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Original Article

Medication Misuse Behaviors in School Settings Among Children and Adolescents: A Systematic Review.

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ABSTRACT
The inappropriate use of medication by students during their schooling period has been recognized as an emerging worldwide public health issue, especially regarding the prescription stimulant medications prescribed for attention-deficit/hyperactivity disorder. Some examples of such behaviors include non-medical use, excessive use, insufficient use, and misuse. Such behaviors emerge from an interplay of many different factors at the level of the individual, peers, and school environment. In this systematic review, we have synthesized data extracted from peer-reviewed scientific articles, book chapters, and systematic reviews published between 2000 and 2025, selected using databases like PubMed, Scopus, Web of Science, and Google Scholar. Thirty scientific papers met our inclusion criteria and underwent thematic analysis, along with evaluations of the quality and certainty of the evidence. Four key themes emerged from our analysis, namely: (1) prevalence and patterns of misuse (from 5% to 29%), (2) peer and environmental influence, (3) risk and protective factors, and (4) effectiveness of school-based interventions. Non-medical use of prescription stimulants is influenced by academic stress, peer pressure, and easy access to drugs, while protection is provided by school surveillance, adherence to policy, and education. Multicomponent interventions comprising policy enforcement, supervision, and peer approaches prove to be more effective than other types of interventions. Medication misuse among children and adolescents in schools can be addressed effectively only with comprehensive interventions taking into account individual, peer, and school-level factors. Further studies are needed in low- and middle-income countries, especially in Africa.

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INTRODUCTION
The abuse of medication among children and adolescents is a global health concern in school settings where peer group influences and access to medication coincide. In global society, studies show that 5 to 9 percent of high school and college students worldwide abuse prescription stimulant medications, which are used to treat attention-deficit/hyperactivity disorder (ADHD), with diversion rates as high as 29 percent. Such behaviors are also associated with other substances, including alcohol and illicit drugs, which demonstrate the complex nature of the behaviors and psychosocial factors that contribute to medication abuse. The social cognitive perspective provides an important model to understand these behaviors and why they are more likely to occur among children and adolescents. The social cognitive perspective suggests that observational behaviors and perceptions of what is normative among peers play an important role in why adolescents are more likely to abuse prescription stimulant medications.

Although most studies are based in North America and Europe, emerging evidence suggests that similar risks are also present in African societies, but with little data to support these claims. Children in African schools face a number of challenges in society, which include inadequate health education and monitoring of access to prescription medications and high peer group influences that can contribute to the abuse, overuse, and underuse of medications. The school environment is an important factor in understanding why children abuse prescription stimulant medications. The school environment is a social system in which policies, peer group influences, and teacher-student relationships are dynamic forces that interact to influence student behaviors. Interventions to prevent substance abuse in schools are important to consider in this manner.

In Rwanda, despite improvements in health policy development to address the issue of medication misuse, as well as efforts to implement school health programs, there is limited information regarding the issue of medication misuse among school-going children. At New Life Christian

Academy in Kayonza District, through direct observation of school clinic activities, there is a triad of medication misuse, medication overuse, and medication underuse among school-going children. This is similar to the global trends observed among school-going children. Therefore, a systematic review that brings together information from different contexts can be helpful in offering guidance to address the issue of medication misuse among school-going children in Rwanda.

Research Questions

Based on the psychological, educational, and health perspectives on adolescent medication use in school settings, this study examined the social cognitive factors, such as observational learning and modeling, which influence students' medication misuse behaviors. The study is also informed by the environmental factors, which include supervision in clinics, prescription stimulants, and policy enforcement in schools. The literature suggests that non-medical use, overuse, and underuse are common in adolescents. The study, therefore, sought to answer the research questions: *How do interventions and policies in school settings influence students' medication misuse behaviors? How does peer modeling influence non-medical use, overuse, and underuse in school settings? What factors contribute to safe medication use in school settings?*

METHODOLOGY

Eligibility Criteria

This study is based on peer-reviewed journal articles, book chapters, and systematic reviews on medication misuse behaviors in school settings. The eligibility criteria include journal articles, chapters, and systematic reviews on non-medical use, overuse, and underuse of prescription medication in secondary school settings, which include supervision in clinics, peer influence, and environmental factors. The exclusion criteria include studies on adults, non-school settings, and substance abuse not related to prescription medication. The eligibility criteria were important in ensuring that the literature addressed factors related to individual, peer, and environmental factors, which influence medication misuse behaviors.

Information Sources and Search Strategy

Literature was also identified based on searches in PubMed, Scopus, Web of Science, and Google Scholar databases using keywords such as “medication misuse,” “nonmedical prescription stimulant use,” “school settings,” “peer influence,” and “adolescent prescription drug use.” The literature search was conducted to obtain literature published between 2000 and 2025. This was to ensure that both foundational and recent literature were included in the search. This led to 30 peer-reviewed literature studies that met the inclusion criteria.

Study Selection and Data Collection

Literature that was retrieved was checked for any duplication. Two authors independently reviewed the abstracts. Literature was then reviewed in detail to obtain information on the design of the studies, the characteristics of the studies, the school setting in which the studies were conducted, the main outcomes measured in the studies, and the findings. Any discrepancies were discussed to ensure that the literature was included that was relevant to medication misuse in school settings.

Risk of Bias Assessment

The quality of the studies was assessed to ensure that they were observational studies and intervention studies. This was done by using adapted quality criteria to ensure that the literature was transparent and had limitations. Literature was included in the review despite having significant methodological flaws to ensure that the findings remained within the bounds of the literature.

Certainty of Evidence

Certainty of evidence was assessed based on evidence synthesis guidelines, focusing on study limitations, consistency, and generalizability. Due to the use of observational designs in the majority of the studies, certainty was initially low, although it was reinforced by consistent findings in studies exploring the issue of misuse of prescription drugs among adolescents (McCabe et al., 2004; McCabe et al., 2017; Schepis & McCabe, 2020). Studies examining the role of peers and environmental factors converged regarding the influence of these factors on substance abuse and misuse among adolescents (Ford & McCabe, 2012; Brechwald & Prinstein, 2011). Additionally, theoretical underpinning based on theories from Bandura and Jessor (2016) reinforces this conclusion, resulting in moderate certainty.

Data Analysis

Literature was analyzed to obtain patterns in medication misuse in schools. This was done to elucidate how individual behaviors, peer networks, and schools interact to influence medication misuse, overuse, and underuse among adolescents. Literature was also analyzed based on theoretical frameworks such as SCT, PBT, and SEM to elucidate how these factors interact to influence medication misuse in schools.

Ethical Considerations

Ethical considerations were maintained by ensuring that all literature was correctly referenced. The limitations and biases in the literature were also acknowledged. Since this was a literature review based on secondary data only, no human subjects were involved in the research. This made it easier to ensure that the research was done in an unbiased manner.

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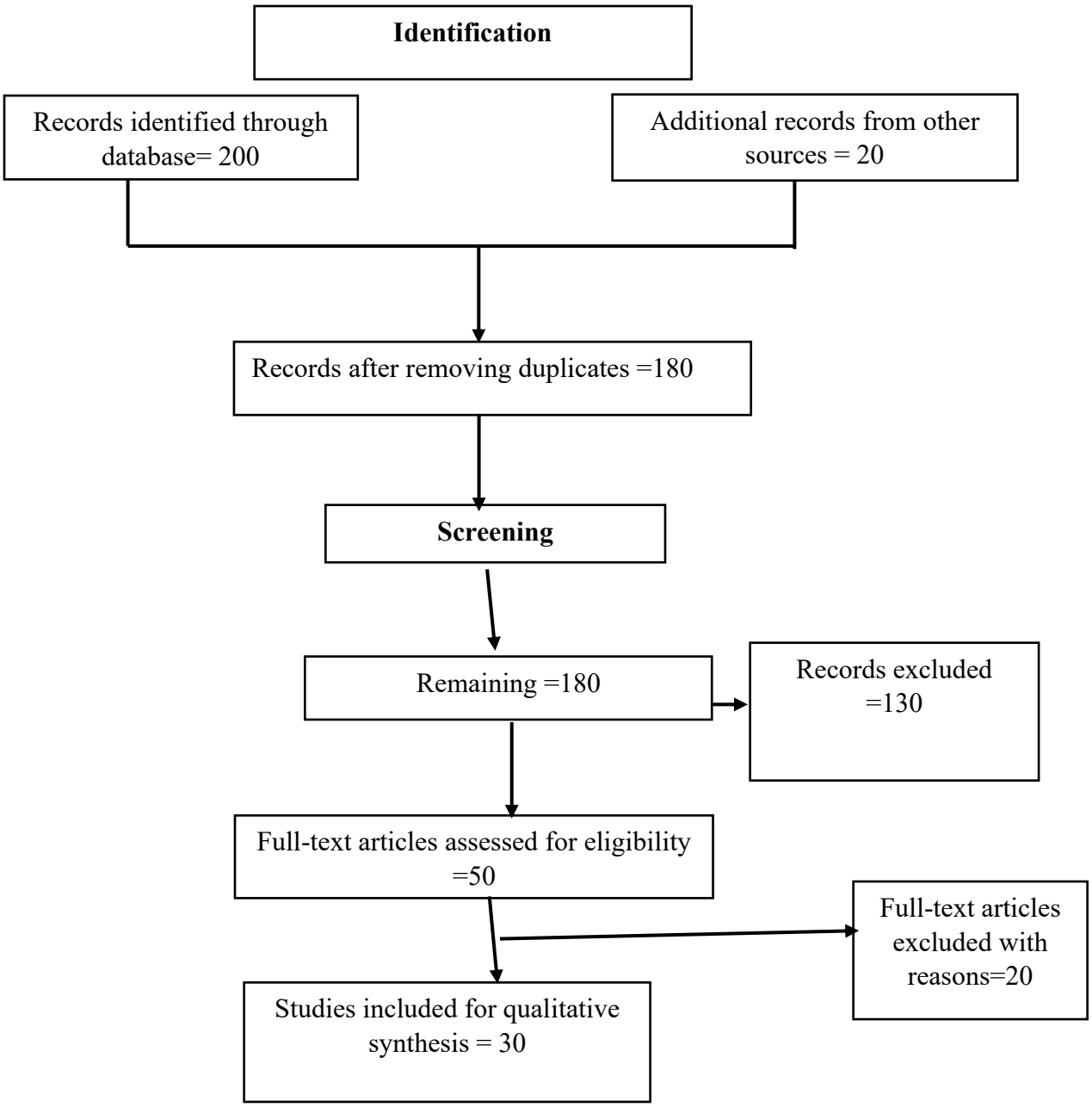
RESULTS

The results of the thematic analysis revealed four major themes related to medication misuse behavior in school settings for children and adolescents. These are prevalence and patterns of misuse, peer and environmental influences, risk and protective factors, and school-based interventions/policy effectiveness. The selection of studies for the systematic review is represented by a PRISMA flowchart.

The database search resulted in a total of 200 studies from PubMed, Scopus, Web of Science, and Google Scholar. Another 20 studies were retrieved from reference searches. After removing duplicates, the studies were filtered to 180 based on titles and abstracts. Of these, 130 studies were excluded because they were not related to school-based medication misuse behavior. Of the 50 studies that passed the inclusion criteria, 20 studies were excluded because of insufficient data, settings, or population. The results of the study are based on the analysis of 30 studies related to children and adolescents in school settings.

PRISMA Flowchart and Study Selection

Figure 1. PRISMA Flow Diagram of Study Selection



Risk of Bias Results

Overall, there was a moderate level of risk of bias among the studies selected for inclusion in the review. The cross-sectional studies were at risk of self-reporting and recall bias, while some longitudinal studies were vulnerable to attrition bias. However, the consistency in results across various studies increased the validity of the established trends in the misuse of prescription drugs (McCabe et al., 2004; Schepis & McCabe, 2020).

Characteristics of Included Studies

The body of studies comes from diverse contexts such as North America, Europe, and developing countries in Africa. The studies are cross-sectional surveys, longitudinal studies, conceptual studies, and systematic reviews. The studies have mainly focused on the non-medical use of stimulant medications, diversion, overuse, underuse, peer influence, school policies, and prevention.

Findings from Individual Studies

In most studies, non-medical use and abuse of stimulants has been found to occur in schools. For example, non-medical use and abuse of stimulant medication has been identified by Wilens et al. (2008) and McCabe et al. (2004); the relationship between non-medical use, ADHD, and polydrug use has been demonstrated by Arria et al. (2018); the impact of peer relations has been stressed by Ford and McCabe (2012), while Veliz et al. (2024) have drawn attention to school-related factors. Systematic literature reviews support such an association.

Table 1 shows the characteristics of the studies.

Author (Year)	Country	Main Focus of the Studies	Research Design	Main Contribution of the Studies
Wilens et al. (2008)	USA	ADHD Stimulant Misuse/Diversion	Empirical	Showcases the prevalence and risk of stimulant diversion in schools
McCabe, Teter, & Boyd (2004)	USA	Prescription Stimulant Misuse	Survey	Documents the pattern of misuse of stimulant medications
Arria et al. (2018)	USA	ADHD Stimulant Misuse	Longitudinal	Links ADHD diagnosis/polydrug use to non-medical use
Ford & McCabe (2012)	USA	Peer Influence on Misuse of Stimulant Medications	Cross-sectional	Highlights peer network effects on stimulant misuse
Schepis & McCabe (2020)	USA	Trends of Stimulant Misuse Among Adolescents	Review	Reveals longitudinal trends of stimulant misuse
Veliz, Boyd, & McCabe (2024)	USA	Adolescent Stimulant Medication Use/Diversion	Empirical	Explores the school-level factors associated with stimulant diversion
Rabiner et al. (2009)	USA	Motives/Consequences of Non-Medical Stimulant Use	Survey	Examines the perceived benefits and risks of stimulant misuse
Benson et al. (2022)	Global	Comprehensive Overview of Stimulant Misuse	Systematic Review	Synthesizes studies on prevalence, risk factors, and interventions
Bonell et al. (2013)	UK	School environment & health	Systematic Review	Emphasis on the school environment in adolescent behaviors
Brechwald & Prinstein (2011)	USA	Peer influence	Review	Discussion on peer influence in adolescent behaviors
Catalano et al. (2012)	USA	Positive youth development	Review	Evidence on the effectiveness of youth development in reducing risk
Hadland et al. (2022)	USA	Prescription stimulant receipt/misuse	Empirical	Examination of prescription stimulant use and misuse
Jessor (2016)	USA	Problem behavior theory	Conceptual	Explanation of adolescent behavior and protective factors
Patrick et al. (2022)	USA	Adolescents' drug/alcohol motives	Survey	Examination of motives in adolescent drug/alcohol use
Levy & Schizer (2019)	USA	Adolescent substance abuse	Review	Examination of comorbidities and risk behaviors
Wilens et al. (2008)	USA	ADHD stimulant misuse/diversion	Empirical	Evidence on stimulant misuse and diversion in schools

Theme 1: Prevalence and Patterns of Misuse

Stimulant misuse among adolescents varies between 5-29%. Overuse, underuse, and diversion of stimulants in schools have been reported (Wilens et al., 2008; McCabe, Teter, & Boyd, 2004; Arria et al., 2018). Misuse has been linked to academic pressure, ADHD, and polydrug use (Arria et al., 2018; Rabiner et al., 2009). The main behavioral patterns of stimulant misuse among adolescents are summarized in Table 2.

Table 2. Patterns of Prescription Medication Misuse Among Adolescents in School Settings

Pattern	Description	Key References
Nonmedical use	Stimulants used without a prescription	McCabe, Teter, & Boyd, 2004; Arria et al., 2018
Overuse	Exceeding the prescribed amount of medication	Wilens et al., 2008; Rabiner et al., 2009
Underuse	Skipping or irregular use of medication	Veliz, Boyd, & McCabe, 2024
Diversion	Sharing or selling the drug with peers	Ford & McCabe, 2012; Schepis & McCabe, 2020

According to the literature, misuse of medication is related to access to medication in school clinics, as well as laxity of school clinic monitoring (McCabe, West, & Boyd, 2017). In most cases, students share the medication with their peers with the aim of improving their academic performance (Ford & McCabe, 2012; Veliz, Boyd, & McCabe, 2024).

Theme 2: Peer and Environmental Influences

Peer influences have been established as a major factor that influences medication misuse among adolescents. In most cases, adolescents have a tendency to emulate behaviors from their peers or their environment (Brechwald & Prinstein, 2011). The school environment has also been established as a major factor that influences medication misuse among adolescents (Bonell et al., 2013; Veliz, Boyd, & McCabe, 2024).

Table 3. Peer and Environmental Influences on Medication Misuse

Influence Type	Mechanism	Key References
Peer Networks	Modeling/Social Approval	Brechwald & Prinstein, 2011; Ford & McCabe, 2012
School Environment	Policy, Clinic Access, Teacher Involvement	Bonell et al., 2013; Veliz, Boyd, & McCabe, 2024

Students who are not monitored or have access to medication have a higher likelihood of abusing the medication (Wilens et al., 2008; McCabe, Teter, & Boyd, 2004). On the other hand, school policies, teacher involvement, and awareness of medication misuse act as protective factors for adolescents (Benson et al., 2022; Hadland et al., 2022).

Theme 3: Risk and Protective Factors

Risk factors include ADHD diagnosis, perceived academic benefits, substance use, and lack of knowledge about the effects (Arria et al., 2018; Rabiner et al., 2009). Protective factors include school monitoring, policy enforcement, parental involvement, and peer education (McCabe, West, & Boyd, 2017; Veliz, Boyd, & McCabe, 2024).

Table 4. Risk and Protective Factors Associated with Medication Misuse

Factor Type	Specific Factor	Key References
Risk	ADHD diagnosis	Arria et al., 2018
Risk	Peer modeling	Brechwald & Prinstein, 2011
Risk	Polydrug use	Arria et al., 2018; Patrick et al., 2022
Protective	School policy enforcement	Wilens et al., 2008; Veliz, Boyd, & McCabe, 2024
Protective	Education & awareness	Benson et al., 2022; Hadland et al., 2022
Protective	Clinic supervision	McCabe, West, & Boyd, 2017

Theme 4: School-Based Interventions and Policy Effectiveness

Studies show that school-based interventions reduce misuse when policy enforcement and education strategies are employed (McCabe, West, & Boyd, 2017; Wilens et al., 2008). The integration of peer education and school nurse supervision has proven to be successful in enhancing compliance and reducing diversion (Ford & McCabe, 2012; Veliz, Boyd, & McCabe, 2024).

Table 5. School-Based Interventions and Policy Effectiveness

Intervention	Mechanism	Key References
Policy enforcement	Limit access/diversion	Wilens et al., 2008; Veliz, Boyd, & McCabe, 2024
Educational programs	Knowledge & risk awareness	McCabe, West, & Boyd, 2017; Benson et al., 2022
Peer-led initiatives	Social norm modification	Ford & McCabe, 2012; Arria et al., 2018

The interplay between individual and environmental factors underscores the importance of a multilevel intervention approach (Bandura, 2001; Jessor, 2016; Bonell et al., 2013). In conclusion, the most impactful interventions are those that address all three domains of influence: individual knowledge, peer influence, and school infrastructure. The literature shows that without monitoring and education, mere availability does not deter misuse (Schepis & McCabe, 2020).

Synthesis of Results

The results show that behavior, risk, and intervention effectiveness are interrelated constructs at the individual, peer, and school levels. Successful prevention requires integrated approaches that address all three domains of influence. This means that school-based interventions, peer-based interventions, and individual student self-regulation are all important factors that influence medication misuse behaviors. Figure 1, PRISMA flow chart, and Tables 1 to 4 illustrate the interrelationship between prevalence, peer influence, risk factors, and intervention effectiveness that influence medication misuse behaviors. The literature highlights the importance of the role of school nurses and the implementation of school-based policies to prevent misuse while promoting responsible use of medications by adolescents. This review of the literature highlights that interventions that address all three domains of influence are essential to reduce the misuse, overuse, and diversion of medications in the school setting to promote positive health outcomes for adolescents.

DISCUSSION OF RESULTS

The results of this systematic review show that medication misuse behaviors among children and adolescents in school settings are common, complex, and involve multiple factors. Nonmedical use, overuse, underuse, and diversion of prescription stimulant medications are common among school-going children and adolescents. The prevalence rates vary from 5% to 29% (Wilens et al., 2008; McCabe et al., 2004; Arria et al., 2018). Moreover, these behaviors are significantly linked to school-related pressures, ADHD status, and polydrug use (Arria et al., 2018; Rabiner et al., 2009). These findings are in line with problem behavior theory, which suggests that adolescent risk behaviors are an outcome of an interaction between individual and contextual factors (Jessor, 2016). The findings of existing studies show that prescription stimulant medication misuse behaviors among school-going children and adolescents are not only influenced by individual factors but also by contextual factors, including the availability of medications in school clinics and social sharing among school-going youth (Ford & McCabe, 2012; Veliz et al., 2024).

The role of peer groups and environment was recognized as an essential factor that influences adolescent medication misuse. This underlines the social aspects of such behavior. Young people are highly prone to peer pressure and social influences, which may trigger misuse and diversion of medication (Brechwald & Prinstein, 2011; Ford & McCabe, 2012). Factors related to the school environment, such as the accessibility of clinics, enforcement of policies, and teacher involvement, are significant influencers of such behavior (Bonell et al., 2013; Veliz, Boyd, & McCabe, 2024). Such structured mechanisms are recognized as beneficial to the prevention of misuse, as they minimize the scope of diversion and promote responsible use of medication (Benson et al., 2022; Hadland et al., 2022). This interrelation of peer groups and the environment may be related to Bandura's social cognitive theory of behavior, which states that behavior may be influenced by observations of the environment (Bandura, 2001).

Lastly, the review of existing studies highlights the effectiveness of school-based interventions that address the enforcement of policies, education, and supervision. Such multi-component interventions, such as the implementation of school nurse supervision, peer education, and awareness programs, have been associated with lower rates of misuse, adherence to medication, and diversion of medication (Wilens et al., 2008; Ford & McCabe, 2012; Veliz, Boyd, & McCabe, 2024). These factors are interrelated with the individual's knowledge, self-regulation, peer groups, and other factors that influence behavior. This underlines the importance of such interventions that address individual factors, peer groups, and the environment to minimize the scope of misuse, overuse, and diversion of medication, which may lead to positive health outcomes.

Competing Interests

The author declares no competing interests.

CONCLUSION

This systematic review highlights the fact that medication misuse behaviors of children and adolescents in school settings are common, multifaceted, and influenced by a variety of individual, social, and institutional factors. The behaviors, including non-medical use, overuse, underuse, and diversion of medication, are common among school

students, with motivations ranging from academic pressure, ADHD, and peer pressure (Wilens et al., 2008; McCabe, Teter, & Boyd, 2004; Arria et al., 2018). The peer group and school environment have a vital role to play in influencing medication misuse behaviors, with peer group behaviors, lack of supervision, school policies, monitoring, and awareness playing a major role (Brechwald & Prinstein, 2011; Bonell et al., 2013; Veliz, Boyd, & McCabe, 2024). The study highlights the need for a holistic, multilevel intervention focusing on individual, peer group, and school-level factors, as emphasized by Bandura's social cognitive theory and Jessor's problem behavior theory (Bandura, 2001; Jessor, 2016). The study highlights the dual role of schools as a source of medication misuse behaviors as well as a source of intervention.

Based on the above study, it is recommended that medication misuse behaviors of school students need to be prevented through evidence-based, multicomponent, and holistic interventions, focusing on policy, school nurse, and awareness-based programs, which inform school students of the risks of overuse, underuse, and diversion of medication (Wilens et al., 2008; Ford & McCabe, 2012; Benson et al., 2022). Peer group-based programs, awareness, and adherence to medication use might also improve medication adherence, which might have a positive impact on school students (Arria et al., 2018; Veliz, Boyd, & McCabe, 2024). The recommendations are based on the evidence that multicomponent, holistic, and multifaceted interventions focusing on individual, peer group, and school-level factors are effective in reducing medication misuse behaviors of school students.

Lastly, this review has highlighted gaps in the literature, which provide avenues for future research. While there is a preponderance of research from North America, there is limited research from African countries and other low- and middle-income countries, which include Rwanda, where school clinics have the potential to be instrumental in preventing misuse (Benson et al., 2022; Bonell et al., 2013). Further research could include longitudinal designs to investigate the patterns of misuse behaviors and the long-term efficacy of interventions (Arria et al., 2018; Schepis & McCabe, 2020). Critical reviews, meta-analyses, and systematic reviews to compare school interventions across different socio-cultural contexts are warranted to identify best practices and moderators of effectiveness in different contexts (Veliz, Boyd, & McCabe, 2024; Hadland et al., 2022). Such research would greatly contribute to the development of relevant, evidence-based, and context-specific strategies by policymakers, school nurses, and teachers to address medication misuse in adolescents while promoting safe and responsible medication use in school settings.

Abbreviations

- **ADHD** – Attention-Deficit/Hyperactivity Disorder
- **AI** – Artificial Intelligence (in related classroom management studies)
- **HBM** – Health Belief Model
- **PBT** – Problem Behavior Theory
- **PRISMA** – Preferred Reporting Items for Systematic Reviews and Meta-Analyses
- **SCT** – Social Cognitive Theory
- **SEM** – Social Ecological Model
- **USA** – United States of America
- **UK** – United Kingdom

Registration and Protocol Information

The review was not registered in the PROSPERO registry or other registries. The methodology and inclusion criteria were specified a priori and were adhered to for transparency.

Funding

The study did not receive any funding. It is purely independent research conducted by the author.

Conflict of Interest

The author declares that there are no conflicts of interest.

Data Availability

The author of the review has provided the data extraction forms and other supplementary materials that were used for the review upon reasonable request.

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Author Biography

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