The Journal of School Nursing
2022, Vol. 38(3) 249–258

DOI: 10.1177/1059840520925522
journals.sagepub.com/home/jsn
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Intervention Adherence and Self-Efficacy as Predictors of Child Outcomes in School Nurse–Delivered Interventions for Anxiety

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Abstract

This study examined the association between two implementation factors, nurse-reported intervention adherence and self-efficacy, and children's outcomes in school nurse–delivered anxiety interventions. Data were collected in a pilot randomized controlled effectiveness trial with 54 children and 21 school nurses. Nurses implemented either a cognitive behavioral or relaxation-skills-only intervention. Nurse questionnaires assessed implementation factors. Independent evaluators assessed changes in children's anxiety symptoms at postintervention and at 3-month follow-up using clinical improvement and global functioning scales. Regression analyses indicated that greater intervention adherence was associated with greater anxiety symptom improvement at follow-up. Nurse self-efficacy interacted with intervention group, such that nurses with higher self-efficacy who implemented the cognitive behavioral intervention tended to have children show improvement and higher postintervention functioning. The impact of implementation factors on children's outcomes may differ depending on intervention type. Self-efficacy may be important for nurses using relatively complex interventions. Intervention adherence should be supported through training and consultation.

Keywords

implementation, anxiety, cognitive behavioral therapy, relaxation, school nurse knowledge/perceptions/self-efficacy, adherence

Excessive anxiety is prevalent and affects more than 20% of youth at some point during childhood or adolescence (Copeland et al., 2014). Symptoms of excessive anxiety include maladaptive thoughts (e.g., youth with social anxiety think everyone will laugh at them; youth with separation anxiety worry about something dangerous happening to their parents), somatic symptoms (e.g., stomachaches, headaches), and avoidant behavior (e.g., youth with social anxiety may refuse to speak in class; youth with separation anxiety may avoid going to school). Excessive anxiety is impairing and negatively impacts children's school performance, friendships, and family functioning (Swan & Kendall, 2016). Fortunately, psychosocial treatment for excessive anxiety is effective; specifically, cognitive behavioral therapy (CBT), which focuses on changing children's maladaptive thoughts and reducing somatic symptoms and avoidant behavior related to anxiety, has been established as an evidence-based treatment (James et al., 2015). Meta-analyses have shown that CBT is effective in reducing children's anxiety (James et al., 2015).

However, getting CBT to the anxious children who could benefit from it is difficult. Only about one third of children with excessive anxiety receive treatment (Chavira et al., 2004; Merikangas et al., 2010, 2011). Barriers to children's access include expense, difficulty finding a service provider, attending weekly therapy appointments that interfere with

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family schedules, and the stigma of seeking mental health treatment (Salloum et al., 2016). One solution to these barriers is the provision of school-based mental health services (Weist et al., 2017). Given that school psychologists and counselors may be burdened by other priorities (Weist et al., 2017), and school nurses may be familiar with anxious students because of their somatic complaints, "task shifting" mental health interventions for anxiety to school nurses offers a promising opportunity (Hoeft et al., 2018).

School nurses have been involved in mental health care for decades; in fact, in 2002–2003, school nurses reported spending 32% of their time providing mental health services (Foster et al., 2005). However, there has been relatively little research on school nurses' use of evidence-based mental health services for anxiety. An early exception, Stallard et al. (2007, 2008) found that a school nurse–delivered universal preventative intervention reduced children's anxiety levels. To our knowledge, the only research on school nurse–delivered evidence-based interventions for children diagnosed with anxiety disorders has focused on a modular cognitive behavioral intervention, Child Anxiety Learning Modules (CALM; Ginsburg et al., 2019; Muggeo et al., 2017). In contrast to this lack of research, however, a large majority of school nurses (94%) report the desire to receive training in evidence-based anxiety-reduction skills (Muggeo & Ginsburg, 2019).

This need for training can be addressed through implementation science, the study and practice of integrating evidence-based treatments into community care (Fixsen et al., 2005). Given the challenges of implementing evidence-based treatments in schools (e.g., Hulleman & Cordray, 2009), examination of implementation factors that influence child outcomes is needed. Implementation factors are best understood in the context of an implementation framework (Tabak et al., 2012). The Consolidated Framework for Implementation Research integrated a number of existing implementation frameworks (Damschroder et al., 2009). It proposed that implementation factors exist within five major domains, including characteristics of the intervention, the inner setting, the outer setting, the implementation process, and the providers. These implementation factors interact to influence implementation effectiveness in complex ways (Damschroder et al., 2009). The current study focuses on one of these domains: characteristics of providers. Understanding whether and how provider-level implementation factors predict client outcomes would allow implementation processes to target these factors in order to improve outcomes (Fixsen et al., 2005). Intervention adherence and provider self-efficacy are two important implementation factors.

Adherence is a component of treatment fidelity and represents the extent to which interventions are administered as designed (Perepletchikova & Kazdin, 2005). Lowered treatment fidelity has been implicated in the reduced effects of evidence-based treatments in community-based settings (Hulleman & Cordray, 2009). However, findings linking adherence with treatment outcomes have been mixed both across the wider field of evidence-based treatments for mental health (Breitenstein et al., 2010) and within youth anxiety treatment research (e.g., Bjaastad et al., 2018; Liber et al., 2010). Given the focus on adherence in training and consultation, more research is needed.

Self-efficacy, or a provider's belief in their ability to achieve implementation goals, is theorized to be a critical factor in individual behavior change and implementation outcomes (Damschroder et al., 2009). Prior work has established a link between providers' self-efficacy and their frequency of evidence-based treatment use after training (Klimes-Dougan et al., 2009; Turner et al., 2011). For example, among primary care providers (61% nurses), providers' self-efficacy predicted how often they used the Primary Care Triple P—Positive Parenting Program—in their usual practice (Turner et al., 2011). Similarly, among school-based counselors, providers' self-efficacy significantly predicted greater knowledge of evidence-based treatments for anxiety and predicted usage of evidence-based treatments for anxiety at the trend level ($p = .069$; Schiele et al., 2014). However, it is less clear whether self-efficacy relates to adherence and competence (Klimes-Dougan et al., 2009), and research on the impact of self-efficacy on client treatment outcomes is needed.

The current study investigated the impact of self-reported adherence and self-efficacy on children's outcomes after receiving one of two brief interventions for pediatric anxiety implemented by school nurses. One intervention (CALM) was a modular cognitive behavioral–based intervention and the other (CALM-Relaxation only [CALM-R]) focused on relaxation strategies only. The current study was conducted in the context of a pilot randomized controlled trial, which found that both interventions resulted in significant reductions in anxiety (Ginsburg et al., 2019). Although the core elements of the two interventions represent mature, well-established components of CBT, and similar modular CBT approaches to treat and prevent anxiety previously have been used by school nurses and counselors (Ginsburg et al., 2012; Stallard et al., 2007), this pilot trial was the first test of these specific modular interventions for anxiety delivered by school nurses.

We hypothesized that higher levels of adherence and self-efficacy would be associated with better child outcomes (i.e., lower anxiety and higher functioning), regardless of intervention condition. We also explored whether associations depended on the type of intervention being implemented, as intervention characteristics such as complexity may impact implementation (Damschroder et al., 2009). We expected that findings would highlight provider-level implementation factors that could be targeted to improve children's outcomes.

Method

Data were collected as part of a pilot randomized controlled trial using a cluster-randomized design to evaluate the feasibility and preliminary effectiveness of CALM. CALM-R was developed as an active control condition. The study protocol was approved by the institutional review board, and participants including nurses, children, and parents provided informed assent/consent for their participation.

Nurse Participants

Nurse participants included 8 CALM and 13 CALM-R nurses in 21 public schools in two eastern states in the United States. This sample reflects 70% of nurses who consented to the study; 8 nurses were trained in CALM and CALM-R but did not treat any children and 1 additional nurse dropped out of the study before implementing the intervention, and these nurses were not included in the current study. All nurses were female. The majority of nurses ($n = 18$, 86%) identified as White and non-Hispanic, two identified as Hispanic, and one as American Indian/Alaska Native. On average, nurses were 52 ($SD = 7$) years old and had been working as school nurses for 10 ($SD = 7$) years. Eight (38%) had an associate degree, 10 (48%) had a bachelor's degree, and 3 (14%) had a master's degree, and all nurses were licensed in their state. On average, nurses implemented the intervention with 2.5 children ($SD = 1.5$, range: 1–6) and covered 5.8 modules ($SD = 0.8$, range: 1–6) over the course of 6.8 weeks ($SD = 2.2$, range: 0–15) in 2016–2017. There were no demographic differences between nurses assigned to CALM and CALM-R.

Child Participants

Child participants included 20 children assigned to CALM and 34 assigned to CALM-R (61% of those referred). The majority of children ($n = 37$, 69%) were female, and on average, they were 8.3 ($SD = 2.0$) years old. Most children ($n = 37$, 69%) were White/non-Hispanic, 13 (24%) were Hispanic, 3 (6%) were multiracial, and 1 (2%) was Black. Fifty-seven percent of the sample reported family incomes of over US$80,000 per year, while 22% of the sample reported receiving income-based free school lunch. There were no demographic differences between children assigned to CALM and CALM-R. Additional sample characteristics, CONSORT diagrams, and inclusion/exclusion criteria can be found in Ginsburg et al. (2019).

Procedure

Nurses working in public and private schools with youth aged 5–12 years were recruited through their district's nursing supervisor, flyers in the school, and word of mouth. Sample size was based on grant-proposed enrollment of 20 nurses and 60 children, with estimates of 80% power and large within-group intervention effect sizes. Nurses provided informed consent and were randomly assigned to CALM or CALM-R. They completed a 1-day training in their assigned intervention and were provided with intervention materials, including the intervention manual, training videos, and psychoeducational handouts. Nurses in both conditions were assigned a doctoral-level clinical psychologist to provide optional consultation. They were not required to demonstrate a particular level of knowledge, adherence, or competence prior to beginning to implement the interventions, and no training certificates were provided.

Children were recruited through participating school nurses who referred children who frequently visited the nurse with anxiety/somatic symptoms. Children were also referred through teachers who were aware of children's anxiety symptoms, by parents who saw flyers in the school newsletter, and through word of mouth. After providing assent/consent, children and parents completed a baseline evaluation in which independent evaluators completed diagnostic clinical interviews and formulated ratings of anxiety symptom severity and global functioning. Children were assigned to the condition in which the nurse in their school had been trained and therefore were not randomly assigned to condition.

Once enrolled, children began meeting with their school nurse individually, usually in the nurse's health office or an empty classroom. Both interventions included six modules that were designed to be delivered to children in brief meetings lasting 20–30 min. Meetings were intended to occur weekly during the school day. After each intervention session, nurses completed a session summary form (adapted from Becker et al., 2012), which included items assessing adherence and self-efficacy. No contextual changes in school nursing policy or staffing were noted that would have affected nurses' intervention implementation, and no harms or unintended effects were reported.

In postintervention and 3-month follow-up evaluations with children and their parents, independent evaluators again completed a diagnostic clinical interview and measures of anxiety symptom severity and global functioning. They also rated children's symptom improvement compared to the baseline evaluation. Independent evaluators had a master's or doctoral degree in psychology and were trained to reliability through training tapes and observation and co-rating by an expert trainer. Once reliable, evaluators received supervision and feedback on each evaluation. Independent evaluators were unaware of children's intervention group assignments, and over 80% indicated that they were "completely uncertain" of group assignment at post- and follow-up evaluations.

Intervention Conditions

CALM. The six CALM modules included core components of CBT for pediatric anxiety: (1) psychoeducation (i.e., provide child with information about nature of anxiety and introduce CBT model), (2) relaxation (i.e., identify child's symptoms

of physiological tension and teach strategies to reduce tension), (3) exposure (i.e., help child begin to face fears by putting themselves in feared situations), (4) cognitive restructuring (i.e., identify child's negative self-talk and begin changing thoughts), (5) problem-solving (i.e., introduce and practice a problem-solving method), and (6) relapse prevention (i.e., review child's progress and plan to use strategies in new fear-provoking situations). These components were designed to address three central manifestations of anxiety: cognitive symptoms (e.g., ruminative worry), somatic symptoms (e.g., physiological arousal), and behavioral symptoms (e.g., avoidance). CALM is described in greater detail in Drake et al. (2015).

CALM-R. The six CALM-R modules focused on relaxation skills, with separate modules for (1) psychoeducation (i.e., provide child with information about anxiety and introduce concepts of physiological tension and relaxation), (2) deep breathing (i.e., introduce and practice method of slow, deep breathing), (3) progressive muscle relaxation (i.e., introduce and practice method of tensing and relaxing different muscle groups), (4) guided imagery (i.e., introduce and practice guided meditation), (5) individualized calming strategies (i.e., identify personal calming strategies such as going for a walk), and (6) relapse prevention (i.e., review child's progress and plan to use skills in new fear-provoking situations). Unlike CALM, CALM-R focused in depth on relaxation strategies and did not explicitly teach strategies to change anxious thoughts or behaviors.

Measures

Implementation factors

Nurse-rated adherence. On each session summary form, nurses rated the item "Did you accomplish the goals of the module?" on a 7-point scale from 1 (*did not accomplish goals*) to 7 (*accomplished all goals*). Though this item was adapted from Becker et al. (2012), psychometric properties are not available, as in that study, the item was used to compare clinician ratings of goal accomplishment between different CBT modules, with findings of no differences. Ratings were averaged across all session summary forms available for each case. Internal consistency of nurses' ratings across sessions was acceptable (Cronbach's $\alpha = .75$), indicating that while there was a good level of stability in individual nurses' ratings, ratings also varied from session to session.

Nurse-rated self-efficacy. On each session summary form, nurses also rated the item "How confident are you in your ability to implement CALM or CALM-R with this anxious student?" from 1 (*not at all confident*) to 7 (*extremely confident*). Ratings were averaged across all session summary forms available for each case. Internal consistency of nurses' ratings across sessions was excellent (Cronbach's $\alpha = .90$), indicating that individual nurses' self-efficacy was largely stable from session to session.

Intervention outcomes

Child symptom severity and improvement. Independent evaluators used the Clinical Global Impression Scale–Severity (CGI-S) and Clinical Global Impression Scale–Improvement (CGI-I; Guy, 1976) to rate child symptom severity at all three time points and clinical improvement at post- and follow-up assessments. Independent evaluators' ratings integrated information from parent and child interviews. The CGI-S and CGI-I are widely used in youth treatment research, with evidence of good interrater reliability and sensitivity to treatment change (e.g., Lang et al., 2016; Mufson et al., 2004; Walkup et al., 2008). Severity scores range from 1 (*normal*; *not at all ill*) to 7 (*extremely ill*), and improvement scores range from 1 (*very much improved*) to 7 (*very much worse*). Interrater agreement, defined as scoring within 1 point on the measure, was 100% for the CGI-S and 80% for the CGI-I.

Child functioning. Child functioning was rated by independent evaluators using the Children's Global Assessment Scale (CGAS; Shaffer et al., 1983). Independent evaluators' ratings integrated information from parent and child interviews. The CGAS has demonstrated acceptable interrater reliability, test–retest reliability, and sensitivity to treatment change (Green et al., 1994; Mufson et al., 2004; Walkup et al., 2008). Scores can range from 1 to 100, with higher scores reflecting better functioning across life domains. Interrater agreement in the current study, defined as scoring within the same decile, was 70%.

Analyses

Pearson's correlations were used to examine bivariate associations among all study variables. Separate regression analyses examined each implementation factor as a predictor of child outcomes, controlling for baseline child functioning/symptom severity and intervention group assignment. To examine whether associations between implementation factors and outcomes differed between intervention groups, additional regression analyses which included all previous predictors, as well as terms representing the interaction between intervention group and implementation factor, were conducted. When an interaction term was significant, findings were probed to examine the impact of the implementation factor within each group by running separate regressions for the CALM and CALM-R groups, including only the implementation factor and baseline child functioning/symptom severity as predictors.

Results

Preliminary Analyses

Bivariate correlations between variables are presented in Table 1. Baseline functioning (CGAS) and symptom severity (CGI-S) were significant predictors of nurse self-efficacy

Table 1. Means, Standard Deviations, and Correlations Between Variables in Full Sample.

Variable	Mean (*SD*)	1	2	3	4	5	6	7	8
1. BL CGAS	51.85 (5.70)	—							
2. Post CGAS	57.89 (6.06)	.64***	—						
3. F-Up CGAS	60.61 (7.88)	.48**	.82***	—					
4. BL CGI-S	4.41 (0.88)	−.74***	−.51***	−.45**	—				
5. Post CGI-I	2.91 (0.77)	.10	−.51***	−.37**	−.23	—			
6. F-Up CGI-I	2.59 (0.79)	.09	−.38**	−.65***	−.07	.67***	—		
7. Adherence	6.10 (0.84)	.11	.15	.29*	−.19	.02	−.28	—	
8. Self-efficacy	5.70 (1.05)	.35*	.37**	.26	−.28*	−.02	−.07	.56***	—
9. Int. (CALM = 1)	n/a	−.14	.13	.09	.13	−.31*	−.22	−.10	−.12

Note. $N = 54$. Correlations are Pearson's *r*s, with point-biserial correlations for intervention (a dichotomous variable). BL = baseline; F-Up = follow-up; CGAS = Children's Global Assessment Scale; CGI-S = Clinical Global Impression Scale–Severity; CGI-I = Clinical Global Impression Scale–Improvement; Int. = Intervention; CALM = Child Anxiety Learning Modules.
*$p < .05$. **$p < .01$. ***$p < .001$.

Table 2. Partial Correlations From Regression Analyses Examining Implementation Factors as Predictors of Outcome.

	Independent Evaluator-Rated Child Outcomes			
	Post		Follow-Up	
	CGAS	CGI-I	CGAS	CGI-I
Regressions examining nurse-rated predictors of outcomes				
Adherence				
Baseline severity (CGAS/ CGI-S)	.63***	−.28^	.44**	−.14
Intervention (CALM = 1)	.25^	−.24^	.18	−.22
Adherence	.10	−.07	.27^	−.33*
Self-efficacy				
Baseline severity (CGAS/ CGI-S)	.58***	−.30*	.40**	−.10
Intervention (CALM = 1)	.25^	−.25^	.17	−.20
Self-efficacy	.22	−.14	.14	−.13
Regressions examining interactions between nurse-rated predictors and intervention group				
Adherence				
Baseline severity (CGAS/CGI-S)	.63***	−.24^	.46**	−.11
Adherence	.03	.02	.09	−.22
Intervention (CALM = 1)	−.05	.07	−.23	.07
Adherence × Intervention	.08	−.10	.25^	−.10
Self-efficacy				
Baseline severity (CGAS/CGI-S)	.66***	−.22	.48**	−.03
Self-efficacy	−.05	.07	−.08	.02
Intervention (CALM = 1)	−.39**	.28^	−.35*	.22
Self-Efficacy × Intervention	.43**	−.32*	.38*	−.25

Note. Values in table represent partial correlations with significance levels identified. CGAS = Children's Global Assessment Scale; CGI-S = Clinical Global Impression Scale–Severity; CGI-I = Clinical Global Impression Scale–Improvement; CALM = Child Anxiety Learning Modules.
^$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

and child functioning at post- and follow-up assessments, so these variables were controlled for in the primary regression analyses.

Primary Analyses

Table 2 presents the results from regression analyses that examined nurse-reported intervention adherence and self-efficacy as predictors of child outcomes. The first set of analyses, presented in the top half of Table 2, examined the direct associations between nurse implementation factors and child outcomes. The second set of analyses, presented in the bottom of Table 2, included interaction terms to determine whether associations between implementation factors and child outcomes differed between intervention groups.

Adherence. Greater nurse-reported adherence to the interventions was associated with greater child anxiety symptom improvement (i.e., lower CGI-I scores), across groups, at the follow-up assessment. No interaction terms were significant,

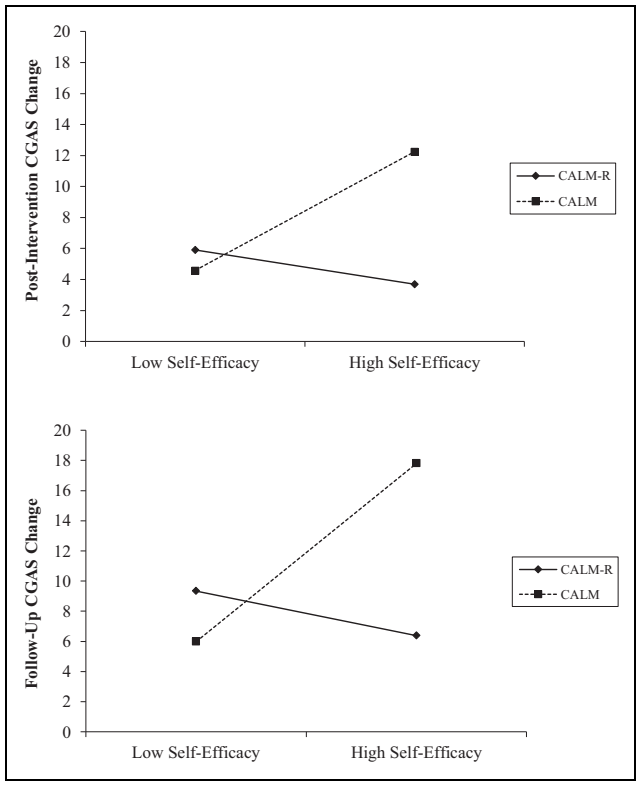

Figure 1. Effects of nurses' self-efficacy on CGAS: Moderation by intervention group. *Note.* Dependent variables represent CGAS change (post/follow-up CGAS score—baseline CGAS score), as preintervention CGAS was a strong predictor of later CGAS scores. CGAS = Children's Global Assessment Scale; CALM = Child Anxiety Learning Modules; CALM-R = Child Anxiety Learning Modules—Relaxation only.

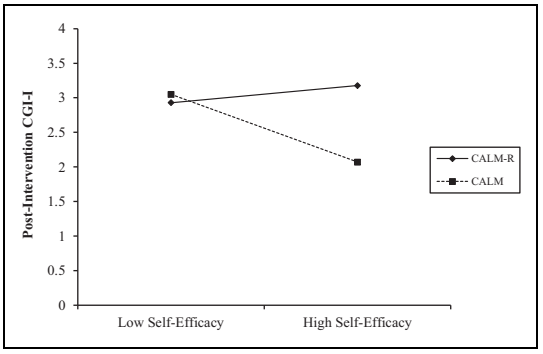

Figure 2. Effects of nurses' self-efficacy on CGI-I: Moderation by intervention group. *Note.* Lower values reflect greater improvement. Regression results depicted do not include Clinical Global Impression Scale–Severity as a control variable (unlike Table 2). CGI-I = Clinical Global Impression Scale–Improvement; CALM = Child Anxiety Learning Modules; CALM-R = Child Anxiety Learning Modules–Relaxation only.

indicating that this association between adherence and outcome was consistent across intervention groups. There were no other significant associations between adherence and child outcomes.

Self-efficacy. Self-efficacy was not a significant predictor of outcomes across intervention groups at the postintervention or follow-up evaluations. However, several interaction terms were significant. Specifically, at postintervention, as shown in Figures 1 and 2, CALM nurses who reported greater self-efficacy were more likely to have children show higher functioning on the CGAS and greater symptom improvement (i.e., lower scores) on the CGI-I. These interactions were supported by the results of probing regressions for each intervention condition, in which CALM nurses' self-efficacy predicted children's CGAS and CGI-I (βs = .51 and −.60, both ps < .01), but CALM-R nurses' self-efficacy did not ($\beta = -.06$ and −.10, both *ns*). At follow-up, replicating postintervention findings, a significant interaction term suggested that CALM nurses who reported greater self-efficacy were more likely to have children show higher functioning on the CGAS. When probed with separate regressions for each intervention condition, as shown in Figure 1, CALM nurses' self-efficacy predicted children's CGAS ($\beta = .58$, $p < .05$), but CALM-R nurses' self-efficacy did not ($\beta = -.16$, *ns*).

Discussion

The current study examined two provider-level implementation factors in relation to children's outcomes after two school nurse–administered brief interventions for child anxiety. Consistent with hypotheses and prior literature (Bjaastad et al., 2018; Ginsburg et al., 2012; Podell et al., 2013), nurse-reported adherence to the intervention modules for CALM and CALM-R was associated with greater improvement for children at the follow-up assessment. It is interesting that this association was found at the follow-up assessment and not at the postintervention assessment, but not without precedent, with similar results found by Bjaastad et al. (2018). It may have taken additional time for children to reap the benefits of high-quality intervention, or intervention quality may have been important for maintenance of gains once children were no longer receiving support. These findings suggest that implementation processes focused on increasing intervention adherence, including training and consultation, are likely to improve children's outcomes, consistent with current recommendations (Damschroder et al., 2009; Edmunds et al., 2013).

Interestingly, findings regarding nurses' self-efficacy differed depending on which intervention nurses were implementing. These findings suggest the impact of another implementation factor, intervention complexity (Damschroder et al., 2009). Specifically, for the more complex or multicomponent intervention (CALM), nurses' self-efficacy was linked to children's outcomes, but for the simpler, more focused intervention (CALM-R), it was not. Self-efficacy did not differ between nurses in the CALM condition ($M = 5.54$, $SD = 0.90$) and the CALM-R intervention ($M = 5.79$, $SD = 1.13$), $t(50) = .82$, *ns*, so implementing

a more complex intervention did not appear to lower self-efficacy. Instead, it appears that less complex interventions can result in positive outcomes for children's anxiety irrespective of how confident the provider feels about implementing the intervention. In contrast, with more complex interventions in which providers' self-efficacy is linked to outcomes, it may be useful to assess and target providers' self-efficacy in order to improve implementation outcomes.

Implementation processes that are linked to increased provider self-efficacy include training, supervision, and a support network of peers who are also conducting the evidence-based treatment (Bohman et al., 2014; David & Schiff, 2017). The impact of these implementation processes was not assessed in the current study. Future research should examine how these implementation support processes can improve children's outcomes through the mediator of increased provider self-efficacy.

More broadly, these results suggest that in addition to acting directly as barriers or facilitators of implementation, characteristics of an intervention can also moderate associations between implementation factors and intervention outcomes and may provide an explanation for why findings regarding implementation factors often differ across studies. For example, providers' level of education has been positively linked to implementation outcomes in some cases (e.g., Campbell et al., 2013) and negatively linked in other cases (e.g., Zvoch, 2009), most often failing to matter (e.g., Klimes-Dougan et al., 2009). These associations may be moderated by intervention complexity, with higher levels of education benefiting implementation of complex interventions, but not mattering for simple interventions. In other cases, when an intervention is at odds with providers' previous training, higher levels of education may mean that previous training is more engrained and the new intervention is harder to adopt. This latter scenario reflects the intervention characteristic of compatibility. In addition to compatibility and complexity, a number of other intervention characteristics have been proposed to affect implementation outcomes, including flexibility, visibility, relative advantage over alternatives, and disruptiveness (Damschroder et al., 2009; Grol et al., 2007). Future randomized controlled trials that include multiple interventions should continue to examine moderation of implementation factor impact by intervention type to identify intervention characteristics that moderate expected associations.

Strengths and Limitations

The results should be taken in the context of several limitations of the study. First, adherence was self-reported by nurses, a method that is inexpensive and more feasible for implementation contexts but is likely less accurate and valid than observer-rated adherence (Breitenstein et al., 2010). The fact that self-reported adherence was associated with children's outcomes despite this limitation is notable. In addition, although the implementation approach to the study (i.e., not requiring nurses to demonstrate a particular level of adherence or competence in delivering the intervention) increases generalizability of the results, this approach may have resulted in lower adherence and self-efficacy and affected children's outcomes. Additionally, adherence and self-efficacy were assessed with single-item measures with limited evidence for validity and reliability, although averaging nurses' ratings across multiple sessions appeared to increase the reliability of estimates in a way similar to that of a multi-item scale. Data were nested (i.e., children were nested within nurses), and statistical analyses did not address the nested structure of the data. Finally, the study's small sample size limited power, and the specific nature of the sample (school nurses implementing mental health interventions) may limit generalizability of the results. Future research should attempt to replicate these findings in a larger sample, with observer-rated measures of treatment fidelity and multi-item scales with established psychometric properties to assess self-reported constructs.

The study also had several strengths. Nurses were randomly assigned to conditions, and randomization appeared successful, allowing us to infer that differences between the CALM and CALM-R groups could be attributed to some aspect of the intervention. As opposed to a treatment as usual comparison group that would include a diffuse mix of intervention strategies, both interventions were active treatment conditions that followed manualized protocols, limiting the possible explanations for the observed differences between intervention groups (e.g., to intervention complexity). In addition, children's outcomes were assessed by independent evaluators following standardized protocols, the best practice in the field. Finally, children were assessed before and after intervention, allowing preintervention functioning (a strong predictor of post- and follow-up functioning) to be controlled in analyses.

Implications for School Nursing Practice

School nurses are able to use evidence-based practices to reduce children's anxiety, which is one of the most prevalent mental health concerns in schools. The current study suggests that school nurses should be encouraged to seek training in evidence-based practices for student mental health and for anxiety in particular. Once trained, nurses should strive to implement interventions with adherence to the protocol, which will promote better outcomes for students. Nurses are also encouraged to use any ongoing implementation supports after training, such as supervision, consultation, or a support network of other nurses, as these supports may increase self-efficacy, which is linked to better outcomes for children in more complex interventions. Finally, nurses who are implementing simple, straightforward interventions are encouraged to persist even if they do not feel confident in their ability, as our results suggest that nurses'

self-efficacy may not be linked to children's outcomes when interventions are not complex. These recommendations would be reinforced by replication of the current results in larger samples using more psychometrically sound measures.

Conclusions

In summary, the current study reinforces the importance of research on factors that affect implementation and treatment outcomes. Modifiable implementation factors including provider adherence and self-efficacy are important targets for implementation processes like training and consultation. Intervention complexity is a factor that should be considered in the intervention selection and adaptation phases of implementation. The current study suggests that by understanding and addressing these implementation factors, client outcomes can be improved.

Authors' Note

The opinions expressed are those of the authors and do not represent views of the Institute of Education Sciences or the U.S. Department of Education.

Acknowledgments

The authors thank the CALM Development Team for their expert guidance and feedback throughout the course of the project: Donna Mazcyk, Nichole Bobo, Dr. Mark Weist, Dr. Catherine Bradshaw, and Stephanie Knutson. The authors also thank all the nurses, children, and parents who participated in the study.

Author Contributions

Kelly L. Drake and Golda S. Ginsburg contributed to the design of the research study, while the draft was prepared by EB Caron and Golda S. Ginsburg. All authors contributed to the acquisition, analysis, and interpretation of data; revisions of the article; gave final approval; and agreed to be accountable for all aspects of work ensuring integrity and accuracy.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This research was funded by the Institute of Education Sciences, U.S. Department of Education Grant #R305A140694 awarded to Drs. Ginsburg and Drake.

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