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Assessment of postural habits and lifestyle factors for scoliosis risk in students

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Abstract

Background Scoliosis is a three-dimensional spinal deformity affecting approximately 2–3% of adolescents worldwide. Lifestyle factors and postural habits during formative years may influence both the development and progression of spinal deformities; however, evidence on postural awareness and health behaviour in student populations remains limited.

Aim To assess postural habits, physical activity patterns, and voluntary postural control among university and school students, and to describe the prevalence of self-reported posture-related complaints and prior scoliosis diagnosis.

Methods A cross-sectional, self-administered online survey (Google Forms) was distributed among university and school students from institutions across Georgia (November 2025–May 2026). The structured questionnaire comprised 10 items addressing preferred resting posture, physical activity participation, history of scoliosis diagnosis, presence of postural complaints, and frequency of voluntary postural monitoring. Descriptive statistics were computed for all items. A total of 104 respondents aged 17–28 years were included.

Results The majority of participants (80%) reported habitually lying on a sofa when using electronic devices, a posture associated with increased spinal loading. Only 17.3% engaged in regular morning exercise and 55.3% participated in any sport. Among respondents, 2.9% reported a prior scoliosis diagnosis and 14.4% were uncertain of their status. Posture-related complaints were common: 31.1% reported habitual slouching, 26.2% lower back pain, and 5.8% rapid back fatigue during classes. Systematic postural self-monitoring was practised by only 13.6% of participants; 35.0% reported giving no attention to posture.

Conclusion This survey identifies a high prevalence of non-supportive postural habits, low physical activity levels, and limited spinal health awareness among Georgian students. These findings support the development and implementation of targeted school- and university-based preventive programmes addressing posture education and early scoliosis screening.

Keywords scoliosis; posture; students; physical activity; spinal health; health awareness; cross-sectional survey; Georgia

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1. Introduction

Scoliosis is a complex three-dimensional spinal deformity characterised by lateral deviation and vertebral rotation, with a reported prevalence of approximately 2–3% among adolescents worldwide [1,2,4]. The majority of cases are idiopathic in origin, meaning no definitive causal factor can be identified [5]. While genetic predisposition has been demonstrated in twin and familial studies, environmental and behavioural influences — including postural loading patterns and physical activity levels — are increasingly recognised as modifiable contributors to disease expression and progression [2,4,5].

The increasing prevalence of sedentary behaviour among adolescents and young adults, driven largely by prolonged screen-based leisure activities, has generated concern about the musculoskeletal consequences of sustained non-ergonomic postures. Prolonged periods of asymmetric or unsupported spinal loading may contribute to cumulative mechanical stress on developing vertebral structures [3,12]. Despite this, systematic evidence on postural habits and spinal health awareness in student populations remains limited, particularly in the Georgian and broader South Caucasian context.

Early detection of scoliosis is recognised as a critical determinant of outcome: conservative management, including physiotherapy-based scoliosis-specific exercises and orthotic bracing, is most effective when initiated before skeletal maturity and before Cobb angle progression exceeds manageable thresholds [9,10,12,13]. The effectiveness of bracing in halting curve progression was robustly demonstrated in the BrAIST randomised controlled trial, which reported successful treatment in 72% of braced participants compared with 48% in the observation group [9]. Surgical intervention, while capable of achieving significant curve correction, does not fully restore native spinal mobility and carries inherent perioperative risk, underscoring the value of prevention and early intervention [1,8].

Close multidisciplinary collaboration among physiotherapists, physiatrists, and orthopaedic specialists is recommended throughout the management pathway [13]. Increasing postural awareness among students represents a low-cost, high-reach preventive strategy that may reduce both the incidence and severity of posture-related disorders in this population. The present study aimed to describe postural habits, physical activity patterns, and spinal health awareness among university and school students in Georgia, and to identify areas for targeted preventive intervention.

2. Methods

2.1 Study design and setting

A cross-sectional, self-administered online survey was conducted among university and school students from institutions located in different regions of Georgia. Data were collected between November 2025 and May 2026. The study adhered to the ethical principles of the Declaration of Helsinki. All participants provided informed electronic consent prior to participation.

2.2 Participants

Eligible participants were students aged 17–28 years who voluntarily agreed to participate. The questionnaire was distributed via Google Forms through student WhatsApp groups and institutional social media channels. Convenience sampling was used. Participants who did not complete the questionnaire were excluded. A total of 104 completed responses were included in the final analysis.

2.3 Instrument

The structured questionnaire comprised 10 items developed by the authors based on established posture and physical activity assessment frameworks used in the scoliosis literature [12,13]. Items addressed: (i) preferred resting posture during leisure and screen-based activities; (ii) participation in physical activity and sports; (iii) morning exercise habits; (iv) history of scoliosis diagnosis in childhood; (v) presence and type of posture-related complaints; and (vi) frequency of voluntary postural self-monitoring. Response options were categorical and mutually exclusive for each item.

2.4 Statistical analysis

Data were entered and managed in Microsoft Excel (Microsoft Corporation, Redmond, WA, USA). Descriptive statistics — frequencies and percentages — were calculated for all questionnaire items. Given the exploratory, cross-sectional design and the categorical nature of all variables, no inferential statistical testing was performed. Results are reported as proportions and visualised using frequency charts.

3. Results

3.1 Sample characteristics and postural habits

A total of 104 students participated; 75% were university students and 25% were school students. Participants ranged in age from 17 to 28 years. Regarding preferred posture during reading activities, 31.7% favoured sitting at a desk and approximately 40% preferred lying on a sofa. A markedly higher proportion — 80% — reported habitually lying on a sofa while using electronic devices, a posture associated with increased asymmetric spinal loading compared with supported seated positions.

3.2 Physical activity

Overall, 55.3% of respondents reported involvement in organised sports, whereas 44.7% reported no sports participation. Concerning morning exercise habits, 46.2% exercised occasionally, 36.5% never

engaged in morning exercise, and only 17.3% exercised regularly in the mornings. Walking was the most commonly reported casual physical activity. Regarding swimming, 51% reported interest or ability, while 49% reported being unable to swim or having no interest in the activity.

3.3 History of scoliosis diagnosis

The majority of participants (82.7%) reported they had not been diagnosed with scoliosis during childhood. A total of 14.4% were uncertain of their diagnostic status, and 2.9% reported a confirmed prior diagnosis of scoliosis (Figure 1). The proportion of uncertain respondents is noteworthy and may reflect limited recall, incomplete medical records, or absence of childhood screening.

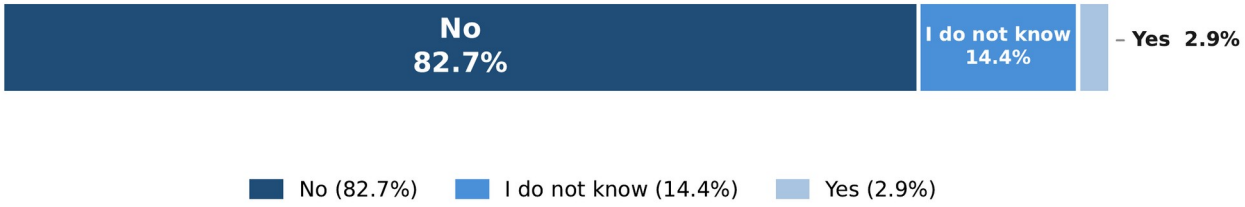

Figure 1. Distribution of self-reported childhood scoliosis diagnosis history among survey respondents (n = 104).

3.4 Posture-related complaints

Posture-related complaints were common: 31.1% of respondents reported habitual slouching, 26.2% reported lower back pain, and 5.8% reported rapid onset of back fatigue during classes. Only 36.9% reported no noticeable posture-related problems (Figure 2). The predominance of slouching and lower back pain is consistent with the biomechanical consequences of prolonged use of electronic devices in non-ergonomic positions.

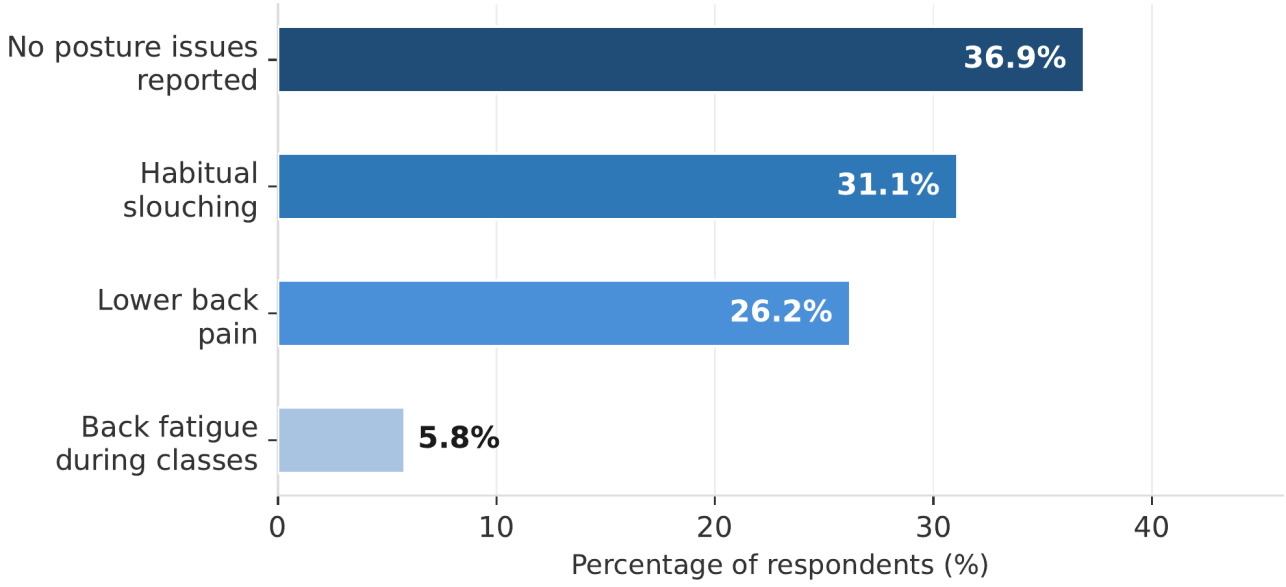

Figure 2. Self-reported posture-related complaints among survey respondents (n = 104). Percentages represent the proportion of respondents selecting each response category.

3.5 Voluntary postural self-monitoring

Assessment of voluntary postural control revealed that 42.7% of participants reported monitoring their posture only "sometimes". A considerable proportion (35.0%) stated they did not think about posture at all, indicating an absence of habitual postural awareness. Systematic postural monitoring was reported by only 13.6% of respondents, and 8.7% reported never monitoring their posture (Figure 3). Collectively, nearly half of respondents (48.7%) demonstrated

either absent or negligible awareness of their postural behaviour.

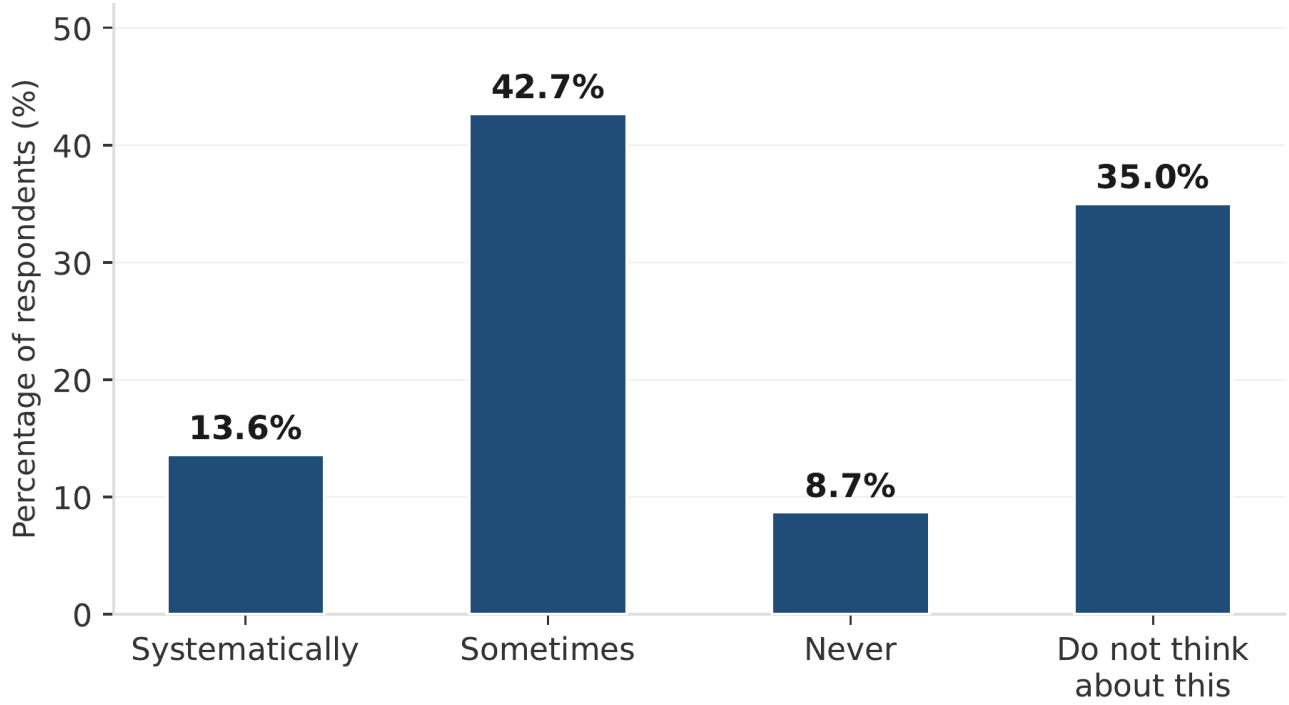

Figure 3. Frequency of voluntary postural self-monitoring among survey respondents (n = 104). Percentages represent the proportion selecting each response category.

4. Discussion

This cross-sectional survey identified a high prevalence of non-supportive postural habits, low rates of regular physical activity, and limited spinal health awareness among students in Georgia. The finding that 80% of respondents habitually assume a recumbent posture when using electronic devices is of particular clinical relevance. Prolonged lying-on-sofa postures generate sustained asymmetric loading of the lumbar and thoracic spine and are biomechanically distinct from supported seated postures in terms of intradiscal pressure distribution and paraspinal muscle activation [3,12]. While the cross-sectional design of this study precludes causal inference, such patterns may contribute to the postural complaints identified in this sample.

The prevalence of posture-related complaints in this cohort — including slouching (31.1%), lower back pain (26.2%), and class-related back fatigue (5.8%) — is broadly consistent with published data from student populations in comparable settings. Lower back pain in particular has been identified as the leading musculoskeletal complaint among university students globally, with reported prevalence ranging from 25% to 65% depending on study setting and measurement instrument [2,12]. The high proportion of respondents reporting habitual slouching is also noteworthy: forward head and thoracic kyphotic postures are associated with altered spinal loading profiles and may predispose susceptible individuals to curve progression [3].

Physical activity participation was suboptimal: only 17.3% of respondents engaged in regular morning exercise, and 44.7% reported no sports participation. Evidence from the scoliosis literature supports the role of structured physical activity — particularly core strengthening, swimming, and scoliosis-specific exercises — in reducing progression risk and improving postural control [3,12,13]. The physiotherapy-based approaches codified in the 2016 SOSORT guidelines represent the current international standard for conservative management and emphasise active exercise as a primary intervention modality [12].

The finding that 14.4% of respondents were uncertain of their childhood scoliosis diagnosis status is consistent with recognised limitations in population-level scoliosis screening coverage. In many countries, systematic school screening programmes remain inconsistent or absent, and adolescent diagnosis may depend on opportunistic clinical encounters [1,4]. The BrAIST trial demonstrated that successful bracing outcomes are strongly associated with early initiation and high compliance, both of which are facilitated by early detection through screening [9]. Improved awareness of scoliosis among students and educational institutions may increase the likelihood of appropriate self-referral.

Postural self-monitoring was practised systematically by only 13.6% of participants, and 35.0% reported giving no attention to posture. These findings align with a broader pattern of low health literacy regarding spinal conditions in non-clinical populations. Targeted educational interventions — including ergonomic guidance, posture workshops, and digital screen-time awareness campaigns — have demonstrated feasibility and acceptability in university settings and represent a scalable preventive strategy [12,13].

4.1 Limitations

Several limitations should be acknowledged. The convenience sampling approach and online distribution method introduce potential selection bias; students without access to social media or with limited engagement in student networks may be underrepresented. The absence of clinical examination data means that self-reported postural complaints and scoliosis diagnosis cannot be objectively validated. The descriptive design does not permit causal inference regarding the relationships between postural habits and spinal health outcomes. The single-region sampling frame limits generalisability to the broader Georgian student population. Future research incorporating clinically validated postural assessment tools, accelerometry-based physical activity measurement, and representative sampling strategies would substantially strengthen the evidence base.

5. Conclusion

This survey identifies a high prevalence of non-supportive postural habits, low rates of regular physical activity, and limited spinal health awareness among Georgian students aged 17–28 years. The predominance of recumbent screen-use postures, the high frequency of posture-related complaints, and the near-absence of systematic postural self-monitoring collectively underscore the need for structured preventive interventions at both school and university level. Evidence-based programmes incorporating postural education, ergonomic guidance, and scoliosis-awareness components are recommended. Integration of opportunistic spinal screening into routine student health assessments may also improve early detection rates and support timely access to conservative management.

Abbreviations

AIS — Adolescent idiopathic scoliosis
BrAIST — Bracing in Adolescent Idiopathic Scoliosis Trial
CC BY 4.0 — Creative Commons Attribution 4.0 International License
DOI — Digital Object Identifier
GMJ — Georgian Medical Journal
ORCID — Open Researcher and Contributor ID
PHIG — Public Health Institute of Georgia
RCT — Randomised controlled trial
SEAS — Scientific Exercises Approach to Scoliosis
SOSORT — Society on Scoliosis Orthopaedic and Rehabilitation Treatment
USPSTF — United States Preventive Services Task Force

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Authors' contributions

RV: Conceptualisation; study design; questionnaire development; supervision; writing — original draft; writing — review and editing; final approval. HK: Investigation; data collection; manuscript preparation; writing — review and editing; final approval. TKSK: Investigation; data collection; formal analysis; manuscript preparation; writing — review and editing; final approval. All authors read and approved the final manuscript.

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Declarations

Ethics approval and consent to participate This study was conducted in accordance with the ethical principles of the Declaration of Helsinki. The survey was anonymous and voluntary; no identifiable personal data were collected. Informed electronic consent was obtained from all participants prior to completion. Formal institutional ethics committee review was not required under applicable regulations for anonymous survey research.

Consent for publication Not applicable. The article does not contain any individual-level or identifying personal information.

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