

Perfectionism in the anesthesiological environment

Olha V. Kravets¹ · Vasyl V. Yekhalov¹ · Dmytro M. Stanin¹ · Daria A. Krishtafor¹ · Danylo A. Martynenko¹

Received: 1 August 2023 / Accepted: 30 October 2023

Published online: 02 November 2023

© The Author(s) 2023 [OPEN](#)

Abstract

Background Perfectionism today is understood as an individual's psychological conviction that the ideal can and should be achieved, and the imperfect result of work (physical, intellectual, etc.), in their opinion, has no right to exist.

The purpose of the study Our goal was to investigate levels and types of perfectionism among anesthesiology interns in comparison with the indicators of practicing anesthesiologists.

Materials and methods An anonymous survey of 92 anesthesiology interns and 124 practicing anesthesiologists was conducted according to the Big-Three Perfectionism Scale (BTPS).

Results The mean general level of perfectionism was average, with the total BTPS score of $124,38 \pm 14,47$ out of 225 in interns and $105,97 \pm 10,31$ in practicing anesthesiologists ($p < 0,05$). Both interns and practicing doctors leaned toward rigid perfectionism (mean score $32,32 \pm 3,32$ out of 50 in interns and $33,33 \pm 3,23$ —in practicing doctors, $p < 0,05$) and self-critical perfectionism, with the average score of $52,08 \pm 4,37$ out of 90 in interns and $42,87 \pm 4,76$ in postgraduates ($p < 0,05$). Narcissistic perfectionism is the factor with the least relative score in both groups ($39,99 \pm 7,61$ out of 85 in interns and $29,77 \pm 4,20$ in practicing doctors, $p < 0,05$).

Conclusions Neither anesthesiology interns nor practicing anesthesiologists in general exhibited high levels of perfectionism. In both groups there was a moderate leaning towards rigid and self-critical perfectionism, which indicates a tendency for the individuals to set high standards for themselves and base their own self-worth on meeting these standards. In interns, the general perfectionism levels were significantly higher than in practicing doctors. Also the self-critical type was more prominent among interns. This might indicate a sense of pressure to meet unrealistic outside expectations and an impostor syndrome which is common for the people at the start of their careers, but it's also a significant risk factor for future burnout.

Keywords Interns · Medical education · Perfectionism · Postgraduate education · Postgraduate doctors

1 Introduction

Modern societal and social transformations are accompanied by significant dynamics of basic personality traits: clip thinking is spreading, and such things as the ability to adapt to stress, psychological resourcefulness, empathic abilities, prioritization of motivation, the phenomenon of procrastination, conflict competence, etc., are undergoing serious changes. As a result, there are problematic issues of providing modern higher medical education for future specialists [1].

Perfectionism today is understood as an individual's psychological conviction that the ideal can and should be achieved, and the imperfect result of work (physical, intellectual, etc.), in their opinion, has no right to exist [2]. The

✉ Daria A. Krishtafor, shredderine@gmail.com | ¹Department of Anesthesiology, Intensive Care and Emergency Medicine, Faculty of Postgraduate Education, Dnipro State Medical University, Dnipro, Ukraine.



progressive spread of perfectionism in modern society is associated with the popularization of neoliberalism. According to this philosophical direction, confrontation between individuals and competitive individualism can contribute to the achievement of ideals. That is, if everyone manages to surpass everyone else, it will turn into the greater good for society. However, this does not determine success, but, on the contrary, is a direct path to nervous distress [3].

Perfectionism is a multidimensional trait with important implications for understanding adjustment [3]. Various models and measures of perfectionism have been proposed in the last decades. Frost's Multidimensional Perfectionism Scale incorporates five dimensions of perfectionism (concern over mistakes, personal standards, parental expectations, parental criticism, and doubts about actions) [4]. Hewitt and Flett's Multidimensional Perfectionism Scale describes three dimensions (self-oriented perfectionism, other-oriented perfectionism, and socially prescribed perfectionism) [5].

The Big-Three Perfectionism Scale (BTPS) was proposed by Smith M.M. et al. in 2016 [6]. It is devoid of the disadvantages of previously existing evaluation options. The authors considered perfectionism as a multidimensional construct that includes three factors: rigid, self-critical, and narcissistic [7–9]. The BTPS questionnaire consists of 45 statements, which can then be distributed into 10 perfectionism facets (self-oriented perfectionism (SOP), self-worth contingencies (SWC), concern over mistakes (COM), doubts about actions (DAA), self-criticism (SC), socially prescribed perfectionism (SPP), other-oriented perfectionism (OOP), hypercriticism (HC), entitlement (ENT) and grandiosity (GRAN)). The facets are then combined to assess three higher-order global factors (rigid perfectionism, self-critical perfectionism, narcissistic perfectionism). The rigid type combines the SOP and SWC facets; self-critical—COM, DAA, SC and SPP; narcissistic—OOP, HC, ENT and GRAN [6]. Rigid perfectionism is defined as demanding flawless performance from the self; self-critical—as concerns about and negative responses to imperfect or flawed performance and believing others desire one to be perfect; and narcissistic perfectionism is defined as a tendency to demand perfection from others in a grandiose, hypercritical, and entitled way [10].

Perfectionism has polar adaptive and maladaptive characteristics that can be mutually transformed: perfectionistic strivings and perfectionistic concerns [11, 12]. With "normal", adaptive perfectionism, a person is motivated for self-development, is able to derive moral satisfaction from work and distinguish between the concepts of personal and situational perfection. "Neurotic", maladaptive perfectionism is characterized by obsessive thoughts about the general lack of perfection of the results of personal and societal performance, and for such individuals, any activity causes a stressful situation with negative experiences and even suicidal thoughts [13, 14]. In Japan, where workers cannot afford to finish their work without giving it an ideal degree of perfection, a special term "yaroyisatsu" (suicide due to stress at work) appeared [15].

Extensive literature associates perfectionism with a number of negative implications for mental health: correlational analysis showed that self-critical perfectionism and extraversion, agreeableness, conscientiousness, and neuroticism were significantly associated with burnout [7]. Paradoxically, this can become another vicious circle, as recent research shows that perfectionistic concerns are negatively related to academic achievement, which can increase perceptions of failure and inadequacy [10]. Idealistic thoughts can have an impact on the mental health: either improve it or compromise it [13].

Perfectionism is common in healthcare workers, and recent literature addresses its potential role in physician burnout [16–18]. O'Brien S. (Canada, 1994) assessed 196 nurses and found that higher levels of socially-prescribed perfectionism and higher levels of self-efficacy were strongly related to both job and life stress [19]. According to Craiovan R.M. research (2014), doctors and nurses with high perfectionistic tendencies are more likely to develop burnout symptoms (emotional exhaustion and depersonalization) and, to some extent, psychopathological symptoms of anxiety and depression. Perfectionism, stress and exhaustion in medical personnel can negatively affect the effectiveness of medical care for patients [20]. In Eley D.S. study [21], which included 376 first-year medical students, high scores in perfectionism (namely concern over mistakes) were associated with the highest levels of stress, anxiety and depression [21]. Martin S.R. et al. [7] assessed 69 general pediatric and pediatric sub-specialist physicians both for perfectionism and burnout symptoms; in this study, high self-critical perfectionism uniquely predicted both high emotional exhaustion burnout and depersonalization burnout [7].

Anesthesiologists, in particular, have certain personality traits that can be problematic when working with patients. To a greater extent than other physicians, they tend to avoid possible harm, which manifests in increased anxiety, pessimism, and doubt. Modern psychological studies have shown that anesthesiologists are more emotionally stressed and less self-confident than representatives of the average population, but are significantly more conscientious, which might be related to perfectionism [22]. Still, we found no studies on perfectionism in anesthesiologists, which motivated us to investigate this phenomenon and determine whether it differs between practicing anesthesiologists and anesthesiology interns.

1.1 The purpose of the study

Our goal was to investigate levels and types of perfectionism among anesthesiology interns, who are undergoing a three-year training program at our department, in comparison with the practicing anesthesiologists.

1.2 Materials and methods

The BTPS questionnaire was translated to Ukrainian, printed out and administered to 92 medical interns in anesthesiology and 124 anesthesiologists who underwent short postgraduate training courses at the Department of Anesthesiology, Intensive Care and Emergency Medicine, Faculty of Postgraduate Education, Dnipro State Medical University. All the forms were anonymous and included a checkbox for informed consent to participate. Duplicate entries were negated during filling out the forms by distributing one copy of the questionnaire per person, and during batch scanning—by assigning every form an identification number.

In facets consisting of 5 items (SOP, SWC, COM, DAA and OOP), we regarded scores of 5–11 as low, 12–18 as average and 19–25 as high. In facets consisting of 4 items (SC, SPP, HC, ENT and GRAN), we regarded scores of 4–9 as low, 10–15 as average and 16–20 as high.

The analysis of the obtained results was carried out using parametric (ANOVA) and non-parametric statistics methods with determination of the mean value, standard deviation, Student T-test for comparing groups and Spearman correlation [23]. Calculations were performed using the Microsoft Excel 2016 software package.

2 Results

A total of 216 entries were analyzed. The results of the analysis distributed by perfectionism facets are shown in Table 1.

Both groups reported the highest level of perfectionism in the SWC facet. In medical interns, the second highest score was in the COM facet, which is seen as a tendency to overreact negatively to perceived failures and mistakes. Anesthesiologists with some experience in practical work, on the contrary, showed a higher level on the SOP facet.

In both groups, the average score didn't reach the high level in any facet, reflecting the average mean level of perfectionism. Among the interns, 1,09% to 35,87% respondents showed a high score at least on one facet, with zero high scores on SOP, DAA and SPP facets. In practicing doctors, only SOP, SWC and COM facets had any high scores—20,97%, 29,84% and 2,42%, respectively.

Both in interns and practicing doctors, the mean scores on SOP, SWC, COM and SC facets were average, and the rate of an average score on these facets varied from 64,13% to 82,61% in interns and from 70,16% to 78,23% in practicing doctors. The mean scores on DAA, SPP, HC and ENT were low in both groups, with the rate of a low score from 42,39% to 69,57% in interns and from 66,94% to 100,00% in practicing doctors. As for the OOP and GRAN facets, the mean result was in the average range in interns and in the low range in practicing doctors.

Table 1 BTPS facets scores in anesthesiology interns and practicing anesthesiologists

Facet	Interns (n=92)			Practicing doctors (n=124)		
	M (SD)	Min	Max	M (SD)	Min	Max
Self-oriented perfectionism	14,81* (3,11)	11	18	16,12* (2,91)	13	19
Self-worth contingencies	17,52 (2,12)	8	22	17,21 (2,12)	5	25
Concern over mistakes	17,31* (2,34)	7	25	13,91* (2,41)	9	25
Doubts about actions	11,42* (3,11)	6	14	10,33* (3,02)	6	16
Self-criticism	13,53* (2,43)	5	20	11,12* (2,14)	8	15
Socially prescribed perfectionism	9,82* (1,99)	4	18	7,51* (1,12)	4	12
Other-oriented perfectionism	11,83* (3,11)	6	22	8,93* (2,81)	5	15
Hypercriticism	9,21* (1,88)	4	18	7,01* (2,31)	4	13
Entitlement	8,42* (2,12)	4	16	6,61* (1,12)	4	9
Grandiosity	10,53* (3,12)	4	16	7,22* (2,52)	4	11

* – $p < 0,05$

Fig. 1 Mean scores of research subjects in three global factors and general level of perfectionism

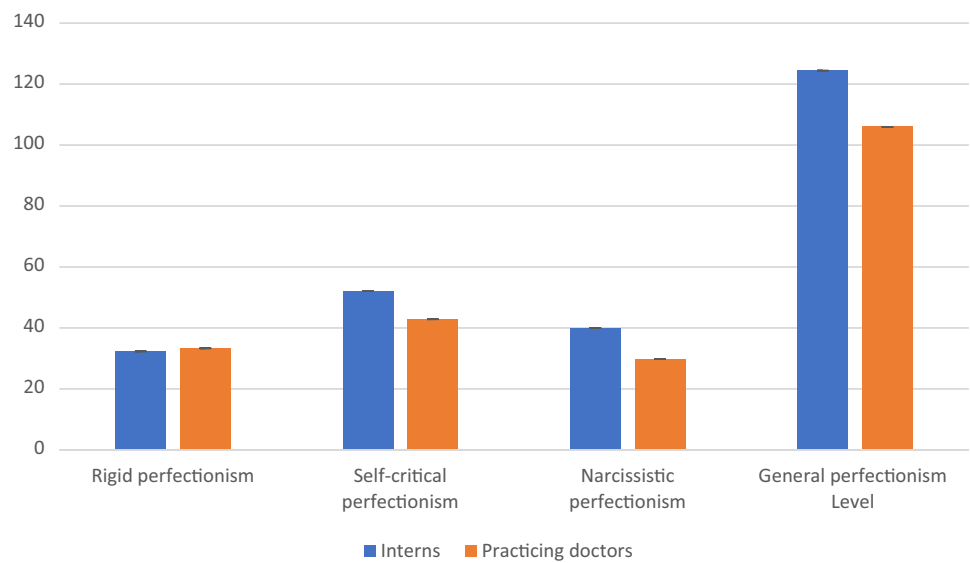


Table 2 Bivariate correlations of the BTPS facets

Facet	SOP	SWC	COM	DAA	SC	SPP	OOP	HC	ENT	GRAN
SOP		0,709*	0,534*	0,290	0,195	-0,001	-0,046	-0,054	-0,055	0,001
SWC	0,503*		0,551*	0,306*	0,230	0,060	0,085	0,148	0,079	0,172
COM	0,374*	0,420*		0,506*	0,414*	0,044	0,066	0,057	0,089	0,203
DAA	0,112	0,088	0,306*		0,323*	0,185	0,030	-0,007	0,046	0,082
SC	0,073	0,162	0,011	0,351*		0,079	-0,042	-0,014	-0,054	0,115
SPP	0,014	0,017	-0,001	0,158	0,232		0,144	0,173	0,047	0,097
OOP	-0,009	0,256	0,085	0,037	0,015	0,124		0,557*	0,297	0,224
HC	0,043	0,051	0,013	0,133	0,055	0,170	0,427*		0,717*	0,656*
ENT	0,078	-0,007	0,060	0,012	-0,045	0,164	0,228	0,517*		0,692*
GRAN	0,050	0,014	0,091	0,139	-0,029	0,032	0,265	0,513*	0,580*	

Interns (n = 92) are above the diagonal; practicing doctors (n = 124) are below diagonal

* p < 0,05

The mean general level of perfectionism was average, with the total BTPS score of $124,38 \pm 14,47$ out of 225 in interns and $105,97 \pm 10,31$ in practicing anesthesiologists ($p < 0,05$). Both interns and practicing doctors leaned toward Rigid Perfectionism (mean score $32,32 \pm 3,32$ out of 50 in interns and $33,33 \pm 3,23$ —in practicing doctors, $p < 0,05$) and Self-critical perfectionism, with the average score of $52,08 \pm 4,37$ out of 90 in interns and $42,87 \pm 4,76$ in postgraduates ($p < 0,05$). Narcissistic Perfectionism was the factor with the least relative score in both groups ($39,99 \pm 7,61$ out of 85 in interns and $29,77 \pm 4,2$ in practicing doctors, $p < 0,05$). These scores are presented in Fig. 1.

Bivariate correlations between the 10 BTPS facets are presented in Table 2. In both groups, participants showed significant correlations between the facets belonging to the same global factor, but not so much between the factors, or the types of perfectionism.

3 Discussion

The results of our study showed that anesthesiologists, both interns and practicing doctors, were moderately prone to perfectionism, especially to the rigid type. The average score in this factor in interns amounted to 64,6% of maximal score, and in practicing doctors—to 66,7%. Rigid perfectionism reflects the insistence that one’s own performance must be flawless, perfect, and without errors. Individuals prone for this type of perfectionism believe that striving for perfection, as well as being perfect, are important; they tend to base their self-worth on self-imposed perfectionistic

standards [7]. The participants in both groups showed the highest scores on the SWC facet, followed by COM in interns and SOP—in practicing doctors. Thus, rigid perfectionism was more typical for practicing doctors than for interns.

Interns' relatively high scores on the COM facet are consistent with impostor syndrome, which, according to several authors, affects approximately 30% of medical students and interns [24–26]. It is characterized by “chronic feelings of self-doubt, the fear of being discovered as an intellectual fraud, a perception of being less intelligent or competent than peers, and an inability to internalize a sense of competence of skill in high-achieving individuals” [27]. Young colleagues who are still studying want to avoid the negative consequences of their activities, which can have both positive and negative results [8, 9]. Experienced physicians are less prone to it [28], which was also confirmed by our results. Still, both interns and practicing doctors scored average on COM and SC facets and low—on DAA and SPP facets. Thus, self-critical perfectionism traits were not as prominent as rigid, but still significant, with the average scores reaching 57,9% and 47,6% maximal score in interns and practicing doctors, respectively. Higher scores in this factor in interns might be explained by their lack of experience and associated impostor syndrome, which is not unusual for the people at the start of their careers [29].

Self-critical perfectionism is characterized by anxiety with an overly negative reaction to perceived mistakes and failures, pervasive insecurity and dissatisfaction with one's work, overly self-critical responses to perceived lack of perfection, and a sense that others demand perfection from the individual [7]. Self-critical perfectionism predicts the development of emotional burnout both directly and indirectly, due to the effect of low self-compassion [10]. People susceptible to self-critical perfectionism make impossible demands on themselves, they thoroughly analyze every smallest component of their actions in search of errors. In the case of an “imperfect” result of their work, they feel guilty, even if they could not influence the course of events. This type of perfectionism is characterized by excessively harsh self-criticism, a tendency to emotional burnout, and a constant feeling that one's own expectations are not met. This type is associated with various components of social adjustment and may be accompanied by anxiety and mild depression [8, 9, 30]. In physicians, self-critical perfectionism is significantly associated with burnout [7].

Narcissistic perfectionism is defined as a tendency to demand perfection from others in a grandiose, hypercritical and entitled way [10]. On the narcissistic perfectionism factor, interns showed low to average scores; the practicing doctors showed only low scores. The facets where the interns scored average were OOP and GRAN. Other-oriented perfectionism is the tendency to hold unrealistic expectations for others, while grandiosity denotes a sustained view of oneself as perfect or superior to others [7]. This might be explained by the Dunning-Kruger effect, a cognitive bias in which people with limited competence in a particular domain overestimate their abilities [31]. In a 2013 study, Alexander M. et al. defined 4 types of “hateful residents”, including the “entitled demanders”, who felt entitled to setting their own rules and, when triggered, threatened their educators with reporting or bad reviews [32]. There is no data on how often this type of resident is encountered. In our current study, only 3,26% interns scored high on OOP facet and 7,61%—on GRAN facet. Another factor might be narcissistic traits common for the professionals in surgery and related fields [33].

Overall, interns showed significantly higher scores on every facet except SWC and SOP than practicing doctors, which is consistent with the previous studies where medical students felt unrealistic outside expectations for their level of training and responded to them by acting as if already competent [34].

Several studies have been conducted on perfectionism in healthcare workers. In Martin S.R. study (2022), mean score on rigid perfectionism factor was $25,28 \pm 8,63$, self-critical— $35,09 \pm 9,04$, narcissistic— $33,59 \pm 9,16$ [7]. Di Fabio A. et al. (2020) administered the Italian short-form version on BTPS to the 148 university students attending different schools at the University of Florence. They studied the relationships between perfectionism personality traits and humor styles. Unfortunately, neither mean scores on the perfectionism factors nor dominating factor were mentioned [35]. Ndoja S. et al. [36] administered a short-form BTPS to 174 clinical clerkship students in their first (pre) and last (post) 12 weeks of their clinical clerkship year. 51 students responded to pre-survey, 62 responded to post-survey. All the students scored low on all factors both pre and post clerkship, leaning towards rigid and self-critical perfectionism [36].

While each of these studies focuses on perfectionism in a selected group of healthcare professionals or students, to our knowledge, there were no studies comparing perfectionism levels and traits in interns and practicing doctors in anesthesiology. There were also no studies conducted to compare perfectionism levels in medical and surgical health care professionals, so it's hard to determine whether higher scores in our study were associated with the specialty. Further studies are needed to investigate this phenomenon in the medical community.

4 Conclusions

Our findings showed that neither anesthesiology interns nor practicing anesthesiologists in general exhibited high levels of perfectionism. In both groups there was a moderate leaning towards rigid and self-critical perfectionism, which indicates a tendency for the individuals to set high standards for themselves and base their own self-worth on meeting these standards.

In interns, the general perfectionism levels were significantly higher than in practicing doctors. Also the self-critical type was more prominent among interns. This might indicate a sense of pressure to meet unrealistic outside expectations and impostor syndrome which is common for the people at the start of their careers, but it's also a significant risk factor for future burnout.

Author contributions OVK—conceptualization, methodology, writing—review & editing. VVY—conceptualization, methodology, formal analysis, writing—original draft. DMS—resources, writing—review & editing. DAK—resources, writing—review & editing. DAM—Translation.

Funding The research has no external funding.

Data availability The data that support the findings of this study are available from the corresponding author, Krishtafor DA, upon reasonable request.

Declarations

Ethics approval and consent to participate The research was conducted in accordance with the 1964 Helsinki Declaration and approved by Dnipro State Medical University ethics committee (Protocol No.9 from May 24, 2023).

Competing interests The authors declare that there is no competing interests and no financial interest in the preparation of this article.

Informed consent Written informed consent was obtained from all individual participants included in the study.

Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

References

1. Barannyk S, Yekhalov V, Kravez O, Trofimov M, Barannik K. Problem issues of providing modern higher medical education to future specialists and ways to overcome them. The XXIX international scientific and practical conference: trends in science and practice of today". Stockholm, Sweden 2022;162–170. <https://doi.org/10.46299/ISG.2022.1.29>
2. Karpenko OV. Perfectionism as a problem of personality psychology. *Pravnychiy visnik Universitetu "Krok."* 2019;34:144–50. <https://doi.org/10.31732/2707-9155-2019-34-144-150>.
3. Nealis LJ, Sherry SB, Sherry DL, Stewart SH, Macneil MA. Towards a better understanding of narcissistic perfectionism: evidence of factorial validity, incremental validity, and mediating mechanisms. *J Res Pers.* 2015;57:11–25. <https://doi.org/10.1016/j.jrp.2015.02.006>.
4. Frost RO, Marten P, Lahart C, Rosenblate R. The dimensions of perfectionism. *Cogn Ther Res.* 1990;14:449–68. <https://doi.org/10.1007/BF01172967>.
5. Hewitt PL, Flett GL. Perfectionism in the self and social contexts: Conceptualization, assessment, and association with psychopathology. *J Pers Soc Psychol.* 1991;60:456–70. <https://doi.org/10.1037/0022-3514.60.3.456>.
6. Smith MM, Saklofske DH, Stoeber J, Sherry SB. The big three perfectionism scale: a new measure of perfectionism. *J Psychoeduc Assess.* 2016;34(7):670–87. <https://doi.org/10.1177/0734282916651539>.
7. Martin SR, Fortier MA, Heyming TW, Ahn K. Perfectionism as a predictor of physician burnout. *BMC Health Serv Res.* 2022;22:1425. <https://doi.org/10.1186/s12913-022-08785-7>.
8. Karamushka LM, Hruby TV. Diagnostic toolkit for determining personality perfectionism. *Aktualni problemi psikhologii: zbirnik naukovikh prats psikhologii imeni G. S. Kostuka NAPN Ukraini. Organizatsiina psikhologia. Ekonomitchna psikhologia. Sotsialna Psikhologia.* 2016;45:35–40.
9. Karamushka LM, Bondarchuk OI, Hruby TV. Research methods for perfectionism, workaholism and personality procrastination: methodical guide. *Kamianets-Podilskyi: PP "Axioma";* 2019.

10. Pereira AT, Brito MJ, Cabaços C, Carneiro M. The protective role of self-compassion in the relationship between perfectionism and burnout in Portuguese medicine and dentistry students. *Int J Environ Res Public Health*. 2022;19(5):2740. <https://doi.org/10.3390/ijerph19052740>.
11. Stairs AM, Smith GT, Zapolski TC, Combs JL, Settles RE. Clarifying the construct of perfectionism. *Assessment*. 2012;19:146–66. <https://doi.org/10.1177/1073191111411663>.
12. Dunkley DM, Blankstein KR, Masheb RM, Grilo CM, et al. Personal standards and evaluative concerns dimensions of “clinical” perfectionism: a reply to Shafran et al. (2002, 2003) and Hewitt et al. (2003). *Behav Res Ther*. 2006;44:63–84. <https://doi.org/10.1016/j.brat.2004.12.004>.
13. Mosalanejad L, Kargar Z, Kalani N, Abdollahifard S. Evaluation of perfectionism and its relationship with hardiness and mental health in students of jahrom university of medical sciences. *J Fundam Appl Sci*. 2016;8(3):1277–85. <https://doi.org/10.4314/jfas.v8i3.621>.
14. Myshchysyn MM, Chemerynska DI, Synychych YY. Psychological features of the relationship between perfectionism and procrastination in student youth. *Visnik Natsionalnogo Universitetu Oboroni Ukraini*. 2022;1(65):72–8. <https://doi.org/10.33099/2617-6858-22-65-1-72-78>.
15. Kononenko OI, Valeeva AR. The problem of the influence of perfectionism on the dependent behavior of the individual. *Gabitus*. 2020;17:84–9. <https://doi.org/10.32843/2663-5208.2020.17.15>.
16. Robertson JJ, Long B. Suffering in silence: medical error and its impact on health care providers. *J Emerg Med*. 2018;54:402–9. <https://doi.org/10.1016/j.jemermed.2017.12.001>.
17. Peters M, King J. Perfectionism in doctors. *BMJ*. 2012;344:e1674. <https://doi.org/10.1136/bmj.e1674>.
18. Robertson JJ, Long B. Medicine’s shame problem. *J Emerg Med*. 2019;57:329–38. <https://doi.org/10.1016/j.jemermed.2019.06.034>.
19. O’Brien S, Page S. Self-efficacy, perfectionism, and stress in Canadian nurses. *Can J Nurs Res*. 1994;26(3):49–61.
20. Craiovan PM. Correlations between perfectionism, stress, psychopathological symptoms and burnout in the medical field. *Procedia Soc Behav Sci*. 2014;127(22):529–33. <https://doi.org/10.1016/j.sbspro.2014.03.304>.
21. Eley DS, Bansal V, Leung J. Perfectionism as a mediator of psychological distress: implications for addressing underlying vulnerabilities to the mental health of medical students. *Med Teach*. 2020;42(11):1301–7. <https://doi.org/10.1080/0142159X.2020.1805101>.
22. Ekhalov VV, Kravets OV, Stus VP, Moiseenko MM, Barannik SI. Sociopsychological image of the modern intern (educational and social research). *Urologija*. 2021;25(1):71–80. <https://doi.org/10.26641/2307-5279.25.1.2021.231404>.
23. Peacock JL, Peacock PL. *Oxford Handbook of Medical Statistics*. 2nd ed. Oxford: Oxford University Press; 2020. <https://doi.org/10.1093/med/9780198743583.001.0001>.
24. Henning K, Ey S, Shaw D. Perfectionism, the impostor phenomenon and psychological adjustment in medical, dental, nursing and pharmacy students. *Med Educ*. 1998;32(5):456–64. <https://doi.org/10.1046/j.1365-2923.1998.00234.x>.
25. Villwock J, Sobin LB, Koester LA, Harris TM. Impostor syndrome and burnout among American medical students: a pilot study. *Int J Med Educ*. 2016;7:364–9. <https://doi.org/10.5116/ijme.5801.eac4>.
26. Chodoff A, Conyers L, Wright S, et al. “I never should have been a doctor”: a qualitative study of impostor phenomenon among internal medicine residents. *BMC Med Educ*. 2023;23:57. <https://doi.org/10.1186/s12909-022-03982-8>.
27. Clance PR, Imes SA. The impostor phenomenon in high achieving women: dynamics and therapeutic intervention. *Psychotherapy*. 1978;15(3):241–7. <https://doi.org/10.1037/h0086006>.
28. Chen C. Doctor who? Reflecting on impostor syndrome in medical learners. *Can Fam Physician*. 2020;66(10):e268–9.
29. Clance PR. *The impostor phenomenon: when success makes you feel like a fake*. New York: Bantam Books; 1985.
30. Grubi TV. A set of techniques to investigation a perfectionism of personality of scientific and pedagogical staff of the higher school. *Organizational psychology. Econ psychol K Logos*. 2016;4(7):25–31.
31. Dignan B. “Dunning-Kruger effect”. In: *Encyclopedia britannica*. 2023. <https://www.britannica.com/science/Dunning-Kruger-effect>. Accessed 21 Oct 2023.
32. Alexander M, McPherson V, Hall MN. The “hateful resident.” *J Grad Med Educ*. 2013;5(4):547–9. <https://doi.org/10.4300/JGME-D-12-00371.1>.
33. Bucknall V, Burwaiss S, MacDonald D, Charles K, Clement R. Mirror mirror on the ward, who’s the most narcissistic of them all? Pathologic personality traits in health care. *CMAJ*. 2015;187(18):1359–63. <https://doi.org/10.1503/cmaj.151135>.
34. Stubbing EA, Helmich E, Cleland J. Medical student views of and responses to expectations of professionalism. *Med Educ*. 2019;53(10):1025–36. <https://doi.org/10.1111/medu.13933>.
35. Di Fabio A, Smith MM, Saklofske DH. Perfectionism and a healthy attitude toward oneself: could humor be a resource? *Int J Environ Res Public Health*. 2019;17(1):201. <https://doi.org/10.3390/ijerph17010201>.
36. Ndoja S, Chahine S, Saklofske DH, Lanting B. The erosion of ambiguity tolerance and sustainment of perfectionism in undergraduate medical training: results from multiple samplings of a single cohort. *BMC Med Educ*. 2020;20(1):417. <https://doi.org/10.1186/s12909-020-02345-5>.

Publisher’s Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.