

CatBoost Classification of High-Risk Perfectionism Using Conditional Self-Worth, Fear of Evaluation, and Cognitive Fusion

Anak Agung. Oka^{1*}, Murad. Khan^{2,3}, Shafeq. Khadidja³

¹ Department of Psychiatry and Mental Health Nursing, Universitas Syiah Kuala, Banda Aceh 23111, Indonesia

² Faculty of Medicine and Health, Institut Teknologi Sepuluh Nopember, Surabaya 60111, Indonesia

³ Department of Family Medicine and Public Health, College of Medicine and Health Sciences, Sultan Qaboos University, Muscat 123, Oman

* Corresponding author email address: anakoka@unsyiah.ac.id

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ABSTRACT

Objective: This study aimed to classify high-risk perfectionism among Indonesian university students using a CatBoost machine-learning model based on conditional self-worth, fear of negative evaluation, and cognitive fusion.

Methods and Materials: This cross-sectional predictive study was conducted among 436 university students in Indonesia during the 2025–2026 academic year. Participants were selected through convenience sampling from public and private universities. High-risk perfectionism was defined according to the upper quartile of perfectionistic concerns scores, while the remaining participants were classified as non-high-risk. Data were collected using standardized self-report instruments measuring perfectionistic concerns, conditional self-worth, fear of negative evaluation, and cognitive fusion. After screening the dataset for incomplete responses, invalid cases, and response irregularities, the data were divided into stratified training and testing subsets. A CatBoost classifier was trained using five-fold cross-validation, and model performance was evaluated using accuracy, balanced accuracy, sensitivity, specificity, precision, F1-score, ROC-AUC, PR-AUC, confusion matrix indices, and calibration statistics. Feature importance and SHAP values were used to interpret the contribution of predictors to model output.

Findings: The CatBoost model demonstrated strong classification performance in identifying high-risk perfectionism. In the independent test set, the model achieved an accuracy of 0.885, balanced accuracy of 0.863, sensitivity of 0.818, specificity of 0.908, precision of 0.750, F1-score of 0.783, ROC-AUC of 0.926, PR-AUC of 0.812, Matthews correlation coefficient of 0.711, and Brier score of 0.104. The confusion matrix showed that 27 of 33 high-risk students were correctly classified, while 89 of 98 non-high-risk students were correctly identified. SHAP analysis indicated that cognitive fusion was the strongest predictor, followed by conditional self-worth and fear of negative evaluation.

Conclusion: The findings suggest that high-risk perfectionism among Indonesian university students can be accurately classified using an interpretable CatBoost model and that cognitive fusion, conditional self-worth, and fear of negative evaluation are important psychological indicators for screening and preventive counseling.

Keywords: CatBoost; High-risk perfectionism; Conditional self-worth; Fear of negative evaluation; Cognitive fusion; Machine learning; University students; Indonesia

1. Introduction

Perfectionism is a multidimensional psychological construct that has increasingly been conceptualized not merely as the pursuit of high standards, but as a transdiagnostic vulnerability process that may intensify distress when personal worth becomes rigidly attached to flawless performance, social approval, or the avoidance of failure. In its adaptive form, perfectionism may be associated with conscientiousness, goal-directed persistence, and striving for excellence; however, when perfectionistic tendencies are dominated by excessive self-criticism, concern over mistakes, doubts about actions, fear of disapproval, and inflexible self-evaluative standards, they can become clinically and educationally problematic. Contemporary research has therefore shifted from viewing perfectionism as a single trait toward examining its maladaptive forms, mechanisms, and risk profiles across different psychological, academic, clinical, and performance contexts. Theoretical discussions of perfectionism emphasize that its influence on personality is complex and may shape cognition, emotion, motivation, and interpersonal functioning in ways that heighten vulnerability to psychological distress (Завада, 2020). Similarly, evidence from clinical and applied domains has shown that perfectionism is relevant to anxiety, depression, procrastination, eating-related pathology, pain-related distress, sleep difficulties, and performance impairment, indicating that maladaptive perfectionism is better understood as a cross-cutting psychological risk factor rather than as a narrow personality style (Giles et al., 2022; Podinã, 2020; Steinert et al., 2021). This broader view provides a foundation for identifying high-risk perfectionism using predictive models that can integrate theoretically meaningful psychological indicators.

A central issue in perfectionism research concerns the distinction between high standards and high risk. Not all individuals who report perfectionistic tendencies experience clinically meaningful impairment, and some forms of striving may coexist with competence, persistence, and achievement. However, perfectionism becomes maladaptive when the individual's self-worth depends on meeting rigid standards, when errors are interpreted as signs of personal defectiveness, and when perceived failure triggers shame, avoidance, or psychological distress. Research in clinical psychology has emphasized that perfectionistic concerns are closely associated with distress and impairment and that interventions for maladaptive perfectionism must address

both cognitive rigidity and self-critical evaluation (Cheli et al., 2022; Rozental, 2020). In addition, bidimensional perspectives on perfectionism have shown that the psychological consequences of perfectionism depend on whether high personal standards are accompanied by low self-esteem, reduced self-compassion, and heightened distress (Chung & Lee, 2024). Such findings suggest that high-risk perfectionism should not be defined only by elevated striving, but by the configuration of evaluative, cognitive, and affective processes that make perfectionism psychologically costly. This is especially important in student populations, where academic demands, social comparison, family expectations, and identity development may intensify the connection between achievement and self-worth.

University students represent a particularly important population for studying high-risk perfectionism because they are often exposed to simultaneous academic, social, developmental, and future-oriented pressures. The university period frequently involves intensified performance evaluation, comparison with peers, uncertainty about future careers, and a heightened need for approval from family, instructors, and social networks. Psychological well-being programs for university students have therefore emphasized the prevention of distress and promotion of adaptive coping before symptoms become severe (Consiglio et al., 2021). Qualitative evidence also indicates that university students experience psychological flexibility and inflexibility through complex interactions among personal values, avoidance, emotional struggle, social expectations, and academic pressure (Cervantes-Perea et al., 2025). These processes are relevant to perfectionism because students who experience conditional self-worth may interpret academic success or failure as evidence of their personal value. In such cases, achievement is not simply a goal but a psychological condition for self-acceptance. This conditional pattern can transform normal academic challenge into a persistent threat to identity, thereby increasing the probability of maladaptive perfectionism and related distress. In non-Western contexts, where family expectations, collective norms, and achievement pressure may carry particular social significance, examining perfectionism among students is especially important (Delakeh, 2026; Zuo & Zhang, 2023).

Conditional self-worth is one of the most theoretically relevant predictors of high-risk perfectionism. When self-worth is contingent on achievement, approval, competence, appearance, or meeting external expectations, individuals

may become more vulnerable to perfectionistic concerns because mistakes are perceived not only as task failures but as threats to personal value. This mechanism is consistent with evidence showing that self-esteem and self-compassion play important roles in the association between perfectionism and psychological distress (Chung & Lee, 2024). In academic and young adult populations, external expectations may strengthen the link between perfectionism and evaluative concerns. For example, parental expectations and fear of negative evaluation have been shown to relate to maladaptive perfectionism among emerging adults, suggesting that the social basis of self-evaluation may intensify perfectionistic vulnerability (Menon et al., 2024). Perfectionism has also been examined in relation to performance outcomes and anxiety in language-learning contexts, where writing performance, evaluative pressure, and multidimensional perfectionism interact in ways that may influence students' academic functioning (Khosravi et al., 2023). These findings support the assumption that conditional self-worth may serve as a powerful marker of high-risk perfectionism because it links internal standards with external validation, making the individual's sense of value unstable and dependent on achievement-related feedback.

Fear of evaluation is another key factor in understanding maladaptive perfectionism. Perfectionistic individuals often experience intense concern about how others perceive their performance, appearance, competence, or mistakes. This fear may lead to overpreparation, avoidance, rumination, reassurance seeking, and emotional exhaustion. Research has shown that fear of negative evaluation is associated with psychological vulnerability through psychological inflexibility, indicating that evaluative fear becomes more harmful when individuals are unable to relate flexibly to distressing thoughts and social concerns (Uğur et al., 2020). In adolescents with social anxiety disorder, both cognitive-behavioral therapy and acceptance and commitment therapy have been investigated in relation to cognitive distortions and rumination, highlighting the importance of distorted self-evaluation and repetitive negative thinking in socially evaluative distress (Ebrahimi et al., 2024). Fear of evaluation is also relevant to perfectionism because it shifts the individual's attention from task engagement to the imagined consequences of being judged, criticized, or exposed as inadequate. When fear of evaluation is combined with conditional self-worth, the person may interpret social disapproval as evidence of personal failure, thereby reinforcing maladaptive perfectionistic patterns. Thus, fear

of negative evaluation is not only an emotional consequence of perfectionism, but also a predictor that may help classify individuals at higher risk.

Cognitive fusion provides a further explanatory pathway linking perfectionism to psychological distress. In acceptance and commitment therapy and process-based approaches, cognitive fusion refers to the tendency to become entangled with thoughts and to treat them as literal truths rather than as transient mental events. This process is relevant to perfectionism because high-risk individuals may become fused with thoughts such as "I must not fail," "mistakes prove I am inadequate," or "others will reject me if I am not perfect." Contemporary process-based therapy emphasizes that psychological suffering is often maintained by rigid behavioral and cognitive processes rather than by diagnostic categories alone (Ong et al., 2020). Acceptance and commitment therapy has been applied transdiagnostically across anxiety, obsessive-compulsive symptoms, values-based exposure, and comorbid conditions, reinforcing the relevance of psychological flexibility and cognitive defusion in addressing rigid patterns of distress (Capel & Twhig, 2024; Howard et al., 2026; Veloso, 2025). Cognitive fusion has also been investigated in performance settings, such as sport, where experiential avoidance, cognitive fusion, values, and social factors have been linked with performance-related problems (Inoué et al., 2024). These findings suggest that cognitive fusion may function as a core mechanism through which perfectionistic standards become psychologically restrictive, making it an important predictor for machine-learning classification of high-risk perfectionism.

The relationship between perfectionism and psychological inflexibility has been observed across diverse populations and applied settings, including performing arts, sport, health, and clinical contexts. Studies with musicians and dance students have highlighted the relevance of psychological flexibility, sleep quality, and well-being in high-demand performance environments, where perfectionistic pressure may be intensified by evaluation and public performance (Arbinaga et al., 2023; Chełkowska-Zacharewicz & Baran, 2023). Research with music students has further shown that pain catastrophizing is related to psychological inflexibility and perfectionism, indicating that perfectionistic tendencies may interact with distress amplification and rigid coping patterns (Arbinaga et al., 2025). In sport settings, studies of soccer referees have linked psychological inflexibility and perfectionism with psychopathological symptoms and resilient behavior,

suggesting that perfectionism may influence both vulnerability and adaptation depending on broader psychological processes (Arbinaga & Sierra, 2025a, 2025b). Similar concerns have been raised in elite athletes and performers, where perfectionism, anxiety, basic need frustration, and performance are interrelated (Haraldsen et al., 2020). The mental health of elite athletes during the COVID-19 lockdown also demonstrated how high-performance populations may be exposed to unique stressors that magnify psychological vulnerability (Pellino et al., 2022). Although these populations differ from university students, they collectively show that perfectionism becomes especially important in environments where performance, evaluation, discipline, and identity are closely connected.

Clinical and health-related studies further support the transdiagnostic relevance of perfectionism and related inflexibility processes. Perfectionism has been examined in fibromyalgia, where its functionality may depend on interaction with activity patterns, suggesting that perfectionism cannot be interpreted independently of behavioral regulation and coping style (Écija et al., 2020). In eating-disorder research, neuropsychological functioning, psychopathology, attitudes toward change, obsessive-compulsive personality traits, and adult eating-disorder symptoms have been connected to perfectionistic and rigid patterns of functioning (Giles et al., 2022; Mata-Saenz et al., 2020). Orthorexia research has similarly highlighted how the pursuit of health can become excessive and psychologically restrictive when “healthy” behavior is taken too far (Galfano et al., 2021). More recently, orthorexic tendencies have also been linked with autistic traits in patients with borderline personality disorder, emphasizing the complexity of rigid behavioral standards and clinical vulnerability (Dell’Osso et al., 2025). Transdiagnostic vulnerability factors have also been studied in chronic insomnia, further demonstrating that cognitive and emotional processes may operate across diagnostic boundaries (Habibi et al., 2023). In adolescent anorexia treatment, metacognitive training has been evaluated as a feasibility approach, reflecting growing interest in interventions that address maladaptive beliefs and rigid cognitive processes (Balzan et al., 2023). These lines of evidence strengthen the rationale for modeling perfectionism as a risk phenotype that can be predicted through psychological mechanisms rather than through symptom labels alone.

The assessment of perfectionism also requires psychometric precision. Multidimensional perfectionism measures have been evaluated in different cultural contexts,

supporting the view that perfectionism includes multiple dimensions and should be assessed through instruments capable of capturing both interpersonal and intrapersonal features (Mansur-Alves et al., 2023). Research on persistence and perfectionism has also contributed to understanding how perseverance, persistence, and perfectionistic tendencies overlap yet remain conceptually distinguishable (Styk et al., 2023). This distinction is important because high-risk perfectionism should not be confused with persistence or disciplined goal pursuit. In educational and occupational contexts, perfectionism may appear as diligence or responsibility, but its maladaptive form is characterized by rigidity, fear-based motivation, and impaired self-evaluation. Factors in university teaching staff perfectionism also indicate that perfectionistic tendencies are not limited to students but can emerge across academic roles and institutional contexts (Grubi, 2021). Therefore, the identification of high-risk perfectionism requires a model that can distinguish between related but nonidentical constructs and detect risk patterns based on combinations of conditional self-worth, evaluative fear, and cognitive fusion.

Despite the breadth of research on perfectionism, many studies continue to rely primarily on linear associations, group comparisons, or traditional regression-based methods. Although such approaches are valuable, they may be limited in detecting nonlinear patterns, interaction effects, and complex combinations of predictors that characterize high-risk psychological profiles. Machine-learning classification offers an alternative framework for identifying individuals at elevated risk by using multiple predictors simultaneously and evaluating predictive accuracy on unseen data. For the present topic, CatBoost is particularly appropriate because it is designed for structured data and can model complex relationships among psychological variables while providing interpretable outputs through feature-importance and SHAP-based explanations. In the context of high-risk perfectionism, such an approach allows researchers to move beyond asking whether conditional self-worth, fear of evaluation, and cognitive fusion are merely associated with perfectionistic concerns and instead examine how well these variables classify students into high-risk and non-high-risk groups. This predictive orientation is valuable for early identification, preventive counseling, and targeted mental health support in university settings, especially in non-Western student populations where culturally shaped expectations may influence perfectionistic self-evaluation.

Taken together, previous studies indicate that maladaptive perfectionism is a complex, transdiagnostic,

and context-sensitive phenomenon associated with conditional self-evaluation, fear of judgment, psychological inflexibility, cognitive fusion, and broader vulnerability to distress. Evidence from clinical, educational, sport, and performance contexts supports the need to distinguish adaptive striving from high-risk perfectionistic concern and to identify the mechanisms that elevate risk. Conditional self-worth may make self-esteem dependent on achievement and approval; fear of evaluation may intensify social threat and self-monitoring; and cognitive fusion may transform perfectionistic thoughts into rigid psychological rules that guide behavior and emotional responses. However, limited research has integrated these predictors into an interpretable machine-learning classification framework among Indonesian university students. Therefore, the aim of this study was to classify high-risk perfectionism among Indonesian university students using a CatBoost machine-learning model based on conditional self-worth, fear of negative evaluation, and cognitive fusion.

2. Methods and Materials

2.1. Study Design and Participants

This study was conducted using a cross-sectional, predictive, and applied machine-learning design to classify high-risk perfectionism based on conditional self-worth, fear of evaluation, and cognitive fusion among university students in Indonesia. The target population consisted of undergraduate and postgraduate students enrolled in public and private universities in Indonesia during the 2025–2026 academic year. Participants were recruited through online announcements distributed via university student groups, academic mailing lists, and social media platforms commonly used by students. Inclusion criteria were being an Indonesian university student, being at least 18 years old, having sufficient proficiency in Indonesian to complete the questionnaires, and providing informed consent to participate in the study. Participants who submitted incomplete questionnaires, showed repetitive response patterns, or completed the survey in an unrealistically short time were excluded from the final dataset. The final sample consisted of 436 Indonesian students. The participants were selected through convenience sampling, which was considered appropriate because the study aimed to develop and evaluate a predictive classification model rather than estimate population prevalence. Before participation, all respondents were informed about the purpose of the study, the voluntary nature of participation, the anonymity of their

responses, and their right to withdraw at any stage without penalty. All procedures were conducted in accordance with ethical principles for human-subject research, and no personally identifying information was collected. High-risk perfectionism was defined as the binary outcome variable of the study. Participants were assigned to the high-risk perfectionism group when their score on the perfectionistic concerns indicator fell in the upper quartile of the sample distribution, while the remaining participants were classified as the non-high-risk group. This classification approach allowed the study to focus on the detection of students whose perfectionistic tendencies were more likely to be maladaptive, distress-related, and associated with excessive self-criticism.

2.2. Measures

High-risk perfectionism was assessed using the Frost Multidimensional Perfectionism Scale, originally developed by Frost, Marten, Lahart, and Rosenblate in 1990. This instrument is one of the most widely used self-report measures for assessing perfectionistic tendencies and includes dimensions such as concern over mistakes, doubts about actions, personal standards, parental expectations, parental criticism, and organization. In the present study, the perfectionistic concerns components, particularly concern over mistakes and doubts about actions, were used to identify students with maladaptive and high-risk perfectionism. Items are rated on a Likert-type scale, with higher scores indicating stronger perfectionistic attitudes and concerns. The total score of perfectionistic concerns was calculated by summing the relevant subscale scores, and the upper quartile of the distribution was used to define the high-risk perfectionism class. Previous studies have supported the validity and reliability of the scale in student and young adult populations, and the instrument has been widely applied in psychological research on maladaptive perfectionism, anxiety, self-evaluation, and academic functioning.

Conditional self-worth was measured using the Contingencies of Self-Worth Scale developed by Crocker, Luhtanen, Cooper, and Bouvrette in 2003. This scale evaluates the extent to which individuals' self-esteem depends on external or internal contingencies such as academic competence, approval from others, appearance, competition, virtue, family support, and religious faith. In the context of the present study, conditional self-worth was considered a central predictor because high-risk perfectionism is often maintained by the belief that personal

value depends on achievement, approval, and the avoidance of failure. The items are answered on a Likert-type response format, and higher scores indicate a stronger dependence of self-worth on contingent domains. For the present analysis, total and domain-level scores were computed, with particular attention to approval-based and competence-based self-worth. Previous psychometric studies have reported acceptable internal consistency, construct validity, and criterion-related validity for this scale, supporting its use in research on self-esteem regulation, perfectionism, achievement pressure, and vulnerability to psychological distress.

Fear of evaluation was assessed using the Brief Fear of Negative Evaluation Scale, developed by Leary in 1983 as a shortened version of the original Fear of Negative Evaluation Scale. The instrument measures apprehension about being judged unfavorably by others, sensitivity to criticism, and discomfort in situations involving social evaluation. This construct was included because perfectionistic individuals often experience intense concern about external judgment and may regulate their behavior according to perceived standards of acceptance, criticism, or rejection. The scale consists of brief self-report statements rated on a Likert-type format, with higher scores reflecting greater fear of being negatively evaluated. In this study, the total score was used as a predictor in the CatBoost classification model. The Brief Fear of Negative Evaluation Scale has demonstrated strong internal consistency and validity across student and community samples and has been frequently used in studies of social anxiety, performance concerns, self-presentation, and maladaptive evaluative beliefs.

Cognitive fusion was measured using the Cognitive Fusion Questionnaire developed by Gillanders and colleagues in 2014. The questionnaire assesses the extent to which individuals become entangled with their thoughts and treat internal experiences as literal truths rather than transient mental events. Cognitive fusion was included as a predictor because students with high-risk perfectionism may become rigidly attached to self-critical thoughts, perfectionistic rules, and failure-related interpretations. The scale includes items rated on a Likert-type response format, and higher scores indicate greater fusion with thoughts. In the present study, the total cognitive fusion score was calculated and entered into the predictive model. The Cognitive Fusion Questionnaire has shown favorable psychometric properties, including strong internal consistency, convergent validity, and sensitivity to psychological inflexibility. Its use was

appropriate for the present study because cognitive fusion represents a theoretically relevant mechanism linking perfectionistic concerns with distress, avoidance, and rigid self-evaluation.

2.3. Data analysis

Data analysis was performed in several sequential stages. First, the dataset was screened for missing values, duplicate responses, outliers, and invalid response patterns. Cases with extensive missing data or careless responding were removed before model development. For variables with minimal missingness, missing values were handled using median imputation because all main predictors were continuous questionnaire scores. Descriptive statistics, including mean, standard deviation, minimum, maximum, skewness, and kurtosis, were calculated for perfectionistic concerns, conditional self-worth, fear of evaluation, and cognitive fusion. The binary outcome variable was then created by classifying participants in the upper quartile of perfectionistic concerns as the high-risk perfectionism group and the remaining participants as the comparison group. Because this procedure created a class imbalance between high-risk and non-high-risk cases, class weights were applied during model training to reduce bias toward the majority class and improve sensitivity in detecting high-risk students.

The primary predictive analysis was conducted using the CatBoost classification algorithm. CatBoost was selected because it is a gradient boosting method that performs well with structured psychological data, can capture nonlinear relationships and interaction effects among predictors, and is robust against overfitting when appropriate regularization and validation procedures are applied. The dataset was divided into training and testing subsets using a stratified split, with 70% of cases allocated to model training and 30% reserved for final model evaluation. Stratification was used to preserve the proportion of high-risk and non-high-risk perfectionism cases in both subsets. Within the training set, five-fold cross-validation was applied to tune model hyperparameters, including learning rate, tree depth, number of iterations, L2 leaf regularization, and class-weighting parameters. Model performance was evaluated using accuracy, precision, recall, F1-score, specificity, receiver operating characteristic area under the curve, precision-recall area under the curve, and the confusion matrix. Because the detection of high-risk perfectionism was the main purpose of the study, recall, F1-score, and area under

the precision-recall curve were emphasized alongside overall accuracy.

To improve interpretability, model explanations were generated using feature-importance analysis and SHAP values. Global feature importance was used to determine the relative contribution of conditional self-worth, fear of evaluation, and cognitive fusion to the classification of high-risk perfectionism. SHAP analysis was then used to examine both the direction and magnitude of each predictor's contribution to the model output. This explainable machine-learning approach made it possible to identify whether higher levels of conditional self-worth, fear of evaluation, and cognitive fusion increased the probability of being classified as high-risk for perfectionism. Dependence patterns were inspected to determine whether predictor effects were linear or nonlinear and whether risk increased sharply after specific score ranges. Model calibration was also examined to evaluate the agreement between predicted probabilities and observed classification outcomes. All analyses were conducted using Python, with the CatBoost library used for model development and standard statistical and machine-learning packages used for preprocessing, performance evaluation, and interpretability analysis. The significance level for preliminary statistical analyses was set at 0.05, while the predictive performance of the machine-learning model was interpreted based on validation metrics rather than null-hypothesis testing alone.

3. Findings and Results

The final sample consisted of 436 university students from Indonesia. The age of the participants ranged from 18 to 29 years, with a mean age of 21.62 years and a standard deviation of 2.48. In terms of gender distribution, 253 participants were female, representing 58.03% of the sample, 178 participants were male, representing 40.83%, and 5 participants preferred not to report their gender, representing 1.15%. Regarding educational level, 374 participants were undergraduate students, representing 85.78%, and 62 participants were postgraduate students, representing 14.22%. With respect to university type, 274 participants were studying at public universities, representing 62.84%, while 162 participants were studying at private universities, representing 37.16%. Based on the operational definition of high-risk perfectionism, participants whose perfectionistic concerns score fell in the upper quartile of the sample distribution were assigned to the high-risk perfectionism group. Accordingly, 109 students, representing 25.00% of the sample, were classified as high-risk, while 327 students, representing 75.00%, were classified as non-high-risk. This distribution was consistent with the quartile-based classification strategy and provided a clearly defined binary outcome for the CatBoost classification model.

Table 1

Descriptive Statistics and Group Comparisons of Study Variables by Perfectionism Risk Status

Variable	Total Sample M ± SD	Non-High-Risk Group M ± SD	High-Risk Group M ± SD	t	p	Cohen's d
Perfectionistic concerns	64.31 ± 14.08	58.12 ± 9.45	82.88 ± 6.73	25.16	< .001	2.79
Conditional self-worth	152.84 ± 26.71	145.63 ± 23.18	174.48 ± 25.42	10.49	< .001	1.22
Fear of negative evaluation	39.76 ± 9.82	37.12 ± 8.93	47.69 ± 7.91	11.04	< .001	1.20
Cognitive fusion	28.54 ± 8.21	26.31 ± 7.35	35.23 ± 7.16	11.22	< .001	1.22

As shown in Table 1, the high-risk perfectionism group obtained substantially higher scores than the non-high-risk group on all study variables. The largest difference was observed for perfectionistic concerns, which was expected because this variable was used to define the classification outcome. Students in the high-risk group showed a markedly higher mean score on perfectionistic concerns than students in the non-high-risk group, and the effect size was very large. More importantly, the predictor variables also showed strong and statistically significant group differences. Conditional self-worth was significantly higher among students classified as high-risk, indicating that these students

were more likely to base their personal value on achievement, approval, competence, and external validation. Fear of negative evaluation was also significantly higher in the high-risk group, suggesting that maladaptive perfectionism was closely associated with heightened sensitivity to judgment, criticism, and perceived social disapproval. Cognitive fusion showed a similarly large difference between groups, meaning that high-risk students were more likely to become entangled with self-critical thoughts, failure-related interpretations, and rigid internal rules. The magnitude of the effect sizes for conditional self-worth, fear of negative evaluation, and cognitive fusion was

large, indicating that the differences were not only statistically significant but also practically meaningful. These preliminary findings supported the theoretical

assumption that high-risk perfectionism is associated with conditional self-evaluation, evaluative fear, and cognitive rigidity.

Table 2

CatBoost Classification Performance for Predicting High-Risk Perfectionism

Evaluation Index	Cross-Validation Result M ± SD	Final Test Set Result	Interpretation
Accuracy	0.872 ± 0.031	0.885	The model correctly classified 88.5% of students in the independent test set.
Balanced accuracy	0.846 ± 0.038	0.863	The model showed acceptable balance in detecting both high-risk and non-high-risk cases.
Sensitivity / Recall for high-risk class	0.791 ± 0.062	0.818	The model identified 81.8% of students who belonged to the high-risk perfectionism group.
Specificity	0.901 ± 0.034	0.908	The model correctly identified 90.8% of students who were not in the high-risk group.
Precision for high-risk class	0.735 ± 0.057	0.750	Among students predicted as high-risk, 75.0% were truly high-risk.
F1-score for high-risk class	0.761 ± 0.049	0.783	The model showed a favorable balance between precision and recall for the high-risk class.
ROC-AUC	0.915 ± 0.026	0.926	The model demonstrated strong overall discrimination between high-risk and non-high-risk students.
PR-AUC	0.795 ± 0.045	0.812	The model maintained strong performance for the less frequent high-risk class.
Matthews correlation coefficient	0.684 ± 0.055	0.711	The model produced a strong overall classification association after accounting for all confusion-matrix cells.
Brier score	0.112 ± 0.018	0.104	The predicted probabilities showed acceptable calibration.

The predictive performance of the CatBoost model is presented in Table 2. The dataset was divided into a stratified training set of 305 participants and an independent test set of 131 participants. The training set included 229 non-high-risk and 76 high-risk students, while the test set included 98 non-high-risk and 33 high-risk students. The model demonstrated strong classification performance in both cross-validation and final testing. In the independent test set, the overall accuracy was 0.885, indicating that the model correctly classified nearly nine out of ten students. However, because the high-risk group represented a smaller proportion of the sample, balanced accuracy, sensitivity, precision, F1-score, and PR-AUC were considered more informative than accuracy alone. The sensitivity value of 0.818 showed that the model successfully detected most students with high-risk

perfectionism, while the specificity value of 0.908 showed that the model also performed well in recognizing students who were not high-risk. The F1-score of 0.783 indicated a satisfactory balance between identifying true high-risk cases and avoiding excessive false-positive classifications. The ROC-AUC value of 0.926 demonstrated strong discrimination between the two groups, while the PR-AUC value of 0.812 confirmed that the model retained good predictive value for the less frequent high-risk class. The Matthews correlation coefficient of 0.711 further indicated that the model had robust overall classification quality. The Brier score of 0.104 suggested that the predicted probabilities were reasonably calibrated and could be meaningfully interpreted as risk estimates rather than only as class labels.

Table 3

Confusion Matrix and Class-Specific Classification Results of the Final CatBoost Model on the Test Set

Actual Class	Predicted Non-High-Risk	Predicted High-Risk	Total	
Non-high-risk perfectionism	89	9	98	
High-risk perfectionism	6	27	33	
Total	95	36	131	
Class	Precision	Recall	F1-Score	Support

Non-high-risk perfectionism	0.937	0.908	0.923	98
High-risk perfectionism	0.750	0.818	0.783	33
Macro average	0.844	0.863	0.853	131
Weighted average	0.890	0.885	0.888	131

The confusion matrix and class-specific classification results are presented in Table 3. Among the 98 students who were actually in the non-high-risk group, 89 were correctly classified, while 9 were incorrectly classified as high-risk. Among the 33 students who were actually in the high-risk perfectionism group, 27 were correctly detected by the model, while 6 were misclassified as non-high-risk. This pattern indicates that the model produced a relatively small number of false negatives, which is important in psychological screening because failure to detect students with maladaptive perfectionistic tendencies may prevent timely support or intervention. The class-specific results further showed that the non-high-risk class had high precision, recall, and F1-score, reflecting the model's strong

performance in identifying students without high-risk perfectionism. For the high-risk class, precision was 0.750 and recall was 0.818, indicating that although some students were falsely flagged as high-risk, the model was sensitive enough to identify most true high-risk cases. The macro-average F1-score of 0.853 showed that the model performed well across both classes rather than merely favoring the majority class. The weighted-average F1-score of 0.888 was also close to the overall accuracy, confirming the stability of the classification results. Overall, the confusion matrix supported the practical usefulness of the CatBoost model for identifying students who may require further psychological assessment for maladaptive perfectionism.

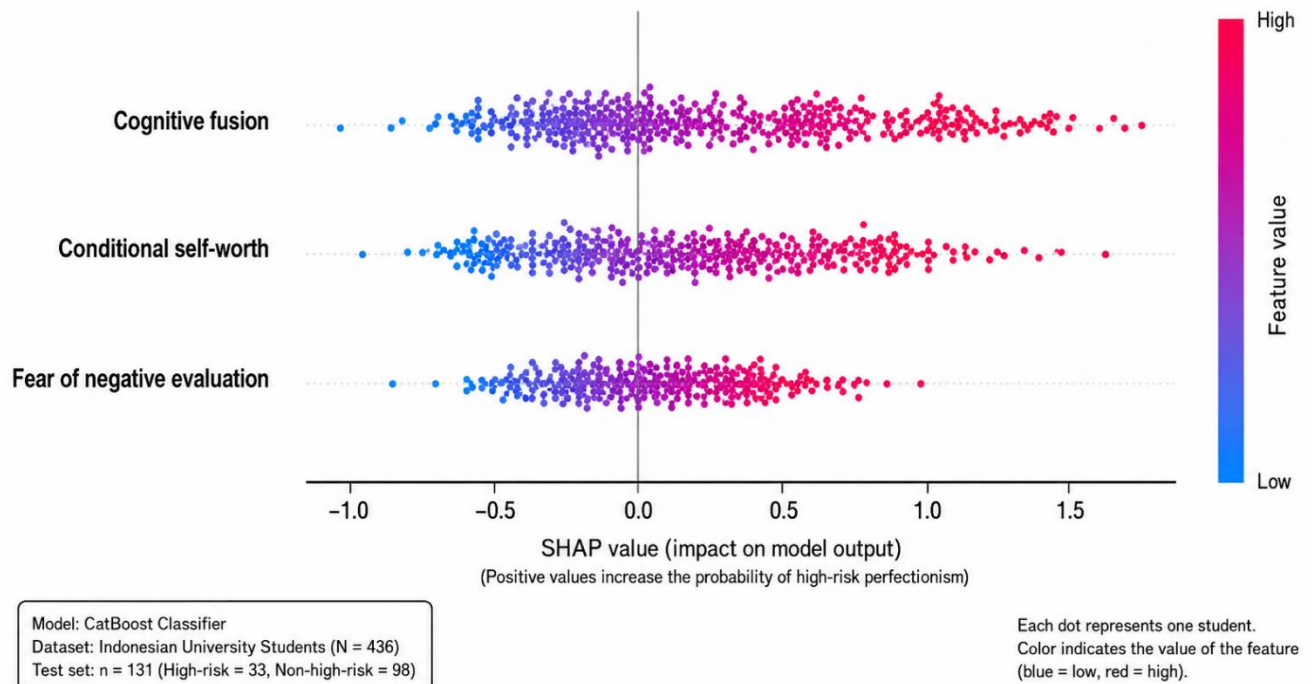
Table 4

Feature Importance and SHAP-Based Contribution of Predictors in the CatBoost Model

Predictor	CatBoost Feature Importance	Mean Absolute SHAP Value	Direction of Association with High-Risk Perfectionism	Relative Interpretation
Cognitive fusion	39.42	0.184	Positive	Strongest predictor of high-risk classification
Conditional self-worth	34.17	0.161	Positive	Second strongest predictor of high-risk classification
Fear of negative evaluation	26.41	0.128	Positive	Meaningful but comparatively lower contribution

Table 4 presents the explanatory results of the CatBoost model based on feature importance and SHAP values. Cognitive fusion emerged as the strongest predictor of high-risk perfectionism, with the highest CatBoost feature-importance value and the largest mean absolute SHAP value. This finding indicates that students who were more fused with their thoughts, especially self-critical and failure-related thoughts, had a higher probability of being classified as high-risk. Conditional self-worth was the second most influential predictor, showing that students whose self-esteem depended heavily on achievement, approval, and external validation were more likely to show high-risk perfectionistic patterns. Fear of negative evaluation also contributed meaningfully to the model, although its relative

contribution was lower than that of cognitive fusion and conditional self-worth. The positive direction of all three predictors indicates that higher scores on each variable increased the predicted probability of high-risk perfectionism. The explanatory results suggest that high-risk perfectionism among Indonesian university students is not simply a matter of setting high standards; rather, it appears to be characterized by cognitive rigidity, dependence of self-worth on external or achievement-based conditions, and heightened concern about negative judgment from others. These findings support the psychological interpretation that students are more likely to enter the high-risk perfectionism class when perfectionistic concerns are embedded in rigid thought patterns and unstable self-evaluation.

Figure 1*SHAP Summary Plot of Predictor Contributions to CatBoost Classification of High-Risk Perfectionism*

The SHAP summary plot indicated that the probability of high-risk perfectionism increased most strongly when students reported elevated cognitive fusion, conditional self-worth, and fear of negative evaluation. Higher cognitive fusion scores produced consistently positive SHAP values, meaning that this variable pushed the model toward a high-risk classification across a broad range of cases. The effect of conditional self-worth was also clearly positive, particularly among students whose self-worth was strongly dependent on academic competence, approval, or achievement-related validation. Fear of negative evaluation showed a positive contribution as well, especially when scores were moderate to high, suggesting that concern about judgment and criticism intensified the likelihood of being classified as high-risk. The figure also suggested that the predictors did not contribute in a purely linear manner. The risk probability appeared to increase more sharply when cognitive fusion and conditional self-worth reached higher score ranges, indicating that students with simultaneously rigid thinking and contingent self-worth may be especially vulnerable to maladaptive perfectionism. Overall, the SHAP interpretation showed that the CatBoost model made psychologically coherent predictions and that the classification process was primarily driven by theoretically meaningful risk indicators rather than arbitrary statistical noise.

4. Discussion

The present study aimed to classify high-risk perfectionism among Indonesian university students using conditional self-worth, fear of negative evaluation, and cognitive fusion through a CatBoost machine-learning model. The findings showed that students classified as high-risk for perfectionism obtained substantially higher scores on all three predictor variables compared with non-high-risk students. Specifically, the high-risk group reported higher conditional self-worth, greater fear of negative evaluation, and stronger cognitive fusion. These results suggest that high-risk perfectionism is not merely a tendency toward high personal standards, but a broader maladaptive pattern in which self-worth depends on external validation, social judgment is experienced as threatening, and perfectionistic thoughts become cognitively rigid and difficult to disengage from. This pattern is consistent with contemporary conceptualizations of perfectionism as a multidimensional and transdiagnostic vulnerability factor that can influence emotional, cognitive, interpersonal, and performance-related functioning (Podină, 2020; Steinert et al., 2021; Zavađa, 2020). The large group differences observed in the present study also support the distinction between adaptive striving and maladaptive perfectionistic concern, because the high-risk group was characterized not simply by elevated

perfectionistic concerns, but by a psychological profile involving unstable self-evaluation, evaluative apprehension, and cognitive inflexibility.

The significant difference in conditional self-worth between the high-risk and non-high-risk groups indicates that students with high-risk perfectionism were more likely to base their personal value on achievement, approval, and competence-related validation. This result is consistent with research showing that the distress associated with perfectionism depends strongly on the way individuals evaluate themselves and whether their self-esteem is fragile, contingent, or accompanied by low self-compassion (Chung & Lee, 2024). When students believe that their worth depends on academic success or social approval, ordinary errors and setbacks may be interpreted as evidence of personal inadequacy. In this way, conditional self-worth can transform achievement contexts into self-threatening environments, thereby strengthening perfectionistic concern and self-critical monitoring. The present findings also align with evidence that parental expectations and fear of negative evaluation are connected with maladaptive perfectionism among emerging adults, suggesting that external standards and social approval may become internalized as conditions for self-acceptance (Menon et al., 2024). Similar patterns have been observed in academic performance contexts, where perfectionism and anxiety can predict learning-related outcomes and performance under evaluative pressure (Khosravi et al., 2023). Therefore, conditional self-worth may operate as a motivational and cognitive mechanism through which students maintain perfectionistic standards because failure is experienced not only as poor performance but as a threat to personal identity.

The finding that fear of negative evaluation was significantly higher among high-risk students further supports the interpersonal and social-evaluative nature of maladaptive perfectionism. Students with high fear of negative evaluation may become excessively concerned about criticism, disapproval, or exposure of perceived inadequacy. This concern can intensify perfectionistic behavior because the student attempts to avoid mistakes as a means of preventing negative judgment. The present result is in line with evidence that fear of negative evaluation is associated with psychological vulnerability through psychological inflexibility (Uğur et al., 2020). It also corresponds with findings from social anxiety research showing that cognitive distortions and rumination are important intervention targets in adolescents with social-evaluative distress (Ebrahimi et al., 2024). In the context of

perfectionism, fear of evaluation may increase repetitive checking, avoidance of challenging tasks, overpreparation, and self-silencing, because the student becomes preoccupied with how performance will be judged by others. This mechanism may be especially relevant in university environments, where assessment, ranking, peer comparison, public performance, and future career concerns are frequent. Thus, the present finding suggests that high-risk perfectionism among Indonesian university students includes a strong evaluative component and should be understood partly as a response to perceived social judgment.

The strongest predictor in the CatBoost model was cognitive fusion, which showed the highest feature-importance value and the largest SHAP contribution. This finding indicates that students were more likely to be classified as high-risk when they were strongly entangled with self-critical, perfectionistic, or failure-related thoughts. The result is theoretically meaningful because cognitive fusion can make perfectionistic rules appear absolute and non-negotiable. For example, thoughts such as “I must perform perfectly,” “mistakes prove that I am not good enough,” or “others will reject me if I fail” may become experienced as literal truths rather than mental events. This finding is consistent with process-based and acceptance-based perspectives, which emphasize psychological inflexibility as a core process underlying distress across diagnostic categories (Howard et al., 2026; Ong et al., 2020). It also aligns with research on acceptance and commitment therapy for obsessive-compulsive and anxiety-related concerns, where values-based exposure, cognitive defusion, and flexible responding are viewed as central mechanisms of change (Capel & Twohig, 2024; Veloso, 2025). The present findings suggest that in high-risk perfectionism, cognitive fusion may be a particularly important mechanism because it strengthens the believability and behavioral control of perfectionistic thoughts. When students are fused with these thoughts, they may find it difficult to tolerate imperfection, accept uncertainty, or act according to values rather than fear-based rules.

The predictive performance of the CatBoost model further demonstrated that conditional self-worth, fear of negative evaluation, and cognitive fusion can effectively classify high-risk perfectionism. The model achieved strong overall accuracy, balanced accuracy, recall, F1-score, ROC-AUC, and PR-AUC, indicating that it performed well in distinguishing students with high-risk perfectionism from those without high-risk status. The recall value for the high-

risk class showed that most students with high-risk perfectionism were successfully identified, while specificity showed that the model also accurately recognized students who were not high-risk. This balance is important because psychological screening requires sensitivity to individuals who may need further support while avoiding excessive false-positive classification. The use of CatBoost was particularly appropriate because the relationship between perfectionism and its predictors may not be purely linear. The SHAP interpretation suggested that risk increased especially when cognitive fusion and conditional self-worth reached higher levels, indicating that combinations of rigid thought processes and contingent self-evaluation may create sharper increases in risk. This supports the value of machine-learning methods in psychological research, particularly when the aim is not only to test associations but also to develop interpretable predictive profiles.

The explanatory results of the model are consistent with studies showing that perfectionism is relevant across clinical, educational, health, and performance contexts. In performance-based populations, perfectionism has been linked with psychological inflexibility, sleep quality, pain catastrophizing, psychopathological symptoms, resilience, anxiety, and performance-related difficulties (Arbinaga et al., 2023; Arbinaga & Sierra, 2025a, 2025b; Arbinaga et al., 2025; Haraldsen et al., 2020). These findings are relevant to university students because academic environments also involve performance demands, evaluation, discipline, and identity-related achievement. Similarly, studies with musicians, dancers, athletes, and sport referees suggest that perfectionism becomes more harmful when it is embedded in rigid psychological patterns and evaluative pressure (Chelkowska-Zacharewicz & Baran, 2023; Inoué et al., 2024; Pellino et al., 2022). The present study extends this literature by showing that a similar risk configuration can be detected in Indonesian university students using an interpretable classification model. Although students differ from elite performers or clinical populations, they may experience comparable mechanisms when academic success becomes central to identity and when mistakes are experienced as personally or socially threatening.

The findings also align with clinical literature showing that perfectionism is involved in diverse psychological and behavioral problems. Previous research has linked perfectionistic and rigid patterns to eating-disorder symptoms, obsessive-compulsive personality traits, orthorexic tendencies, chronic insomnia, fibromyalgia-related functioning, and transdiagnostic vulnerability factors

(Dell’Osso et al., 2025; Ėcija et al., 2020; Galfano et al., 2021; Giles et al., 2022; Habibi et al., 2023). Studies on neuropsychology, psychopathology, and attitudes toward change in eating disorders further suggest that rigidity and perfectionistic patterns may reduce flexibility and complicate psychological adjustment (Mata-Saenz et al., 2020). The feasibility of metacognitive training for adolescents with anorexia nervosa also reflects the relevance of targeting maladaptive beliefs and cognitive rigidity in conditions where perfectionistic processes may be present (Balzan et al., 2023). These studies support the present interpretation that cognitive fusion and conditional self-evaluation are not secondary features but central processes that may explain why perfectionism becomes high-risk. In this sense, the present study contributes to a transdiagnostic understanding of perfectionism by showing that high-risk classification can be achieved through psychological mechanisms that are meaningful across several domains of distress.

The present results are also consistent with intervention-oriented research. Cognitive-behavioral therapy, group CBT with positive psychotherapy, school-based group CBT, and integrated individual and group interventions have all been used to address maladaptive perfectionism and its associated distress (Cheli et al., 2022; Delakeh, 2026; Rozental, 2020; Zuo & Zhang, 2023). These interventions commonly target rigid beliefs, self-criticism, fear of mistakes, avoidance, and distorted self-evaluation. The present findings suggest that intervention programs for high-risk perfectionism among university students should also address conditional self-worth and cognitive fusion. Acceptance- and commitment-based approaches may be especially useful when students are fused with perfectionistic thoughts and organize their behavior around avoiding failure rather than pursuing personally meaningful values (Capel & Twohig, 2024; Howard et al., 2026; Ong et al., 2020). Moreover, prevention programs for university students can be designed to strengthen psychological flexibility, self-compassion, and value-based action before perfectionistic concerns develop into more severe distress (Cervantes-Perea et al., 2025; Consiglio et al., 2021). Thus, the model developed in the present study has practical relevance not only as a classification tool but also as a guide for identifying intervention targets.

5. Conclusion

Another important implication concerns the cultural and educational context of the study. The sample consisted of Indonesian university students, a population situated within a non-Western context where academic achievement, family expectations, collective values, and social reputation may influence self-evaluation. Although the present study did not directly test cultural variables, the strong role of conditional self-worth and fear of negative evaluation suggests that social and relational standards may be important in shaping high-risk perfectionism. This interpretation is compatible with research conducted in non-Western and emerging adult contexts, where parental expectations, self-esteem, and evaluative concerns are important components of maladaptive perfectionism (Delakeh, 2026; Menon et al., 2024; Zuo & Zhang, 2023). Psychometric research on multidimensional perfectionism across cultural settings also supports the need to examine perfectionism in diverse populations rather than assuming that its structure and consequences are identical across contexts (Mansur-Alves et al., 2023). The present study therefore adds to the literature by applying an interpretable machine-learning approach to an Indonesian student sample and by identifying psychological predictors that may be culturally relevant for academic mental health screening.

6. Limitations & Suggestions

This study had several limitations that should be considered when interpreting the findings. First, the cross-sectional design prevents causal conclusions about the relationships among conditional self-worth, fear of negative evaluation, cognitive fusion, and high-risk perfectionism. Although the CatBoost model classified high-risk cases with strong performance, prediction does not establish temporal or causal direction. Second, the use of self-report questionnaires may have introduced response bias, including social desirability, self-presentation concerns, or inaccurate introspection. Third, the sample consisted of Indonesian university students recruited through convenience sampling, which may limit the generalizability of the findings to other student groups, non-student populations, clinical samples, or adolescents. Fourth, high-risk perfectionism was defined using an upper-quartile cutoff, which is useful for classification but may not correspond to a clinical diagnosis or universally accepted risk threshold. Finally, although the model included theoretically meaningful predictors, other relevant variables such as self-compassion, academic stress,

parental expectations, emotion regulation, depression, anxiety, and cultural values were not included.

Future studies should use longitudinal designs to examine whether conditional self-worth, fear of negative evaluation, and cognitive fusion prospectively predict the development or persistence of high-risk perfectionism over time. Researchers are encouraged to validate the present model in larger and more diverse samples, including students from different regions, educational levels, academic disciplines, and cultural backgrounds. Future research should also compare CatBoost with other machine-learning algorithms such as random forest, XGBoost, LightGBM, support vector machines, and neural networks to determine whether the observed classification performance is algorithm-specific or stable across modeling approaches. In addition, future studies should examine whether adding psychological variables such as self-compassion, intolerance of uncertainty, rumination, academic burnout, parental expectations, and emotion-regulation strategies improves predictive accuracy. Clinical validation is also needed to determine whether machine-learning risk classifications correspond to interview-based assessments, functional impairment, or future help-seeking behavior. Finally, future studies should examine the fairness and calibration of the model across gender, educational level, socioeconomic background, and university type to ensure that predictive tools do not produce biased classifications.

The findings suggest that university counseling centers and student mental health services should pay attention to perfectionism not only as high achievement striving but also as a risk pattern involving unstable self-worth, fear of judgment, and rigid attachment to self-critical thoughts. Screening programs may benefit from including brief measures of conditional self-worth, fear of negative evaluation, and cognitive fusion to identify students who may require preventive support or further psychological assessment. Interventions should help students distinguish personal value from academic performance, reduce excessive dependence on external approval, and develop more flexible responses to mistakes, criticism, and uncertainty. Psychoeducational workshops may teach students that imperfection, feedback, and temporary failure are normal parts of learning rather than signs of personal inadequacy. Counseling programs should also include cognitive defusion, self-compassion, value clarification, and exposure to imperfection-based learning tasks. At the institutional level, universities should promote academic cultures that encourage mastery, growth, and psychological

safety rather than excessive comparison, fear-based achievement, or perfectionistic competition.

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Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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All authors equally contributed in this article.

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References

- Arbinaga, F., Moreno-San-Pedro, E., & Sierra, M. I. M. (2023). Chronotype and Self-Reported Perception of Sleep Quality in Relation to Psychological Inflexibility in Dance Students. <https://doi.org/10.20944/preprints202310.1712.v1>
- Arbinaga, F., & Sierra, M. I. M. (2025a). Pain Catastrophizing in Music Students: Examining Its Relationship With Psychological Inflexibility and Perfectionism. *Musicae Scientiae*, 30(2), 215-238. <https://doi.org/10.1177/10298649251378257>
- Arbinaga, F., & Sierra, M. I. M. (2025b). Psychopathological Symptoms in Soccer Referees: The Role of Psychological Inflexibility and Perfectionism. *PeerJ*, 13, e19790. <https://doi.org/10.7717/peerj.19790>
- Arbinaga, F., Vargas, G. A., & Moreno, E. (2025). Soccer Refereeing and Resilient Behavior: Relationships With Psychological Inflexibility and Perfectionism. *Perceptual and Motor Skills*. <https://doi.org/10.1177/00315125251365290>
- Balzan, R., Gilder, M., Thompson, M., & Wade, T. (2023). A Randomized Controlled Feasibility Trial of Metacognitive Training With Adolescents Receiving Treatment for Anorexia Nervosa. *International Journal of Eating Disorders*, 56(9), 1820-1825. <https://doi.org/10.1002/eat.24009>
- Capel, L. K., & Tsohig, M. P. (2024). ACT for OCD: An Example of ACT and Values-Based Exposures. *Journal of Clinical Psychology*, 81(2), 93-101. <https://doi.org/10.1002/jclp.23759>
- Cervantes-Perea, W., Martínez-Bacaicoa, J., & Gámez-Guadix, M. (2025). Psychological Flexibility and Inflexibility of University Students: An in-Depth Qualitative Study. *International journal of environmental research and public health*, 22(7), 1141. <https://doi.org/10.3390/ijerph22071141>
- Cheli, S., Cavalletti, V., Flett, G. L., & Hewitt, P. L. (2022). Perfectionism Unbound: An Integrated Individual and Group Intervention for Those Hiding Imperfections. *Journal of Clinical Psychology*, 78(8), 1624-1636. <https://doi.org/10.1002/jclp.23365>
- Chelkowska-Zacharewicz, M., & Baran, L. (2023). Psychological Flexibility for the Well-Being of Musicians: New Possibilities for Psychological Counseling. *Musicae Scientiae*, 27(4), 913-931. <https://doi.org/10.1177/10298649231179430>
- Chung, C. H. P., & Lee, A. M. (2024). Bidimensional Perfectionism and Psychological Distress: The Roles of Self-Esteem and Self-Compassion. <https://doi.org/10.1101/2024.07.24.24310699>
- Consiglio, M. D., Fabrizi, G., Conversi, D., Torre, G. L., Pascucci, T., Lombardo, C., Violani, C., & Couyoumdjian, A. (2021). Effectiveness of NoiBene: A Web-based Programme to Promote Psychological Well-being and Prevent Psychological Distress in University Students. *Applied Psychology Health and Well-Being*, 13(2), 317-340. <https://doi.org/10.1111/aphw.12251>
- Delakeh, N. K. (2026). School Based- Group Cognitive Behavioral Therapy for Maladaptive Perfectionism: Effects on Anxiety and Self Esteem- In Adolescent Girls in a Nonwestern-Cultural Context. <https://doi.org/10.21203/rs.3.rs-8766716/v1>
- Dell'Osso, L., Nardi, B., Giovannoni, F., Bonelli, C., Cremone, I. M., & Pini, S. (2025). Orthorexic Tendencies Are Associated With Autistic Traits in Patients With Borderline Personality Disorder. *Journal of clinical medicine*, 14(11), 3891. <https://doi.org/10.3390/jcm14113891>
- Ebrahimi, S., Moheb, N., & Vafa, M. A. (2024). Comparison of the Effectiveness of Cognitive-Behavioral Therapy and Acceptance and Commitment Therapy on Cognitive Distortions and Rumination in Adolescents With Social Anxiety Disorder. *Practice in Clinical Psychology*, 12(1), 81-94. <https://doi.org/10.32598/jpcp.12.1.922.1>
- Écija, C., Catalá, P., Sanromán, L., López-Roig, S., Pastor-Mira, M. Á., & Peñacoba, C. (2020). Is Perfectionism Always Dysfunctional? Looking Into Its Interaction With Activity Patterns in Women With Fibromyalgia. *Clinical Nursing Research*, 30(5), 567-578. <https://doi.org/10.1177/1054773820973273>
- Galfano, V., Syurina, E. V., Valente, M., & Donini, L. M. (2021). When "Healthy" Is Taken Too Far: Orthorexia Nervosa—Current State, Controversies and Future Directions. 159-176. https://doi.org/10.1007/978-3-030-81174-7_14
- Giles, S., Hughes, E. K., Fuller-Tyszkiewicz, M., Treasure, J., Fernández-Aranda, F., Karwautz, A., Wagner, G., Anderluh, M., Collier, D., & Krug, I. (2022). Bridging of Childhood Obsessive-compulsive Personality Disorder Traits and Adult Eating Disorder Symptoms: A Network Analysis Approach.

- European Eating Disorders Review*, 30(2), 110-123. <https://doi.org/10.1002/erv.2885>
- Grubi, T. (2021). Factors in University Teaching Staff Perfectionism. *Організаційна Психологія Економічна Психологія*, 4(24), 15-21. <https://doi.org/10.31108/2.2021.4.24.2>
- Habibi, M., Vand, H. D. A., Yegaei, P. S., Hooman, F., Ahmadi, R., Baglioni, C., & Moradi, S. (2023). The Contribution of Transdiagnostic Vulnerability Factors in Patients With Chronic Insomnia. *Frontiers in Psychiatry*, 14. <https://doi.org/10.3389/fpsyt.2023.1162729>
- Haraldsen, H. M., Solstad, B. E., Ivarsson, A., Halvari, H., & Abrahamsen, F. E. (2020). Change in Basic Need Frustration in Relation to Perfectionism, Anxiety, and Performance in Elite Junior Performers. *Scandinavian Journal of Medicine and Science in Sports*, 30(4), 754-765. <https://doi.org/10.1111/sms.13614>
- Howard, L. R., Earleywine, M., DeCount, T. A., & Forsyth, J. P. (2026). Acceptance and Commitment Therapy (ACT) for Comorbid Generalized Anxiety Disorder and Premenstrual Dysphoric Disorder: A Transdiagnostic Approach. *Clinical Case Studies*. <https://doi.org/10.1177/15346501261421541>
- Inoué, K., Yamada, T., & Ohtsuki, T. (2024). Relationships Between Throwing Yips in Baseball, Experiential Avoidance, Cognitive Fusion, Values, and Social Factors. *Journal of Clinical Sport Psychology*, 18(3), 374-395. <https://doi.org/10.1123/jcsp.2022-0057>
- Khosravi, R., Mohammadi, E., Esmaeili, N., & Zandi, H. (2023). Perfectionism and Writing Anxiety as Predictors of Iranian EFL Learners' Performance in IELTS Writing Module: A Multi-Dimensional Perspective. *Frontiers in Education*, 8. <https://doi.org/10.3389/feduc.2023.1108542>
- Mansur-Alves, M., Muniz, M., Rueda, F. J. M., & Zeferino, G. G. (2023). Psychometric Properties of the Hewitt and Flett Multidimensional Perfectionism Scale in Brazilian Adults. *Psicologia Teoria E Pesquisa*, 39(spe). <https://doi.org/10.1590/0102.3772e39nspe09.en>
- Mata-Saenz, B., Rodríguez-Cano, T., Muñoz-Martínez, V. E., & Beato-Fernández, L. (2020). Relationship Between Neuropsychology, Clinical Traits, Psychopathology and Attitudes Towards Change in Eating Disorders. <https://doi.org/10.21203/rs.3.rs-21795/v2>
- Menon, S., Aiswarya, V. R., & Rajan, S. K. (2024). Parental Expectations and Fear of Negative Evaluation Among Indian Emerging Adults: The Mediating Role of Maladaptive Perfectionism. *Indian Journal of Psychological Medicine*, 47(5), 479-487. <https://doi.org/10.1177/02537176241252949>
- Ong, C. W., Levin, M. E., & Twohig, M. P. (2020). Beyond Acceptance and Commitment Therapy: Process-Based Therapy. *The Psychological Record*, 70(4), 637-648. <https://doi.org/10.1007/s40732-020-00397-z>
- Pellino, V. C., Lovecchio, N., Puci, M. V., Marin, L., Gatti, A., Pirazzi, A., Negri, F., Ferraro, O. E., & Vandoni, M. (2022). Effects of the Lockdown Period on the Mental Health of Elite Athletes During the COVID-19 Pandemic: A Narrative Review. *Sport Sciences for Health*, 18(4), 1187-1199. <https://doi.org/10.1007/s11332-022-00964-7>
- Podinã, I. R. (2020). Concluding Commentary: Treating Perfectionism Transdiagnostically With an Eye on the Future. *Journal of Clinical Psychology*, 76(11), 2109-2115. <https://doi.org/10.1002/jclp.23061>
- Rozental, A. (2020). Beyond Perfect? A Case Illustration of Working With Perfectionism Using Cognitive Behavior Therapy. *Journal of Clinical Psychology*, 76(11), 2041-2054. <https://doi.org/10.1002/jclp.23039>
- Steinert, C., Heim, N., & Leichsenring, F. (2021). Procrastination, Perfectionism, and Other Work-Related Mental Problems: Prevalence, Types, Assessment, and Treatment—A Scoping Review. *Frontiers in Psychiatry*, 12. <https://doi.org/10.3389/fpsyt.2021.736776>
- Styk, W., Zmorzyński, S., & Samardakiewicz, M. (2023). Persistence Is Multi-Trait: Persistence Scale Development and Persistence Perseveration and Perfectionism Questionnaire Into Polish Translation. *Brain Sciences*, 13(6), 864. <https://doi.org/10.3390/brainsci13060864>
- Uğur, E., Kaya, Ç., & Tanhan, A. (2020). Psychological Inflexibility Mediates the Relationship Between Fear of Negative Evaluation and Psychological Vulnerability. *Current Psychology*, 40(9), 4265-4277. <https://doi.org/10.1007/s12144-020-01074-8>
- Veloso, P. (2025). Third-Generation Cognitive and Behavioral Therapies for Obsessive-Compulsive Disorder: A Narrative Review. *Cureus*. <https://doi.org/10.7759/cureus.94299>
- Zuo, Z., & Zhang, X. (2023). A Randomized Controlled Trial of Group CBT With Positive Psychotherapy Intervention for University Students With Maladaptive Perfectionism in China. *Frontiers in psychology*, 14. <https://doi.org/10.3389/fpsyg.2023.1161575>
- Завада, Т. (2020). Theoretical Aspects of Perfectionism Influence on the Personality. 250-269. <https://doi.org/10.30525/978-9934-588-37-2.1.15>