

Preventing Deviant Behavior Through The Implementation of an Early Warning System in Schools: A Quasi-Experimental Sociological Analysis

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Abstract

The article substantiates a sociological model of an early warning system aimed at the early identification of deviant behavior risk among students in general secondary schools and the organization of targeted preventive measures. The study interprets the school as an environment where the institutions of social control, socialization, and child protection intersect. The author proposes a SMART-Alert model, in which the classic ABC indicators attendance, academic performance, and behavior are supplemented with indicators of emotional state, social integration, and family engagement. The original material's aggregate indicators for 240 students, 120 in the experimental group and 120 in the control group in one school during the 2025–2026 academic year, were re-analyzed. Differences between the groups were assessed using Pearson's χ^2 test, relative risk, and Cramér's V coefficient. Preliminary results show that in schools where the EWS was implemented, the proportion of absenteeism, behavioral disruptions, and deviant incidents was lower, while access to psychological support and parental involvement were higher. The article substantiates the necessity of implementing the system not as a punitive monitoring tool, but as a support mechanism based on confidentiality, avoidance of stigmatization, and interagency cooperation.

Keywords: Deviant Behavior, Early Warning System, School, Prevention, Attendance, Social Control, Risk Indicators, Case Management, Interagency Cooperation

1. Introduction

The school is one of the primary institutions of socialization for children and adolescents, in which, alongside educational outcomes, behavioral norms, group belonging, mutual trust, and civic responsibility are formed. For this reason, absenteeism, chronic tardiness, aggression, bullying, vandalism, a sharp decline in academic motivation, or isolation from the peer group should not be analyzed merely as matters of individual discipline, but as signs of weakening social ties among the family, school, peers, and the neighborhood mahalla.[1] An Early Warning System uses regularly collected data about the student to identify early signs of dropping out of the educational pathway, academic failure, or behavioral risk, and to help select appropriate support measures. In practical guidelines, the core of such systems is typically presented as the ABC indicators — attendance, behavior, and coursework/academic

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performance [2]. However, the indicator alone does not produce a preventive effect: without a team that regularly reviews the data, conducts in-depth needs assessments, provides individualized interventions, and conducts repeated monitoring, the system risks becoming merely a "risk list." In Uzbekistan, new legal foundations for protecting children from all forms of violence require educational institutions to identify risk, develop protective mechanisms, and cooperate with other authorized entities. This situation makes it an urgent task to develop an evidence-based preventive monitoring model for schools — one that does not stigmatize the child and ensures confidentiality. The research problem is that in existing preventive practice, reactive measures are most often taken only after an offense or a serious disciplinary incident has already occurred. This article, in turn, proposes a sociological model for identifying early signs of risk, explaining their causes within a social context, and providing multi-stage support.[3]

1.1 Research Aim, Questions, And Scientific Novelty

The study aims to theoretically substantiate the SMART-Alert model, aimed at the early identification and prevention of deviant behavior risk in general secondary schools, and to assess its practical effectiveness based on pilot results presented by the author.

The research questions consist of the following: 1) which school indicators constitute practically observable and manageable criteria for the early identification of deviant behavior risk; 2) what differences exist between schools where the EWS has been implemented and those applying traditional prevention methods, in terms of attendance, behavior, psychological support, parental involvement, and deviant incidents; 3) which organizational-ethical principles should take priority in implementing the EWS in schools in Uzbekistan?[4]

Hypotheses: H1 — in schools where the EWS has been implemented, the proportion of absenteeism will be lower than in control schools; H2 — in schools where the EWS has been implemented, the proportion of behavioral disruptions and deviant incidents will be lower; H3 — the EWS increases access to psychological support and parental involvement; H4 — the effect of the EWS emerges not merely from recording indicators, but when the indicator–need–intervention–reassessment chain functions.

The scientific novelty of the article is manifested in three respects. First, the ABC model was expanded for schools in Uzbekistan with indicators of emotional state, social integration, and family engagement. Second, alongside a green–yellow–red risk assessment scale, a case-management approach and a 30/60/90-day reassessment cycle were proposed. Third, based on the preliminary aggregate data, the difference between groups was recalculated not merely in percentages, but using χ^2 , relative risk, and Cramér's V indicators. The author's personal contribution consists of developing the SMART-Alert conceptual model, operationalizing the indicators, statistically re-analyzing the pilot results, and formulating organizational-practical recommendations suited to conditions in Uzbekistan.

The school as a social context of deviant behavior

The sociological approach does not confine deviant behavior to an individual's "bad conduct." In Merton's anomie theory, a mismatch between social goals and the legitimate means of achieving them may create grounds for deviant adaptation. Agnew's general strain theory, meanwhile, links experiences of failure, negative treatment, and injustice to aggressive or avoidant behavior. According to Hirschi's social control theory, the stronger the attachment to family, school, and constructive activity, the lower the likelihood of norm violation. Bronfenbrenner's ecological model makes it possible to explain the child through the interaction of family, school, neighborhood, and the broader institutional environment. These

theories provide the basis for interpreting the EWS not merely as a technical monitoring tool, but as an institutional mechanism that reveals, at an early stage, the severing of social ties, declining school belonging, and barriers to accessing resources. For example, deteriorating attendance may be linked to family economic pressure, a health problem, bullying, transportation difficulties, or a sense of injustice at school. For this reason, the same indicator may require different explanations and different interventions for different students.[5]

International experience with early warning systems

In the scientific literature, the strong link between attendance, behavior, and course outcomes and a student's subsequent educational pathway has been confirmed repeatedly. Balfanz and co-authors noted that low attendance in middle grades, serious behavioral incidents, and failure in core subjects predict the risk of subsequently dropping out of education. Allensworth and Easton demonstrated the importance of attendance and course failure in identifying "on-track/off-track" status on the path to graduation. Practical guidelines distinguish five components of an effective EWS: forming a school team; selecting valid indicators and thresholds suited to the local context; simple and regular reporting; matching interventions to indicators; and reassessing student trajectories and intervention effectiveness. UNICEF's approach relies on a whole-school principle, cooperation with families and external services, data protection, and individualized assessment of student needs. At the same time, international evaluations show that excessively high expectations should not be placed on the EWS. For instance, in randomized studies, although certain risk indicators decreased, no immediate, significant effect was observed on all final educational outcomes. Thus, the EWS itself is not an intervention; it is an information infrastructure for properly directing resources, enabling collective decision-making, and improving the quality of support.

Legal and institutional foundation in the context of Uzbekistan

The Law of the Republic of Uzbekistan No. O'RQ-996, dated November 14, 2024, "On the Protection of Children from All Forms of Violence," assigns educational institutions the authority to develop, implement, and monitor the enforcement of protection programs and mechanisms. Resolution No. 440 of the Cabinet of Ministers, dated July 14, 2025, establishes the procedure for identifying instances of violence, assessing risk levels, and drawing up protection plans. The national strategy planned for 2026–2030, meanwhile, strengthens cooperation among education, social protection, healthcare, law enforcement agencies, and civil society entities in protecting children. From this standpoint, the SMART-Alert model proposes not post-offense monitoring, but an internal school mechanism that prioritizes the child's best interests, detects risk early, and safely refers the child to the appropriate service. The legal legitimacy of the system does not automatically imply an unlimited right to collect all student data; purpose limitation, minimal necessary data, restricted access rights, and confidentiality must be strictly ensured.[6]

2. Methodology

Research Design and Sample

The original material indicates that the study was conducted in 2025–2026, and that the EWS model was piloted in one general secondary school during the 2025–2026 academic year. Of these, 0.5 constituted the experimental and 0.5 the control school, with 120 students in each group, covering a total of 240 students. The published version of the article includes the region's name, the criteria for selecting schools, grade and age composition, gender

distribution, and baseline equivalence indicators. The design was framed as a quasi-experimental "experimental–control, final comparison" format. In the experimental schools, the monitoring, risk assessment, case management, tiered intervention, and reassessment components of SMART-Alert were applied; in the control schools, the existing traditional prevention work continued. The original file notes that a survey was conducted with 50 teachers, psychologists, principals, and parents, and interviews with 50 specialists, but the distribution and results of this data are not provided. For this reason, the main statistical analysis in this article was directed at school administrative records for the 240 students.[7]

Operationalization of Indicators

The SMART-Alert model expands the classic Table 1. And Figure 1. ABC indicators with three additional blocks: emotional state, social integration, and family–school cooperation. The indicators are applied not for diagnosis, but as a signal indicating the need for an in-depth assessment of the student's needs. A short-term change in a single indicator does not, on its own, constitute grounds for assigning the label of an "at-risk student." [8]

Table 1. Recommended indicators and preliminary thresholds for SMART-Alert

Indicator	Green level	Yellow level	Red level
Attendance	0–2 unexcused absences/month	3–5 unexcused absences/month or sharp decline	6+ unexcused absences/month / 10%+ time loss
Academic performance	Stable or positive trend	Decline in several subjects	Persistent failure in core subjects
Behavior	No serious incidents	1–2 repeated warnings	Violence, self-harm, 3+ serious incidents
Emotional state	Stable	Signs of anxiety, depression	Crisis or direct threat to safety
Social integration	Active, supportive connections	Passivity, withdrawal	Isolation, victim or instigator of bullying
Family–school connection	Regular cooperation	Episodic or conflictual contact	Contact severed, protection needed

Note: the thresholds are not a universal norm; they should be refined based on local historical data and expert validation.

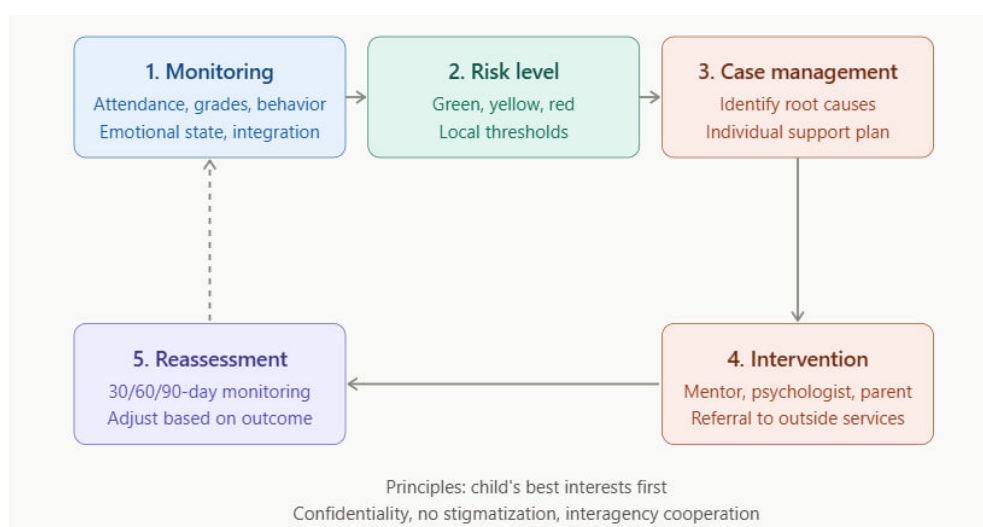


Figure 1. SMART-Alert early warning and intervention cycle

Data Analysis

The percentages in the original table were multiplied by the denominator of $n=120$ for each group and rounded to the nearest whole number. The difference in proportions between groups was tested using Pearson's χ^2 test. To indicate the direction and magnitude of the effect, relative risk (RR), the percentage-point difference, and Cramér's V coefficient were calculated. Cramér's V values were cautiously interpreted as approximately 0.10 — small, 0.30 — moderate, and 0.50 — large association. Because the calculations were based on aggregate data, it was not possible to control for covariates, cluster by school, or assess individual-level trajectories.[9]

3. Results

Differences Between Experimental and Control Schools

The table 2. re-analysis of the aggregate data showed a statistically significant difference between the experimental and control schools across all six indicators ($p<0.001$ in all cases). However, Figure 2. statistical significance can arise from small differences in a large sample; for this reason, the effect size was interpreted together with Cramér's V and relative risk.

Table 2. Statistical comparison of indicators between experimental and control schools[10]

Indicator	Experimental n (%)	Control n (%)	Difference, p.p.	RR	χ^2	Cramér's V
Absenteeism	102 (8.5)	218 (18.2)	-9.7	0.47	48.52	0.142
Behavioral disruptions	64 (5.3)	152 (12.7)	-7.4	0.42	39.40	0.128
Access to psychological support	281 (23.4)	97 (8.1)	+15.3	2.90	106.31	0.210
Parental involvement	41 (34.6)	19 (15.8)	+18.8	2.18	11.88	0.21
Improvement in academic performance	148 (12.3)	49 (4.1)	+8.2	3.02	54.20	0.150
Instances of deviant behavior	38 (3.2)	114 (9.5)	-6.3	0.33	40.57	0.130

Note: $\chi^2=48.52$; $V=0.142$. [Abbreviation note: p.p. — percentage point; RR — the ratio of the proportion in the experimental group to the proportion in the control group. Numbers calculated from percentages have been rounded. For all χ^2 tests, $df=1$ and $p<0.001$.]

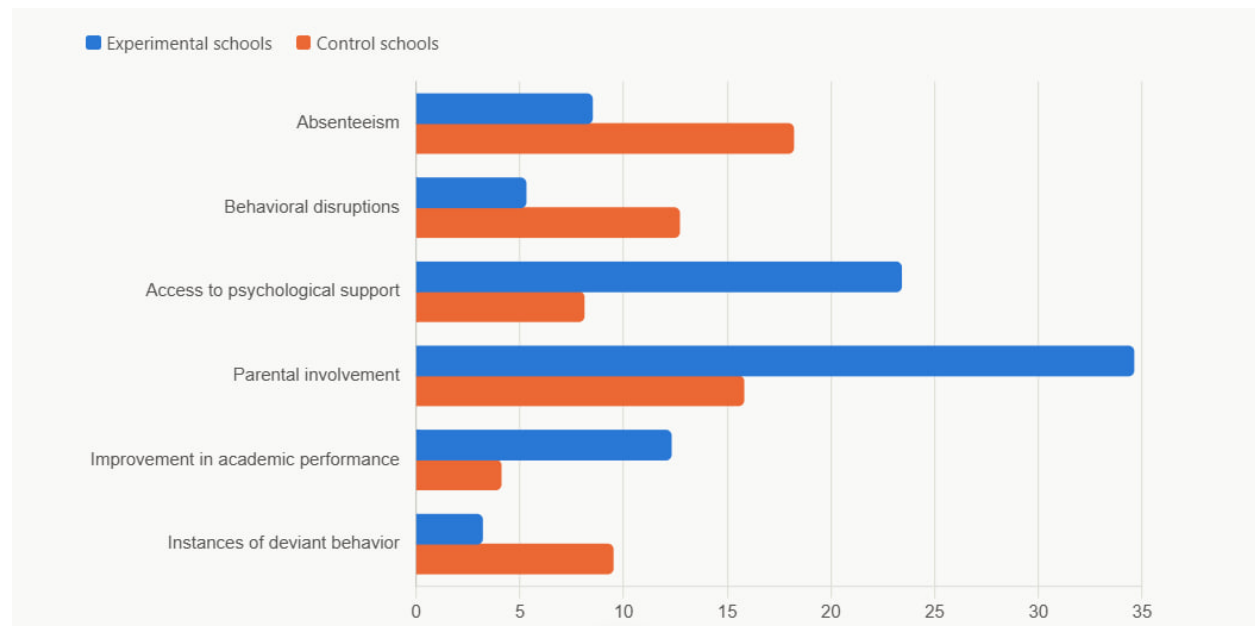


Figure 2. Key indicators in schools with and without EWS implementation

Attendance and Behavior Indicators

In the experimental schools, absenteeism was 8.5 percent, compared to 18.2 percent in the control schools. The difference was -9.7 percentage points, with the risk of absenteeism in the experimental group approximately 53 percent lower than in the control group $RR=0.47$; $\chi^2=48.52$; $V=0.142$. This result supports hypothesis H1.[12] However, the improvement in attendance cannot be explained by monitoring alone; mentoring, contact with parents, and the removal of specific barriers facing the student are considered possible mechanisms. Behavioral disruptions were 5.3 percent in the experimental schools and 12.7 percent in the control schools; difference -7.4 percentage points; $RR=0.42$; $\chi^2=39.40$; $V=0.128$. Instances of deviant behavior were, respectively, 3.2 and 9.5 percent (difference -6.3 percentage points; $RR=0.33$; $\chi^2=40.57$; $V=0.130$). Thus, the deviant behavior rate recorded in the experimental group is equal to roughly one-third of that in the control group. These indicators are consistent with hypothesis H2, though it is necessary to verify with the raw data whether incident-recording criteria and disciplinary policy were uniform across schools.[13]

Help-Seeking, Parental Involvement, and Academic Performance

Access to psychological support was 23.4 percent in the experimental schools and 8.1 percent in the control schools $RR=2.90$; $\chi^2=106.31$; $V=0.210$. An increase in help-seeking may indicate not an increase in problems, but an improvement in the visibility, trustworthiness, and accessibility of the service. An important effect of the EWS is not the concealment of problems, but the creation of a safe channel through which a student can seek help. Parental involvement was higher, at 34.6 percent compared to 15.8 percent $RR=2.18$; $\chi^2=111.88$; $V=0.216$. This indicator showed one of the strongest associations among the six outcomes. The improvement in academic performance was 12.3 percent in the experimental schools and 4.1 percent in the control schools, $RR=3.02$; $\chi^2=54.20$; $V=0.150$. These results support hypothesis H3 and indicate that the preventive system may operate by activating social capital — trust and cooperation among the family, school, and specialists.

4. Discussion

The results show a coherence between the decrease in negative indicators and the increase in access to support resources in schools where the EWS has been implemented. This suggests that a positive outcome can emerge when the system's supportive function, rather than its monitoring function, is dominant. From the standpoint of Hirschi's social control theory, strong ties with mentors, parents, and the school increase the student's attachment to normative activity. The ecological approach, meanwhile, explains a student's problem not by a single individual characteristic, but through the interaction of family, school, and neighborhood systems.[14] Cramér's V values ranged from 0.128–0.216, indicating an association ranging from small to small-moderate. This means it would be incorrect to interpret the EWS as a technology that "solves all problems." Beyond the accuracy of the indicators themselves, the bulk of the effect depends on the regular functioning of the school team, the availability of support services, the quality of communication with parents, and the school climate. Compared with international experience, these pilot results align with existing research on reducing indicators of absenteeism and academic failure. At the same time, some randomized studies have shown that the EWS does not affect all final outcomes in the short term. For this reason, in implementing the system in schools in Uzbekistan, priority should be given not to "purchasing a platform," but to data quality, specialist training, real support services, and continuous evaluation.[15]

5. Conclusion

The Implementing an early warning system in schools makes it possible to shift the prevention of deviant behavior from a reactive disciplinary measure to a proactive, data-driven, and child-supportive system. The re-analysis of the pilot indicators presented by the author showed that in schools where the EWS has been implemented, the proportion of absenteeism, behavioral disruptions, and deviant incidents was lower, while the use of psychological services, parental involvement, and improvement in academic performance were higher. However, these results can be presented as final empirical conclusions only after being verified against the primary data.

Recommendation

Pilot SMART-Alert initially in a limited area; validate indicator thresholds against local historical data; form a multidisciplinary team in each school; apply a standardized needs-assessment form for risk signals; create a catalog of psychological, social, and pedagogical interventions; provide transparent information to parents and students; approve a data protection regulation; and conduct an annual audit of outcomes, fairness, and stigmatization risk. Thus, the success of an early warning system depends not on the complexity of the algorithm or electronic platform, but on the school's capacity to listen to the student, mobilize support quickly, and establish interagency cooperation.

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