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Addictive Behaviors

Effectiveness of School-based Health Center Delivery of a Cognitive Skills Building Intervention in Young, Rural Adolescents: Potential Applications for Addiction and Mood

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ABSTRACT

Purpose: Uniquely positioned, school nurses address two of the most critical adolescent health issues – addiction and mood. Cognitive behavioral therapy, the mainstay in management of adolescent mood disorders, demonstrates promise in the treatment and prevention of addictive behaviors. Quality decision-making may protect adolescents from substance abuse. Executive function, a neurocognitive aspect of decision-making, involves impulse control, future thinking, and behavioral regulation. Further, the continuum of addition implicates executive function, which makes executive function a viable target for prevention and treatment of substance use. This pilot study examined the effectiveness of a nurse-led cognitive skills training intervention, Creating Opportunities for Personal Empowerment, on executive function and mood in a novel population and setting.

Design and methods: The study sample included adolescents ranging in age from 12 to 15 years and enrolled in a rural school-based health center. Fifteen (n = 15) adolescents completed the seven-week cognitive skills building intervention led by a nurse practitioner. Researchers measured executive function, anxiety, and depression at: baseline, after the intervention series, and three-months later.

Results: One domain of executive function – behavioral regulation – improved, as did anxiety. Depression showed short-term improvement. Metacognition did not change over time.

Conclusions: Preliminary results indicate that cognitive skills building delivered by school nurses may enhance aspects of executive function linked with addiction and coping, such as behavioral regulation. Further, this intervention may also improve mood in this population.

Practice implications: Delivery of cognitive skills training by school nurses could be an accessible, effective piece in addressing addiction and mood in young, rural adolescents.

Introduction

Mental health disorders represent the most common disease of childhood. Substance abuse, anxiety, and depression contribute to morbidity and mortality in adolescents (Child Mind Institute, 2016). Most recently, 49.5% of adolescents met diagnostic criteria for a mental health disorder, including substance abuse disorders, mood disorders, and attention deficit disorders (ADD) (Child Mind Institute, 2016). Feelings of depression, anxiety, and inattention may also be associated with early alcohol and drug use in adolescents (Skogen et al., 2014). Executive function (EF), a neurocognitive variable, links to future-orientation, working memory, impulse-control, emotional regulation, and decision-making (Dawson & Guare, 2010). EF encompasses future thinking and diverse other competences, including goal-directedness, problem solving, memory, cognitive flexibility, planning, inhibitory control, and internal dialogue (Bilder, 2012; Gioia & Isquith, 2000). Regulating impulses, setting goals, and understanding long-range consequences require EF skills (Dawson & Guare, 2010). A key domain of addiction, EF has emerged as a target variable in the treatment and prevention of substance abuse (Kwako, Momenan, Litten, Koob, & Goldman, 2016; Lammers et al., 2015; Lechner, Sidhu, Kittaneh, & Anand, 2019). The standard for anxiety and depression in adolescents, cognitive behavioral therapy (CBT) may also influence EF. This paper describes novel testing of a CBT intervention, Creating Opportunities for Personal Empowerment (COPE), in a young, rural group of adolescents who screened positive for anxiety and or depression in a school-based health center.

Background and significance

Executive function

An increasing body of literature suggests that strong EF may mediate the drive of addiction (craving) and allow for functional decision-

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making (Lechner et al., 2019). EF develops rapidly in adolescence and responds to both practice of EF skills and insult by drugs or alcohol (Dawson & Guare, 2010). Superior to measures like Intelligence Quotient and personality types in predicting goal-directed behavior, EF allows for the combination of cognitive domains such as working memory, impulse control, and mental flexibility. Thereby, EF potentially accounts for nuances of both planned and impulsive decision-making and permits further understanding of goal-directed behaviors (Hall, Fong, & Epp, 2014).

Alterations in EF, sometimes termed executive dysfunction or dysregulation, have been implicated in adverse health behaviors that are directly related to impulse-control such as self-harm (Oldershaw et al., 2009), suicide (Ellis, 2008), disordered eating (Groppe & Elsner, 2015), and alcohol abuse (Nixon, 2013). EF skills training, including CBT, is used to prevent and treat substance abuse in youth (Nguyen, O'Brien, & Schapp, 2016; Pentz, 2014; Pentz, Riggs, & Warren, 2016). Substance abuse disorders commonly emerge during adolescence; at the same time, vulnerability of the developing adolescent brain complicates the concern (Parolin, Simmonelli, Mapelli, Sacco, & Cristofalo, 2016).

Interventions to promote EF skills among youth may occur at the environmental or personal level (Dawson & Guare, 2010). At the level of the person, the goal is to assist the child in understanding and practicing their executive skills. This can be done through teaching executive skills or through motivational strategies such as incentives. One way to help adolescents practice these skills is the development of self-talk, i.e. assist the adolescent in an internal dialogue such as, "What is my problem? What is my plan? Am I following my plan? How did I do?" (Dawson & Guare, 2010, p. 64). This self-talk is the centerpiece of CBT which is founded on the assumption that how we feel and behave is based on the things we think (Dawson & Guare, 2010). Self-talk in the form of CBT has been applied to executive skills development in adolescents with traumatic brain injuries (Ylvisaker, Turkstra, & Coelho, 2005), in the treatment of substance abuse in adolescents (Wu, Schoenfelder, & Chih-Jui Hsaio, 2016) and in adolescents with attention deficit disorders (Ylvisaker, 2009).

Cognitive behavioral therapy

CBT is a mainstay in addressing anxious and depressive symptoms and shows promise in promotion of EF skills. EF improved with CBT in adolescents with a history of self-harming behavior (Slee, Garnefski, V.D.L., Arensman, & Spinhoven, 2008). CBT received an *A* evidence rating as a recommended treatment for adolescents with mild depression and is suggested alongside pharmacologic management in children with moderate to severe depression (Clarke et al., 2016; Spirito, Esposito-Smythers, Wolff, & Uhl, 2011). CBT involves "training adolescents in specific coping skills and affect regulation techniques" and has been applied to changing thoughts, emotions, and behaviors related to suicide (Spirito et al., 2011). Like adults, adolescents experiencing depression and/or poor coping are more likely to have executive dysfunction (Lantrip, Isquith, Koven, Welsh, & Roth, 2016). Further, EF deficits are thought to both co-occur and serve as a risk factor for substance abuse disorders, including alcohol use and cigarette smoking (Wilens et al., 2011).

Adolescence

Adolescent developmental tasks, such as managing school schedules, establishing long-term goals, making positive use of leisure time, and "inhibiting reckless and dangerous behaviors" (Dawson & Guare, 2010, p. 11) require EF skills. The inhibition of reckless and dangerous behaviors is a central focus of health promotion in adolescent nursing – particularly in the school-based setting. Thus, EF skill development is a concern for the school-based nurse and perhaps a future area of focus for health promotion and risk reduction practices.

Rural dwelling youth

Critical shortages in health care providers exist for rural adolescents, particularly access to behavioral or mental health care (Kim, 2003; Thomas & Holzer, 2006; Watanabe-Galloway, Valleley, Rieke, & Corley, 2017). For example, rates of suicide among rural adolescents almost doubled that of their urban counterparts from 1996 to 2010 (Fontanella et al., 2015). Notions of stigma, privacy, and confidentiality compound health care access for rural adolescents. Rural parents may seek care for physical illness rather than mental illness because stigma persists that parenting style may contribute to mental or behavioral health problems (Young & Rabiner, 2015). Healthcare options may be limited in rural areas; for example, a rural community may have only one clinic or health department or may share resources with neighboring counties. Therefore, it is more likely that a rural adolescent would encounter a family member or acquaintance when seeking care for sensitive health issues. Gaps continue in health insurance coverage for mental health concerns (Young & Rabiner, 2015).

School-based health

The American Academy of Pediatrics (AAP) recognizes school-based health centers (SBHCs) as integral and effective components of the health care safety net for adolescents, particularly in low-income communities or areas with challenges in access to health care (O'Leary et al., 2014). Adolescents attending school where a SBHC is present are ten times more likely to seek care for mental health and substance abuse than their peers who do not have that access (Child Mind Institute, 2016). Mental and reproductive health services have been cited as the most common reasons for adolescents accessing school-based health services (Mason-Jones et al., 2012). Despite the well-established history of SBHCs, rigorous research on mental health outcomes and intervention effectiveness in this setting remain limited (Mason-Jones et al., 2012). Targeted interventions in early adolescence may prevent long-term issues with substance abuse, depression, and anxiety. Early intervention is important, as many of the adverse health behaviors established in adolescence continue into adulthood where they may have considerable consequences on quality of life, disability, and social functioning (Jackson, Henderson, Frank, & Haw, 2012). SBHCs are a potential means of addressing these health issues.

COPE, a cognitive skills training intervention designed for delivery by nurses, has been well supported in the literature for improving symptoms of anxiety and depression in older and urban adolescents (Lusk & Melnyk, 2011; Lusk & Melnyk, 2013; Melnyk et al., 2007; Melnyk et al., 2013; Melnyk, Kelly, & Lusk, 2014; Melynk et al., 2009). Studies in younger, rural adolescents are limited. COPE had not been evaluated for effects on EF. This study aimed to test the feasibility and effectiveness of COPE in a rural, adolescent population for its effects on EF, anxiety, and depression.

Methods

Design and setting

A prospective, quasi-experimental, feasibility design was used in a rural, SBHC that services a middle school.

Sample and sampling

Inclusion criteria were age 11–15 years, enrolled in the SBHC, and positive annual screen for anxiety and/or depression via the SBHC. During regular clinic communication with parents, nurses notified parents if their child qualified for the study and offered the contact information of the PI to parents. Parents could then contact the PI for more study information. Once parents received this information, they could give permission for their child to participate. Thirty-three ($n = 33$) patients

qualified for the study, seventeen (n = 17) parents gave permission for their child to participate in the study, and fifteen (n = 15) adolescents provided assent to participate in the study. All 15 adolescents completed the seven intervention sessions. Two adolescents were suspended from school between the time of permission/assent and the first intervention session. These two adolescents were placed on an alternate schedule and received sessions five days apart, where the other 13 participants completed the intervention in one week intervals. The intervention developer approved the five-day interval.

Data collection

Adolescents completed a demographic questionnaire to verify inclusion criteria. Adolescents then provided written assent and baseline measures for EF, anxiety, and depression prior to beginning the first intervention session. Adolescents repeated measures for EF, anxiety, and depression after completing the entire intervention series (seven sessions) and again at a three-month follow-up. Instruments included the Behavior Rating of Executive Function Self-Report (BRIEF-SR) and the Beck Youth Inventory 2nd Edition scales for Anxiety and Depression. All fifteen adolescents completed the pre-intervention and post-intervention measures. Thirteen (n = 13) adolescents completed a third longitudinal follow up, three months after completing the interventions series.

Intervention

Adolescents attended seven, thirty-minute intervention sessions. At the time of initial assent, adolescents were asked whether they preferred to attend the intervention sessions in a small group or alone, and the researcher accommodated each request. Participants presented to the clinic during their physical education elective period, where they met with the nurse researcher to complete the weekly intervention session. Each participant received a workbook that guided them in the practice of cognitive exercises and contained a log for recording daily practices. Adolescents were to practice cognitive exercises for one week, keeping a daily log, before attending the next week's intervention session. Examples of cognitive skills exercises included positive self-talk, guided imagery, abdominal breathing, goal setting, identifying triggers or stressors, and self-reflection. Example session topics are in Table 1.

The nurse researcher completed training and certification for delivering COPE, and delivered all sessions. At the start of each session, participants presented their daily practice log to the nurse researcher and reviewed skills from the previous weeks' session. This is standard practice with COPE to support treatment fidelity. For their time, study participants received a certificate of completion, a fidget spinner, and pens at the end of the study.

Measures

BRIEF-SR

The Behavior Rating Inventory of Executive Function – Self-Report (BRIEF-SR) has demonstrated reliability, validity and clinical utility as an ecologically valid assessment of executive functions (Gioia, Isquith, Guy, & Kenworthy, 2018). The instrument is based on a fifth-grade reading level and is appropriate for teens 11 to 18 years (Gioia, Isquith, Guy, & Kenworthy, 2018). The BRIEF-SR contains 80 items in eight non-overlapping scales including measures for *inhibit*, *shift*, *emotional control*, *self-monitoring*, *working memory*, *planning/organizing*, *organization of materials*, and *task completion*. Subscales are combined to result in three composite scores: *Behavioral Regulation Index*, *Metacognition Index*, and *Global Executive Composite*. The BRIEF-SR demonstrates a Cronbach's alpha of 0.80–0.98 for the various subscales. Lower scores indicate higher EF, and higher scores indicating possible executive dysfunction. Importantly, the BRIEF-SR reliably stands-alone; and though it is strengthened by proxy measures from teachers and/or parents, it is reliable for independent interpretation. Respondents answer to what degree they have had difficulty with various executive skills in the past. The BRIEF-SR results in a raw score that is normed for age and sex across three categories: Behavioral Regulation Index (BRI), Metacognition (MI), and Global Executive Composite (sum of BRI and MI).

Beck inventories for anxiety and depression

The Beck Youth Inventory 2nd edition (BYI-II) consists of five scales for children and adolescents ages 7 to 18 years (Beck, Beck, Jolly, & Steer, 2005). Each scale is suited for individual administration and interpretation for five different constructs – depressive symptoms, anxiety symptoms, anger, disruptive behavior, and self-concept (Steer, Kumar, Beck, & Beck, 2005). Scales for anxiety (BAI) and depression (BDI) were used in this study. Each of these scales contains 20 Likert-type items on a four-point frequency scale ranging from 0 to 3. Participants rated the degree to which they experienced symptoms related to anxiety or depression in reference to thoughts, feelings, behaviors, and social situations over the past two weeks. Raw scores range from 0 to 63. *T*-scores are assigned based on age and gender with a *T* score of <55 being average, 55–69 being moderately elevated, and >70 being extremely elevated. The BYI-II demonstrates content and construct validity, with >0.70 correlation for all subscales (Lusk & Melnyk, 2011; Melynk et al., 2009; Thastum, Ravn, Sommer, & Trillingsgaard, 2009). The Cronbach's alpha in previous reliability studies for the depression and anxiety subscales were 0.92 and 0.90, respectively (Beck et al., 2005).

Ethical approval

The Institutional Review Board at the supporting academic health science center granted approval for this study.

Data analysis

Data were analyzed using Statistical Package for Social Science (SPSS) version 24. Descriptive statistics characterized the sample (Table 2). Repeated measures analysis of variance (ANOVA) compared means in EF, anxiety, and depression over the three data collection points (Table 3). Paired *t*-tests analyzed the change in mean scores for outcome variables from pre-intervention to post-intervention, from

Table 1
COPE intervention: session content.

Thinking, feeling, and behaving: what is the connection?
Positive thinking and forming healthy thinking habits
Coping with stress
Problem solving & setting goals
Dealing with your emotions in health ways through positive thinking and effective communication
Putting it all together for a healthy you

Table 2
Demographics of adolescent participants.

Characteristic	n	%
Gender		
Female	7	46.7
Male	8	53.3
Race		
Black	14	93.3
White	1	6.7
Age in years		
11	0	0
12	3	20.0
13	6	40.0
14	3	20.0
15	3	20.0

Table 3
Repeated measures ANOVA for anxiety, depression, and executive function.

Variable	df	F	p-Value
Anxiety	2	4.258	.024*
Depression	2	1.956	.160
Executive function			
BRI	2	3.03	.064
MI	1.426	1.530	.238
GEC	2	2.770	.080

* Significant at $p < .05$.

post-intervention to longitudinal follow-up, and from pre-intervention to the longitudinal follow-up (Table 4). An a priori power analysis indicated a minimum of ten ($n = 10$) participants for parametric testing. The value of $p < .05$ was accepted as the statistical significance limit.

Results

Demographic characteristics of study participants

Table 2 displays demographic characteristics of the sample. Males represented 53.3% ($n = 8$) of the sample. Most participants reported their race as black (93.3%) with one participant reporting their race as white (6.7%). Target age was 11–15 years, however, no 11 year-olds participated. The mean age of the sample was 13.4 years.

Executive function, anxiety, and depression

Table 3 depicts the results of the repeated measures ANOVA for each outcome variable, where Table 4 depicts the paired *t*-tests for each outcome variable. The repeated measures ANOVA did not detect improvement in any of the domains of EF in response to the intervention. Paired t-tests detected a statistically significant improvement in one EF skill set – Behavioral Regulation Index – from post-intervention to the three month follow-up ($p = .017$). Though not statistically significant ($p = .060$), results showed a clinically significant improvement in BRI skills from pre-intervention to the three-month follow up.

Anxiety improved ($p = .024$). Overall mean scores for depression decreased for the group from pre-intervention to post-intervention, but this trend did not hold at the three-month follow-up. Paired *t*-tests also detected a borderline statistically significant improvement in depression from pre-intervention to post-intervention ($p = .051$), but this improvement did not hold at the three-month follow up. Effect sizes were calculated using Cohen's *d* for statistically significant results, demonstrating a medium effect size for anxiety (0.5), and small-medium effect sizes for BRI skills (0.4–0.6). Trends in scores for BRI, anxiety, and depression are presented in Figs. 1, 2, and 3, respectively.

Table 4
T-tests and effect sizes for anxiety, depression, and executive function (BRI, MI, GEC).

Variable	Mean (SD)	df	p-Value	Cohen's *d*	Effect size
Anxiety					
T1 to T2[a]	57.6 (13.6), 52.2 (14.5)	14	.093		
T2 to T3	52.2 (14.5), 50.3 (12.7)	14	.339		
T1 to T3	57.6 (13.6), 50.3 (12.7)	14	.019*	0.5	Medium
Depression					
T1 to T2	57 (13.8), 51.8 (12.1)	14	.051		
T2 to T3	51.8 (12.1), 52.6 (14.6)	14	.764		
T1 to T3	57 (13.8), 52.6 (14.6)	14	.211		
BRI					
T1 to T2	63 (11.2), 61 (15)	14	.607		
T2 to T3	61 (15), 55.2 (14.6)	14	.017*	0.4	Small
T1 to T3	63 (11.2), 55.2 (14.6)	14	.060		
MI					
T1 to T2	54 (10.7), 52.5 (12.2)	14	.251		
T2 to T3	52.5 (12.2), 51.33 (12.3)	14	.380		
T1 to T3	54 (10.7), 51.33 (12.3)	14	.194		
GEC					
T1 to T2	58.9 (10.3), 56.9 (14)	14	.418		
T2 to T3	56.9 (14), 53.4 (14.2)	14	.057		
T1 to T3	58.9 (10.3), 53.4 (14.2)	14	.074		

* Significant at $p < .05$.
[a] T1 = pre-intervention, T2 = post-intervention, T3 = three-month longitudinal follow-up.

Discussion

The preliminary effectiveness of a nurse-delivered cognitive skills training intervention for executive function, anxiety, and depression showed promising results. Although COPE had a record of effectiveness for anxiety and depression, validation in younger, rural, African American adolescents was lacking. Further, COPE's effect on EF had not been tested. As EF skills may be protective against addiction and other high-risk behaviors, COPE could serve as a potential comprehensive strategy in the school-based care of adolescent patients.

In this population, COPE improved symptoms of anxiety and showed potential for improving symptoms of depression. COPE also demonstrated potential effectiveness for improving one subset of executive skills known as Behavioral Regulation. The repeated measures ANOVA did not show a statistically significant change in BRI. Analysis with paired *t*-tests reflected a statistically significant change from post-intervention to the study endpoint ($p = .017$) and a clinically significant change in mean scores, overall. Cohen's *d* analysis demonstrated a small effect size from post-intervention to the three-month follow-up point for BRI. It is possible that the improvement in EF skills from post-intervention to the longitudinal follow up indicates a need for longer exposure or practice of the cognitive skills in COPE. Future studies should consider EF skills over a longer period of time.

Clinically, a change in *T*-score of nine points or more indicates improvement in executive skills for a particular domain. For BRI, the overall group mean decreased by eight points. Participants who scored *clinically elevated* at baseline saw a mean decrease in BRI score of twelve points throughout the study and those who were *potentially clinically elevated* saw a decrease of 27 points. While both groups saw a significant clinical change, it is possible that those who were *potentially clinically elevated* had enough executive skills to benefit from CBT and enough threshold for improvement to demonstrate a significant change. Those with *clinically elevated* scores may not have had the executive skills necessary to benefit from CBT skills practice, showing a lesser degree of change. Participants who showed *average* or *mild* scores at baseline did not experience a change in scores throughout the course of the study. This may be due to having a lesser threshold for improvement from baseline. Potentially, those with higher degrees of executive skill difficulty may show the most improvement on BRI in response to COPE. Regardless, the clinical improvement is a promising result and

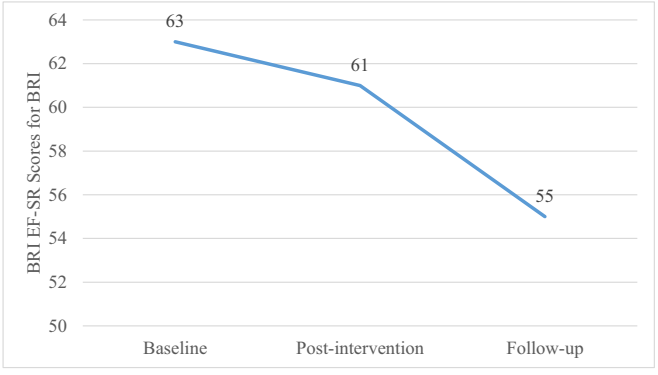

Fig. 1. Trend in BRI scores from baseline (pre-intervention) to post intervention and follow-up (3 months post-intervention).

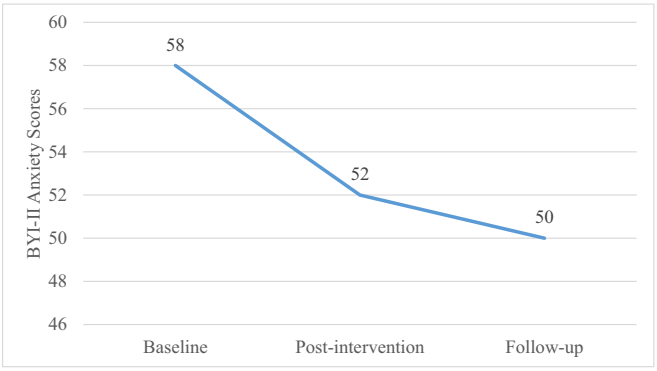

Fig. 2. Trend in anxiety scores from baseline (pre-intervention) to post intervention and follow-up (3 months post-intervention).

calls for future studies with larger sample sizes to determine if COPE or other cognitive skills-building interventions may improve decision-making in adolescents.

Most notably, BRI was the only EF domain to demonstrate a potential response to COPE. BRI was posited to be the executive skills domain most closely related to the skills that are emphasized in COPE. Interestingly, participants reported in their interviews and feasibility feedback that they perceived COPE as helping them control stress and handle their emotions, with many participants re-terming COPE as "anger management class." Participants reported COPE as a means to remaining in control of their emotions and behavior, although this was not an overt objective of the program. Irritability, one aspect of adolescent depression, is not reflected on the BYI-II. Future studies may include instruments that consider irritability as a feature of depression and that are more specific to the behavioral regulation skill set rather than those in the domain of metacognition.

No statistically significant change occurred in MI, ($p = .238$). Further, when examined with paired *t*-tests, no statistically significant difference appeared among any of the study time points. Clinically, the overall change in the mean for MI was insignificant (three-point decrease). The skills associated with MI include initiating, working memory, planning/organizing, organization of materials, and monitoring. These executive skills are less directly related than BRI skills. Further, this sample had less difficulty with MI skills at baseline.

Clinically, these findings are important because they indicate that COPE may be an appropriate and useful intervention to improve anxiety and depression for young adolescents receiving care in the school setting. With further validation, COPE may be a valuable tool in school nursing practice to comprehensively address substance use, mood, and coping.

SBHC delivery of COPE showed initial effectiveness for improving symptoms of anxiety in young, rural adolescents. Although mean scores

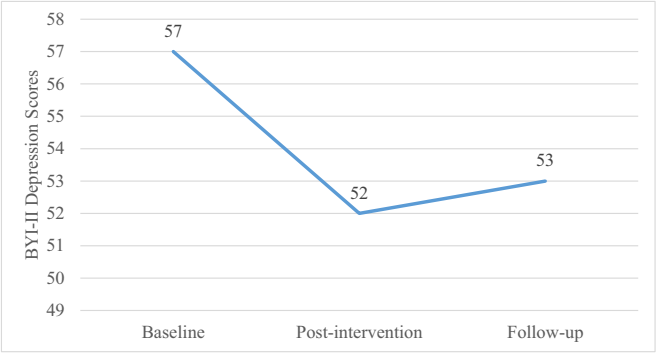

Fig. 3. Trend in depression scores from baseline (pre-intervention) to post intervention and follow-up (3 months post-intervention).

for depression improved immediately post-intervention ($p = .051$), the change was not sustained. Two participants retained elevated scores for depression at the third follow-up point and were referred for specialty care. It is possible that these two scores skewed results. Though COPE did not demonstrate statistically significant improvement in behavioral regulation skills ($p = .060$), participants demonstrated clinically significant improvement in behavioral regulation skills throughout the course of the intervention.

Substance abuse, anxiety, and depression represent major health concerns for adolescents. SBHCs have the potential to address these issues in the adolescents' environment through interventions like COPE. However, SBHCs cannot function without policy and funding support. Policies to support school nurses for all students and to support interventions such as COPE are critical for securing access to health care for adolescents. The rate of adolescents experiencing anxiety and depression has increased by 40% since 2005, and rates of teen suicides have increased by a third since 2007 (Vestal, 2018). SBHCs are a natural fit for the delivery of both preventive and therapeutic mental health services. These efforts have already begun in states such as New York, the second state in the nation to require mental health education for students in public schools (Vestal, 2018). In many other parts of the country, SBHCs are largely supported with state funds, including contributions by school districts and state grants (School-Based Health Alliance, 2015). Many rural areas where state budget priorities have not historically included school health remain at high risk.

Recommendations

Future studies are necessary to draw broader conclusions about the effectiveness and feasibility of COPE in rural adolescents regarding benefits to EF and mood. Training additional COPE instructors and engaging multiple schools may yield larger sample sizes. Computer delivery of COPE could expand treatment across multiple districts. This study showed that school nurses could feasibly provide this to students. Ideally, future studies capture long-term changes through extended longitudinal designs. Inclusion of a technology-based reminder for participants and peer-led COPE sessions are potential solutions for challenges identified in this study. These interventions may improve COPE's effectiveness in similar populations. Inclusion of a waitlist control or attention control group would also strengthen study findings. More exploration of the behavioral and emotional regulation aspects of EF is warranted. The initial inclusion of EF in this study was also due to EF's potential influence on high-risk behaviors in adolescents. Additional outcome variables such as participation in high-risk activities, episodes of disciplinary action or peer violence, anger, self-regulation, and/or cognitive resiliency may be included in future research.

Implications for the school nurse

School nurses and SBHC staff often encounter adolescents with emotional and/or behavioral health concerns. Particularly in rural communities, accessing further care for these patients can be challenging. COPE may serve as a primary therapy for adolescents with mild or subclinical symptoms of anxiety and depression, as an adjunct therapy for those with more elevated symptoms, and as an interim therapy for those with extreme elevation in symptoms until specialist care can be secured.

With additional training in interventions such as COPE, school nurses are able to offer private, confidential services to depressed and anxious adolescents. Further, because they often have therapeutic relationships and repeat-contact with patients, school nurses can give insight into which patients may need COPE and which patients may benefit from 1:1 intervention delivery as opposed to group delivery.

School nurses are in the unique position to advocate for school-level policy changes that improve student health (for example, school nurses have been integral in changing nutrition policies in public school cafeterias). School nurses, uniquely positioned to promote ecological change

in schools, could address challenges mentioned by these adolescent participants. Results may include a school environment where mindfulness, mental imagery, positive statements, goal-setting, and positive communication techniques are common practice among students, staff, and teachers. Future studies could assess whether such school-wide changes improve student and SBHC patient outcomes.

Limitations

This study aimed to examine the effectiveness and feasibility of COPE in a younger population, but no 11-year-olds were in the sample. Therefore, generalizability is limited. A feasibility study was an intentional design choice for several reasons, but it does limit statistical power and generalizability. Ethically, a control group raised concerns. Since this study established initial intervention effectiveness and feasibility for the practical aspects of referral for participants who did not show improvement, future studies may have waitlist control or attention control groups. The financial cost for delivering COPE is relevant, thus piloting the intervention allows for the justification of resources to conduct future, larger-scale studies.

Two participants were suspended from school and placed on alternate schedules. Though they received the intervention within an appropriate amount of time per the intervention developer, they did receive sessions at the minimum allowed space of time, which translated into less practice time between sessions when compared to other participants. Some participants attended sessions alone while some participated in small groups of 2–4. This makes it impossible to know if group size affected study outcomes. The researcher had no contact with the participants from the final intervention session to the three-month follow up period. Results may have been affected had the researcher made weekly phone calls or offered reminders for participants to practice intervention techniques between the final intervention session and the longitudinal follow up. A subset of participants moved from eighth to ninth grade between the final intervention session and the final study follow-up. This may be considered an external threat, as moving from one school to another may have been a significant stressor for some adolescents that was not faced by the other participants. The researcher who delivered the intervention sessions also administered pre, post, and follow-up instruments to participants, allowing for a potential threat to validity. The researcher employed field notes and fidelity checks throughout to mitigate researcher bias.

Conclusions

This work highlights directions for future research and important implications for nursing practice, specifically for the school nurse. Rural adolescents need access to evidence-based strategies for substance abuse, mood, and coping. Specialist provider shortages in rural areas often call for unique delivery methods and settings. School nurses could fill this gap. COPE is well-established for its effectiveness for anxiety and depression in other populations. This work adds to the body of knowledge, demonstrating COPE's effectiveness in a younger, rural, African-American population. Further, this study validates the initial effectiveness of COPE for delivery by nurses in a SBHC.

COPE had not been examined as a potential comprehensive intervention for substance abuse and mood in adolescents. The addition of executive skills as an outcome variable is a strength of this study, as the literature supports the executive skills as protective against participation in high-risk behaviors such as substance abuse. COPE showed potential effectiveness in addressing the executive skills and mood, comprehensively.

Author statement

All authors certify that they have participated sufficiently in the work to take public responsibility for the content, including participation in the concept, design, analysis, writing, or revision of the manuscript. Furthermore, all authors certify that this material or similar material has not been submitted.

Conflict of interest

Authors declare no conflict of interest. This research was supported by funds from the National League for Nursing's Jonas Nurse Scholars Program.

CRediT authorship contribution statement

Kayla L. Carr: Conceptualization, Methodology, Validation, Formal analysis, Investigation, Data curation, Visualization, Writing - original draft. **Mary W. Stewart:** Conceptualization, Methodology, Validation, Writing - review & editing, Visualization, Supervision, Funding acquisition.

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