

ATTACHMENT AND BIOBEHAVIORAL CATCH-UP: A SYSTEMATIC REVIEW

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ABSTRACT: Attachment Biobehavioral Catch-up (ABC; Dozier et al., 2006) is a 10-week, in-home intervention primarily for early childhood aged children (ages 6 months–2 years). The ABC intervention seeks to teach parents how to provide nurturing care and engage in appropriate interactions with their children. ABC has been identified as a Level 1 evidence-based practice by the California Evidence-Based Clearinghouse for Child Welfare. However, to date, there has been no systematic review presenting the overall evidence behind ABC available in a peer-reviewed journal. The objective of this review is to address this gap by synthesizing prior literature and evidence, specifically evidence from randomized control trials (RCTs), regarding the effectiveness of the ABC intervention and to determine the contexts in which the intervention has been implemented. To complete this review, literature was searched across three bibliographic databases and relevant Web sites. Only RCTs examining child outcomes were included in the review. Using identified search procedures, 10 articles discussing RCTs which tested the efficacy of ABC were identified. Findings indicate that ABC is effective, when implemented with child-welfare-involved children, at improving emotion regulation, improving externalizing and internalizing behaviors, increasing normative developmental functioning, and attachment quality. Sample information from the 10 RCTs identified is presented as well as additional study characteristics.

Keywords: Attachment Biobehavioral Catch-up, early childhood, systematic review, evidenced-based intervention

RESUMEN: La Nivelación de Bio-Conducta de Afectividad (ABC) es una intervención en casa de diez semanas primariamente para niños en la edad de la temprana niñez (de seis meses a dos años). La intervención ABC busca enseñarles a los progenitores cómo proveer un cuidado de crianza y participar en interacciones apropiadas con sus niños. La Oficina de Información Basada en Evidencia para el Bienestar del Niño de California ha identificado a la ABC como una práctica de primer nivel basada en la evidencia. Sin embargo, hasta el momento, no hay una revisión sistemática disponible en revistas acreditadas que presente en general la evidencia que apoya la ABC. El objetivo de la presente revisión es tratar este vacío por medio de sintetizar la anterior literatura y evidencia, específicamente la evidencia por medio de ensayos aleatorios controlados, con respecto a la eficacia de la intervención ABC y determinar los contextos dentro de los cuales la intervención ha sido implementada. Para completar esta revisión, investigamos literatura a lo largo de tres bancos de información bibliográfica y de relevantes páginas electrónicas. Sólo se incluyeron en la revisión los ensayos aleatorios controlados que examinaron los resultados en el niño. Usando procedimientos de investigación identificados, diez artículos que discuten este tipo de ensayos y que pusieron a prueba la eficacia de la ABC fueron identificados. Los resultados indican que la ABC es efectiva, cuando se le implementa con niños bajo el sistema de bienestar infantil, para mejorar la regulación emocional, mejorar las conductas de externalización e internalización, aumentar el funcionamiento de desarrollo normativo, y la calidad de la afectividad. Se presenta información de muestra proveniente de los diez ensayos aleatorios controlados identificados, así como características adicionales del estudio.

Palabras claves: Nivelación de Bio-Conducta de Afectividad, temprana niñez, revisión sistemática, intervención con base en la evidencia

RÉSUMÉ: Le Rattrapage d'Attachement et Biocomportemental (RAB, en anglais *Attachment Biobehavioral Catch-Up*, soit ABC) est une intervention à domicile de dix semaines pour la petite enfance (âges de six mois à deux ans). L'intervention RAB a pour but d'enseigner aux parents comment s'occuper avec soin de leurs enfants et comment bien se comporter avec leurs enfants. Le RAB a été identifié comme étant une pratique ayant fait ses preuves par le Bureau Factuel de la Protection de l'Enfance de Californie. Cependant jusqu'à présent les preuves générales derrière le RAB n'ont pas été systématiquement évaluées dans une publication scientifique avec évaluations par les pairs. L'objectif de ce compte-rendu est d'examiner cet écart en synthétisant les recherches qui ont été faites et les preuves qui ont été apportées, plus particulièrement les preuves émanant d'essais contrôlés randomisés, pour ce qui concerne l'efficacité de l'intervention RAB et afin de déterminer les contextes dans lesquels l'intervention a été appliquée. Afin de faire ce compte-rendu les recherches ont été scrutées au travers de trois bases de données bibliographiques et de sites internet appropriés. Seuls les essais contrôlés randomisés examinant les résultats sur les enfants ont été inclus dans ce compte-rendu. En utilisant les procédures de recherche

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identifiées, dix articles discutant des ECR ayant testé l'efficacité du RAB ont été identifiés. Les résultats indiquent que lorsqu'il est mis en place avec des enfants de la protection de l'enfance, le RAB est efficace pour l'amélioration de la régulation de l'émotion, pour l'amélioration de comportements d'externalisation et d'internalisation, et pour l'augmentation du fonctionnement développemental normative et pour la qualité de l'attachement. Des extraits des dix ECR identifiés sont présentés, ainsi que les caractéristiques supplémentaires de l'étude.

Mots clés: Rattrapage d'Attachement et Biocomportemental, petite enfance, compte-rendu systématique, intervention basée sur des preuves

ZUSAMMENFASSUNG: „Attachment and Biobehavioral Catch-Up“ (ABC) ist eine zehnwöchige Hausbesuchs-Intervention für Kinder im frühen Kindesalter (im Alter von sechs Monaten bis zwei Jahren). Die ABC-Intervention zielt darauf ab, den Eltern beizubringen, wie sie eine fürsorgliche Betreuung und angemessene Interaktionen mit ihren Kindern gewährleisten können. ABC wurde vom „California Evidence-Based Clearinghouse for Child Welfare“ als evidenzbasierte Praxis der Stufe eins identifiziert. Bislang gibt es jedoch kein systematisches Review, das die Gesamtevidenz für ABC in einer Fachzeitschrift (mit Peer-Review) darstellt. Das Ziel dieses Reviews ist es, diese Lücke zu schließen, indem frühere Literatur und Befunde, insbesondere Befunde aus randomisierten Kontrollstudien, über die Wirksamkeit der ABC-Intervention zusammengefasst werden und die Kontexte, in denen die Intervention durchgeführt wurde, untersucht werden. Für das Review wurde die Literatur von drei bibliografischen Datenbanken und relevanten Webseiten durchsucht. Nur randomisierte Kontrollstudien, die die Ergebnisse von Kindern untersuchten, wurden in das Review einbezogen. Mit Hilfe spezieller Suchverfahren wurden zehn Artikel identifiziert, die RCTs diskutieren, die die Wirksamkeit von ABC untersuchten. Die Ergebnisse deuten darauf hin, dass ABC wirksam ist, wenn es mit Kindern der Kinderwohlfaht umgesetzt wird sowie bei der Verbesserung der Emotionsregulation, der Verbesserung des Externalisierungs- und Internalisierungsverhaltens, der Erhöhung der normativen Entwicklungsfunktion und der Bindungsqualität. Es werden Stichprobeninformationen aus den zehn identifizierten RCTs sowie zusätzliche Studienmerkmale dargelegt.

Stichwörter: „Attachment Biobehavioral Catchup“, frühe Kindheit, systematisches Review, evidenzbasierte Intervention

抄録: Attachment Biobehavioral Catch-Up(ABC) は、早期乳幼児期の子ども(生後6か月から2歳まで)に向けた10週間の家庭での介入である。ABCによる介入では、親に養育的なケアと子どもとの適切な相互交流への携わり方を教えることを目指している。ABCはカリフォルニア児童福祉エビデンスに基づくクリアリングハウスによってレベル1のエビデンスに基づく実践と認定されている。しかしながら、論文審査のある専門誌におけるABCを支持する根拠のすべてを示す入手可能な系統的検討は現在までのところない。この検討の目的は、このギャップを示すことにある。すなわち、まず先行文献と根拠、その中でも特にABCによる介入の有効性を重要視したランダム化比較試験から得られた根拠を総合的に扱うことによって、介入が実施された状況の前後関係を確定することである。この検討を完結するため、3つの著書目録のデータベースと関連するウェブサイトにて文献検索した。その中で子どもの転帰を調査したランダム化比較試験のみを検討対象に含んだ。認定された検索手続きを使用し、ABCの効果を検証したランダム化比較試験を考察する10論文が割り出された。得られた知見は、ABCは児童福祉の関わりを持った子どもに実施されると、情緒調整の改善、行動の外在化と内在化の改善、定型的発達機能やアタッチメントの質の向上に関し効果的であることが示された。ランダム化比較試験で認められた10論文の実例の情報を提示し、追加研究に見られた特徴も加えた。

キーワード: Attachment Biobehavioral Catch-Up, 早期乳幼児期, 系統的検討, 根拠に基づく介入

摘要: 依附和生物行為追趕(ABC)是一項為期十週的家庭干預,主要對象是幼兒(6個月至2歲)。ABC干預旨在教導父母如何提供養育護理並與孩子進行適當的互動。ABC已被加州循證兒童福利信息中心確定為一級以證據為基礎的做法。然而,到目前為止,在同行評審期刊中還沒有ABC總體證據的系統評論。本文章的目的是通過綜合先前的文獻和證據,特別是隨機對照試驗的證據,評論關於ABC干預的有效性,以及確定干預措施實施的背景。為完成此評論,作者在三個書目數據庫和相關網站上搜索了文獻。只有檢查兒童結果的隨機對照試驗才被納入評論。作者使用已確定的檢索程序,確定了10篇討論RCT的文章,這些文章都測試了ABC的功效。調查結果表明,ABC對接受福利的兒童,有效改善情緒調節、改善外化和內化行為、增加規範性發育功能和依附質量。作者提供了來自10個RCT的樣本信息,以及其他研究特徵。

關鍵詞: 依附生物行為追趕, 幼兒期, 系統評價, 循證干預

ملخص: يعتبر برنامج التعلق واللاحق البيولوجي السلوكي (ABC) نموذج تدخل منزلي لمدة عشرة أسابيع مخصص أساساً لفترة الطفولة المبكرة (الذين تتراوح أعمارهم بين ستة أشهر وستين). ويهدف هذا التدخل إلى تعليم الآباء كيفية توفير الرعاية الصحية والانخراط في التفاعلات المناسبة مع أطفالهم. وقد تم تحديد برنامج (ABC) على أنه المستوى الأول من الممارسات القائمة على الأدلة من قبل مركز رفاهية الطفل في كاليفورنيا. غير أنه لا يوجد حتى الآن استعراض منهجي يقدم الأدلة العامة حول برنامج (ABC) في الأبحاث المنشورة. والهدف من هذا الاستعراض هو معالجة هذه الفجوة من خلال توليف الأدبيات والأدلة السابقة، ولا سيما الأدلة المستمدة من معالجات تجريبية، فيما يتعلق بفعالية تدخل برنامج (ABC) وتحديد السياقات التي تم فيها تطبيق هذا التدخل. ولإكمال هذا الاستعراض، تم البحث في الأدبيات عبر ثلاث قواعد بيانات ببيولوجية ومواقع شبكية ذات صلة. ولم تدرج في الاستعراض سوى المعالجات التجريبية التي تتناول نتائج التدخل. باستخدام إجراءات البحث المحددة، تم تحديد عشر مقالات تناقش فعالية ABC. وتشير النتائج إلى فعالية هذا التدخل وذلك عند تنفيذه مع الأطفال داخل مؤسسات رعاية الطفل، في تحسين تنظيم الانفعالات، وتحسين السلوكيات الخارجية والداخلية، وزيادة الأداء المعياري للنمو، ونوعيه التعلق. تقدم في الدراسة عينة من المعلومات في الدراسات العشرة المحددة، فضلاً عن الخصائص الإضافية للدراسة.

الكلمات الرئيسية: برنامج التعلق واللاحق البيولوجي السلوكي، الطفولة المبكرة، مراجعته منهجية، التدخل القائم على الأدلة

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Infancy and early childhood are critical periods, given the rapid development of the brain and regulatory systems (Hertzman, 1999; National Research Council and Institute of Medicine, 2000; Teicher, Andersen, Polcari, Anderson, & Navalta, 2002; Tottenham, 2012). As such, early adversity during childhood, such as poverty or maltreatment, has the potential for long-lasting and negative consequences on health and development throughout an individual's life span (Hanson, Adluru, Chung, Alexander, Davidson, & Pollack, 2013; Lawson, Duda, Avants, Wu, & Farah, 2013). Adversity during the early childhood years can lead to problems in brain development, later engagement in risky behaviors, mental health concerns, and chronic health problems, and can even lead to early death (Burke, Hellman, Scott, Weems, & Carrion, 2011; Felitti et al., 1998; Shonkoff & Garner, 2012). Furthermore, even if stress or adversities do not extend beyond the early childhood stage, risk for negative outcomes such as later health issues can remain (Winning, Glymour, McCormick, Gilsanz, & Kubzansky, 2015).

During the early developmental period for infants and young children, the brain has high plasticity (Bernard, Butzin-Dozier, Rittenhouse, & Dozier, 2010; Johnson & Blum, 2012; National Research Council and Institute of Medicine, 2000; Nelson, 1999). During the early years, infants and young children develop strategies to handle stressful or difficult stimuli and rely on a caregiver to assist them in developing these strategies (Moran, Forbes, Evans, Tarabulsky, & Madigan, 2008). Infants and young children, who do not form a secure relationship with a caregiver in their early years, in some cases are at risk for developing psychopathology (Cassidy, Jones, & Shaver, 2013; Moran et al., 2008). The Attachment and Biobehavioral Catch-up (ABC; Dozier et al., 2006) intervention is an evidence-based intervention targeting these types of children and caregivers. ABC is designed for implementation in the early childhood years for work with parents of young children at risk of maltreatment or experiencing multiple adversities.

ABC is a 10-week parenting program delivered in the home. ABC was developed to meet the needs of infants aged 6 to 24 months. Although an adapted version for older children (24–28 months; Attachment Biobehavioral Catchup Program, 2017) has been developed, its evidence is not yet as fully published and thus will not be considered in this review. ABC was designed to promote sensitive parenting to help children who have experienced early adverse environments develop self-regulation and coping (Dozier, Dozier, & Manni, 2002; Dozier & Infant Caregiver Project, 2016). ABC helps caregivers learn optimal sensitive parenting behavior (Dozier et al., 2002), which in turn assists the child in emotion regulation (Dozier & Infant Caregiver Project, 2016). ABC is designed to assist parents in following their child's lead and creating nurturing environments. Parent coaches, who are trained in the delivery of the ABC model, meet with parents in the child's home and provide "in-the-moment" coaching comments to parents; these comments are meant to promote ABC's target behaviors of providing nurturance and following the child's lead (Dozier & Infant Caregiver Project, 2016).

Prior studies have evaluated the efficacy of the ABC intervention (Dozier & Infant Caregiver Project, 2016; Wright et al., 2015). As such, the California Evidence-Based Clearinghouse for Child Welfare (California Clearinghouse) recognizes ABC as a Level 1 evidence-based intervention. The California Clearinghouse is a registry of evidence-based practices, which independently reviews and disseminates information about evidence-based interventions for child welfare. A Level 1 rating indicates that the evidence behind the ABC intervention is strong and well-supported, compared with other interventions rated (California Evidence-Based Clearinghouse for Child Welfare, n.d.).

AIMS

There are multiple aims of this review. First, while ABC is registered with the California Clearinghouse, there is not a systematic review available in a peer-reviewed journal. This review addresses this gap. Other evidence-based approaches, such as Acceptance and Commitment Therapy which also is registered with the California Clearinghouse, have had reviews published in peer-reviewed journals (Montgomery, Kim, & Franklin, 2011), setting a precedent for such review. The second aim is to synthesize the evidence supporting ABC to be easily accessible to other scholars, policymakers, or practitioners wishing to implement the ABC intervention. Although the California Clearinghouse identifies some of the research behind ABC, the studies identified are listed individually, and a condensed review is not readily available. This review allows for a condensed and more easily accessible method for understanding the randomized control trials (RCTs) examining ABC. Finally, this review allows for a better understanding of the methodological rigor of previously conducted RCTs and for an abbreviated understanding of the various settings, sample characteristics, and outcomes associated with ABC regarding children.

METHOD

Studies included in this review have focused on the effectiveness of the ABC intervention on child outcomes, its implementation in different child populations, and its implementation in various child settings. Child outcomes were of particular interest for this review due to authors' interest in child populations. Furthermore, combining various types of outcomes in a systematic review is not always appropriate (Littell, Corcoran, & Pillai, 2008). Note that RCTs examining caregiver outcomes, although highly valuable, were not the focus of this review and therefore are not included. This study focused solely on RCTs. The focus of this study was to describe the ABC intervention literature or evidence obtained through RCTs. While the developers of ABC are explicit in stating that ABC's outcomes are to teach parents how to create nurturing environments for their children and to assist parents behave in ways that support their child's ability to develop self-regulatory skills, the studies included in this review utilized various measures to examine a variety of outcomes pertaining to social, emotional, and developmental outcomes of children.

Search Strategy

For this systematic review, a comprehensive search of the literature was completed using multiple bibliographic databases such as PsycInfo, Web of Science, and EBSCO Host. These databases were chosen due to the nature of the publications and their large, interdisciplinary approach. Appendix A includes the complete search strategy. It was deemed unlikely for the search terms to be in titles only; however, it was believed that the search terms would appear or be available in article abstracts. Therefore, the search term was searched in both the titles and abstracts of the bibliographic databases. No date restrictions were utilized; however, searches were conducted through March 2017. In addition to bibliographic databases, the search included hand-searching two peer-reviewed journals that publish papers related to the study topic: the *Infant Mental Health Journal* and the *Child and Adolescent Social Work Journal*.

Authors also conducted Internet searches. Internet searches included searching the official ABC Web site maintained by the University of Delaware, infantcaregiverproject.com, and by the California Clearinghouse, cebc4cw.org. Finally, authors examined the included articles' reference lists to identify additional literature that met study criteria.

Data Collection and Analysis Method

Study selection. To be included in the review, the study must have utilized an RCT and implemented the ABC intervention. Outcomes discussed in the studies must have involved child outcomes, not just caregiver outcomes. Furthermore, studies must have been published in English. The focus of the review was RCTs; therefore, qualitative studies were excluded because they did not fit within the scope of the review.

Based on the search strategy described, 193 articles were identified, including duplicates. Identified articles were downloaded to a citation-management software program, Zotero Version 4.0 (2017). After eliminating duplicates in the citation-management software program, 144 articles remained. Both authors reviewed the title and abstracts of the 144 identified articles using inclusion and exclusion criteria, and excluded 126 articles for study design reasons such as studies reporting only caregiver outcomes. Of the 18 articles that met inclusion criteria based on the title and abstract review, nine were eventually excluded from the analysis, leaving a total of nine articles. As part of the review process described previously, reference lists of identified articles were reviewed. After reviewing the reference lists of the identified nine articles, an additional article was selected for possible inclusion. After reviewing this article, it was determined that the article met inclusion criteria; therefore, the final reviewed consisted of 10 articles. Disagreements were resolved through a consensus process (see Appendix B). There were two primary reasons for exclusion: (a) After review, the article was not an RCT; and (b) the article discussed caregiver outcomes, which is outside of the scope of this review.

Data Extraction

After studies were selected, authors independently utilized a data-extraction form to assess and extract pertinent data for the systematic review. Data extracted included (a) demographics of the targeted population (both child and caregiver, if available), including age, gender, and race; (b) service sector family/child was involved with (e.g., foster care/child welfare system, mental health system, etc.); (c) independent and dependent variables; and (d) statistical significance between the intervention and outcome variable(s). Specifically, we examined whether children assigned to the ABC intervention group demonstrated statistically significant associations with dependent variables. We also extracted information regarding the professionals delivering the ABC intervention and adherence to fidelity of the ABC model. Data were extracted by the first author and then by second author, and checked by both authors to establish interrater reliability in the data-extraction process. Disagreements between the two authors were again resolved by consensus.

After data extraction, it was determined that several studies selected for analysis utilized the same data set, yet reported findings related to different child outcomes and utilized various evaluation/follow-up time periods. In addition, two studies identified through the search procedures were obvious follow-ups to previously conducted RCTs; however, the RCT of origin is not identifiable or clearly delineated in the article. Authors clarified this information through e-mail communication with the ABC developers (for more information regarding each study and the RCT for which the study is reporting results, see Tables 1 and 2).

RESULTS

The following section details the results of the review. Results are categorized based on study design, randomization process, control/comparison group, setting, sample characteristics, intervention characteristics, and outcome measurement. Note that the majority of articles identified, and subsequently the results of the review, stem from three major RCTs.

Study Design

Tables 1 and 2 provide a summary of the data extracted from the 10 studies, including sample size, outcomes measured, instrument/tool used to measure outcomes, statistical approach, and study results. As indicated previously, to be included in the analysis, the study must have utilized a randomized control design.

Numerous studies utilized the same data or sample cohort, yet report on various outcomes. Dozier et al. (2006) is one of the earlier evaluation studies of ABC and examines children placed in foster care and living with foster caregivers. Four additional studies (Bernard, Lee, & Dozier, 2017; Dozier et al., 2009; Dozier, Peloso, Lewis, Laurenceau, & Levine, 2008; Lewis-Morrarty, Dozier, Bernard, Terracciano, & Moore, 2012) were follow-up studies to Dozier et al. (2006). Sprang (2009) utilized RCT design features and reported outcomes based on a data set not affiliated

TABLE 1. ABC Implementation Characteristics

Author(s) & Year	Location	Service Sector	Fidelity Adherence?	Control Group(s)?	Randomization Process	Provider Characteristics	When Were Data Collected?
I. Dozier et al., 2006	2 Mid-Atlantic States	Child Welfare	YES	DEF Comparison Group of Typically Developing Children	Participants Were Blind to Random Assignment; Researchers Entering and Analyzing Data Also Were Blind to Group Assignment	Professionally Licensed Social Workers or Psychologist With 5 Years' Experience	1 Month After Intervention
Dozier, Peloso, Lewis, Laurenceau, & Levine, 2008 [follow up to Dozier et al., 2006]	Labs Affiliated With University of Delaware	Child Welfare	YES	DEF Comparison Group of Typically Developing Children	Participants Were Blind to Random Assignment; Researchers Entering and Analyzing Data Also Were Blind to Group Assignment	Professionally Licensed Social Workers or Psychologist With 5 Years' Experience	Not Clearly Identified
Dozier et al., 2009 [follow up to Dozier et al., 2006]	2 Mid-Atlantic States	Child Welfare	No Description	DEF	Participants Were Blind to Random Assignment; Researchers Entering and Analyzing Data Also Were Blind to Group Assignment	Professionally Licensed Social Workers or Psychologist With 5 Years' Experience	1 Month After Intervention
Lewis-Morrarty, Dozier, Bernard, Terracciano, & Moore, 2012 [follow up to Dozier et al., 2006]	Not Indicated	Child Welfare	No Description	Foster care control Non-foster care control	Not Discussed	Not Discussed	Not Clear
Bernard, Lee, & Dozier, 2017 [follow up to Dozier et al., 2006]	Not Indicated	Child Welfare	No Description	DEF	Project Coordinator Randomly Assigned Children to Intervention Group Using Randomly Generated Number Sequence (Intervention assignment was based on even vs. odd digit.)	Not Discussed	2 Years' Postintervention

(Continued)

TABLE 1. Continued

Author(s) & Year	Location	Service Sector	Fidelity Adherence?	Control Group(s)?	Randomization Process	Provider Characteristics	When Were Data Collected?
2. Sprang, 2009	Not Indicated	Mental health/clinical treatment; child welfare	Not Adequate Description	Treatment as usual plus parent support group	Research Staff Performed Random Assignment Based on Fixed Randomization Process (Every 4th case was designated to wait-list control.)	1 Child Psychiatrist 1 Psychiatric Nurse 2 Licensed Clinical Social Workers	Pre-Intervention & Postintervention
3. Bernard et al., 2012	Large Mid-Atlantic City	Child Welfare	Not Discussed	DEF	Not Discussed	Not Discussed	At Least 1 Month' Postintervention
Lind, Bernard, Ross, & Dozier, 2014 [follow up to Bernard et al., 2012]	Large Mid-Atlantic City	Child Welfare	Not Discussed	DEF	Not Discussed	Parent Coaches Were a Mix of Bachelor's and Master's Levels; No Indication of Professional Type	Not Clearly Identified; 1–27 Months' Postintervention
Bernard, Dozier, Bick, & Gordon, 2015 [follow up to Bernard et al., 2012]	Not Discussed	Child Welfare	YES; Briefly Mentions Fidelity	DEF	Not Discussed	Not Discussed	1 Month' Postintervention; 2.67 Months on Average; Collection Time Ranged up to 1 Year
Bernard, Hostinar, & Dozier, 2015 [follow up to Bernard et al., 2012]	Not Discussed	Child Welfare	Not Discussed	DEF	Project Coordinator Randomly Assigned Children to Intervention Group Using Randomly Generated Number Sequence (Intervention assignment was based on even vs. odd digit.)	Not Discussed	3 Years' Postintervention

TABLE 2. Sample and Outcome Data Extraction

Author(s) and Year	Sample Type	Sample Size	Race	Gender	Age	Child Outcomes Measures	Statistical Approach	Intent-to-Treat Analysis	Results
1. Dozier et al., 2006	Child-Welfare-Involved Children	60 Children in ABC and DEF Additional 104 Children Comparison Group in Secondary Analysis	Children: 63% Black 32% White 5% other (biracial) Typically Developing Comparison Group: 48% Black 50% European American	Caregivers: 93% Female, 7% Male Children: 50% Male, 50% Female Typically Developing Comparison Group: 48% Male, 52% Female	Children: 3.6–39.4 Months Typically Developing Comparison Group: 20–60 Months	Cortisol Sampling Twice Per Day for 2 Days Parent Daily Report of Problem Behaviors for 3 Days at Postassessment	ANOVA	Not Discussed	DEF Children Showed Higher Cortisol Values. Caregivers in the ABC Group Reported Fewer Problem Behaviors for Toddlers Than Infants; Which Was Not the Case for DEF Caregivers. ABC Cortisol Regulation Was More Similar to Typically Developing Children. Children in the ABC Group Showed Lower Initial Levels of Cortisol Upon Arriving in the Strange Situation Lab Than Children in the DEF Group. Comparison Group Children Did Not Have Significantly Different Initial Levels of Cortisol Than the ABC Group But Did Have Lower Levels Than the DEF Group; Increases in Cortisol Were Not Present In Any Group After the Strange Situation. Children in the ABC Group Were Reported To Show Less Avoidance Than Children in the DEF Group. Scores Pertaining to Security Were Not Significant.
Dozier, Peloso, Lewis, Laurenceau, & Levine, 2008	Child Welfare	46 ABC Children 47 DEF 48 Typically Developing Children Not in Foster Care	Children: ABC: 81% Black 17% White 2% Hispanic DEF: 66% Black 29% White 5% Hispanic Comparison: 56% White 35% Black 5% Hispanic	Children: ABC: 41% Male, 59% Female DEF: 57% Male, 43% Girls Typically Developing: 56% Male 44% Girls	Children: ABC: 20.0 Months DEF: 19.5 Months Comparison: 19.5 Months	Strange Situation Cortisol Sampling: 15 Min Before Strange Situation; 15 Min After; and 30 Min After. Additional Foster Parents Collected Samples Prior to Leaving Their House for the Strange Situation and 2 hr Post-Strange Situation	Hierarchical Linear Modeling: Group Differences in Strange Situation	Not Discussed	Children in the ABC Group Showed Lower Initial Levels of Cortisol Upon Arriving in the Strange Situation Lab Than Children in the DEF Group. Comparison Group Children Did Not Have Significantly Different Initial Levels of Cortisol Than the ABC Group But Did Have Lower Levels Than the DEF Group; Increases in Cortisol Were Not Present In Any Group After the Strange Situation. Children in the ABC Group Were Reported To Show Less Avoidance Than Children in the DEF Group. Scores Pertaining to Security Were Not Significant.
Dozier et al., 2009	Child Welfare	46 Children	Children: 63% Black 26% White 10% other (biracial; Hispanic)	Children: 50% Male, 50% Female	Children: 3.6–39.4 Months	Attachment Diaries: Foster Parents Completed Diaries for 3 Days	ANOVA	Not Discussed	Children in the ABC Group Were Reported To Show Less Avoidance Than Children in the DEF Group. Scores Pertaining to Security Were Not Significant.

(Continued)

TABLE 2. Continued

Author(s) and Year	Sample Type	Sample Size	Race	Gender	Age	Child Outcomes Measures	Statistical Approach	Intent-to-Treat Analysis	Results
Leitw-Morrarty, Dozier, Bernard, Terraciano, & Moore, 2012	Children Involved With Child Welfare	61 Children ABC Group: 17 Foster Care Control: 20 Non-Foster-Care Comparison: 24	Caregivers: 57% Female 39% Black 1% Asian Children: 43% Black 36% European American 21% Biracial, Hispanic, Asian	Caregivers: 100% Female Children: 50% Male, 50% Female	4 and 6 Years Old; 60.3 Months	Cognitive Flexibility: Card Sort Game Theory of Mind: Penny-Hiding Game	ANCOVA χ^2 Controls: Child Receptive Language	No	Children in the ABC Group and the Non-Foster-Care Control Group Scored Significantly Better in Cognitive Flexibility and Theory of Mind Activities, Which Indicates ABC Supports Normative Development in Children.
Bernard, Lee, & Dozier, 2017	Child-Welfare-Involved Children	52 Children DEF Group: 28 ABC Group: 24 Children (22 of which were still residing with caregiver who had received intervention)	Children: 50% Black 29% White 21% Other (biracial; Asian American; Hispanic)	Children: 44% Male, 56% Female	34.2–46.4 Months	Receptive Language: Peabody Picture Vocabulary Test, 3rd ed. (PPVT III): No Validity Measures Given	Control and Intervention Group Differences: χ^2 Tests and <i>t</i> Tests. PPVT (III): Independent Samples <i>t</i> Test. Control for Covariates: Stepwise Regression	Yes	ABC Children Scored in the 45th Percentile While Control Group Children Scored in 28th Percentile on PPVT Standard Scores. Effect of ABC on Receptive Language Remains Significant When Controlling for Covariates.
2. Sprang, 2009	Foster Parents Children Diagnosed With Attachment-Related Disorders	58 Care-giver/Child Dyads 29 in ABC Group 29 in DEF Group	Caregivers: 25 White Children: Not Provided	Caregivers: 15% Male, 85% Female Children: 49% Female, 51% Male	Caregivers: 39.7 Years Children: 42.5 Months	Child Behavior Checklist for 4- to 18- and 1- to 5-Years-Olds Child Abuse Potential Inventory Parent Stress Index Short Form	CAPI, CBCL, and PSI Analyzed Using One-Way ANOVA Demographic Differences Between Groups: Independent Samples <i>t</i> Test χ^2 Analysis: Categorical Variables Multivariate Repeated Measures ANOVA: Pre- and Postinteraction Effects; No Control Variables Described	Yes	CBCL Internalizing and Externalizing Scores Were Higher for Control Group. Therapists' Determination of the Level of Engagement of the Caregiver Was the Best Predictor of CBCL Improvements.
3. Bernard et al., 2012	Children & Families in Foster-Care Diversion	120 Children 113 Parents	Children: 73% Black 8% White 31% Other (biracial; Hispanic)	Parents: 98% Female, 2% Male Children: 58% Male, 42% Female	Parents: 15.7–47 Years Children: 1.7–21.4 Months	Strange Situation Procedure	Organized Versus Disorganized Attachment: χ^2 Tests	Not Discussed	Children in ABC Group Showed Lower Rates of Disorganized Attachment & Significantly Higher Rates of Organized Attachment.

(Continued)

TABLE 2. Continued

Author(s) and Year	Sample Type	Sample Size	Race	Gender	Age	Child Outcomes Measures	Statistical Approach	Intent-to-Treat Analysis	Results
Lind, Bernard, Ross, & Dozier, 2014	Children & Families in Foster-Care Diversion	112 Biological Parents 117 Children	Parents: ABC: 4% Male 96% Female DEF: 2% Male 98% Female Children: ABC: 55% Male 45% Female DEF: 51% Male 49% Female	Parents: ABC 65% Black 19% White 16% Other (biracial; Hispanic) DEF: 62% Black 10% White 28% Other (biracial, Hispanic)	Parents: ABC: 28.7 Years DEF: 27.7 Years Children: ABC: 26.7 Months DEF: 26.2 Months	Negative Affect: the Tool Tasks	ANOVA	Not Discussed	Children in the ABC Group Showed Lower Negative Affect Expression Compared to Children in the Control Intervention Group. Children in the ABC Group Showed Lower Levels of Anger, Anger Toward Parent, and Lower Levels of Global Anger and Sadness.
Bernard, Dozier, Bick, Gordon, & Dozier, 2015	Child-Welfare-Involved Children	101 Children (49 ABC; 52 DEF)	Parents: 65% Black 16% White 19% Other (biracial; Hispanic) Children: ABC: 69% Black 7% White 24% Other (biracial; Hispanic) DEF: 62% Black 10% White 28% Other (biracial; Hispanic)	Parents: All Female But 2 ABC: 59% Male 41% Female DEF: 54% Male 46% Female	Parents: 15.1–46.6 Years Children: 46.5–69.6 Months	Cortisol Sampling Twice Per Day for 3 Days	Group Differences in Cortisol Levels: Hierarchical Linear Modeling	Not Discussed	Waking Cortisol Levels Differed Significantly for ABC Children Than DEF Children; Bedtime Cortisol Levels Were Not Significantly Different. Children in the DEF Group Showed Blunted Cortisol Patterns (not steep pattern).
Bernard, Hostinar, & Dozier, 2015	Child-Welfare-Involved Children	105 Children (54 ABC; 61 DEF)	59% Black 10% White 31% Other (biracial; Hispanic)	Abc: 59% Male 41% Female Def: 56% Male 44% Female	Children: 5–34.2 Months	Cortisol sampling Twice Per Day Over 2–3 days Control(s): Child Age	Group Differences in Cortisol Levels: Hierarchical Linear Modeling	Not Discussed	Waking Levels of Cortisol Differed Significantly Between Children in the ABC Group and Children in the DEF Group When Controlling for Time and Age. ABC Child Showed a Steeper Wake Up to Bedtime Pattern Than Children in the DEF Intervention.

with the other studies identified. In the description of the study design, Sprang utilized elements of “efficacy studies and effectiveness research by applying specific components of a randomized control trial to a clinic based setting” (p. 82).

Finally, Bernard et al. (2012) examined children and families who received ABC after being referred to a child welfare diversion program. These children experienced some sort of maltreatment; however, the maltreatment did not rise to a level requiring removal from the home. Three additional studies included in this analysis (Bernard, Dozier, Bick, & Gordon, 2015; Bernard, Hostinar, & Dozier, 2015; Lind, Bernard, Ross, & Dozier, 2014) were follow-up studies to Bernard et al. (2012).

The majority of studies utilized pre- and posttest design elements. Several of the studies clearly indicated that evaluation of the sample children occurred 1 month after the conclusion of the ABC intervention (Bernard et al., 2012; Dozier et al., 2009; Dozier et al., 2006). Longitudinal evaluations occurred for Bernard et al. (2017), who evaluated children 2 years’ postintervention; for Bernard, Hostinar, and Dozier (2015), who evaluated children 3 years’ postintervention; and for Lewis-Morrarty et al. (2012), who evaluated children during their preschool years, but it was not clear how much time had lapsed since the children received the ABC intervention. The remaining studies also were not clear in describing their postevaluation time period (Dozier et al., 2008; Sprang, 2009) or the postevaluation time period ranged and was not the same across all children and families participating in the postevaluation (Bernard, Dozier, Bick, & Gordon, 2015; Lind et al., 2014).

Randomization

Sprang (2009) utilized a fixed randomization process. Families were either randomized for treatment or were placed on a waitlist control. Every fourth case was identified as a random control case starting with a random number.

Although not presented in the original Bernard et al., (2012) article, in Bernard, Hostinar, and Dozier (2015), randomization is described in detail. For this RCT, the project coordinator randomly assigned children to the intervention groups using a randomly generated sequence of numbers, with the intervention assignment based on even versus odd digits.

Dozier et al. (2006) described using double-blind randomization procedures, as both foster caregivers and participating birth parents were blind to their assigned condition. Furthermore, researchers who entered data, analyzed data, and assayed cortisol samples also were blind to the participants’ random assignment. Dozier et al. (2006) did not indicate if all researchers participating in the project were blind to participants’ group assignment.

Nine of the 10 publications reviewed indicated that they completed randomization checks to determine if children and families in the intervention control group or comparison group(s) differed significantly from the children in the ABC intervention group (Bernard et al., 2012; Bernard, Dozier, Bick, & Gordon, 2015; Bernard, Hostinar, & Dozier, 2015; Bernard et al., 2017; Dozier

et al., 2009; Dozier et al., 2008; Dozier et al., 2006; Lewis-Morrarty et al., 2012; Lind et al., 2014). Dozier et al. (2008) did find statistically significant differences between their comparison, intervention control, and experimental intervention groups regarding initial cortisol levels; however, subsequent analysis demonstrated no statistical significant difference in the ABC group and the comparison group. Lewis-Morrarty et al. (2012) discussed numerous statistically significant differences between the three groups analyzed in their follow-up study. Child differences regarding age, race/ethnicity, and gender were found as well as differences in family income and caregiver education level. Researchers conducted further analyses and determined that these variables were not needed as control variables in the main analysis. Sprang (2009) did not indicate if those on the wait-list/in the control condition differed significantly from the treatment condition.

Control/Comparison Group

All publications reviewed randomly assigned consenting participants to an experimental intervention group, an intervention control group, or a treatment-as-usual control group. In the secondary data-analysis phase, Dozier et al. (2008) and Dozier et al. (2006) included a comparison group of typically developing children. Eight of the 10 publications discuss the same intervention program for their intervention control group (Bernard et al., 2012; Bernard, Dozier, Bick, & Gordon, 2015; Bernard, Hostinar, & Dozier, 2015; Bernard et al., 2017; Dozier et al., 2009; Dozier et al., 2008; Dozier et al., 2006; Lind et al., 2014). The RCTs that these publications are based on utilized the Developmental Education for Families program (Ramey, McGinness, Cross, Collier, & Barrie-Blackley, 1982; Ramey, Yeates, & Short, 1984). This educational intervention was designed to enhance cognitive and linguistic development, as opposed to attachment and socioemotional development skills addressed by ABC. Components that involve parental sensitivity to child cues were excluded in our version of the intervention to keep the interventions distinct. Although the intervention is manualized, specific activities take into account the child’s developmental level. Sprang (2009) utilized a treatment-as-usual approach and offered support groups to caregivers. Lewis-Morrarty et al. (2012) utilized a foster-care intervention control group, a non-foster-care control group, and an ABC experimental intervention group. Lewis-Morrarty et al. did not elaborate on what intervention the control group received.

Location

When determining what variables to include in this review, location of the delivery of the intervention was deemed essential to understanding the intervention’s impact. According to the U.S. Census Bureau (2016), close to 60 million people live in rural areas, including close to 13 million children. Authors were interested in if ABC had been implemented with children living in rural areas due to the unique challenges associated with delivering home-based services in rural areas. After reviewing the articles, one location

was identified. Sprang (2009) did not indicate any location characteristics, and all other studies appeared to have taken place in the Mid-Atlantic region, with no indication of rural settings (Bernard et al., 2012; Bernard, Dozier, Bick, & Gordon, 2015; Bernard, Hostinar, & Dozier, 2015; Bernard et al., 2017; Dozier et al., 2009; Dozier et al., 2008; Dozier et al., 2006; Lewis-Morrarty et al., 2012; Lind et al., 2014).

SAMPLE

Articles reviewed centered on RCTs conducted with children either living with foster parents or with biological parents. Sample sizes for both the experimental intervention group and control group(s) ranged from 46 (Dozier et al., 2009) to 120 children (Bernard et al., 2012). All children and their caregivers were involved in the child welfare system at the time of the intervention. Four of the 10 studies implemented ABC with biological caregivers and children who were part of a foster-care diversion program (Bernard et al., 2012; Bernard, Dozier, Bick, & Gordon, 2015; Bernard, Hostinar, & Dozier, 2015; Lind et al., 2014). Abuse histories of these studies' sample children were not available or presented. Sprang (2009) sampled children who were residing with foster caregivers and were experiencing attachment-related disorders. However, the child welfare system was not the primary service sector making the referral to the ABC project. Rather, these children were treatment-seeking, and the place of referral was described as a clinical-based setting. Dozier et al. (2006) and subsequent follow-up studies (Dozier et al., 2009; Dozier et al., 2008) utilized children who were involved in the child welfare system, were removed from their home, and living with foster caregivers. Bernard et al. (2017) and Lewis-Morrarty et al. (2012), also indicated that their samples were predominantly children living with foster caregivers.

The primary race of the sample children was African American, followed by White. Most studies cited having some percentage of their sample as biracial or Hispanic. Most children were in their early childhood or infant years during delivery of the ABC intervention, yet older during some of the more long-term follow-ups. Sprang (2009) conducted the only study in which delivery of the ABC intervention could have been done with older children (up to age 6 years). However, Sprang reported the average child's age included in the study as 42 1/2 months. Bernard et al. (2012) reported having a child as young as 1.7 months, and the study was conducted using mostly infants. Bernard, Hostinar, and Dozier (2015) reported having a child included in their sample as old as 69.6 months in their study, which functioned as a follow-up study to Bernard et al. (2012) using children up to 3 years after the original 2012 study.

Demographic information for the caregiver was presented in some articles (Bernard et al., 2012; Bernard, Dozier, Bick, & Gordon, 2015; Dozier et al., 2006; Lewis-Morrarty et al., 2012; Lind et al., 2014; Sprang, 2009) and not presented in others (Bernard, Hostinar, & Dozier, 2015; Bernard et al., 2017; Dozier et al., 2009; Dozier et al., 2008). In the articles in which caregiver information was presented, caregivers were predominantly female,

and their ages ranged from 15 to 47 years (Bernard et al., 2012). Additional descriptions of familial or caregiver characteristics were limited in all studies. Only 4 of the 10 studies discussed caregiver education level (Bernard et al., 2012; Bernard et al., 2017; Lewis-Morrarty et al., 2012; Lind et al., 2014), and 3 of the 10 studies discussed household or caregiver income levels (Bernard et al., 2017; Dozier et al., 2008; Lewis-Morrarty et al., 2012).

Dozier et al. (2006) and subsequent follow-up studies (Dozier et al., 2008; Dozier et al., 2009; Lewis-Morrarty et al., 2012; Bernard et al., 2017) described placement challenges with some of the child and caregiver participants. Dozier et al. (2006) stated that delivery of the ABC intervention continued with the child's new placement caregivers, if possible.

Intervention Characteristics

Environmental conditions can play a large role in child and family functioning. ABC is a program designed to be delivered in the home, and all articles indicated that they adhered to home delivery of ABC services. The study by Bernard, Dozier, Bick, and Gordon (2015) was the only one to describe service delivery to children and families experiencing homelessness. Although they briefly indicated that ABC is to be delivered wherever the family resides (shelter, hotel, etc.), they did not go on to detail if any of their sample experienced homelessness at any given time during service provision. If ABC is being delivered to a family who is experiencing homelessness, which is plausible because ABC is designed to be delivered to a child where he or she resides, as noted in Bernard, Dozier, Bick, and Gordon (2015), it would be an important variable to note.

The primary service sector or setting for the identified studies was of particular interest for this review. Specifically, authors were interested in how often ABC was tested with biological caregivers versus foster caregivers. In addition, authors were interested in which child-serving service sector was primarily observed in RCTs. All articles included child participants and caregivers involved in the child welfare system either at the time of the study or previously in the child's life. The setting described in Sprang (2009) indicated that ABC was offered through a clinical-treatment setting; however, the children in the sample were residing with foster caregivers. All other studies explicitly indicated that their sample was derived from the child welfare population/system.

As ABC is a manualized intervention, with an unusually rigorous fidelity process. Dozier et al. (2006) and Bernard et al. (2012) both indicated that treatment providers adhered to the fidelity process and were videotaped so that proper fidelity could be assessed. Therefore, the follow-up studies to these original RCTs also adhered to fidelity procedures. The extent to which fidelity was measured in Sprang (2009) is unclear. Sprang mentions fidelity adherence as practitioners followed the ABC manual, but does not specify practitioners being videotaped for proper fidelity measurement, which is an indicator of the ABC fidelity process (Dozier et al., 2006).

Measurements/Outcomes

Saliva sampling. There was significant variance across studies regarding the child outcomes being measured. Table 2 contains information pertaining to each study's outcome, statistical analysis method, and results. Although outcomes tested varied across studies, the cortisol tests—via saliva sampling—were the most frequent outcome measure utilized to test the efficacy of ABC (Bernard, Dozier, Bick, & Gordon, 2015; Bernard, Hostinar, & Dozier, 2015; Dozier et al., 2008; Dozier et al., 2006).

To test cortisol levels, most studies utilized multiple saliva samples from each participant. Caregivers were carefully trained in saliva-collection procedures and collected saliva from their children over 2 to 3 days, twice per day. In addition, studies indicated that caregivers also were instructed to keep a wellness log to indicate if the child was sick or indicate other reasons that could potentially alter cortisol levels in their saliva. Bernard, Dozier, Bick, and Gordon (2015) found that children in the intervention control group (DEF) demonstrated blunted cortisol regulation patterns, as compared to children in the ABC group. Blunted cortisol patterns demonstrate weak slope lines from morning saliva samples to bedtime saliva samples.

While examining the cortisol outcomes presented in the studies, a discrepancy was found between the outcomes in Dozier et al. (2006) and the longitudinal outcomes in Bernard, Dozier, Bick, and Gordon (2015) regarding waking cortisol levels for children in the ABC experimental group, as compared to children in the DEF intervention control group. Both of these studies utilized ABC as the experimental group and DEF as the intervention control group. However, Bernard, Dozier, Bick, and Gordon (2015) found that children in their ABC group demonstrated higher waking levels of cortisol whereas Dozier et al. (2006) found that the DEF children demonstrated higher levels of waking cortisol. Bernard, Dozier, Bick, and Gordon (2015) therefore saw steeper waking to bedtime cortisol slopes for ABC children, as compared to Dozier et al. (2006). Bernard, Dozier, Bick, and Gordon (2015) recognized this discrepancy and attributed the difference found to variances in samples. Bernard, Dozier, Bick, and Gordon (2015) examined children living with high-risk birth families whereas Dozier et al. (2006) examined children living with foster caregivers. Bernard, Dozier, Bick, and Gordon (2015) suggested that perhaps steeper cortisol-regulation patterns were more indicative or normative of children living with high-risk birth families versus children living with foster caregivers.

Dozier et al. (2008) also utilized saliva sampling; however, they were interested in evaluating the impact of ABC versus DEF on cortisol levels of sample children when completing the Strange Situation Procedure. The Strange Situation Procedure is an often utilized procedure to measure attachment in young children (Ainsworth, Blehar, Waters, & Wall, 1978) and is described in more detail later. Dozier et al. (2008) had caregivers collect saliva in various intervals throughout the day that the child was to participate in the Strange Situation procedure. Dozier et al. (2008) found that children whose caregiver had received ABC showed

lower levels of cortisol upon arriving in the Strange Situation lab than did children in the DEF group. They also found that comparison-group children, or typically developing children, did not have significantly different initial levels of cortisol than did the ABC group. The typically developing comparison-group children did have lower levels of initial cortisol than did children in the DEF group. In their model, Dozier et al. (2008) included three categorical predictor variables: age, gender, and ethnicity. None of these variables accounted for significant variance in cortisol levels of the sample children. Researchers also measured cortisol after children completed the Strange Situation Procedure. These results indicated no significant difference among all three groups.

Finally, Bernard, Hostinar, and Dozier (2015) utilized saliva-collection procedures and child cortisol levels as a longitudinal outcome for testing the efficacy of ABC versus DEF. When collecting saliva samples nearly 3 years' post-ABC, researchers found that when controlling for age and time of collection, children in the ABC group still demonstrated higher levels of waking cortisol compared to children in the DEF group. In addition, researchers found that ABC children had a negative and steeper waking to bedtime cortisol-regulation pattern than did children in the DEF group.

Attachment. Some studies measured attachment qualities among sample children in both the ABC group and the DEF group. To measure attachment, Bernard et al. (2012) utilized the Strange Situation Procedure (Ainsworth et al., 1978). The Strange Situation Procedure involves creating an artificial environment in which children are put through a series of stressful situations designed to elicit attachment responses. Dozier et al. (2008) also utilized the Strange Situation Procedure, but rather than an outcome of interest, it was utilized as a mechanism to determine cortisol changes for children in the ABC group and DEF group after exposure to the Strange Situation Procedure. Bernard et al. (2012) found that children in the ABC group showed lower rates of disorganized attachment and significantly higher rates of organized attachment than did children in the DEF group.

Other measures of attachment qualities included attachment diaries. In Dozier et al. (2009), caregivers completed an attachment diary for 3 days. Foster caregivers reported daily on children's help-seeking behavior, or lack thereof. Coders then coded the diaries and looked for child behavior matching proximity-seeking/constant maintenance, successful calming by the parent, avoidance, or resistance. To ensure interrater reliability, coders assessed 26% of the diaries at 86% agreement or above. Dozier et al. (2009) also presents validation properties for the diaries, which were validated based on the Strange Situation Procedure. Findings from Dozier et al. (2009) indicate that caregivers who received ABC reported that their children showed less avoidance when distressed than did caregivers in the control group.

Problem behaviors/emotion regulation. Emotion regulation or improvement in problem behaviors was a frequent outcome domain examined in the studies. Lind et al. (2014) examined children's negative affect using the Tool Task. The Tool Task Matas, Arend,

& Sroufe, 1978 is a parent–child interaction procedure designed to assess children’s emotion expression during a series of challenging tasks. Children and caregivers are presented three small challenges. Challenges increase in difficulty, and parents are instructed to first allow the child the opportunity to solve the challenge by him- or herself. After a few minutes, the caregiver can then assist the child. Researchers videotape children’s responses to the challenges and score the responses. For this study, scores were categorized as anger, anger toward parent, or global sadness/anger. Findings revealed that children in the ABC group showed lower levels of negative affect expression, as compared to children in the control intervention group. In addition, children in the ABC group showed lower levels of anger, anger toward parent, and global anger and sadness.

Sprang (2009) also examined emotional and problem behavior outcomes. Using the Child Behavior Check List (CBCL; Achenbach & Edelbrock, 1983), for both 1- to 5-years-olds and 4- to 18-year-olds, She found that children in the control group demonstrated higher levels of internalizing and externalizing behaviors than did children in the ABC intervention group. Sprang also found that therapists’ perceptions of the caregivers’ level of engagement in the intervention was the best predictor of CBCL improvements for children. She did not describe utilizing any control variables in the statistical analysis.

Developmental. Two studies examined child developmental outcomes, Bernard et al. (2017) and Lewis-Morrarty et al. (2012). Bernard et al. (2017) evaluated ABC’s impact on children’s receptive language skills by using the Peabody Picture Vocabulary Test (3rd ed.; Dunn & Dunn, 1997). Researchers conducted follow-up evaluation with ABC and DEF children 2 years’ postintervention and found that ABC children scored in the 45th percentile whereas DEF children scored in 28th percentile on Peabody Picture Vocabulary Test standard scores. Furthermore, researchers found that the effect of ABC on receptive language remained significant when controlling for child’s gender, caregiver education level, caregiver income level, and the number of foster care placements since birth. However, note that data for this outcome were available for only 22% of the original sample.

Lewis-Morrarty et al. (2012) utilized children’s receptive language skills as a control variable in their study which examined children’s executive functioning and cognitive flexibility. Researchers utilized the Dimensional Change Card Sort activity (Zelazo, 2006) to measure these constructs. This card sort activity asks children to sort a series of cards into separate piles, first according to one dimension (e.g., color) and then, after completing six trials, according to the other dimension (e.g., shape). Furthermore, researchers examined children’s theory of mind by administering the penny-hiding game. This game involves a researcher hiding a penny in his or her hand behind his or her back. The researcher then presents both closed hands to the child, and the child guesses which hand holds the penny. The researcher conducts this activity three times, then asks the child to hide the penny. Children are given scores on how well they complete the

trials. In their study, Lewis-Morrarty et al. found that children in the ABC group and the non-foster-care control group scored significantly better in cognitive flexibility and theory of mind activities, which indicates that ABC supports normative development in children.

DISCUSSION

Overall Findings

The overarching goal of this review was to examine the effectiveness of the ABC intervention by reviewing RCTs, to determine the characteristics of the child populations with which the intervention has been implemented, and to assess the child outcomes impact by ABC. Despite the methodological challenges that this review identified with previously conducted RCTs, this review demonstrates that ABC is an intervention that addresses and positively impacts some of the most vulnerable children and families.

This review found that through RCTs, ABC appears to be effective at improving a variety of child outcomes. Saliva sampling and cortisol testing were the most frequent outcome measure utilized to test the effect of ABC on emotion regulation of young children. Studies citing saliva testing indicated that saliva-collection procedures were carefully followed and adequately discussed with caregivers. Findings from the review indicate that ABC assists in regulating children’s cortisol production and patterns. This is a substantial finding, as prior research has found potential negative and harmful neurological implications from early childhood exposure to prolonged toxic stress, which in turn makes children susceptible to adverse reactions from traumatic experiences (Middlebrooks & Audage, 2008). Studies also found that children and their caregivers who received the ABC intervention demonstrated improvements in externalizing and internalizing problem behaviors. ABC, derived from attachment theory (Bowlby, 1969), also enhances children’s attachment qualities. In addition to emotional and behavioral outcomes, ABC impacts children’s cognitive development. Studies identified found ABC to be effective in improving or assisting in normative function development as well as language skill acquisition.

All children and families included in the studies identified had been previously involved or were currently involved with the child welfare system. This is an important aspect of the ABC intervention because young children involved in child welfare are among the most vulnerable children, making effective interventions necessary and essential, which, based on the RCTs identified, ABC has demonstrated. Children involved in the child welfare system are, at minimum, experiencing one major adversity. Furthermore, those children who are ultimately placed in foster care have typically experienced maltreatment in the form of physical, sexual, emotional, or psychological abuse, and/or general neglect. In 2015, approximately 2.2 million cases of abuse and neglect were reported involving 4.1 million children, making child welfare a priority in terms of effective interventions (Children’s Bureau, 2018).

TABLE 3. Methodological Quality

Study Authors & Year	Large Sample Size	Avoidance of Detection Bias	Avoidance of Performance Bias	Random Assignment	Addressed Sample Power	No Conflicts of Interest	Validated Measures	Avoidance of Allegiance Bias
Dozier et al., 2006		✓	✓	✓			✓	
Dozier, Peloso, Lewis, Laurenceau, & Levine, 2008		✓		✓		✓	✓	
Dozier et al., 2009		✓	✓	✓			✓	
Lewis-Morrarty, Dozier, Bernard, Terracciano, & Moore, 2012								
Bernard, Lee, & Dozier, 2017			✓	✓				
Sprang, 2009			✓	✓		✓		✓
Bernard et al., 2012			✓	✓			✓	
Lind, Bernard, Ross, & Dozier, 2014		✓	✓	✓				
Bernard, Hostinar, & Dozier, 2015			✓	✓			✓	
Bernard, Dozier, Bick, & Gordon, 2015			✓	✓			✓	

Methodological Quality

Table 3 contains methodological quality indicators and whether each study adhered to those indicators. This table is based on Littell et al.’s (2008) suggestions for study quality indicators as well as the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (Moher, Liberati, Tetzlaff, & Altman, 2009) checklist. Quality indicators include whether studies addressed large sample sizes and sample power, avoidance of detection and performance bias, random assignment, conflicts of interest, validate measures, and avoidance of allegiance bias. This review’s inclusion criterion required all studies to be RCTs; therefore, the studies reviewed can be initially classified as rigorous due to the nature of this review. RCTs are the “gold standard” in the hierarchy of evidence (Litrell et al., 2008); thus, this review is examining some of the highest quality intervention evidence.

Whereas RCTs are the gold standard and have been conducted to evaluate the ABC intervention, few methodological issues emerged throughout the course the review. First, the majority of RCTs identified through the systematic review procedures were follow-ups to an original cohort of ABC sample children and families. Although this review examines 10 publications, only three RCTs were found through the search procedures. No studies addressed sample power; therefore, sample sizes could not be adequately assessed.

Other issues identified throughout this review regarding methodological quality involve limited to no variance in intervention control groups to which ABC has been compared, potential conflicts of interest/allegiance bias, possible detection bias, and unstandardized observation periods. Almost all articles utilized the same intervention for their control group, DEF. This is due to the majority of articles presenting follow-up findings to an RCT. While, based on the descriptions provided in the studies, DEF is comparable to ABC in terms of brevity, utilizing other intervention control groups in conducting RCTs examining ABC can further strengthen ABC’s evidence. Although it is not necessarily a limitation, it would be interesting to note how

ABC children and caregivers compare to other control groups or interventions.

Nine of the 10 studies were authored or coauthored by the ABC developer, leading to possible conflicts of interested or allegiance bias. However, Dozier et al. (2006) described blind data-analysis methods, and therefore questions or concerns pertaining to conflicts of interest and allegiance bias can be somewhat alleviated. It is important for future evaluation studies of the effectiveness of ABC to be conducted independently from those who are part of the ABC development to ensure no biases in data analysis or dissemination. Furthermore, due to the limited variance of the location of the studies, the generalizability of the intervention should be further examined.

Finally, one of the most unanticipated findings from this review involves the lack of control variables included in most of the RCTs conducted. Children, especially young children experiencing adversities which ABC intends to target, should be understood within the environmental contexts in which they live (Hare, 2004). Few studies provided any information on the homes where the children lived or the families of which they were members. Of the studies that did provide familial characteristics, these characteristics were limited to basic demographic information. As all of the children and families identified are part of, or involved with, the child welfare system, it is logical to assume that these families may have been receiving additional services from numerous agencies. No study mentioned controlling for other services that families received. However, the randomization process itself could address some of the need for more control variables.

Implications and Future Areas of Research

The mental health status of children involved in the child welfare system is often marked by disruptions in emotional and behavioral development (Leve et al., 2012). A rich area for future inquiry involves examining ABC’s effect on the longitudinal mental health status of children exposed to caregivers who received ABC. In

addition, given that ABC was found to be effective in improving varying aspects of emotion regulation in young children involved in the child welfare system, which was the goal of the ABC developer, questions leading to its applicability as a primary prevention program for young children in the general population remain. Additional RCTs could expand knowledge regarding ABC applicability to children and families involved in different child-serving systems such as early childhood mental health services. Given how successful ABC has been found to be in child welfare contexts, it is logical to assume that ABC also could be useful and beneficial when implemented in other settings in which young children and their caregivers are experiencing adversities.

An additional implication derived from this review involves previous RCTs' setting and location. The majority of the studies took place in the Mid-Atlantic region, again bringing into question the generalizability of the RCTs' findings. Given that procedural aspects of children's services vary across regions, future RCTs in the Midwest or West Coast regions could prove beneficial in expanding the generalizability of the effects of the ABC intervention to populations in other settings and locations. In addition, it would be interesting to see the global and international use of ABC and evaluate its impact on children in countries other than the United States. Other parent/child programs have seen popularity in other countries (Thomas & Zimmer-Gemback, 2007). While it is outside of the scope of this review to examine the global implications of ABC, future reviews could examine this issue.

Finally, provider characteristics were detailed in some studies, but lacking in others. Variation in provider characteristics such as discipline type or education level could be included as variables in future ABC evaluation studies as differential provider characteristics could impact the effect of ABC on children. Future studies also could look at how ABC impacts providers, particularly in reference to their professional quality of life or overall job satisfaction.

Conclusion

The goal of this review was to summarize and identify the prior literature surrounding the implementation of ABC. Specifically, this review sought to identify which child outcomes ABC has been found to impact, the settings/context of prior ABC implementation, and the characteristics of the children and families previously sampled through ABC RCTs. This review found that ABC has a significant effect on a plethora of vitally important child social, emotional, and developmental outcomes. This review also identified that ABC has primarily been implemented in the child welfare system, which was the target population of the ABC developer.

To our knowledge, no other systematic reviews are available in peer-reviewed journals examining the ABC intervention; therefore, overall comparisons for this review are not available. However, overall, the studies included in the review are in agreement with one another as well as with previously conducted studies looking at infant and toddler attachment and emotional regulation. The studies

identified support for the implementation and use of the ABC intervention with children and families experiencing adversities. After reviewing 10 articles pertaining to RCTs, we found that ABC has been previously tested using randomized control procedures; however, there is ample room for future research into the ABC intervention and there is potential to expand the population/settings using ABC is implemented.

Limitations

Like all studies or reviews, this review has limitations that should be addressed. However, first note this review's strengths. This review makes a significant contribution to the peer-reviewed literature, as it is the only systematic review on ABC available in a peer-reviewed journal. This review helps condense the plethora of information on ABC so that providers, scholars, or other policymakers can easily read in one location about the impact that ABC has had on children.

A major limitation of the review centers on the fact that only child outcomes were examined; thus, RCTs which examined only caregiver or parent outcomes could have been missed. ABC is a parenting program or intervention designed specifically to enhance parenting skills. It is possible that additional RCTs have been conducted and that the findings from them pertain to caregiver or parent outcomes. Therefore, they were not included in this review but could add substantially to the understanding of the effectiveness of the ABC intervention. In addition, this review does not contain a meta-analysis. A meta-analysis to understand the common effect of ABC could greatly add to the literature. This review examined only RCTs. It is not possible to randomly assign children to conditions of neglect or foster care, therefore, studies examining those specific constructs more in-depth without utilizing an RCT design may have been conducted but overlooked due to the inclusion criteria for this review. Studies not utilizing RCT procedures should be examined because they also could add to the understanding of ABC. Finally, literature available on organization Web sites was searched, but it is plausible that researchers failed to identify unpublished RCTs.

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APPENDIX A

Search Strategy

- Databases searched: Web of Science, EBSCO Host, and PsychINFO
- For simplicity and parsimony, only one search term was utilized across all databases. Search term used: (attachment AND biobehavioral) AND (catch up), all text, no date restrictions.
- Original yield = 55 articles (Web of Science: 5; PsychINFO: 24; EBSCO Host: 26)

Additional literature searched:

- Infantcaregiverproject.com via the University of Delaware: Original search of this site yielded 98 articles.
- California Evidence-Based Clearinghouse for Child Welfare: Original searched yielded 10 articles.
- Hand-searched *Child and Adolescent Social Work Journal*: Yielded 3 articles
- Head-searched *Journal of Infant Mental Health*: Yielded 27 articles

Total articles: $n = 193$; after duplicates removed: $n = 144$

APPENDIX B

Preferred Reporting Items for Systematic Reviews and Meta-Analyses Search Flow Chart

