



Published in final edited form as:

J Sch Nurs. ; : 10598405241300466. doi:10.1177/10598405241300466.

School Nurse Practices Related to Blood Pressure Screening, and Identification and Monitoring of High Blood Pressures in Youth

Melissa Goulding, PhD MS¹, Claire Branley, BS¹, Mary Jane O'Brien, PhD, RN, CPNP – PC, NCSN², Laura L Hayman, PhD, MSN, FAAN, FAHA, FPCNA, FSBM^{1,3}, Stephenie C. Lemon, PhD MS¹

¹Division of Preventative and Behavioral Medicine, Department of Population and Quantitative Health Sciences, UMass Chan Medical School, Worcester, Massachusetts

²Boston Public Schools, School Health Services, Boston, Massachusetts

³Manning College of Nursing & Health Sciences, UMass Boston, Boston, Massachusetts

Abstract

Despite rising prevalence of high blood pressure among youth, literature on school nurses' practices related to youth blood pressure is limited. We aimed to describe school nurses' current practices related to blood pressure screening and identification and monitoring of high blood pressures. We conducted a web-based national survey of currently practicing school nurses and received 195 responses across 37 states. All participants reported having a blood pressure cuff, nearly all (98%) reported confidence measuring children's blood pressure, and 82% reported interest in doing more to support children's cardiovascular health. Blood pressure measurement by school nurses was common (73% reported "sometimes" or "often" and 25% reported "seldomly"). However, only 32% stated hypertension impacts their students and only 59% endorsed having enough time to complete all their necessary tasks. In describing school nurse's current practices related to youth blood pressure, we highlight opportunities for expanding this role and considerations for doing so.

Background

School nurses play a critical role in supporting the health and in so doing, the education of school aged children (Bergren, 2017; Council on School Health, 2008; COUNCIL ON SCHOOL HEALTH et al., 2016). One key aspect of this role is providing preventive screenings and referrals to clinical and community based services for common health conditions (Council on School Health, 2008). Such practices are well established for several types of preventive screenings including vision and hearing, and are emerging for others including mental health and social determinants of health (Council on School Health, 2008;

Corresponding Author: Melissa Goulding PhD MS, 368 Plantation Street Worcester, MA 01604 USA.
Melissa.Goulding@umassmed.edu.

Declaration of Conflicting Interests: The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Koslouski et al., 2024; Ready, Set, Go, Review: Screening for Behavioral Health Risk in Schools, n.d.). However, despite the stark rise (fourfold increase) in high blood pressure in youth over the past three decades (Flynn et al., 2017; Song et al., 2019), and the impacts of hypertension across the life course (Robinson et al., 2024), school nurse practices related to screening for and identifying, and monitoring high blood pressures and diagnosed hypertension have not been well described (Flynn et al., 2017). The American Academy of Pediatrics (AAP) guidelines state that “school-based BP [blood pressure] measurement can be a useful tool to identify children who require formal evaluation as well as a helpful adjunct in the monitoring of diagnosed HTN [hypertension]” (Flynn et al., 2017). However, the extent to which these practices are undertaken in schools across the United States is largely unknown.

There may also be confusion around the role of school nurses related to blood pressure because the AAP guidelines also state “Because of insufficient evidence and a lack of established protocols, the routine use of school-based measurements to diagnose HTN [hypertension] cannot be recommended” (Flynn et al., 2017). Evidence on school nurse practices related to blood pressure screening, and identification and monitoring of elevated blood pressures or diagnosed hypertension is indeed insufficient. Literature dating back to the 1970’s explores the opportunity for and feasibility of school nurses screening student’s blood pressures but available evidence is dated and limited (Fixler et al., 1979; Kelsall & Watson, 1990; Spratlen, 1982). One study from the 1970s was conducted in an eighth-grade population in Dallas which assessed the prevalence of hypertension in this population concluded that school nurse hypertension screening was feasible (Fixler et al., 1979). More recent, though still dated (2004–2012) literature describes similar small scale efforts in which blood pressure was screened in school settings for research purposes including comparing populations whose hypertension was identified in school versus in clinic settings (Moore et al., 2009; Sorof et al., 2004; Underwood et al., 2012). Importantly, all of these studies took place prior to the release of the AAP’s 2017 guidelines which recommended more frequent (yearly or at every clinical encounter for children with increased risk) blood pressure screening than past guideline iterations and discussed the role of school nurses as described above. Contemporary literature on this topic is needed given the updated guidelines and associated changes in the pediatric hypertension landscape over the last decade (Flynn et al., 2017, Falkner et al., n.d.). Therefore, the present work aimed to begin addressing this critical gap by describing school nurse current practices related to blood pressure, as well as their beliefs related to their role in this area.

Methods

Design and Institutional Review Board Approval

We conducted a descriptive cross-sectional survey of school nurses associated with the National Association of School Nurses and the Massachusetts School Nurse Organization. This study (STUDY00001610) was reviewed and approved by the UMass Chan Medical School Institutional Review Board as exempt on February 28, 2024, and participant consent was not required.

Survey Development

The survey was iteratively developed with input from school nurses who were identified through the research team's professional connections. First the research team which includes a former school nurse and researchers with expertise in chronic disease prevention drafted the survey. Next the drafted survey was reviewed by one practicing Massachusetts school nurse for content completeness and clarity no changes were made after this review. Finally, the survey was pre-tested by three currently practicing Massachusetts school nurses. During this pre-test, feedback was collected on survey length, relevance of the content to school nurses, completeness of content, ease of answering, and suggestions for improvement. Following the pretest the survey was shortened, and questions were added to ask about the school population served and the presence of a school health center. The exact phrasing of survey items is shown in the result tables. The survey included questions about school nurses' practices and beliefs related to blood pressure screening and identification and monitoring of elevated blood pressures or diagnosed hypertension, as well as school nurse demographics, and characteristics of the schools they serve. The primary survey items sought to uncover the current state of youth blood pressure related efforts by school nurses as well as opportunities to expand such efforts.

Participants

Currently practicing school nurses were recruited to participate in the survey through the Massachusetts School Nurse Organization (MSNO) and the National Association of School Nurses (NASN). A brief invitation to participate in the survey along with a link to participate was included in the MSNO monthly email newsletter (March and April 2024) which is sent to all their approximately 800 members. This brief invitation and link were also distributed via two emails sent three weeks apart in March and April 2024 to a random sample of 2,000 NASN members determined by NASN. When accessing the survey link participants were first directed to a page which assessed eligibility. School nurses were eligible to participate in the survey if they were willing and able to participate in an English language electronic survey and indicated that they were currently practicing as a school nurse (no restriction was placed on the level or type of school at which they practiced).

Data Collection

The survey was hosted on the UMass Chan Medical School REDCap platform. REDCap is a secure web platform for building and managing online databases and surveys which is widely recognized for its utility in research and has been used extensively by our team (Harris et al., 2009, 2019).

Analysis

We used descriptive statistics in the form of means with standard deviations for continuous variables and proportions for categorical variables. Since not all items were completed by all participants the number of responding participants is given for each item in the result tables. Based on common guidance for privacy, all cell sizes with fewer than five responses are reported as "<5" (Manual for Preventing Disclosure: Rules for Researchers, 2023). All analyses were conducted with STATA 18.

Results

A total of 195 currently practicing school nurses met eligibility criteria and began the survey. Of those who began the survey, 82% completed all four sections of the survey.

Nurse and School Demographics

The demographic characteristics of the school nurses who participated in the survey and the schools they serve are shown in Table 1. Most of the participants were female (98%), of white race (92%), and held a bachelor's degree (58%). The majority of participating school nurses worked in schools that were public (91%), served both elementary and secondary levels (42%), and had 250–1,000 students. The number of schools served by participants ranged from 1 to 34 with a mean of 2.2 and standard deviation of 3.5 and 69% (n=126) reported serving a single school. Only nine participants reported having a school health center (in which primary care services are provided by advanced practicing primary care practitioners) and seven of those reported they work separately from the school health center. Overall, participants served schools within 37 states, and the geographic distribution of schools served is shown in Figure 1.

Equipment

All of the 186 participants who completed the section on equipment reported that they had access to a blood pressure cuff in the school(s) they serve: access to manual cuffs (98%), automatic cuffs (57%), both manual and automatic (55%), and multiple sizes of blood pressure cuffs (89%) were reported. Three percent of participants also reported having access to ambulatory blood pressure measuring devices.

General Practices

As shown in Table 2, when asked about the frequency at which they perform several general practices, most participants reported they often counsel children on healthy lifestyles (i.e. healthy eating and physical activity) (59%), and measure children's vital signs (46%). Participants reported undertaking the practices of measuring height, weight, and calculating body mass index (BMI) less frequently with only 18%, 17%, and 15% respectively reporting they "often" undertake the practice of each of these measurements.

Practices Related to Blood Pressure

Table 2 also demonstrates the nurses' report of the frequency at which they perform several practices specifically related to the identification and monitoring of high blood pressures and diagnosed pediatric hypertension. Of the participating school nurses, 53% reported that they "sometimes" measure children's blood pressure and 20% reported they do so "often". When asked about specific situations in which they measure blood pressure, most participating school nurses reported that blood pressure measurement was "never" or "seldom" for the purpose of regular screening (41% and 43%), nor for follow-up after a high blood pressure which occurred at school or the child's primary care clinic (43% and 37%). Vital sign assessment was reported as the reason for blood pressure measurement "sometimes" by 41% and "often" by 32% of participating school nurses. Receipt of referrals from children's primary care providers to measure children's blood pressure was reported

as occurring “seldom” by 41% and “sometimes” by 34% of participating school nurses. Most participating school nurses also reported that they “never” treat children for high blood pressure in reference to lifestyle counseling (50%) and to pharmacologic treatment (77%).

Communication

Reported frequency of practices related to communication are also displayed in Table 2. Of participating school nurses communicating about children’s health with the children’s primary care provider, it was reported as occurring at least “sometimes” by 63% of participants as well as at least “sometimes” with the children’s parents/caregivers 84%. Communication specifically regarding children’s blood pressure was reported by participating school nurses as occurring with the children’s primary care provider “sometimes” (11%) as well as with the children’s parents/caregivers “sometimes” (28%) and “often” (8%).

General Beliefs

Participating school nurses’ level of agreement with statements about their role are shown in Table 3. The majority agreed or strongly agreed that school nurses should have a role in providing lifestyle counseling (94%), making referrals for healthy eating and physical activity (72%) as well as social needs (78%). Additionally, 78% of participants agreed or strongly agreed that their student population would benefit from care coordination. However, less than one fifth (19%) of participating school nurses disagreed with the statement “I do not have enough time to complete all the tasks I need to as a school nurse”.

Blood Pressure Related Beliefs

As shown in Table 3, most participants strongly agreed or agreed to having interest in doing more to support cardiovascular health (24% and 58%), and high blood pressures/diagnosed hypertension (15% and 54%). Most participants also expressed agreement that school nurses have a role to play in diagnosing (73%) and managing hypertension (77%), as well as their own confidence measuring blood pressure (99%), their awareness of blood pressure guidelines (62%), their comfort interpreting blood pressures (80%), their familiarity with blood pressure percentiles (58%), and their confidence communicating with children’s primary care providers about blood pressure (89%). However, only about one third of participants reported they either “agree” (27%) or strongly agree (6%) that pediatric hypertension impacts their student population.

Discussion

Through this cross-sectional descriptive survey of currently practicing school nurses, we begin to fill the critical knowledge gap regarding school nurse’s role in and practices related to pediatric blood pressure screening, and identification and monitoring of elevated blood pressures or diagnosed hypertension. This work has two key findings: 1) We found blood pressure measurement by school nurse participants occurs often, and a high level of agreement with school nurses wanting to do more to support the cardiovascular health of their students, and to support students who have high blood pressures/diagnosed hypertension. 2) However, the rate of blood pressure screening for the purpose of detecting

hypertension was low as were the rates of discussing children's blood pressures with parents and providers. Importantly, we also provide context to these findings by reporting demographics of the school nurse participants and the schools in which they work which is crucial because the high variability in school nursing care delivery models and educational requirements for school nurses across states. Our key findings highlight school nurses practices, and the potential related to increasing awareness as well as expanding school nurses' role related pediatric blood pressure screening, and identification and monitoring of elevated blood pressures and diagnosed hypertension.

School Nurse Practices

Our primary findings is that in this sample school nurses reported that, blood pressure measurement is occurring in schools, and they are generally confident with measuring and interpreting blood pressures. However, this practice is generally a part of vital sign assessment in response to acute symptoms, not specifically for the purpose of blood pressure screening nor identifying and monitoring elevated blood pressures or diagnosed hypertension.

Importantly our data demonstrate that in line with the AAP's suggestion on the utility of school blood pressure screening "to identify children who require formal evaluation" and "in the monitoring of diagnosed HTN [hypertension]" about one of every six participating school nurses at least "sometimes" screen for hypertension and about one in every three participating school nurses sometimes monitors blood pressure based on primary care provider's requests (Flynn et al., 2017). Qualitative work conducted by our team in 2022 similarly found in one large not-for-profit healthcare system in central Massachusetts, school nurses collaborate with pediatric providers to screen or monitor pediatric blood pressure during the hypertension diagnosis process. However, the majority of school nurses are not undertaking these practices. The US Preventive Services Task Force (US Preventive Services Task Force, 2020) does not recommend regular blood pressure screening in children and adolescents, and the AAP cites a lack of evidence and standardized protocols to support diagnosis of hypertension based on school measurements (Flynn et al., 2017). Such lack of consensus may explain why these practices are not more widespread and represents a missed opportunity to recognize school nurse's potential in care coordination for at risk and affected children.

Potential Benefits of Increasing Awareness

Currently, pediatric hypertension is an underrecognized condition (Falkner et al., n.d.). There is important work that must be done to raise awareness of the impact of hypertension in youth (Falkner et al., n.d.; Goulding et al., 2024). Our survey found that one third of participants did not believe that hypertension has an impact on their student population. This may be because many school nurse participants are not currently providing direct care or care coordination for students with diagnosed hypertension, nor regularly screening blood pressure. However, prior work has also identified low awareness of this condition in parents (Goulding et al., 2022), and lack of recognition by pediatric providers (Bello et al., 2017; Brady et al., 2010). The low belief of hypertension's impact in the present sample is especially interesting because it is contradictory to the high number of participants who

reported bring aware of evidence-based guidelines related to pediatric blood pressure and wanting to do more to support cardiovascular health and high blood pressures/diagnosed hypertension in their student population. School nurses may see the importances of cardiovascular health promotion in children but may be unaware of the rising prevalence of and long-term impacts of hypertension in this population. Alternatively, this response may reflect a focus on obesity prevention as the primary practice related to cardiovascular health promotion (Story et al., 2009). Importantly, cardiovascular health promotion focused on blood pressure may overcome some of the barriers encountered by prior obesity centered efforts (Ruggieri & Bass, 2015).

Potential Benefits of Expanding School Nurse Practices

Even in cases where pediatric hypertension is diagnosed, the process of reaching a diagnosis can be long and delay the onset of proper management (Goulding et al., 2023). Raising the school nurse's awareness of the impact of hypertension in youth may increase recognition of their potential role in identifying, and monitoring elevated blood pressures and diagnosed hypertension in students. Regular blood pressure screening by school nurses and their involvement in the diagnostic process through care coordination is in line with current school nurse practices (Willgerodt et al., 2024). The opportunity for care coordination is especially clear since school nurses in our survey reported frequently communicate with parents around their child's episodic visits to the health office and also commonly communicate with primary care providers. Further research is needed to examine the effectiveness of such care coordination models that involve school nurses. Supporting and standardizing this role of school nurses in adjunct with primary care pediatricians could help to decrease the time to diagnose hypertension and in turn improve early identification and subsequent management of pediatric hypertension, especially in populations that face systemic barriers to returning to healthcare clinics. Therefore, further research should be conducted to establish evidence-based protocols for school nurse's role related to blood pressure and associated care coordination.

Such efforts to expand the role of school nurses in relation to blood pressure will need to consider school nurse's access to appropriate equipment and procedures for the conduction of blood pressure measurement in school settings. High quality blood pressure measurement relies on knowledge, skill, and appropriate equipment (Falkner et al., n.d.; Flynn et al., 2017). The vast majority of participants in the present survey indicated access to a blood pressure cuffs (either manual, automatic, or both; and of various sizes). Our survey however did not elicit responses about the calibration of the equipment, or the validation of the equipment for use in pediatric or adolescent populations. Further exploration of school nurses' training in diagnostic protocols and application of AAP guidelines will be needed to support expansion efforts.

School Nurse Workload

School nurses' report of wanting to do more to support cardiovascular health and belief that they have a role to play in hypertension identification and management is contradictory to our finding that most school nurses feel they do not have enough time to complete the tasks they need to as a school nurse. This lack of sufficient time for school nurses is also seen

in our low response rate even though we partnered with state and national organizations to send the survey. Prior research has also shown the overburdened nature of the school nurse role (Endsley, 2017; Willgerodt et al., 2024). The school nurse is usually the only healthcare provider in the school and an estimated 40% of school aged youth have at least one chronic health condition (Centers for Disease Control and Prevention [CDC], 2023). Unsurprisingly, workload and caseload issues as well as lack of access to resources are reported as barriers to school nurses implementing population health practices (Davis et al., 2021; Hughes et al., 2024; Willgerodt et al., 2018). This underscores the importance of investment in school nurses and policies to support school nurses and the work they do.

Implications for School Nurses and School Nursing Practice

The recent National School Nurse Workforce Study 2.0 highlighted that many schools do not have school nurses and noted the importance of demonstrating and documenting the value of school nurse's work (Willgerodt et al., 2024). In the present work we describe the role that school nurses are already playing in relation to hypertension in youth which has not yet been widely described. We also describe the potential for this role to expand and the value that this expansion may have for early identification and timely management of this impactful condition. Such descriptions are important for supporting and advocating for the critical role of school nurses in health promotion. School nurses have the skillset and tools available to measure blood pressure and are interested in doing more to support their student's cardiovascular health. The potential for school nurses to identify elevated blood pressure, and manage hypertension through care coordination, and for schools to serve as a population-based venue for preceptive cardiovascular care is clear.

Strengths and Limitations

While it has important implications for school nurses, this study also has limitations that should be considered in interpretation of its findings. First, social desirability bias may be present in school nurses' responses especially given the altruistic nature of nursing. Second and likely reflective of the lack of time that many school nurses reported, this survey suffered from a low response rate. As such, we present findings from a sample of school nurses that may not be generalizable to all school nurses in all settings. Although more participant demographic diversity could have helped our findings reflect a broader population of school nurses, the similarities between our sample's demographic profile and that reported by a nationally representative samples of public school nurses supports the representation of US school nurses in our sample and generalizability of our findings (Willgerodt et al., 2018, 2024). The reach of our work is also supported by the fact that we had participants from 35 states. School nurse education is a particularly important demographic as it is related to school nurse care delivery models. The proportion of our sample which hold a bachelor's degrees is similar to that found in a prior nationally representative sample (Willgerodt et al., 2018, 2024). However, in our sample of school nurses a higher proportion hold a master's degree (Willgerodt et al., 2018, 2024). This may reflect our oversampling of school nurses from Massachusetts, where a master's degree in a related field is required within 5 years of hire (603 CMR 7.00: Educator Licensure and Preparation Program Approval Regulations - Education Laws and Regulations, n.d.). Despite the limited diversity of our sample, this work remains critically important as there is a lack

of contemporary data on school nurse practices related to blood pressure screening, and identification and monitoring of high blood pressures in youth.

Conclusion

This survey of currently practicing school nurses provides an important description of practices related to hypertension identification and management. Despite varied practices, it is apparent that school nurses commonly measure blood pressure and have interest in doing more to support the cardiovascular health of their students.

Acknowledgements:

The authors would like to thank and acknowledge the impact of the school nurses who provided feedback on survey development and who piloted our survey. We would also like to thank the school nurses who responded to our survey for sharing their practices and beliefs.

References

- 603 CMR 7.00: Educator Licensure and Preparation Program Approval Regulations—Education Laws and Regulations. (n.d.). Retrieved August 8, 2024, from <https://www.doe.mass.edu/lawsregs/603cmr7.html?section=11>
- Bello JK, Mohanty N, Bauer V, Rittner SS, & Rao G (2017). Pediatric Hypertension: Provider Perspectives. *Global Pediatric Health*, 4, 2333794X17712637. 10.1177/2333794X17712637
- Bergren M (2017). School Nursing and Population Health: Past, Present, and Future. *OJIN: The Online Journal of Issues in Nursing*, 22(3). 10.3912/OJIN.Vol22No03Man03
- Brady TM, Solomon BS, Neu AM, Siberry GK, & Parekh RS (2010). Patient-, Provider-, and Clinic-Level Predictors of Unrecognized Elevated Blood Pressure in Children. *Pediatrics*, 125(6), e1286–e1293. 10.1542/peds.2009-0555 [PubMed: 20439598]
- CDC. (2023, April 27). Recognizing School Nurses. Centers for Disease Control and Prevention. https://www.cdc.gov/healthyschools/features/school_nurse.htm
- Council on School Health. (2008). Role of the School Nurse in Providing School Health Services. *Pediatrics*, 121(5), 1052–1056. 10.1542/peds.2008-0382 [PubMed: 18450912]
- COUNCIL ON SCHOOL HEALTH, Holmes BW, Sheetz A, Allison M, Ancona R, Attisha E, Beers N, De Pinto C, Gorski P, Kjolhede C, Lerner M, Weiss-Harrison A, & Young T (2016). Role of the School Nurse in Providing School Health Services. *Pediatrics*, 137(6), e20160852. 10.1542/peds.2016-0852 [PubMed: 27217476]
- Davis D, Maughan ED, White KA, & Slota M (2021). School Nursing for the 21st Century: Assessing Scope of Practice in the Current Workforce. *The Journal of School Nursing*, 37(5), 374–386. 10.1177/1059840519880605 [PubMed: 31607213]
- Endsley P (2017). School Nurse Workload: A Scoping Review of Acute Care, Community Health, and Mental Health Nursing Workload Literature. *The Journal of School Nursing*, 33(1), 43–52. 10.1177/1059840516681423 [PubMed: 27932601]
- Falkner B, Gidding SS, Baker-Smith CM, Brady TM, Flynn JT, Malle LM, South AM, Tran AH, Urbina EM, & null, null. (n.d.). Pediatric Primary Hypertension: An Underrecognized Condition: A Scientific Statement From the American Heart Association. *Hypertension*, 0(0). 10.1161/HYP.0000000000000228
- Fixler DE, Laird WP, Fitzgerald V, Stead S, & Adams R (1979). Hypertension screening in schools: Results of the Dallas study. *Pediatrics*, 63(1), 32–36. [PubMed: 440800]
- Flynn JT, Kaelber DC, Baker-Smith CM, Blowey D, Carroll AE, Daniels SR, Ferranti S. D. de, Dionne JM, Falkner B, Flinn SK, Gidding SS, Goodwin C, Leu MG, Powers ME, Rea C, Samuels J, Simasek M, Thaker VV, Urbina EM, & Children, S. on S. and M. of H. B. P. I. (2017). Clinical Practice Guideline for Screening and Management of High Blood Pressure in Children and Adolescents. *Pediatrics*, 140(3). 10.1542/peds.2017-1904

- Goulding M, Rea CJ, & Flynn JT (2024). Pediatric and Adolescent Hypertension: A Multidisciplinary Call to Action. *Pediatrics*, e2024067082. 10.1542/peds.2024-067082 [PubMed: 39165243]
- Goulding M, Rosal MC, Gupta N, Borg A, & Lemon SC (2022). High Prevalence and Lack of Parental Awareness of Pediatric Hypertension Among a Low-income Sample in Worcester, MA. *Maternal and Child Health Journal*. 10.1007/s10995-022-03470-x
- Goulding M, Ryan G, Frisard C, Stevens E, Person S, Goldberg R, Garg A, & Lemon SC (2023). Pediatric High Blood Pressure Follow-Up Guideline Adherence in a Massachusetts Health Care System. *Academic Pediatrics*. 10.1016/j.acap.2023.07.006
- Harris PA, Taylor R, Minor BL, Elliott V, Fernandez M, O'Neal L, McLeod L, Delacqua G, Delacqua F, Kirby J, & Duda SN (2019). The REDCap consortium: Building an international community of software platform partners. *Journal of Biomedical Informatics*, 95, 103208. 10.1016/j.jbi.2019.103208 [PubMed: 31078660]
- Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, & Conde JG (2009). Research electronic data capture (REDCap)—A metadata-driven methodology and workflow process for providing translational research informatics support. *Journal of Biomedical Informatics*, 42(2), 377–381. 10.1016/j.jbi.2008.08.010 [PubMed: 18929686]
- Hughes ML, White L, O'Brien MJ, Aubin J, & Bradford C (2024). Listening to School Nurses' Voices: A Mixed Methods Study on the Continued Impact of COVID-19 on School Nursing Practice. *The Journal of School Nursing: The Official Publication of the National Association of School Nurses*, 10598405241237726. 10.1177/10598405241237726
- Kelsall JE, & Watson AR (1990). Should school nurses measure blood pressure? *Public Health*, 104(3), 191–194. 10.1016/S0033-3506(05)80376-2 [PubMed: 2359839]
- Koslowski JB, Chafouleas SM, Briesch AM, Caemmerer JM, Perry HY, Oas J, Xiong SS, & Charamut NR (2024). School-Based Screening of Social Determinants of Health: A Scoping Review. *School Mental Health*, 16(1), 1–14. 10.1007/s12310-023-09622-w
- Manual for Preventing Disclosure: Rules for Researchers. (2023, March). National Center for Health Statistics Research Data Center. https://www.cdc.gov/rdc/data/b5_left/disclosure-manual_v2.7.pdf
- Moore WE, Eichner JE, Cohn EM, Thompson DM, Kobza CE, & Abbott KE (2009). Blood Pressure Screening of School Children in a Multiracial School District: The Healthy Kids Project. *American Journal of Hypertension*, 22(4), 351–356. 10.1038/ajh.2009.13 [PubMed: 19214168]
- Ready, Set, Go, Review: Screening for Behavioral Health Risk in Schools. (n.d.).
- Robinson CH, Hussain J, Jeyakumar N, Smith G, Birken CS, Dart A, Dionne J, Garg A, Kandasamy S, Karam S, Marjerrison S, South AM, Thabane L, Wahi G, Zappitelli M, & Chanchlani R (2024). Long-Term Cardiovascular Outcomes in Children and Adolescents With Hypertension. *JAMA Pediatrics*. 10.1001/jamapediatrics.2024.1543
- Ruggieri DG, & Bass SB (2015). A Comprehensive Review of School-Based Body Mass Index Screening Programs and Their Implications for School Health: Do the Controversies Accurately Reflect the Research? *Journal of School Health*, 85(1), 61–72. 10.1111/josh.12222 [PubMed: 25440454]
- Song P, Zhang Y, Yu J, Zha M, Zhu Y, Rahimi K, & Rudan I (2019). Global Prevalence of Hypertension in Children: A Systematic Review and Meta-analysis. *JAMA Pediatrics*, 173(12), 1154–1163. 10.1001/jamapediatrics.2019.3310 [PubMed: 31589252]
- Sorof JM, Turner J, Franco K, & Portman RJ (2004). Characteristics of hypertensive children identified by primary care referral compared with school-based screening. *The Journal of Pediatrics*, 144(4), 485–489. 10.1016/j.jpeds.2003.12.047 [PubMed: 15069397]
- Spratlen LP (1982). Nurse-Role Dimensions of a School-Based Hypertension Screening, Education, and Follow-Up Program. *Journal of School Health*, 52(3), 174–178. 10.1111/j.1746-1561.1982.tb03985.x [PubMed: 6916960]
- Story M, Nannery MS, & Schwartz MB (2009). Schools and Obesity Prevention: Creating School Environments and Policies to Promote Healthy Eating and Physical Activity. *The Milbank Quarterly*, 87(1), 71–100. 10.1111/j.1468-0009.2009.00548.x [PubMed: 19298416]
- Underwood SM, Averhart L, Dean A, Ivalis R, Muluken M, Robinson R, Russ J, & Williams M (2012). Clinical evaluation and follow-up of body mass and blood pressure in pre-elementary

school children: Program review. *Journal of National Black Nurses' Association: JNBNA*, 23(1), 8–15. [PubMed: 23061164]

US Preventive Services Task Force. (2020). Screening for High Blood Pressure in Children and Adolescents: US Preventive Services Task Force Recommendation Statement. *JAMA*, 324(18), 1878–1883. 10.1001/jama.2020.20122 [PubMed: 33170248]

Willgerodt MA, Brock P, Douglas M, & Maughan ED (2018). Public School Nursing Practice in the United States. *Journal of School Nursing*, 34(3), 232–244. 10.1177/1059840517752456

Willgerodt MA, Tanner A, McCabe E, Jameson B, & Brock D (2024). Public School Nurses in the United States: National School Nurse Workforce Study 2.0. *The Journal of School Nursing*, 10598405241253565. 10.1177/10598405241253565

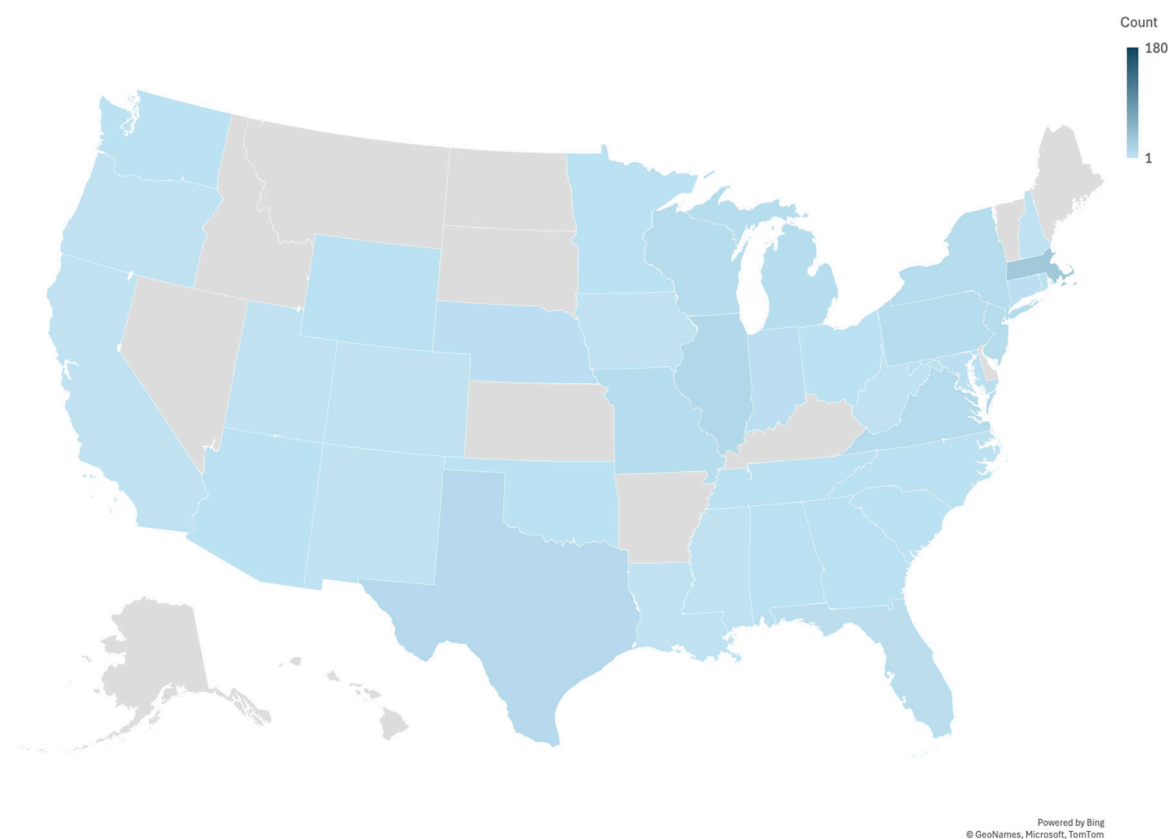


Figure 1:
School Nurse Participants by State

Table 1:
Demographics of Participating School Nurses and their Schools

	% (n) or mean (SD)
Nurse Demographics	
Gender (n=158)	
Female	98.1% (155)
Education (n=155)	
Doctorate	(<5)
Masters	31.6% (49)
Bachelors	58.1% (90)
Associates	9.7% (15)
Certificates (n=155)	
Department of Elementary and Secondary Education (DESE)	16.1% (25)
Nationally Certified School Nurse	17.4% (27)
Race (n=155)	
White	92.3% (143)
Black	2.6% (4)
Multiracial	3.2% (5)
Asian	(<5)
American Indian/Alaska Native	(<5)
Unknown	(<5)
Ethnicity (n=156)	
Hispanic	3.2% (5)
Years practicing as school nurse (n=158)	11.2 years (8.6)
School Demographics	
Size (n=186)	
0–250 Students	10.8% (20)
251–1,000 Students	69.4% (129)
Over 1,000 Students	19.9% (37)
School Type (n=182)	
Private	8.8% (16)
Public	91.21% (166)
School Level (n=186)	
Elementary	30.7% (57)
Secondary	27.4% (51)
Mixed	41.9% (78)
School Health Center (n=184)	4.89% (9)

Table 2:
School Nurse Reported Frequency of Practices

	% (n)	Never	Seldom	Sometimes	Often
General Practices					
Counsel children on healthy lifestyles (i.e. healthy eating and physical activity) (n=169)		(<5)	7.1% (12)	33.1% (56)	59.2% (100)
Measure children's vital signs (n=168)		0	7.1% (12)	46.4% (78)	46.4% (78)
Measure children's weight (n=168)		22.6% (38)	23.2% (39)	36.3% (61)	17.9% (30)
Measure children's height (n=168)		26.2% (44)	26.2% (44)	30.9% (52)	16.7% (28)
Calculate children's body mass index (BMI) (n=167)		42.5% (71)	23.9% (40)	18.6% (31)	15.0% (25)
Blood Pressure Related Practices					
Measure children's blood pressure (n=169)		(<5)	25.4% (43)	53.2% (90)	20.1% (34)
When you measure children's blood pressure, how often is this measurement part of a vital signs assessment? (n=165)		(<5)	26.1% (43)	41.2% (68)	32.1% (53)
When you measure children's blood pressure, how often is the purpose of this measurement a regular screening for high blood pressure? (n=167)		41.3% (69)	42.5% (71)	12.0% (20)	4.2% (7)
When you measure children's blood pressure, how often is the purpose of this measurement to follow-up on a high blood pressure screening that occurred at school? (n=167)		42.5% (71)	37.1% (62)	16.8% (28)	3.6% (6)
When you measure children's blood pressure, how often is the purpose of this measurement to follow-up on a high blood pressure screening that occurred at the child's primary care clinic? (n=166)		33.7% (56)	42.8% (71)	18.1% (30)	5.4% (9)
Receive referrals from children's primary care providers to measure children's blood pressure (n=169)		22.5% (38)	40.8% (69)	34.3% (58)	(<5)
Treat children for high blood pressure/hypertension with lifestyle counseling (i.e. healthy eating and physical activity) (n=169)		50.3% (85)	31.9% (54)	15.4% (26)	(<5)
Administer children's antihypertensive medication (n=168)		76.8% (129)	18.4% (31)	3.6% (6)	(<5)
Communication					
Communicate with children's primary care providers about children's health? (n=168)		7.1% (12)	29.8% (50)	41.7% (70)	21.4% (36)
Communicate with parents/caregivers about their child's overall health? (n=169)		(<5)	13.6% (23)	34.3% (58)	49.7% (84)
Communicate with parents/caregivers to make recommendations about improving physical activity? (n=169)		18.3% (31)	48.5% (82)	30.2% (51)	(<5)
Communicate with parents/caregivers to make recommendations about healthy eating? (n=169)		16.6% (28)	40.8% (69)	34.3% (58)	8.3% (14)
Communicate with parents/caregivers about social needs (i.e., housing, food, transportation, etc.)? (n=168)		13.7% (23)	38.7% (65)	35.7% (60)	11.9% (20)
Communicate with provider about children's blood pressure (n=169)		44.4% (75)	44.4% (75)	11.2% (19)	0
Communicate with parents/caregivers about their child's blood pressure? (n=168)		20.2% (34)	43.4% (73)	28.0% (47)	8.3% (14)

Table 3:**School Nurse Reported Beliefs**

% (n)	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
General					
School nurses have a role to play in lifestyle counseling (i.e. physical activity and healthy eating) (n=163)	(<5)	0	4.9% (8)	50.3% (82)	44.2% (72)
School nurses should refer children/families to community resources for physical activity and healthy eating (n=161)	(<5)	(<5)	25.5% (41)	48.4% (78)	23.6% (38)
School nurses should refer children/families to community resources for social needs (i.e., housing, food, transportation, etc.) (n=161)	(<5)	3.1% (5)	18.6% (30)	52.8% (85)	24.8% (40)
My student population would benefit from coordination of care between myself and their primary care providers (n=162)	(<5)	(<5)	19.7% (32)	48.8% (79)	29.0% (47)
I do not have enough time to complete all the tasks I need to as a school nurse (n=159)	(<5)	18.9% (30)	20.1% (32)	28.9% (46)	30.2% (48)
Cardiovascular and Blood Pressure Related					
As a school nurse, I am interested in doing more to support children's cardiovascular health (n=161)	0	0	17.4% (28)	58.4% (94)	24.2% (39)
Pediatric hypertension impacts my student population (n=162)	6.8% (11)	24.7% (40)	35.8% (58)	26.5% (43)	6.2% (10)
School nurses have a role to play in the process of diagnosing high blood pressure/hypertension (n=161)	(<5)	4.3% (7)	21.1% (34)	65.8% (106)	7.4% (12)
School nurses have a role to play in managing high blood pressure/hypertension (n=159)	(<5)	3.1% (5)	19.5% (31)	69.2% (110)	7.5% (12)
I feel confident measuring children's blood pressure (n=162)	0	0	(<5)	42.6% (69)	56.2% (91)
I am aware of evidence-based guidelines related to pediatric blood pressure/hypertension (n=161)	(<5)	8.7% (14)	27.3% (44)	47.8% (77)	14.3% (23)
I am comfortable interpreting pediatric blood pressure measurements (n=161)	0	5.0% (8)	14.9% (24)	54.7% (88)	25.5% (41)
I am familiar with the blood pressure percentiles used to interpret blood pressure levels in children (n=161)	(<5)	14.9% (24)	24.8% (40)	42.9% (69)	14.9% (24)
I am interested in doing more to support children with high blood pressure/hypertension at my school (n=162)	0	(<5)	29.0% (47)	54.3% (88)	15.4% (25)
I am confident communicating with primary care providers about children's blood pressure (n=159)	0	(<5)	8.2% (13)	53.5% (85)	35.8% (57)