

THE IMPACT OF TOOTHACHE AND DENTAL PROBLEMS ON ACADEMIC PERFORMANCE AND BEHAVIOR OF SCHOOLCHILDREN: PSYCHOLOGICAL AND PEDAGOGICAL ASPECTS

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Abstract. The aim of the study was to examine the impact of toothache and dental problems on the academic performance and behavior of schoolchildren, and to evaluate the role of psychological factors, such as anxiety and behavioral problems, in the mechanisms of influence. A cross-sectional design was used to recruit students aged 9–14 from 6 schools. The following measures were measured: toothache intensity on a 0–10 scale, dental health (DMFT index), academic performance, and behavior (strengths and difficulties scale). Anxiety and stress were additionally assessed using short scales (approximately as indicators of psycho-emotional state). The analysis included descriptive statistics, correlation analysis, and a hierarchical regression model. The results showed that more severe toothache and a higher DMFT were associated with lower academic performance and a greater number of behavioral problems. The contribution of the strengths and difficulties questionnaire to explaining the variance in academic performance was the greatest, partially explaining the influence of pain and dental problems through psychological disturbances. Practical implications: Early identification of dental problems in schools and integration of dental and psychological support are needed to reduce the impact of pain on learning.

Key words: toothache, dental problems, schoolchildren, academic performance, behavior, psychology, pedagogy, questionnaire of strengths and difficulties, DMFT

Introduction. Toothache and dental diseases are more common in children and adolescents than is commonly believed. In addition to physical discomfort, they can lead to decreased concentration in class, increased absences, worsening mood, and decreased motivation for learning. Chronic stress and sleep disturbances associated with pain can affect memory, attention, and executive functions, ultimately impacting academic performance and social and educational behavior. Existing literature highlights the need to explore the interrelationships between physical dental factors, students' psychological states, and educational outcomes. The aim of this study was to evaluate the relationships between dental pain intensity, oral health, and academic performance in schoolchildren, as well as behavioral and psychological manifestations, in order to propose directions for integrated educational and medical interventions.

Materials and methods. Cross-sectional study with a sample of schoolchildren from 6 schools in different districts. Participants: 300 students aged 9–14 years (mean age 11.8 years; 52% girls). Ethical approval was obtained by the local research ethics committee; written consent from parents/guardians and oral assent from children. Measured variables: toothache: pain intensity scale 0–10 (0 = no pain, 10 = worst pain). Oral health: DMFT index (number of cavities, fillings, and extracted teeth). Academic performance: average grade point average in core school subjects for the current term (0–100). Behavior: total score on behavioral problems scales (0–40; higher score = more problems). Psychological state: Abbreviated Anxiety/Stress Scale (used provisionally to explain mechanisms; data are considered as supporting studies). Controls: age, gender, and parents' socioeconomic status (SES) (measured by parents' education level and family income). Procedure: A pilot sample was completed by teachers and school administrators; children completed questionnaires during school activities under the supervision of researchers. All data were anonymized. The analysis is presented in the following: descriptive statistics for all variables. Pearson correlations between pain, DMFT, GPA, and SDQ.



Hierarchical regression: Model 1: control variables (age, gender, SES). Model 2: adding pain and DMFT. Model 3: adding SDQ. The contribution of SDQ to explaining the variation in GPA and SDQ to the variation in GPA and vice versa is considered as a potential mediator/moderator.

Pain is associated with lower academic performance and higher levels of behavioral problems ($p < 0.01$). Higher DMFT is also associated with lower academic performance, but statistical significance is reduced when accounting for the SDQ. The SDQ is the strongest predictor of academic performance: the more behavioral problems, the lower the student's GPA ($\beta = -0.38$, $p < 0.001$). Model 3 explains approximately 25% of the variance in GPA; adding the SDQ reduces the contribution of pain/DMFT, indicating a partial role of behavioral problems as a mediator in the pain-academic performance relationship.

Discussion. Key finding: Toothache and dental problems are associated with lower academic achievement and increased behavioral difficulties in school children. Psychological factors, especially behavioral problems, are a significant mediator/moderator in this relationship. Possible mechanisms: pain reduces concentration, sleep, and overall well-being; toothache may distract from learning and lead to decreased motivation; pain and dental problems may increase stress and anxiety, which is reflected in behavior at school. Practical implications: a targeted approach to school health should include dental prevention and treatment, as well as psychological support to reduce the negative impact of pain on learning. Schools and educators should consider the impact of dental health on student achievement and behavior by organizing access to dental care and pain management support. Limitations of the study: cross-sectional design does not allow establishing causality; data are based on self-reported information; possible sampling variability and cultural and contextual features; The impact of confidentiality violations and cultural factors on responses. Future research areas include longitudinal studies that include monitoring dental health and academic progress; implementing school dental programs and analyzing their impact on academic achievement; and conducting cross-regional comparative studies.

Conclusions. Toothache and dental problems have a significant impact on the academic performance and behavior of schoolchildren. This impact is partly explained by psychological factors, such as behavioral problems. Implementing an integrated school health model combining dental prevention and psychological support may improve academic performance and behavior among students. Limitations and future research directions. Limitations: cross-sectional design, limited diagnostic depth of dental problems, possible socioeconomic and cultural influences. Recommendations: long-term cohorts, a broader range of psychometric measures, inclusion of pain and sleep management, analysis of interactions between gender and age.

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