

Adaptive Riding Incorporating Cognitive-Behavioral Elements for Youth with Anxiety: An Exploratory Randomized Controlled Study

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Between 15% to 20% of youth meet diagnostic criteria for anxiety, yet most do not receive treatment due to workforce shortages, under-detection, or barriers that dissuade families from seeking services in traditional settings. Equine-assisted services (EAS) include several promising approaches to reach populations who do not access traditional therapies. Few studies using rigorous methods have been conducted on EAS for youth. This study examined feasibility and outcomes of a 10-session Cognitive Behavioral Therapy (CBT)-based adaptive riding intervention (hereafter called Reining in Anxiety) delivered by trained equine professionals.

Forty-one youth 6-16 years of age were recruited from GallopNYC, an adaptive horseback riding center in the NYC metro area. Youth were randomized to an experimental group (n=22) or services as usual (n=19), a standard adaptive riding group (services as usual or SAU). Severity of anxiety symptoms, anxiety in close relationships, and emotional self-efficacy were assessed at baseline and at the end of treatment.

Fidelity to the manual was excellent, ranging from 88.9% to 100%. There was a non-significant trend in the experimental group towards greater improvement with higher number of sessions completed. Youth in the Reining in Anxiety group displayed significant reductions in anxiety ($t=4.426$, $df=38$, $p=0.042$) and improvement in emotional self-efficacy at posttest ($t=4.132$, $df=38$, $p=0.049$) in comparison to the SAU group. No significant differences were found between groups for anxiety in close relationships.

This study suggests that a CBT-based adaptive riding intervention delivered by non-mental health equine professionals following a detailed manual can reduce youth anxiety symptoms and be delivered with fidelity by riding instructors. These findings have implications for families seeking non-traditional services.

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Anxiety disorders in children are common, costly, and few evidence-based treatments are reaching those who need them, making finding alternative treatment modalities to reduce anxiety disorders in children and youth a critical public health problem. First, anxiety disorders are the most common psychiatric disorders affecting children and adolescents (Higa-McMillan et al., 2016), with approximately 15% to 20% of youth meeting diagnostic criteria for an anxiety disorder (Beesdo et al., 2009). Anxiety disorders impact children in several domains, including in their interpersonal relationships with family and friends and their functioning at school (de Lijster et al., 2018).

Untreated childhood anxiety is not only costly for U.S. society, but also for the parents or caregivers (hereafter referred to as caregivers). While no U.S. studies estimate the cost burden due only to childhood anxiety, international studies show large societal costs (e.g., \$20 million euros a year in the Netherlands), and costs to families of youth with anxiety are 21 times higher than those without (Bodden et al., 2008). Collectively, anxiety disorders in the U.S. are estimated to cost between 43 and 47 billion dollars in mental health treatment, unneeded medical services, lower work productivity and loss of earnings due to premature mortality (Kessler & Greenberg, 2002). For families of youth with mental health challenges, the work productivity of caregivers depends largely on flexible work arrangements that enable caregivers to care for their child's mental health needs (Brannan et al., 2018). Importantly, childhood anxiety also predicts and is associated with adult depression (Colletti et al., 2009), compounding its impact when it is untreated.

Evidence-based treatments are available to treat childhood anxiety. Guidelines recently released by the American Academy of Child and Adolescent Psychiatry (AACAP) identify cognitive behavioral therapy (CBT) as the first line of treatment for youth with mild to moderate anxiety (Walter et al., 2020), echoing the findings of several previous meta-analyses and systemic reviews (Kendall et al., 2018; Warwick et al., 2017). CBT has also shown long-term therapeutic gains, post-treatment, of up to 16 years (Wei & Kendall, 2014).

However, while evidence-based treatments have been identified, most youth do not receive any treatment, much less CBT (Bringewatt & Gershoff, 2010; Hoagwood et al., 2001). Moreover, most state mental health agencies report that only 3% of their delivered services are evidence-based, which indicates that the few youth who do receive treatment are unlikely to receive CBT (Bruns et al., 2016). While there are several reasons for lack of access to CBT, three primary barriers include professional resources, access to services, and detection of mental health

challenges. First, few mental health professionals are trained in evidence-based practices (EBP), such as CBT (Creswell & Waite, 2016). Second, many families of children with mental health needs are unable or uninterested in accessing mental health services delivered in traditional ways, such as in office-based settings and in outpatient clinics. Lack of interest and inability to access services are particularly true in rural settings, where caregivers often prefer services to be a part of the more routine care their child receives. Stigma tends to be attached to services received in health care or school settings (Fehr et al., 2020; Polaha et al., 2015). Third, internalizing disorders such as anxiety are more difficult for caregivers to detect and thus address (Pavuluri et al., 1996). The general literature regarding barriers that families experience in accessing child mental health services points to transportation, competing priorities, and perceptual issues such as mistrust of mental health providers and stigma as interfering with seeking services (Staudt, 2006).

The combination of high prevalence of youth anxiety, sparse availability of evidence-based practices, and under-use of traditional mental health services creates a need for alternative models of community care that can be delivered in a range of non-office-based settings (Atkins et al., 2015). This more ecological approach can improve access, reduce stigma, and improve the reach of effective therapies (Mueller & McCullough, 2017). Additionally, because the professional mental health workforce is currently unable to meet the public health need for services (Thomas et al., 2009), developing evidence-based interventions that can be delivered by non-mental health providers is critical.

Equine-assisted services (EAS) are non-traditional approaches to reach populations that may be unable or unwilling to seek out traditional therapies. Various human services now incorporate animals, including equines, within EAS (Acri et al., 2016; Hoagwood et al., 2016). A very small set of studies suggest equine-assisted services may be effective at reducing symptoms among veterans with PTSD (Malinowski et al., 2018) and adults with a range of traumas (Monroe et al., 2019). However, few studies of children or adolescents that incorporate equines have used rigorous methods, with the exception of three studies for youth with autism (Bass et al., 2009; Gabriels et al., 2015, 2018) and one study for children with emotional and behavioral issues (Pendry et al., 2018).

To address this scientific gap in knowledge about EAS and their potential for youth with anxiety disorders, the authors developed an adaptive riding intervention with CBT elements designed to be delivered in therapeutic riding stables (Acri et al., in press). Enhancing adaptive riding by integrating elements of cognitive behavioral therapy may be a promising approach because the child's interaction with the horse provides a naturalistic opportunity to observe and address problematic thinking and behavior (Wilson et al., 2017). Horseback riding has also been found to reduce stress among children (Ohtani et al., 2017) and improve emotion regulation (Pendry et al., 2018). In addition, horses are instinctually attuned to react to the rider's affect, serving as an immediate feedback loop about how their feelings are influencing others and signaling the child to relax (Johns et al., 2016).

By enhancing adaptive riding with cognitive behavioral elements and administering the intervention in a naturalistic setting, the intent was to reduce symptoms of anxiety, enhance attendance in services, and bypass implementation barriers found in traditional mental health settings. The research team also sought to provide a low-cost alternative to traditional outpatient mental health services by training adaptive riding instructors to integrate elements of CBT into adaptive riding sessions.

Methods

Participants

Participants were youth with mild to moderate anxiety and their caregivers recruited from the GallopNYC therapeutic horseback riding center servicing the New York City metro area. Screening for study eligibility was conducted by GallopNYC administrative staff using parent-reported scores on the Generalized Anxiety Disorder 2-item (GAD-2) survey and the Children's Global Assessment Scale (CGAS), two measures that are routinely included in their regular screening process. Briefly, the GAD-2 asks about two core anxiety symptoms, and how often the child has experienced those symptoms in the last two weeks, on a 4-point scale (from 0=Not at all to 3=Nearly every day); scores range from 0-6; a cutoff score of 3 indicates a possible case of generalized anxiety disorder, and that further evaluation is warranted (Kroenke et al., 2007). The CGAS is a 1-item measure of functional impairment and overall severity of disturbance, with scores ranging from 1 to 100, with higher scores representing better functioning (Shaffer et al., 1983).

Inclusion criteria were that the youth was between 6 and 17 years of age, scored 2 or above on the GAD-2, and had a minimum score of 41 on the CGAS. Exclusion criteria for youth were (a) being under the age of 6 or over the age of 17; (b) not showing symptoms of anxiety (GAD-2 score below 2); and (c) not meeting a minimum level of functioning (i.e., did not have a score of 41 or higher on the CGAS). Inclusion criteria for caregivers included being aged 18 years or older and speaking English; exclusion criteria for caregivers included if they were below 18 years old or if they were unable to provide informed consent. GallopNYC screening staff referred caregivers of eligible youth to the New York University (NYU) study team for more information.

Recruitment

Recruitment and delivery of the intervention occurred between December 5, 2018 and March 11, 2020. Study enrollment ended three months earlier than planned due to the COVID-19 closure of GallopNYC. As such, the final study sample size was 41 youth/caregiver dyads; 22 in the intervention group and 19 in services as usual (SAU), short of the planned goal of 60 youth/caregiver dyads. Data collection for youth/caregiver dyads was completed on May 26, 2020, and caregiver satisfaction and instructor satisfaction surveys were collected through the end of June 2020.

Procedures

The New York University (NYU) Langone Health Institutional Review Board (IRB) approved the protocol. Potential participants were recruited in three ways: through existing GallopNYC program attendees (or waitlist for services), advertisement through NYU's Child Study Center (via social media outreach), and via flyers posted in the metro-NYC area's libraries and community centers. After screening, interested participants met with the study Research Coordinator, who explained the study in detail and secured written informed consent. After assent, participants were randomly assigned, via choosing unmarked envelopes which had their group written inside, to either the services as usual (SAU) standard adaptive riding program offered by GallopNYC, or to the experimental intervention, Reining in Anxiety. Reining in Anxiety (RiA) is an adaptive riding group intervention that incorporates five elements derived from a rigorous review of the evidence base for CBT for youth anxiety. Comprising the top five most effective components of evidence-based treatments for youth anxiety, these elements included in vivo exposure, cognitive restructuring, child psychoeducation, relaxation, and caregiver psychoeducation (see below).

Intervention Development

The authors of this paper, who are equine professionals, mental health services researchers, or licensed mental health professionals, developed this manualized treatment, which includes both mounted and unmounted equine interaction activities, with a focus on mental health goals. Development of the content of the intervention was based on information drawn from PracticeWise® (Practicewise.com, 2019), a virtual warehouse of research findings from randomized controlled studies of all effective psychosocial interventions treating children’s mental health disorders. In a search of the PracticeWise® database, a focus was on treatments for mild to moderate anxiety disorders. The top five most effective components, or those with “best-supported research” were: *in vivo* exposure (92%), cognitive restructuring (66%), client psychoeducation (56%), relaxation (44%), and caregiver psychoeducation (40%).

The five identified components were integrated into 10, one-hour adaptive riding sessions, detailed in a comprehensive 75-page intervention manual, with delivery supported by a separate set of implementation supports (e.g., including session props and prompts). Each one-hour session focused on a specific component of CBT towards skill development (e.g. restructuring negative thoughts), using repetition, and reinforced through a weekly homework journal to promote generalization of skills outside of sessions. A caregiver psychoeducation component was developed and delivered in 10-minute segments at the end of each session in conjunction with their child. All learning was supported by both a website (www.reininginanxiety.com) and written caregiver materials. A detailed description of the development of this intervention is described in more detail in Acri et al., in press.

Session Number and Focus:

- 1 { • Components of CBT
- 2 { • CBT w/Anxiety Focus
- 3 { • Relaxation Techniques
- 4 { • Review Sessions 1-3
- 5 { • Finalize Fear Ladder
- 6 { • Thought Changing
- 7 { • Cognitive Distortions
- 8 { • Cognitive Distortions
- 9 { • Problem Solving
- 10 { • Completion: Celebration and Maintenance

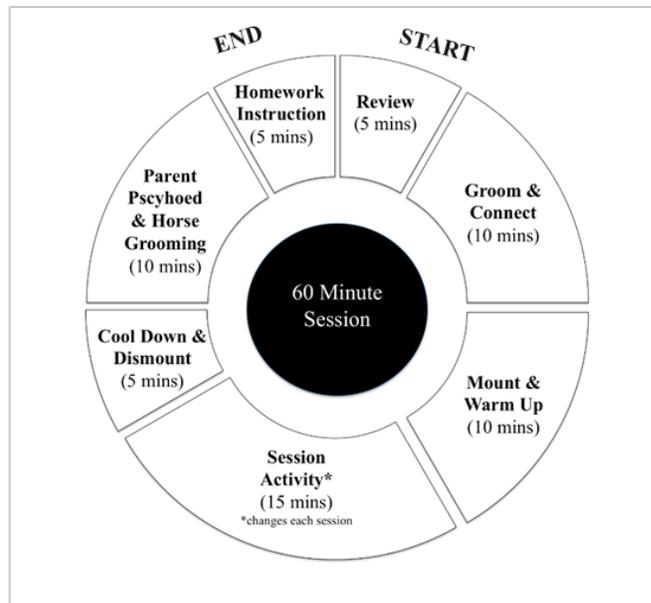


Figure 1
Reining in Anxiety Session Components and Breakdown of Each Session

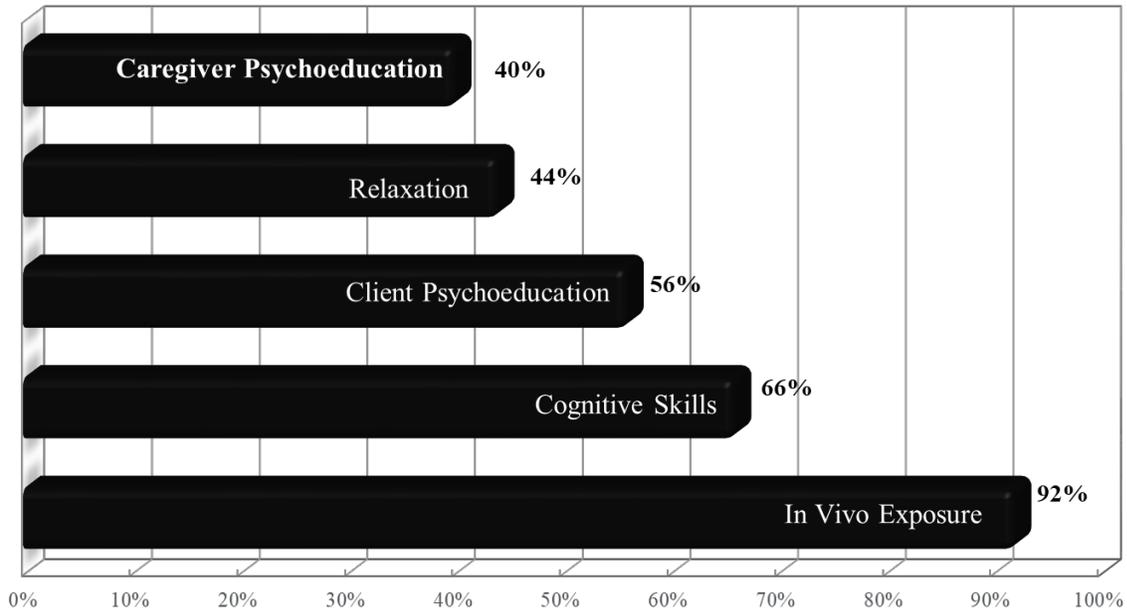


Figure 2
Recommended Top Five Practice Elements for Anxiety from PracticeWise®

Intervention Delivery

The intervention was delivered over the course of GallopNYC’s five program semesters (Winter 2019; Spring 2019; Summer 2019; Fall 2019; Winter 2020); as noted above, the Winter 2020 semester was truncated due to the COVID-19 closure of GallopNYC. Participants in the services as usual (SAU) group received 10 weekly GallopNYC standard adaptive riding lessons, which consisted of teaching horsemanship skills and horseback riding to the children in a manner adapted to their skill level, in accordance with Professional Association of Therapeutic Horsemanship International (PATH) standards for therapeutic riding. PATH-certified instructors employed at GallopNYC taught SAU classes. GallopNYC incorporated anxiety and functional assessment screening into its intake process, and then referred interested caregivers to the research team.

Training

Two PATH-certified therapeutic riding instructors working at GallopNYC delivered the Reining in Anxiety intervention; both had between 3 and 15 months of experience working as PATH-certified instructors. Neither group of instructors had formal mental health training or licensure (e.g. counseling, social work or psychology).

The PATH-certified instructors attended a two-day in person training provided by co-author and co-developer, who is both a PATH-certified instructor and a licensed mental health clinician. Training the instructors in the intervention consisted of content review, practice of the CBT skill, such as teaching relaxation, role modeling, and feedback. Instructors also received extensive implementation supports including props, cards outlining each session’s components, fanny packs (to hold session cards and lesson supplies), and fidelity checklist cards for instructors to keep track that they completed all essential elements of that session.

No families were randomized to the RiA group in the first semester, Winter 2019, so instructors received a one-day booster training from the trainer just before the start of the Spring

2019 semester, the first semester that participants were randomized to the RiA group. The two instructors teaching the Reining in Anxiety sessions also received weekly 30-minute telephone consultation with the trainer to assist in delivery and assess any safety concerns.

Caregiver Psychoeducation

Caregiver psychoeducation was embedded at the end of each session. Brief adjunctive caregiver education programs have been shown to improve outcomes for children with mood disorders (Fristad et al., 2009). The new AACAP anxiety treatment guidelines delineate the importance of caregiver psychoeducation and participation in their child's therapy for improving their symptoms of anxiety (Walter et al., 2020). The riding instructor and riders debriefed in a group with the caregivers, and the riding instructor coached the riders to advise caregivers of skills learned or practiced. This also provided caregivers with an opportunity to ask questions, including how to apply the session's skill to every-day anxiety-provoking scenarios experienced by their child.

Instructor Fidelity in Delivering the Intervention

Fidelity to the manualized protocol was assessed throughout the program. Fidelity checklists were created for each of the 10 sessions by pulling out key elements of the session, and were organized in chronological order of the lesson. An example checklist item is: "Instructor gave riders 3 chances each to provide examples of the connection between a thought, feeling, and action." The number of items on the checklist for each session ranged from 13 to 18. Checklists were completed by a binary yes/no rating on whether or not the instructor completed that part of the session, and scored by calculating the percentage of elements marked 'yes' in each session. In the first semester, 100% of the sessions were rated for fidelity by two raters. In subsequent semesters, 22.8% of sessions were rated for fidelity. 21.7% of all sessions were also assessed by a second rater. Individual session fidelity ratings averaged 98.7%; individual instructor fidelity ratings were 98.1% (Instructor 1) and 99.7% (Instructor 2), well beyond the standard threshold of greater than 80% (Garbacz et al, 2014). In addition, inter-rater reliability was excellent, $k=1$. Further detail on fidelity outcomes can be found in Seibel et al., in press.

Measures

Youth were assessed via caregiver report at baseline and after the last session of the 10-week semester on symptoms of anxiety and self-efficacy and by instructors on general functioning using the measures below. Caregivers also provided sociodemographic data at baseline. Baseline measures were administered in person, with caregivers answering either paper surveys or online through REDCap on a laptop provided. Post-survey measures were sent to caregivers via email and completed online at home via REDCap.

Screen for Child Anxiety Related Disorders (SCARED). This is a 41-item questionnaire that describes anxiety symptoms (Birmaher et al., 1999). Answers are scored on a 3-point Likert scale ranging from "not true" to "very true", and caregivers answered the questions based on which best described their child in the last three months. Items are summed to find a total anxiety score, with a total possible score of 82. Items can also be summed to find five subscale scores (panic disorder, separation anxiety, school avoidance, general anxiety, and social anxiety). Higher scores indicate more anxiety symptoms (a cutoff of 25 indicates an anxiety disorder). Caregivers of youth enrolled in the study completed this both pre and post-intervention. The caregiver and child version of the SCARED were originally developed together, and tested together, showing moderate caregiver-child correlations. Both scales were shown to have good reliability, validity, and internal consistency ($\alpha = 0.90$) (Birmaher et al., 1999).

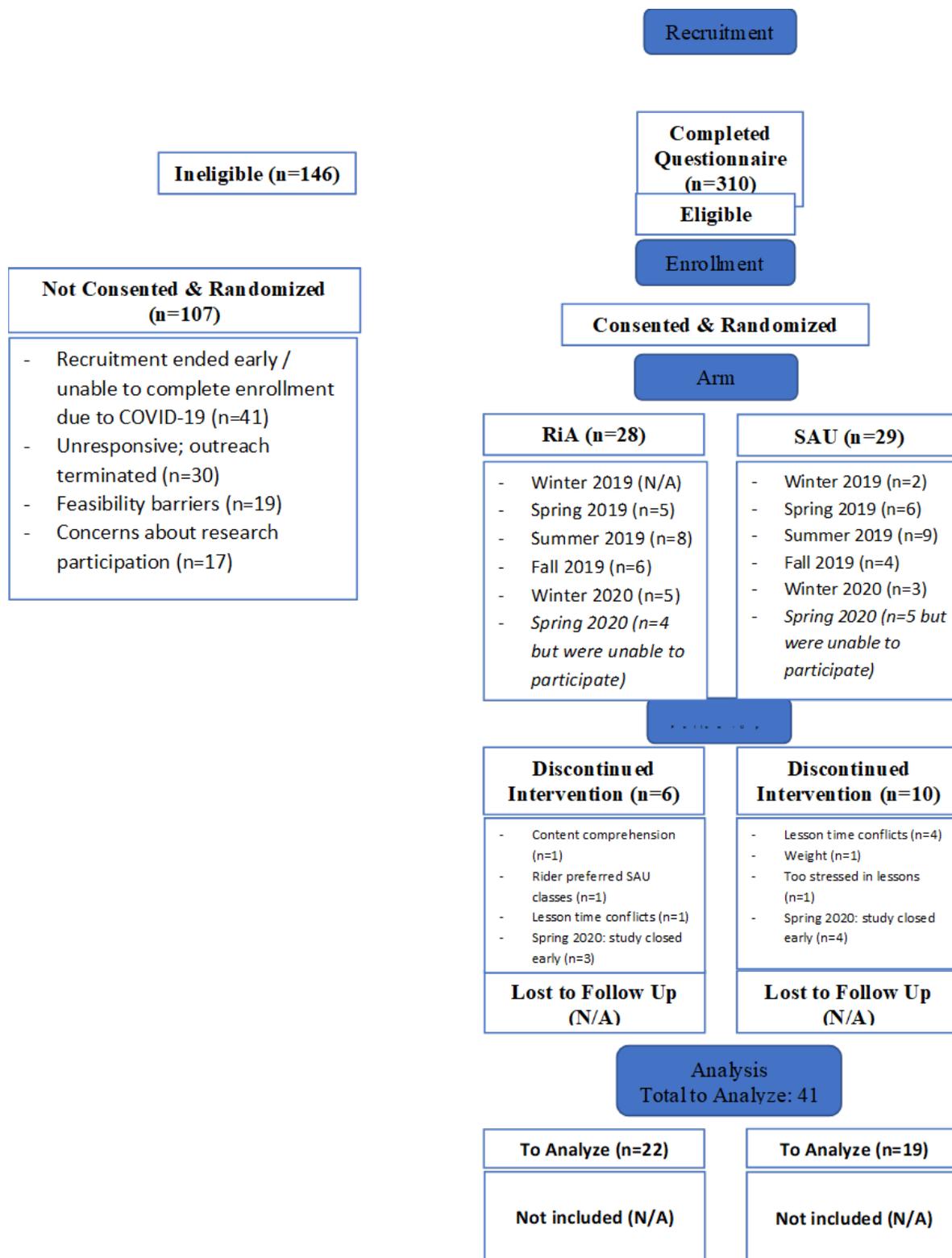


Figure 3
 CONSORT Flow Chart; Participant Recruitment For Reining in Anxiety Trial, for RiA (Reining in Anxiety intervention group) and SAU (Services as Usual)

Brief Experiences in Close Relationships (ECR). The ECR Adult Short Form (Wei et al., 2007) consists of 16 items that measure attachment anxiety (defined as fear of interpersonal rejection, excessive need for approval, and distress when one's partner is unavailable) and attachment avoidance (defined as a fear of dependence, excessive need for self-reliance, and reluctance to self-disclose). This scale was shortened to a 7-item questionnaire to test anxiety in relationships. Participants use a 5-point Likert scale (1 'disagree strongly', 5 'agree strongly') to rate their agreement with statements based on their experiences in close relationships. Higher scores indicate greater levels of attachment anxiety. The language of the measure was modified by the research team so that caregivers could fill it out in regard to their children's relationships. Caregivers of youth enrolled in the study completed this both pre and post-intervention.

Self-Efficacy Questionnaire for Children, Emotional Self-Efficacy Subscale (SEQ- C). The SEQ-C (Muris, 2001) was developed as a child self-report measure, and has 24 questions across 3 domains of self-efficacy. For this study, the emotional self-efficacy subscale (8 items) was used, and modified to ask questions from the caregiver's perspective, rather than from the child's. The eight items assessed caregiver's beliefs regarding their children's competence in controlling negative emotions. Items are scored using a 5-point Likert scale ranging from "not at all (1)" to "very well (5)." Higher scores indicate greater self- efficacy. Caregivers of youth enrolled in the study completed this measure both pre and post- intervention.

Analyses

All analyses were conducted in the statistical program "R". Univariate statistics were used to describe youth and caregivers' sociodemographic characteristics and baseline scores of assessment report. Bivariate analyses, chi-square test or Fisher's exact test, where appropriate, were used to examine differences between the two treatment groups on categorical variables. Group differences on continuous variables were evaluated with two-sample t-test or Man-Whitney U test.

Analysis of covariance (ANCOVA) was conducted to compare pre-post changes of symptoms of anxiety (SCARED), attachment anxiety (SEQ-C) and self-efficacy (ECR) between two groups (Table 2). P-values equal to or less than 0.05 were considered statistically significant.

Changes in anxiety, attachment anxiety, and self-efficacy were assessed by group and by number of sessions attended over time (Table 3 and Table 4).

An ANCOVA was used to examine whether baseline CGAS scores modified the pre-post differences between the groups because all assumptions were met.

Results

Table 1 presents the demographic characteristics of the sample. Sixteen children (n=16, 40%) were between six and eight years of age, followed by 15 (37.5%) who were between nine and 12, and nine (22.5%) who were between 13 and 16 years of age. Slightly over half of children were male (n=22, 53.7%), almost two-thirds identified as White (n=26, 63.4%), and slightly over half of the sample were not of Hispanic ethnicity (n=22, 53.7%). The majority of youth had been previously diagnosed with a mental health disorder (n=29, 70%), as reported by their caregivers.

Half of the caregivers were between 40 and 49 years of age (n=18, 45%), all but three were female (n=38, 92.7%), almost two-thirds identified as White (n=27, 65.9%), and over three-quarters were not of Hispanic ethnicity (n=31, 75.6%). Most caregivers either completed a four-year bachelor's degree (n=14, 34.1%) or graduate/professional school (n=12, 29.3%), and were either employed full time (n=15, 36.6%) or part time (n=12, 29.3%). There were no significant differences between groups regarding child or caregiver sociodemographic characteristics.

Child Outcomes

At baseline, the mean score of anxiety as measured by the SCARED was 70.46 ($SD=12.65$), indicating the presence of an anxiety disorder. The mean score on the ECR, which assesses attachment anxiety in close relationships was 28.41 ($SD=10.83$), indicating some anxiety in close relationships. Emotional self-efficacy as measured by the SEQ-C was 18.49 ($SD=5.06$), indicating moderately low levels of self-efficacy. Scores on these measures across the two groups showed no significant differences. Overall functioning, as measured by the CGAS, was 75.00 (range 70.00-85.00), indicating some impairment in functioning. Youth in the RiA condition had higher CGAS scores at baseline ($n=77.50$, range 71.25-88.75) in comparison to youth in the SAU group ($n=70.50$, range 57.50-76.25; $p=.031$), suggesting slightly higher levels of functioning in the RiA group than the SAU group. No other significant mental health differences were found between groups.

Table 1
Descriptive Variables and Baseline Scores

	Overall <i>N(%) or Mean(SD) or Median[IQR]</i>	RiA <i>N(%) or Mean(SD) or Median[IQR]</i>	SAU <i>N(%) or Mean(SD) or Median[IQR]</i>	P value
Total	41	22	19	
Child				
Child age group				0.474
6-8	16 (40.0)	9 (42.9)	7 (36.8)	
9-12	15 (37.5)	6 (28.6)	9 (47.4)	
13-16	9 (22.5)	6 (28.6)	3 (15.8)	
Child gender				0.662
Male	22 (53.7)	13 (59.1)	9 (47.4)	
Female	19 (46.3)	9 (40.9)	10 (52.6)	
Child race				0.903
White	26 (63.4)	13 (59.1)	13 (68.4)	
Black	7 (17.1)	4 (18.2)	3 (15.8)	
Other/mixed	8 (19.5)	5 (22.7)	3 (15.8)	
Child ethnicity				0.871
Hispanic	18 (43.9)	10 (45.5)	8 (42.1)	
Non-Hispanic	22 (53.7)	11 (50.0)	11 (57.9)	
Other	1 (2.4)	1 (4.5)	0 (0.0)	
Child mental health diagnosis	29 (70.7)	15 (68.2)	14 (73.7)	0.967
Caregiver age group				0.960
28-39	11 (27.5)	6 (28.6)	5 (26.3)	
40-49	18 (45.0)	9 (42.9)	9 (47.4)	
50-68	11 (27.5)	6 (28.6)	5 (26.3)	
Caregiver gender				1.000
Male	3 (7.3)	2 (9.1)	1 (5.3)	
Female	38 (92.7)	20 (90.9)	18 (94.7)	
Caregiver race				0.809
White	27 (65.9)	14 (63.6)	13 (68.4)	
Black	6 (14.6)	4 (18.2)	2 (10.5)	
Other/mixed	8 (19.5)	4 (18.2)	4 (21.1)	
Caregiver ethnicity				0.727
Hispanic	10 (24.4)	6 (27.3)	4 (21.1)	
Non-Hispanic	31 (75.6)	16 (72.7)	15 (78.9)	
Caregiver education				(0.169)
Completed high school/GED	2 (4.9)	0 (0.0)	2 (10.5)	
Some college	3 (7.3)	3 (13.6)	0 (0.0)	

Four-year bachelor's degree	14 (34.1)	7 (31.8)	7 (36.8)	
Completed graduate or professional school	12 (29.3)	8 (36.4)	4 (21.1)	
Other	10 (24.4)	4 (18.2)	6 (31.6)	
Caregiver employment				(0.220)
Employed full-time	15 (36.6)	10 (45.5)	5 (26.3)	
Employed part-time	12 (29.3)	5 (22.7)	7 (36.8)	
Unemployed	9 (22.0)	6 (27.3)	3 (15.8)	
Other	5 (12.2)	1 (4.5)	4 (21.1)	
Baseline Scores				
Baseline SCARED score	70.46 (12.65)	72.68 (12.12)	67.89 (13.09)	0.231
Baseline ECR score	36.51 (11.86)	38.36 (10.15)	34.37 (13.53)	0.515
Baseline SEQ-C score	18.49 (5.06)	18.23 (4.39)	18.79 (5.86)	0.728
Baseline CGAS score	75.00 [70.00, 85.00]	77.50 [71.25, 88.75]	70.50 [57.50, 76.25]	0.031

Note. Descriptive variables and baseline scores for Screen for Child Anxiety Related Disorders (SCARED), Brief Experiences in Close Relationships (ECR), and Self-Efficacy Questionnaire for Children, Emotional Self-Efficacy Subscale (SEQ-C), for treatment groups: RiA (Reining in Anxiety intervention group) and SAU (services as usual). Includes N, the total number of individuals in the sample and the percentage of total sample, mean and standard deviation (SD), or median and interquartile range (IQR).

Analysis of covariance (ANCOVA) found that children in the RiA group displayed significant reductions in symptoms of anxiety as measured by the SCARED ($t=4.426$, $df=38$, $p=0.042$) and improvements in emotional self-efficacy at posttest ($t=4.132$, $df=38$, $p=0.049$) in comparison to the SAU group. No significant differences were found between groups for attachment anxiety in close relationships at posttest. See Table 2.

Table 2
Differences between Groups at Posttest

Group	Analysis	Effect	DFn	DFd	F value	P
RiA vs SAU	SCARED	pre SCARED	1	38	32.97	<0.001
		arm	1	38	4.426	0.042
	ECR	pre ECR	1	38	27.619	<0.001
		arm	1	38	1.746	0.196
	SEQ-C	pre SEQ-C	1	38	32.702	<0.001
		arm	1	38	4.132	0.049

Note. Differences between groups: RiA (Reining in Anxiety intervention group) and SAU (services as usual) at posttest, for outcomes: Screen for Child Anxiety Related Disorders (SCARED), Brief Experiences in Close Relationships (ECR), and Self-Efficacy Questionnaire for Children, Emotional Self-Efficacy Subscale (SEQ-C). Includes DFn (degree of freedom for the numerator of the F ratio) and DFd (degree of freedom for the denominator of the F ratio).

Changes in anxiety, attachment anxiety, and self-efficacy were also assessed by group over time (see Table 3). Children receiving the RiA intervention showed a reduction in anxiety as measured by the SCARED (-6.91), a reduction in anxiety as measured by the ECR (-3.77), and an increase in emotional self-efficacy over time (3.55). Children in the SAU group showed an increase in anxiety (1.21), an increase in anxiety in their close relationships (0.21), and a decrease in self-efficacy from pre to post (-1.33).

Table 3
Mean Pre/Post Changes and Differences by Group

Group	SCARED			ECR			SEQ-C		
	Pre	Post	Diff	Pre	Post	Diff	Pre	Post	Diff
RiA	72.68	65.77	-6.91	29.45	25.68	-3.77	18.23	21.77	3.55
SAU	67.89	69.11	1.21	27.21	27.42	0.21	18.79	19.16	0.37

Note. Mean pre/post changes and differences (Diff) for Screen for Child Anxiety Related Disorders (SCARED), Brief Experiences in Close Relationships (ECR), and Self-Efficacy Questionnaire for Children, Emotional Self-Efficacy Subscale (SEQ-C) by group: RiA (Reining in Anxiety intervention group) and SAU (services as usual).

Additionally, changes in outcomes were assessed by dose (number of sessions attended). Children in the RiA group who attended 6 or fewer sessions showed an increase in anxiety (0.43), a reduction in anxiety in close relationships (-2.14), and an increase in emotional self-efficacy from pre to post (1.57). Children who attended between 7 and 8 sessions showed a decrease in anxiety (-8.60), a decrease in anxiety in close relationships (-3.10), and an increase in emotional self-efficacy (4.00). Children who attended nine or 10 sessions showed a decrease in anxiety (-13.80), a decrease in anxiety in social relationships (-7.40), and an increase in emotional self-efficacy (5.40). While not significant, the trends suggest a dose effect.

In contrast, children in the SAU condition showed an increase in anxiety irrespective of the number of sessions attended (.50, .50, 2.00). Children who attended six or fewer sessions also showed reductions in attachment anxiety (-4.00), while children who attended 7 to 8 sessions showed no change (0.00), and children who attended nine or more sessions (1.33) showed an increase in anxiety in close relationships. Emotional self-efficacy improved among children who attended six or fewer sessions (4.00) and 7 or 8 sessions (1.38), whereas children who attended nine or more sessions showed a decrease in self-efficacy (-1.33).

Table 4
Mean Pre/Post Changes and Differences by Group and Attendance Level

Group	Levels of attendance	SCARED			ECR			SEQ-C		
		Pre	Post	Diff	Pre	Post	Diff	Pre	Post	Diff
RiA	<=6	70.29	70.71	0.43	23.14	21.00	-2.14	19.00	20.57	1.57
	7-8	76.80	68.20	-8.60	33.10	30.00	-3.10	17.90	21.90	4.00
	>=9	67.80	54.00	-13.80	31.00	23.60	-7.40	17.80	23.20	5.40
SAU	<=6	77.00	77.50	0.50	30.00	26.00	-4.00	16.00	20.00	4.00
	7-8	66.00	66.50	0.50	24.25	24.25	0.00	22.25	23.63	1.38
	>=9	67.56	69.56	2.00	29.22	30.56	1.33	16.33	15.00	-1.33

Note. Mean pre/post changes and differences (Diff) for Screen for Child Anxiety Related Disorders (SCARED), Brief Experiences in Close Relationships (ECR), and Self-Efficacy Questionnaire for

Children, Emotional Self-Efficacy Subscale (SEQ-C) by group: RiA (Reining in Anxiety intervention group) and SAU (services as usual), and by attendance level (number of sessions attended).

Discussion

While there are a handful of studies that incorporate horses and target children's mental health, there are very few that use rigorous methods, thus leaving open the question as to whether and how adaptive riding improves children's mental health outcomes (Hoagwood et al., 2016). Among mental health challenges that affect children, anxiety is the most common and is dramatically increasing (Bitsko et al., 2018), especially in the aftermath of the COVID pandemic (Marques de Miranda et al., 2020). There are now literally hundreds of randomized trials (Practicewise.com, 2019) that identify both effective therapies and effective therapeutic techniques for youth with anxiety. Yet there have been no rigorous studies adapting these therapies for alternative delivery approaches, such as adaptive riding. To address this gap, the research team developed and tested an evidence-informed intervention using established CBT elements, and importantly, developed a detailed manual and implementation supports for riding instructors who did not have mental health training.

Data from this pilot study suggests that implementation of Reining in Anxiety was feasible in terms of screening, recruitment, randomization, and retention. Fifty-seven were consented and twenty-eight (n=22, 79%) of the families were randomly assigned to the intervention arm, and twenty-nine (n=19, 66%) to a services as usual (SAU) group. These elements of rigorous evaluation, screening, recruitment, randomization and retention are cornerstones of Good Clinical Practices, required by NIH-funded clinical trials (Grants.nih.gov, 2020).

Youth in the Reining in Anxiety group showed significant reductions in anxiety symptoms over the ten-week program, in contrast to youth in the standard program. Children in the RiA group also showed significant improvements in their sense of competence or self-efficacy over this ten-week trial. No significant differences were found between the groups in attachment anxiety. Baseline differences in child or caregiver sociodemographic characteristics, including age, gender, race, as well as baseline scores for general anxiety (SCARED), attachment anxiety (ECR), and emotional self-efficacy (SEQ-C) did not differ, with the exception of general functioning, where there was a difference favoring the RiA group.

These findings, based as they are on a small sample size, are promising, and suggest that further testing of this experimental intervention is warranted. The authors also examined whether initial functioning (CGAS) scores modified outcome differences and found no effect. Thus it appears that Reining in Anxiety may have had a positive effect on children and youth over and above standard adaptive riding. While not significant, the dose, or number of sessions completed, showed that there was a trend in the experimental group towards greater improvement with higher number of sessions completed, whereas in the standard adaptive riding group, there was no such trend.

Fidelity to the intervention exceeded the standard benchmark of 80% (Garbacz et al., 2014), ranging from 88.9% to 100% across the two PATH-certified instructors (Seibel et al., in press). This suggests that it is feasible to train a non-mental health care workforce to deliver therapeutic interventions. This finding also speaks to the potential to expand access to high-quality, alternative mental health services in areas where there are workforce shortages, or to families who may prefer to access mental health services in more natural and non-traditional (not office-based) settings.

There are several limitations to this study. The COVID-19 pandemic, which closed GallopNYC on March 17, resulted in a premature termination of the program at the fifth semester

of the trial, preventing the achievement of the intended goal of 60 youth and caregiver dyads. One limitation, therefore, is that our power to detect effects across all of our outcome measures was constrained by the smaller sample size. Second, the experimental group at baseline had slightly higher general functioning as measured by the CGAS; it is possible this difference influenced the outcomes in favor of the experimental group. However, the authors tested whether this difference in CGAS scores at baseline modified the differences in outcomes and found no effect, so it is unlikely that this baseline difference affected the outcomes. Third, anxiety, attachment anxiety, and self-efficacy outcomes were assessed through *self-report* of the caregivers. Self-report can be biased and affect ratings, although given that the youth/caregiver dyads were randomized, bias is likely to be similar in both groups.

Conclusion

The findings from this novel experimental study suggest that rigorous methods (random assignment with concordant fidelity measurement) combined with scientifically-validated treatment elements (CBT) for a very common disorder (youth anxiety) can be feasibly tested in non-traditional settings (stables). Further, the findings support the promise of the Reining in Anxiety program as an effective intervention for some children and adolescents experiencing mild to moderate levels of anxiety. Following AACAP guidelines about the first line of treatment for youth anxiety (Walter et al., 2020), treatment components were selected that could be paired with horsemanship skills and activities, and detailed in a 75-page manual that included intensive implementation supports (e.g., weekly consultation, session props, and fidelity checklists). To our knowledge this is the first study of a group intervention for children and youth that integrates CBT components into standard adaptive riding services.

To confirm and build on these initial positive findings, additional research is needed with larger sample sizes and a wider range of outcome measures, including importantly, not just psychological measures, but physiological measures of anxiety and stress in both the horse and rider. Promising data are now emerging that show how EAS can impact adolescent stress hormones, including cortisol (Pendry et al., 2014) and oxytocin (Beetz et al., 2012). Further, at least one study has shown how in youth with anxiety disorders, alpha amylase, a marker of stress, can be lowered using animal-assisted therapy (Yorbik et al., 2016). Future studies of EAS with youth with mental health challenges, particularly internalizing problems, should also consider the collection of additional physiologic markers of stress, including heart rates of riders and horses. It may be fruitful to consider including neuroimaging studies to assess the impact of rhythmic riding on neural pathways (Arnold et al., 2015). Because EAS and the field of human-animal interaction in general are acknowledging the importance of attending to animal well-being as well as human well-being in the delivery of therapeutic services, collecting such physiological indicators from both equines and riders is critical.

While EAS hold promise as an alternative service delivery modality for children and adolescents with mental health struggles, rigorous studies of its effectiveness are sorely lacking. This exploratory study, integrating evidence-informed cognitive-behavioral therapeutic techniques to treat child anxiety into an adaptive riding program, suggests that such an intervention, when delivered with fidelity, can alleviate symptoms of anxiety in children and can be delivered in alternative settings by non-mental health professionals, namely therapeutic riding instructors. This study advances knowledge about how evidence-based and effective care for youth with anxiety can be delivered in naturalistic settings by real-world providers, and thus addresses an important public health issue: broadening delivery and extending the reach of evidence-based mental health services for youth.

References

- Acri, M., Hoagwood, K., Morrissey, M., & Zhang, S. (2016). Equine-assisted activities and therapies: Enhancing the social worker's armamentarium. *Social Work Education, 35*(5), 603-612. doi:10.1080/02615479.2016.1173669
- Acri, M., Morrissey, M., Peth-Pierce, R., Seibel, L., Seag, D., Hamovitch, E.K., Guo, F., Horwitz, S. Hoagwood, K.E. (in press). An equine-assisted therapy for youth with mild to moderate anxiety: Manual development and fidelity. *Journal of Child and Family Studies*.
- Arnold, L. E. (2015). The alone rangers and Silver. *Journal of the American Academy of Child & Adolescent Psychiatry, 54*(7), 535-536. doi:10.1016/j.jaac.2015.04.010
- Atkins, M. S., Rusch, D., Mehta, T. G., & Lakind, D. (2015). Future directions for dissemination and implementation science: Aligning ecological theory and public health to close the research to practice gap. *Journal of Clinical Child & Adolescent Psychology, 45*(2), 215-226. doi:10.1080/15374416.2015.1050724
- Bass, M. M., Duchowny, C. A., & Llabre, M. M. (2009). The effect of therapeutic horseback riding on social functioning in children with autism. *Journal of Autism and Developmental Disorders, 39*(9), 1261-1267. doi:10.1007/s10803-009-0734-3
- Beesdo, K., Knappe, S., & Pine, D. S. (2009). Anxiety and anxiety disorders in children and adolescents: Developmental issues and implications for DSM-V. *Psychiatric Clinics of North America, 32*(3), 483-524. doi:10.1016/j.psc.2009.06.002
- Beetz, A., Uvnäs-Moberg, K., Julius, H., & Kotrschal, K. (2012). Psychosocial and psychophysiological effects of human-animal interactions: The possible role of oxytocin. *Frontiers in Psychology, 3*, 234. <https://doi.org/10.3389/fpsyg.2012.00234>
- Birmaher, B., Brent, D. A., Chiappetta, L., Bridge, J., Monga, S., & Baugher, M. (1999). Psychometric properties of the Screen for Child Anxiety Related Emotional Disorders (SCARED): A replication study. *Journal of the American Academy of Child & Adolescent Psychiatry, 38*(10), 1230-1236. doi:10.1097/00004583-199910000-00011
- Bitsko, R. H., Holbrook, J. R., Ghandour, R. M., Blumberg, S. J., Visser, S. N., Perou, R., & Walkup, J. T. (2018). Epidemiology and impact of health care provider-diagnosed anxiety and depression among US children. *Journal of Developmental & Behavioral Pediatrics, 39*(5), 395-403. doi:10.1097/dbp.0000000000000571
- Bodden, D. H., Dirksen, C. D., & Bögels, S. M. (2008). Societal burden of clinically anxious youth referred for treatment: A cost-of-illness study. *Journal of Abnormal Child Psychology, 36*(4), 487-497. doi:10.1007/s10802-007-9194-4
- Brannan, A. M., Brennan, E. M., Sellmaier, C., & Rosenzweig, J. M. (2018). Employed parents of children receiving mental health services: Caregiver strain and work-life integration. *Families in Society, 99*(1), 29-44. <https://doi.org/10.1177/1044389418756375>
- Bringewatt, E. H., & Gershoff, E. T. (2010). Falling through the cracks: Gaps and barriers in the mental health system for America's disadvantaged children. *Children and Youth Services Review, 32*(10), 1291-1299. doi:10.1016/j.childyouth.2010.04.021
- Bruns, E. J., Kerns, S. E. U., Pullmann, M. D., Hensley, S. W., Lutterman, T., & Hoagwood, K. E. (2016). Research, data, and evidence-based treatment use in state

- behavioral health systems, 2001–2012. *Psychiatric Services*, 67(5), 496–503. <https://doi.org/10.1176/appi.ps.201500014>
- Burstein, M., & Ginsburg, G. S. (2010). The effect of parental modeling of anxious behaviors and cognitions in school-aged children: An experimental pilot study. *Behaviour Research and Therapy*, 48(6), 506–515. doi:10.1016/j.brat.2010.02.006
- Colletti, C. J., Forehand, R., Garai, E., Rakow, A., McKee, L., Fear, J. M., & Compas, B. E. (2009). Parent depression and child anxiety: An overview of the literature with clinical implications. *Child & Youth Care Forum*, 38(3), 151–160. doi:10.1007/s10566-009-9074-x
- Creswell, C., & Waite, P. (2016). Recent developments in the treatment of anxiety disorders in children and adolescents. *Evidence Based Mental Health*, 19(3), 65–68. doi:10.1136/eb-2016-102353
- de Lijster, J. M., Dieleman, G. C., Utens, E. M., Dierckx, B., Wierenga, M., Verhulst, F. C., & Legerstee, J. S. (2018). Social and academic functioning in adolescents with anxiety disorders: A systematic review. *Journal of Affective Disorders*, 230, 108–117. doi:10.1016/j.jad.2018.01.008
- Egger, H. L., & Angold, A. (2006). Common emotional and behavioral disorders in preschool children: Presentation, nosology, and epidemiology. *Journal of child Psychology and Psychiatry, and Allied Disciplines*, 47(3-4), 313–337. Doi:10.1111/j.1469-7610.2006.01618
- Fehr, K. K., Leraas, B. C., & Littles, M. (2020). Behavioral health needs, barriers, and parent preferences in rural pediatric primary care. *Journal of Pediatric Psychology*, 45(8), 910–920. doi:10.1093/jpepsy/jsaa057
- Fristad, M. A., Verducci, J. S., Walters, K., & Young, M. E. (2009). Impact of multifamily psychoeducational psychotherapy in treating children aged 8 to 12 years with mood disorders. *Archives of General Psychiatry*, 66(9), 1013. doi:10.1001/archgenpsychiatry.2009.112
- Gabriels, R. L., Pan, Z., Dechant, B., Agnew, J. A., Brim, N., & Mesibov, G. (2015). Randomized controlled trial of therapeutic horseback riding in children and adolescents with autism spectrum disorder. *Journal of the American Academy of Child & Adolescent Psychiatry*, 54(7), 541–549. doi:10.1016/j.jaac.2015.04.007
- Gabriels, R. L., Pan, Z., Guérin, N. A., Dechant, B., & Mesibov, G. (2018). Long-term effect of therapeutic horseback riding in youth with autism spectrum disorder: A randomized trial. *Frontiers in Veterinary Science*, 5. doi:10.3389/fvets.2018.00156
- Garbacz, L. L., Brown, D. M., Spee, G. A., Polo, A. J., & Budd, K. S. (2014). Establishing treatment fidelity in evidence-based parent training programs for externalizing disorders in children and adolescents. *Clinical Child and Family Psychology Review*, 17(3), 230–247. doi:10.1007/s10567-014-0166-2
- Greenberg, P. E., & Kessler, R. C. (2002). The economic burden of anxiety and stress disorders. In Davis, K.L., Charney, D., Coyle, J.T. & Nemeroff, C. (Eds.), *Neuropsychopharmacology: The fifth generation of progress* (pp. 981–992). Philadelphia, PA: Lippincott Williams & Wilkins.
- Higa-McMillan, C. K., Francis, S. E., Rith-Najarian, L., & Chorpita, B. F. (2015). Evidence base update: 50 years of research on treatment for child and adolescent anxiety. *Journal of Clinical Child & Adolescent Psychology*, 45(2), 91–113. doi:10.1080/15374416.2015.1046177

- Hoagwood, K. E., Aciri, M., Morrissey, M., & Peth-Pierce, R. (2016). Animal-assisted therapies for youth with or at risk for mental health problems: A systematic review. *Applied Developmental Science, 21*(1), 1-13. doi:10.1080/10888691.2015.1134267
- Hoagwood, K., Burns, B. J., Kiser, L., Ringeisen, H., & Schoenwald, S. K. (2001). Evidence-based practice in child and adolescent mental health services. *Psychiatric Services, 52*(9), 1179–1189. doi:10.1176/appi.ps.52.9.1179.
- Johns, L., Bobat, S., & Holder, J. (2016). Therapist experiences of equine-assisted psychotherapy in South Africa: A qualitative study. *Journal of Psychology in Africa, 26*(2), 199-203. doi:10.1080/14330237.2016.1167333
- Kendall, P. C., Settapani, C. A., & Cummings, C. M. (2018). No need to worry: The promising future of child anxiety research. *Future Work in Clinical Child and Adolescent Psychology, 179-191*. doi:10.4324/9781315187914-13
- King, N. J., & Bernstein, G. A. (2001). School refusal in children and adolescents: A review of the past 10 years. *Journal of the American Academy of Child and Adolescent Psychiatry, 40*(2), 197–205. doi:10.1097/00004583-200102000-00014
- Kroenke, K., Spitzer, R.L., Williams, J.B., Monahan, P.O., Löwe, B. (2007). Anxiety disorders in primary care: Prevalence, impairment, comorbidity, and detection. *Annals of Internal Medicine(146)*, 317-25. doi:10.7326/0003-4819-146-5-200703060-00004
- Lazarus, R. S., Dodd, H. F., Majdandžić, M., de Vente, W., Morris, T., Byrow, Y., Bögels, S. M., & Hudson, J. L. (2016). The relationship between challenging parenting behaviour and childhood anxiety disorders. *Journal of Affective Disorders, 190*, 784–791. doi:10.1016/j.jad.2015.11.032
- Malinowski, K., Yee, C., Tevlin, J. M., Birks, E. K., Durando, M. M., Pournajafi-Nazarloo, H., Mckeever, K. H. (2018). The effects of equine assisted therapy on plasma cortisol and oxytocin concentrations and heart rate variability in horses and measures of symptoms of post-traumatic stress disorder in veterans. *Journal of Equine Veterinary Science, 64*, 17-26. doi:10.1016/j.jevs.2018.01.011
- Marques de Miranda, D., da Silva Athanasio, B., Sena Oliveira, A. C., & Simoes-E-Silva, A. C. (2020). How is COVID-19 pandemic impacting mental health of children and adolescents? *International Journal of Disaster Risk Reduction, 51*, 101845. <https://doi.org/10.1016/j.ijdr.2020.101845>
- McLeod B.D., Wood J.J., Avny S.B. (2011) Parenting and Child Anxiety Disorders. In: McKay D., Storch E. (Eds.) *Handbook of child and adolescent anxiety disorders*. Springer, New York, NY. doi:10.1007/978-1-4419-7784-7_15
- Monroe, M., Whitworth, J. D., Wharton, T., & Turner, J. (2019). Effects of an equine-assisted therapy program for military veterans with self-reported PTSD. *Society & Animals, 1- 14*. doi:10.1163/15685306-12341572
- Mueller, M. K., & McCullough, L. (2017). Effects of equine-facilitated psychotherapy on post-traumatic stress symptoms in youth. *Journal of Child and Family Studies, 26*(4), 1164- 1172. doi:10.1007/s10826-016-0648-6
- Muris, P. (2001). A brief questionnaire for measuring self-efficacy in youths. *Journal of Psychopathology and Behavioral Assessment, 23*(3), 145-149.
- NIH. (2017, May 16). Good Clinical Practice Training. Retrieved September 18, 2020, from <https://grants.nih.gov/policy/clinical-trials/good-clinical-training.htm>
- Ohtani, N., Kitagawa, K., Mikami, K., Kitawaki, K., Akiyama, J., Fuchikami, M., . . .

- Ohta, M. (2017). Horseback riding improves the ability to cause the appropriate action (go reaction) and the appropriate self-control (no-go reaction) in children. *Frontiers in Public Health, 5*. doi:10.3389/fpubh.2017.00008
- Pavuluri, M.N., Luk, S.L., McGee, R. (1996). Help-seeking for behavior problems by parents of preschool children: A community study. *Journal of the American Academy of Child & Adolescent Psychiatry, 25*(2). doi: 10.1097/00004583-199602000-00015.
- Pendry, P., Carr, A. M., & Vandagriff, J. L. (2018). Adolescents' affective and physiological regulation shape negative behavior during challenging equine assisted learning activities. *Frontiers in Veterinary Science, 5*. doi:10.3389/fvets.2018.00300
- Pendry, P., Carr, A. M., Smith, A. N., & Roeter, S. M. (2014). Improving adolescent social competence and behavior: A randomized trial of an 11-week equine facilitated learning prevention program. *The Journal of Primary Prevention, 35*(4), 281-293. doi:10.1007/s10935-014-0350-7
- Polaha, J., Williams, S. L., Heflinger, C. A., & Studts, C. R. (2015). The perceived stigma of mental health services among rural parents of children with psychosocial concerns. *Journal of Pediatric Psychology, 40*(10), 1095–1104. doi:10.1093/jpepsy/jsv054
- Practicewise, LLC. (2019). Evidence-based youth mental health services literature database. Retrieved March, 2019, from https://www.practicewise.com/pwebs_2/index
- Seibel, L., Seag, D., Guo, F., Morrissey, M., Peth-Pierce, R., Acri, M., Hamovitch, E., Horwitz, S., & Hoagwood, K. (in press). Adaptive riding incorporating cognitive behavioral elements for youth with anxiety: Fidelity outcomes. *Human Animal Interaction Bulletin: Special Issue*.
- Shaffer, D. (1983). A Children's Global Assessment Scale (CGAS). *Archives of General Psychiatry, 40*(11), 1228. <https://doi.org/10.1001/archpsyc.1983.01790100074010>
- Staudt, M. (2006). Treatment Engagement with Caregivers of At-risk Children: Gaps in Research and Conceptualization. *Journal of Child and Family Studies, 16*(2), 183-196. doi:10.1007/s10826-006-9077-2
- Thomas, K. C., Ellis, A. R., Konrad, T. R., Holzer, C. E., & Morrissey, J. P. (2009). County- Level Estimates of Mental Health Professional Shortage in the United States. *Psychiatric Services, 60*(10), 1323-1328. doi:10.1176/ps.2009.60.10.1323
- van der Bruggen, C. O., Stams, G. J., & Bögels, S. M. (2008). Research review: the relation between child and parent anxiety and parental control: a meta-analytic review. *Journal of Child Psychology and Psychiatry, and Allied Disciplines, 49*(12), 1257–1269. doi:10.1111/j.1469-7610.2008.01898.x
- Walter, H. J., Bukstein, O. G., Abright, A. R., Keable, H., Ramtekkar, U., Ripperger-Suhler, J., & Rockhill, C. (2020). Clinical Practice Guideline for the Assessment and Treatment of Children and Adolescents With Anxiety Disorders. *Journal of the American Academy of Child & Adolescent Psychiatry, 59*(10), 1107-1124. doi:10.1016/j.jaac.2020.05.005
- Warwick, H., Reardon, T., Cooper, P., Murayama, K., Reynolds, S., Wilson, C., & Creswell, C. (2017). Complete recovery from anxiety disorders following Cognitive Behavior Therapy in children and adolescents: A meta-analysis. *Clinical*

- Psychology Review*, 52, 77-91. doi:10.1016/j.cpr.2016.12.002
- Wei, C., & Kendall, P. C. (2014). Parental Involvement: Contribution to Childhood Anxiety and Its Treatment. *Clinical Child and Family Psychology Review*, 17(4), 319-339. doi:10.1007/s10567-014-0170-6
- Wei, M., Russell, D. W., Mallinckrodt, B., & Vogel, D. L. (2007). The Experiences in Close Relationship Scale (ECR)-Short Form: Reliability, Validity, and Factor Structure. *Journal of Personality Assessment*, 88(2), 187-204. doi:10.1080/00223890701268041
- Wilson, K., Buultjens, M., Monfries, M., & Karimi, L. (2016). Equine-Assisted Psychotherapy for adolescents experiencing depression and/or anxiety: A therapist's perspective. *Clinical Child Psychology and Psychiatry*, 22(1), 16-33. doi:10.1177/1359104515572379
- Wood, J. J., McLeod, B. D., Sigman, M., Hwang, W. C., & Chu, B. C. (2003). Parenting and childhood anxiety: theory, empirical findings, and future directions. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, 44(1), 134-151. doi:10.1111/1469-7610.00106
- Yorbik, O., Mutlu, C., Ozturk, O., Altinay, D. K., Tanju, I. A., & Kurt, I. (2016). Salivary alpha amylase levels in youths with anxiety disorders. *Psychiatry Research*, 235, 148-153. doi:10.1016/j.psychres.2015.11.021