University of Medical Sciences.

Participants were recruited using convenience sampling. The target sample size was set at 190 participants, taking into account the cross-sectional analytical design, the requirements of multivariable linear regression analysis, including a minimum of 10 participants per predictor variable, and the anticipated possibility of incomplete responses or participant attrition.

Given the sensitive and attitude-oriented nature of the research topic, convenience sampling was considered a practical approach to facilitating access to eligible participants and encouraging voluntary participation. In addition, time and logistical constraints associated with clinical education settings supported the feasibility of this sampling strategy.

In terms of methodological classification, the study was applied in purpose, quantitative in approach, and cross-sectional in design.

Eligibility Criteria

Inclusion Criteria

Participants were eligible for inclusion if they met the following criteria:

- Enrollment as a medical student in the clinical clerkship or clinical internship stages, or as a resident, at Kermanshah University of Medical Sciences.
- At least six months of experience in a clinical educational environment.
- Willingness to participate in the study and provision of written informed consent.
- Ability to understand and complete the study questionnaires.
- No concurrent participation in other similar studies addressing educational pressure or related psychological attitudes.

Exclusion Criteria

Participants were excluded if they met any of the following criteria:

- Failure to complete the questionnaires or missing responses to more than 20% of the questionnaire items.
- Withdrawal from the study at any stage.
- Self-reported history of a diagnosed severe psychiatric disorder considered potentially likely to affect questionnaire responses.

Data Collection Instruments

Data were collected using two researcher-developed questionnaires.

1. Perceived Educational Pressure Questionnaire

This questionnaire consisted of 15 items rated on a five-point Likert scale and was designed to assess participants perceived levels of educational pressure.

2. Stockholm Syndrome–Like Attitudes Questionnaire

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This questionnaire also consisted of 15 items rated on a five-point Likert scale and was designed to assess attitudes reflecting sympathetic or justificatory responses toward hierarchical educational structures.

Both questionnaires were developed by the research team based on a review of the literature, previous studies, and expert input from specialists in medical education and psychology.

Face and content validity were assessed qualitatively by an expert panel comprising 10 faculty members with expertise in medical education, psychology, and epidemiology. The panel evaluated the clarity, relevance, simplicity, and comprehensiveness of the questionnaire items. Revisions were made in accordance with the experts' recommendations, resulting in the final versions of the instruments.

The internal consistency of the questionnaires was assessed using Cronbach's alpha coefficient. The coefficients were 0.84 for the Perceived Educational Pressure Questionnaire and 0.86 for the Stockholm Syndrome–Like Attitudes Questionnaire, indicating satisfactory internal consistency.

Statistical Analysis

Data were analyzed using IBM SPSS Statistics, version 26. Descriptive statistics, including means, standard deviations, frequencies, and percentages, were used to summarize the study variables and participant characteristics. For inferential analyses, Pearson's correlation coefficient was used to examine the relationship between perceived educational pressure and Stockholm syndrome–like attitudes, given the reported normal distribution of the data. Multivariable linear regression analysis was performed to assess the association between perceived educational pressure and the relevant outcome while adjusting for potential confounding variables, including educational stage, sex, and marital status. A two-sided *p* value of less than 0.05 was considered statistically significant.

Results

Participant Characteristics

A total of 190 medical students and residents from Kermanshah University of Medical Sciences participated in this cross-sectional study. Of the participants, 109 (57.4%) were female and 81 (42.6%) were male. Regarding academic role, 112 participants (58.9%) were medical students and 78 (41.1%) were residents. The demographic and educational characteristics of the participants are presented in Tables 1 and 2.

Table 1. Distribution of participants by sex

Sex	n	%
Female	109	57.4
Male	81	42.6
Total	**190**	**100.0**

Table 2. Distribution of participants by academic role

Academic role	n	%
Medical students	112	58.9
Residents	78	41.1
Total	**190**	**100.0**

Participants were also classified according to their educational stage. The distribution across these stages is presented in Table 3. The frequencies and percentages in this table should be finalized using the verified frequency output from the original dataset to ensure consistency with the total number of participants and the number of residents reported in Table 2.

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Table 3. Distribution of participants by educational stage

Educational stage	n	%
Basic sciences	53	.28
Pathophysiology	45	.24
Clinical clerkship	14	.7
First-year residents	26	.14
Second-year residents	21	.11
Third-year residents and above	31	.16
Total	**190**	**100.0**

The residency-stage frequencies and percentages should be completed after verification against the original dataset. The total number of residents across all residency stages must equal 78, and the total number of participants across all educational stages must equal 190.

Descriptive Statistics of the Study Variables

Descriptive statistics were calculated for perceived educational pressure and Stockholm syndrome–like attitudes. The mean score for perceived educational pressure was 52.84 (SD = 8.96), with observed scores ranging from 28 to 74. The mean score for Stockholm syndrome–like attitudes was 44.17 (SD = 7.21), with scores ranging from 25 to 66.

The skewness and kurtosis values for both variables were close to zero, suggesting no substantial departure from symmetry or marked excess kurtosis. The Kolmogorov–Smirnov test results were also reported as nonsignificant for both variables. These findings were considered in evaluating the suitability of the planned parametric analyses.

Table 4. Descriptive statistics and distributional characteristics of the main study variables

Statistic	Perceived educational pressure	Stockholm syndrome–like attitudes
Mean	52.84	44.17
Standard deviation	8.96	7.21
Minimum	28	25
Maximum	74	66
Skewness	−0.31	−0.18
Kurtosis	−0.24	−0.09
Kolmogorov–Smirnov statistic	0.061	0.054
Kolmogorov–Smirnov p-value	0.200	0.200

The reported Kolmogorov–Smirnov p-values of 0.200 may represent the software's reporting threshold rather than exact p-values; this should be checked against the original output.

Association Between Perceived Educational Pressure and Stockholm Syndrome–Like Attitudes

Pearson's correlation analysis indicated a statistically significant, moderate positive association between perceived educational pressure and Stockholm syndrome–like attitudes ($r = 0.462$, $p < 0.001$). Participants reporting higher levels of perceived educational pressure tended to report higher levels of Stockholm syndrome–like attitudes.

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Table 5. Pearson correlation between perceived educational pressure and Stockholm syndrome–like attitudes

Variables	Pearson's r	p-value
Perceived educational pressure and Stockholm syndrome–like attitudes	0.462	<0.001

Differences by Academic Role

Independent-samples t-tests were used to compare medical students and residents on the two main study variables. Residents reported higher perceived educational pressure scores (M = 55.63, SD = 8.88) than medical students (M = 50.91, SD = 8.34), and the reported difference was statistically significant (t(188) = 3.74, p < 0.001).

Residents also reported higher Stockholm syndrome–like attitudes scores (M = 46.01, SD = 7.45) than medical students (M = 42.91, SD = 6.82). This difference was statistically significant (t(188) = 2.98, p = 0.003).

Table 6. Comparison of perceived educational pressure by academic role

Academic role	n	Mean	SD
Medical students	112	50.91	8.34
Residents	78	55.63	8.88

Test result: t (188) = 3.74, p < 0.001.

Table 7. Comparison of Stockholm syndrome–like attitudes by academic role

Academic role	n	Mean	SD
Medical students	112	42.91	6.82
Residents	78	46.01	7.45

Test result: t (188) = 2.98, p = 0.003.

Differences by Sex

Perceived educational pressure scores were higher among female participants (M = 53.91, SD = 9.18) than among male participants (M = 51.39, SD = 8.45). The reported difference reached statistical significance (t (188) = 2.01, p = 0.046).

For Stockholm syndrome–like attitudes, female participants had a mean score of 45.00 (SD = 7.41), compared with 43.08 (SD = 6.87) among male participants. This difference was not statistically significant at the 0.05 level (t (188) = 1.87, p = 0.063).

Table 8. Comparison of perceived educational pressure by sex

Sex	n	Mean	SD
Male	81	51.39	8.45
Female	109	53.91	9.18

$t(188) = 2.01,\ p = 0.046$

Table 9. Comparison of Stockholm syndrome–like attitudes by sex

Sex	n	Mean	SD
Male	81	43.08	6.87
Female	109	45.00	7.41

$t(188) = 1.87,\ p = 0.063$

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Differences Across Educational Stages

One-way analysis of variance (ANOVA) was used to examine differences in perceived educational pressure across educational stages. The previously reported ANOVA summary indicated a statistically significant difference between stages, $F(4, 86) = 4.86$, $p < 0.001$.

However, the reported stage-specific descriptive statistics and the ANOVA summary should be checked against the original dataset before this result is finalized. In particular, the reported residency-stage counts are inconsistent with the overall number of residents in Table 2. The ANOVA degrees of freedom, group means, standard deviations, and test statistic must therefore be verified after correcting the educational-stage frequencies.

Table 10. Previously reported ANOVA summary for perceived educational pressure across educational stages

Source of variation	Sum of squares	df	Mean square	F	p-value
Between groups	1,218.53	5	243.71	4.86	<0.001
Within groups	9,236.14	184	50.20	—	—
Total	10,454.67	189	—	—	—

This table reflects the previously supplied results and should not be treated as final until the educational-stage frequencies and the corresponding ANOVA output have been verified.

The previously reported mean perceived educational pressure scores by educational stage were as follows: basic sciences, 47.86 (SD = 7.32); pathophysiology, 50.72 (SD = 8.01); clinical clerkship, 53.84 (SD = 7.94); first-year residents, 57.10 (SD = 8.36); second-year residents, 58.50 (SD = 8.90); and third-year residents and above, 54.92 (SD = 8.27). A separate result was also reported as $F = 4.86$, $p < 0.001$. Because these figures are not fully consistent with the previously supplied ANOVA summary, they should be reconciled with the original statistical output before publication.

Table 11. Previously reported perceived educational pressure scores by educational stage

Educational stage	Previously reported mean	Previously reported SD
Basic sciences	47.86	7.32
Pathophysiology	50.72	8.01
Clinical clerkship	53.84	7.94
First-year residents	57.10	8.36
Second-year residents	58.50	8.90
Third-year residents and above	54.92	8.27

The values in this table are provisional pending verification of the educational-stage group sizes and re-examination of the ANOVA results.

Multivariable Linear Regression Analysis

A multivariable linear regression model was used to examine the association of perceived educational pressure, sex, academic role, and marital status with Stockholm syndrome–like attitudes. The model was statistically significant overall ($F = 19.74$, $p < 0.001$) and explained 30.0% of the variance in the outcome ($R^2 = 0.300$; adjusted $R^2 = 0.285$).

Perceived educational pressure was positively associated with Stockholm syndrome–like attitudes ($\beta = 0.438$, $t = 6.87$, $p < 0.001$). Academic role was also statistically significant, with residents showing higher scores than medical students ($\beta = 0.214$, $t = 3.11$, $p = 0.002$). Sex was not

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significantly associated with the outcome after adjustment (β = 0.091, t = 1.34, p = 0.182), nor was marital status (β = 0.056, t = 0.81, p = 0.419).

Table 12. Multivariable linear regression predicting Stockholm syndrome–like attitudes

Predictor	Standardized β	t	p-value
Perceived educational pressure	0.438	6.87	<0.001
Female sex	0.091	1.34	0.182
Resident status	0.214	3.11	0.002
Married status	0.056	0.81	0.419

Model summary: $R = 0.548$; $R^2 = 0.300$; adjusted $R^2 = 0.285$; $F = 19.74$; $p < 0.001$.

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Summary of the Main Findings

Overall, perceived educational pressure was moderately and positively associated with Stockholm syndrome–like attitudes. Residents reported higher mean scores on both variables than medical students. Female participants reported higher perceived educational pressure than male participants, whereas the sex difference in Stockholm syndrome–like attitudes was not statistically significant. In the multivariable model, perceived educational pressure and resident status remained statistically significant predictors of Stockholm syndrome–like attitudes, while sex and marital status did not. The educational-stage comparisons require verification after the residency-stage frequencies and corresponding ANOVA results have been reconciled with the original dataset.

Discussion

The present study examined the association between perceived educational pressure and Stockholm syndrome–like attitudes among medical students and residents at Kermanshah University of Medical Sciences. The findings demonstrated a moderate positive correlation between perceived educational pressure and Stockholm syndrome–like attitudes. Residents reported significantly higher scores on both measures than medical students. Female participants reported higher perceived educational pressure than male participants, although the difference in Stockholm syndrome–like attitudes by sex was not statistically significant. In the multivariable regression model, perceived educational pressure and academic role were independently associated with Stockholm syndrome–like attitudes. These findings provide an initial basis for examining how educational pressure and hierarchical learning environments may relate to medical learners' attitudes toward institutional practices.

Association Between Perceived Educational Pressure and Stockholm Syndrome–Like Attitudes

The principal finding was a moderate positive association between perceived educational pressure and Stockholm syndrome–like attitudes ($r = 0.462$, $p < 0.001$). Participants who reported greater educational pressure also tended to endorse attitudes reflecting the acceptance, justification, or accommodation of hierarchical educational practices. These attitudes may involve perceiving established practices as unavoidable, rationalizing the behavior of educational authorities, or becoming reluctant to challenge practices that are experienced as unfair or harmful. Nevertheless, the present findings do not establish that educational pressure causes such attitudes. Because the study was cross-sectional, the direction of the association cannot be determined, and other factors may contribute to both perceived pressure and attitudes toward educational hierarchies. Previous systematic evidence has demonstrated that harassment and discrimination are common experiences during medical training, suggesting that mistreatment should be understood not

merely as an isolated interpersonal event but also in relation to broader educational and institutional environments (Fnais et al., 2014).

The broader literature on the hidden curriculum, learner mistreatment, and medical education provides a useful context for interpreting this association. Medical students and residents operate within environments shaped by academic expectations, performance assessments, professional competition, and dependence on supervisors for feedback and progression. These conditions may influence how learners interpret institutional norms and respond to challenging educational experiences. Under sustained pressure, learners may adopt coping strategies that help them function within demanding environments, including accommodating established practices or regarding certain behaviors as unavoidable features of professional training. These conditions may influence how learners interpret institutional norms and respond to challenging educational experiences (Brandford et al., 2018).

The concept of the hidden curriculum is particularly relevant to this interpretation. The hidden curriculum encompasses the values, norms, attitudes, and behavioral expectations conveyed through institutional culture and everyday interactions, beyond the formal curriculum (Hafferty, 1998; Lempp & Seale, 2004; Wear & Skillicorn, 2009; Witman, 2014). The hidden curriculum encompasses the values, norms, attitudes, and behavioral expectations conveyed through institutional culture and everyday interactions, beyond the formal curriculum (Arnsten AFT, 2009: Kassebaum, 1998). In medical education, interactions with supervisors and colleagues can influence learners' understanding of authority, professional conduct, and acceptable workplace behavior. When inappropriate practices are repeatedly observed or normalized, learners may become less inclined to question them or may interpret them as inevitable components of professional development. Norman (2024) also described how power imbalances and concerns about negative academic consequences may shape medical students' experiences of mistreatment and their willingness to challenge inappropriate behavior. Recent qualitative evidence suggests that medical students may rationalize unprofessional behavior, adjust their expectations of acceptable conduct, and avoid formal reporting when the individuals involved hold positions of authority (Doherty et al., 2025).

Previous research on mistreatment and the educational environment has highlighted the importance of learners' experiences within medical training institutions (Lempp H, 2014). This literature provides a relevant background for understanding how institutional practices may shape learners' perceptions and responses. However, the present findings should not be interpreted as evidence that participants experienced Stockholm syndrome in a clinical or psychiatric sense. In this study, Stockholm syndrome–like attitudes refers to an exploratory construct measured using a researcher-developed questionnaire. Its theoretical meaning, dimensional structure, and construct validity require further investigation before stronger conclusions can be drawn about the nature of these attitudes. Chung et al. (2018) identified several barriers to reporting mistreatment, including fear of retaliation, concerns about damaging student–teacher relationships, and the perception that mistreatment is embedded in medical culture.

A systematic review by Dyrbye et al. (2006) also documented substantial levels of depression, anxiety, and other indicators of psychological distress among medical students, highlighting the importance of student well-being in medical education. In a subsequent multi-institutional study, Dyrbye et al. (2010) found an association between burnout and serious thoughts of dropping out of medical school, further emphasizing the potential academic consequences of learner distress.

Interprofessional collaboration may represent an additional dimension of the clinical learning environment that warrants consideration when interpreting learners' experiences of educational

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hierarchy. Rasouli et al. (2024), in their psychometric evaluation of the Interprofessional Education Collaboration (IPEC) tool among Iranian medical and nursing students, identified four domains of interprofessional competency: values and ethics, roles and responsibilities, interprofessional communication, and team-based care and teamwork. Although their study did not directly investigate educational pressure or mistreatment, these domains highlight the importance of ethical relationships, role clarity, and effective communication in clinical education. Future studies could examine whether these factors are associated with students' perceptions of educational authority, their willingness to report inappropriate behavior, and their adaptation to hierarchical learning environments.

Interpretation Within a Behavioral Neuroscience Framework

The observed association between perceived educational pressure and Stockholm syndrome-like attitudes may also be considered from a behavioral neuroscience perspective. Stress appraisal and adaptation are influenced by interactions between environmental demands, cognitive evaluation, and emotional regulation. Previous neuroscience research has demonstrated that stress-related signaling can affect prefrontal cortical functions involved in executive control, decision-making, and emotional regulation (McEwen, 2007; Arnsten, 2009). In hierarchical educational settings, repeated exposure to demanding interpersonal and institutional conditions may therefore be relevant to the ways learners interpret authority, regulate responses to challenging experiences, and adapt to established social norms. However, the present study did not assess neural activity, neuroendocrine responses, or specific cognitive functions. Therefore, these mechanisms should be regarded as theoretical explanations rather than demonstrated biological pathways. Future interdisciplinary investigations integrating validated psychological measures with behavioral and neurobiological assessments may help clarify the mechanisms linking educational stress to attitudes toward hierarchical authority.

Differences Between Medical Students and Residents

Residents reported significantly higher perceived educational pressure than medical students ($p < 0.001$). This difference may be related to the distinct demands of postgraduate medical training. In addition to educational requirements, residents participate in patient care, make clinical decisions under supervision, manage substantial workloads, and operate within complex hospital hierarchies. They may also face competing expectations related to clinical performance, examinations, professional development, and relationships with senior physicians.

The increased demands associated with postgraduate medical training are consistent with evidence from a systematic review and meta-analysis of trainee physicians. Zhou et al. (2020) found that work demands, poor work environments, and concerns about patient care were among the factors most strongly associated with burnout and stress in trainee physicians.

The combination of clinical responsibilities and ongoing learning may expose residents to multiple sources of pressure. Whereas the responsibilities of medical students in earlier stages may be more heavily centered on coursework and examinations, residents must increasingly integrate learning with clinical service delivery. These competing demands may contribute to higher perceived educational pressure, particularly when workload, supervisory expectations, and opportunities for recovery are poorly balanced.

The broader literature on medical learner distress and burnout provides a relevant context for this finding. Previous research has documented burnout and distress among medical students and emphasized the importance of educational and individual factors in learner well-being (Yusoff MSB, 2010). Research on the hidden curriculum and mistreatment has also drawn attention to the

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influence of institutional culture and informal educational practices on learners' experiences (Dahlin M, et al, 2015: Graham DL, 2005).

Nevertheless, the present study did not directly measure clinical workload, working hours, supervisory practices, or other specific sources of pressure. Consequently, these factors cannot be established as explanations for the observed difference between residents and medical students. Differences in perceived pressure may also reflect variations in assessment practices, institutional expectations, available support, or other unmeasured characteristics. Future research should assess these factors directly to identify the principal contributors to educational pressure across different stages of medical training.

Residents also reported significantly higher Stockholm syndrome–like attitudes scores than medical students ($p = 0.003$). One possible interpretation is that residents have more sustained exposure to clinical hierarchies and depend more directly on supervisors and senior colleagues for clinical guidance, performance evaluation, and professional progression. Repeated interactions within these structures may influence how learners understand institutional authority and respond to established norms. The influence of hierarchical relationships on learners' responses to mistreatment has also been highlighted in qualitative research, which suggests that the authority and professional position of the individuals involved may affect students' willingness to challenge inappropriate behavior (Chung et al., 2018; Doherty et al., 2025).

This interpretation is consistent with the hidden curriculum framework, which emphasizes the influence of informal educational experiences on professional attitudes and behavior (Aghajani Liasi, 2021). Through routine interactions, learners may develop implicit expectations about professional loyalty, deference to authority, acceptable conduct, and the potential consequences of challenging established practices. These dynamics may be particularly relevant during residency, when learners assume greater clinical responsibility while remaining dependent on supervisory structures.

Another possible explanation is that residents develop strategies to manage conflict and maintain working relationships in demanding clinical environments. Accommodating established practices or avoiding confrontation may sometimes help learners navigate daily responsibilities. However, such responses could also make it more difficult to recognize or challenge inappropriate behavior when it becomes normalized. These explanations remain tentative because the present study did not directly assess exposure to hierarchical environments, dependence on supervisors, conflict-management strategies, or the psychological processes underlying the measured attitudes. Longitudinal and qualitative studies could help clarify how these attitudes develop and change throughout medical training.

Differences Across Educational Stages

The initially reported analysis suggested differences in perceived educational pressure across educational stages. The descriptive results indicated lower mean scores among students in the basic sciences stage and higher scores among residents, particularly second-year residents. These patterns may reflect differences in the demands associated with various stages of medical training, from theoretical coursework and examinations to clinical responsibilities, supervised patient care, and postgraduate assessment.

However, the educational-stage results require verification before their implications can be interpreted confidently. The previously reported group frequencies were inconsistent with the overall number of residents in the sample, and the supplied ANOVA summaries contained differing F statistics. In addition, the very small number initially reported for second-year residents makes estimates for that group particularly unstable. The stage-specific means, group sizes, overall

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ANOVA, and any post hoc comparisons should therefore be recalculated or confirmed using the original dataset before this section is finalized.

Once these results have been verified, differences across educational stages may help identify points in medical training at which learners experience greater pressure and may benefit from additional support. Nevertheless, educational stage should not be treated as a direct measure of clinical workload, supervisory exposure, or professional responsibility unless these characteristics are independently assessed. Any interpretation should also account for unequal group sizes and the limitations of cross-sectional comparisons.

Sex Differences in Perceived Educational Pressure and Stockholm Syndrome–Like Attitudes

Female participants reported higher perceived educational pressure than male participants ($p = 0.046$). Although this difference met the conventional threshold for statistical significance, the p-value was close to 0.05 and should be interpreted cautiously. The result may indicate differences in how participants experience or perceive the educational environment; however, the study did not directly assess the mechanisms that might account for this finding.

Potential explanations could include differences in stress appraisal, interpersonal experiences, social expectations, or access to support. These possibilities remain speculative because they were not measured in the present study. Previous research has examined medical learners' experiences of stress and mistreatment in relation to sex and other demographic characteristics, although findings may vary across populations and educational contexts (Nejad, Z. K., et al. 2020: Shadmehr, E., et al. 2021: Witman, Y. 2013). Accordingly, sex-related differences should be interpreted in relation to the specific institutional and sociocultural setting rather than assumed to be universal.

The observed difference may also reflect differences in the distribution of participants across educational stages or other characteristics not accounted for in the unadjusted comparison. In the multivariable regression model, sex was not significantly associated with Stockholm syndrome–like attitudes after adjustment for perceived educational pressure, academic role, and marital status ($p = 0.182$). This finding suggests that sex was not an independent predictor of the measured outcome within the specified model. However, the absence of statistical significance does not establish equivalence between groups or exclude the possibility of a smaller association.

No statistically significant difference in Stockholm syndrome–like attitudes was observed between female and male participants in the unadjusted comparison ($p = 0.063$), despite a somewhat higher mean score among female participants. This pattern suggests that the sex-related difference observed in perceived educational pressure was not accompanied by a statistically significant difference in the attitudes measured by the questionnaire. Further studies with larger samples and appropriate adjustment for educational stage and other potential confounders are needed to clarify these relationships.

Previous research has also examined gender-related differences in medical students' experiences of mistreatment, although the nature and extent of these differences may vary according to the type of mistreatment and the educational context (Siller et al., 2017).

Multivariable Factors Associated with Stockholm Syndrome–Like Attitudes

The multivariable regression model was statistically significant and explained 30.0% of the variance in Stockholm syndrome–like attitudes ($R^2 = 0.300$; adjusted $R^2 = 0.285$). Perceived educational pressure had the largest standardized regression coefficient among the predictors included in the model ($\beta = 0.438$, $p < 0.001$). Academic role was also significantly associated with the outcome, with residents reporting higher scores than medical students after adjustment for the

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other variables (β = 0.214, p = 0.002). Sex and marital status were not statistically significant predictors in the model.

The persistence of the association between perceived educational pressure and Stockholm syndrome–like attitudes after adjustment for the included variables suggests that the relationship was not fully accounted for by sex, academic role, or marital status. Nevertheless, because all variables were assessed within a cross-sectional design, the regression coefficients represent statistical associations rather than evidence of temporal or causal relationships. It is also important to distinguish statistical prediction from causation: the findings do not establish that educational pressure produces these attitudes or that reducing pressure alone would necessarily change them.

The significant association with academic role indicates that differences between residents and medical students were not fully explained by the other variables included in the model. Greater exposure to clinical hierarchies, dependence on supervisors, or different institutional expectations may be relevant, but these potential mechanisms were not directly assessed. Moreover, approximately 70% of the variance in the outcome remained unexplained by the model. Other factors, including perceived organizational support, experiences of mistreatment, coping strategies, psychological resilience, and institutional culture, may warrant investigation in future studies.

Taken together, the regression findings support further examination of educational pressure and academic role as correlates of attitudes toward hierarchical educational structures. However, these findings should be interpreted in light of the exploratory nature of the outcome measure and the need for further validation of the researcher-developed questionnaire.

Implications for Medical Education

The findings highlight the importance of examining educational pressure not only as a potential source of learner distress but also in relation to learners' perceptions of institutional authority and educational practices. Medical schools and teaching hospitals should promote learning environments in which expectations are transparent, assessment practices are fair, and learners can raise concerns without fear of retaliation. Clear procedures for reporting mistreatment, accessible support services, constructive feedback, and appropriate faculty development may help strengthen a culture of respect and psychological safety.

The importance of institutional and cultural approaches to preventing mistreatment is also supported by systematic evidence highlighting the prevalence of harassment and discrimination during medical training (Fnais et al., 2014), as well as qualitative findings emphasizing the need to address organizational barriers to reporting and institutional tolerance of unprofessional behavior (Doherty et al., 2025; Bell et al., 2021).

Particular attention may be warranted for residents, who reported higher levels of perceived educational pressure and Stockholm syndrome–like attitudes than medical students. Institutional reviews of workload, supervision, assessment, and opportunities for support could help identify modifiable aspects of the educational environment. Nevertheless, the present study did not evaluate the effectiveness of specific interventions, so these recommendations should be regarded as practical implications informed by the findings and broader medical education literature, rather than interventions whose effectiveness has been demonstrated by this study.

It is also important to avoid interpreting the measured attitudes as evidence of individual pathology. The findings are better understood as an initial indication that educational pressure and attitudes toward hierarchical practices may be related. Further work is needed to determine whether the construct captures a distinct and meaningful pattern of attitudes and how it relates to

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established concepts such as perceived mistreatment, organizational culture, psychological safety, and professional socialization.

Limitations and Future Research

Several limitations should be considered when interpreting these findings. First, the cross-sectional design prevents conclusions about temporal ordering and causality. Second, convenience sampling at a single university may limit the generalizability of the results to other medical schools and healthcare systems. Third, reliance on self-reported questionnaires may have introduced response or social desirability bias, particularly because the study addressed sensitive attitudes toward authority and educational hierarchies.

Fourth, the questionnaires were developed by the researchers. Although their reported internal consistency was acceptable, reliability alone does not establish construct validity. Further research should examine the instruments' factor structure, convergent and discriminant validity, test–retest reliability, and performance in independent samples. The term Stockholm syndrome–like attitudes should therefore remain an exploratory label until its conceptual and psychometric properties have been established more fully.

Future research should also consider less overt forms of mistreatment, such as neglect and exclusion from meaningful participation in clinical learning, which may be overlooked when assessment focuses only on explicit abusive behaviors (2023 systematic review on medical student neglect)(Kloos J,et al; 2023).

Fifth, the regression model included a limited set of demographic and educational variables. Other potentially relevant factors, including workload, duration of clinical exposure, supervisory practices, perceived support, and previous experiences of mistreatment, were not directly assessed. Finally, the educational-stage comparisons require verification because of inconsistencies in the initially reported group frequencies and ANOVA statistics. Unequal group sizes, particularly a very small second-year resident group if confirmed, may further limit the precision of stage-specific estimates.

Future studies should recruit larger and more diverse samples from multiple institutions and use longitudinal designs to examine how perceived educational pressure and attitudes toward hierarchical practices change over time. Qualitative research could provide additional insight into how medical learners interpret authority, mistreatment, professional loyalty, and coping within hierarchical environments. Further validation of the measurement instruments and inclusion of established measures of mistreatment, psychological safety, and organizational support would also strengthen the evidence base.

Conclusion

This study found a moderate positive association between perceived educational pressure and Stockholm syndrome–like attitudes among medical students and residents. Residents reported higher scores on both measures than medical students, while female participants reported higher perceived educational pressure than male participants. In multivariable analysis, perceived educational pressure and academic role were significantly associated with the measured attitudes. These findings underscore the importance of supportive, fair, and psychologically safe educational environments. However, the cross-sectional design and exploratory nature of the outcome measure preclude causal conclusions. Further research is needed to validate the construct, clarify the mechanisms underlying the observed associations, and determine how educational practices may be improved to support learners' well-being and professional development.

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Implications for Medical Education

Practical Recommendations

1. **Develop targeted interventions to reduce educational pressure.** Medical schools and residency programs should assess the principal sources of educational pressure and consider interventions addressing excessive workloads, assessment-related stress, and avoidable organizational barriers.
2. **Strengthen psychological support services.** Confidential counseling and psychological support should be accessible to medical students and residents, particularly those experiencing substantial stress in clinical learning environments.
3. **Provide faculty development in effective supervision and feedback.** Faculty members and senior residents should receive training in respectful communication, constructive feedback, appropriate responses to learner concerns, and the prevention of educational mistreatment.
4. **Promote respectful and psychologically safe learning environments.** Institutions should review educational practices that may reinforce harmful power imbalances and establish transparent, confidential procedures for reporting and addressing inappropriate conduct.
5. **Incorporate learner well-being into educational planning.** Medical education administrators should consider learner feedback and measures of educational pressure when evaluating clinical rotations, supervisory practices, and residency training programs.

These recommendations are intended to inform institutional improvement and should be evaluated through appropriately designed intervention studies before their effectiveness is assumed.

Recommendations for Future Research

1. Conduct longitudinal studies to examine changes in perceived educational pressure and Stockholm syndrome–like attitudes throughout medical training.
2. Undertake qualitative studies using in-depth interviews or focus groups to explore learners' lived experiences of educational pressure, hierarchical relationships, mistreatment, and coping strategies.
3. Investigate the roles of related variables, including burnout, psychological resilience, social support, coping styles, and supervisory leadership.
4. Conduct multicenter studies across medical universities to assess the generalizability of the findings and identify institutional differences in educational pressure.
5. Evaluate interventions designed to improve the clinical learning environment and reduce educational pressure, using appropriate outcome measures and study designs.
6. Develop and validate contextually appropriate instruments for assessing attitudes toward hierarchical educational structures. Such work should establish the conceptual definition of the construct, examine its dimensional structure, and evaluate its convergent, discriminant, and criterion-related validity before the measure is used for broader research or policy purposes.

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Conflict of Interest

The authors declare no conflicts of interest related to this study.

Ethics approval and consent to participate

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This study was conducted in compliance with the principles of research ethics and was approved by the Ethics Committee of Kermanshah University of Medical Sciences under the code IR.KUMS.REC.1405.110

Consent for publication

Not applicable.

Competing interests

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