

Culturally Responsive JASPER Remote Support for Caregivers of Children with Autism in
China

by

Wenjing Bao

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Dissertation Committee:

Stephanie Shire, Chair

John Seeley, Core Member

Kent McIntosh, Core Member

Elizabeth Stormshak, Institutional Representative

University of Oregon

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DISSERTATION ABSTRACT

Wenjing Bao

Doctor of Philosophy in Special Education

Title: Culturally Responsive JASPER Remote Support for Caregivers of Children with Autism in China

Joint Attention, Symbolic Play, Engagement, and Regulation (JASPER) is an evidence-based intervention (EBI) that caregivers can implement to improve children's engagement, social communication, and play. As it was developed and tested for efficacy and effectiveness primarily in North America, it remains unclear whether caregiver-mediated JASPER intervention is suitable for Chinese caregivers. Therefore, this dissertation study was designed to collaborate with Chinese community partners as well as JASPER intervention and cultural adaptation experts to identify adaptations necessary to improve the fit of the JASPER caregiver learning materials and program procedures for Chinese communities and to examine the effects of culturally responsive caregiver-mediated JASPER intervention using adapted materials and procedures on caregivers' intervention fidelity and children's joint engagement through a single-subject concurrent multiple baseline study. Findings provide preliminary evidence supporting the feasibility and efficacy of delivering adapted caregiver-mediated JASPER remotely with Chinese families, highlighting its potential for efficacious application in cross-cultural contexts.

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CHAPTER I. INTRODUCTION

Implementation science has a history in the field of healthcare to explore questions about why some interventions and programs were producing desired outcomes in real world setting and others were not and did not produce desired outcomes. Implementation science (or knowledge transition) seeks to promote the systematic adoption of knowing (e.g., research findings, evidence-based practices) into actual application in order to make services more effective and of a higher quality, and the focus of it is adopting, implementing and spreading interventions (Eccles, & Mittman, 2006; Nordstrum et al., 2017; Squires et al., 2015).

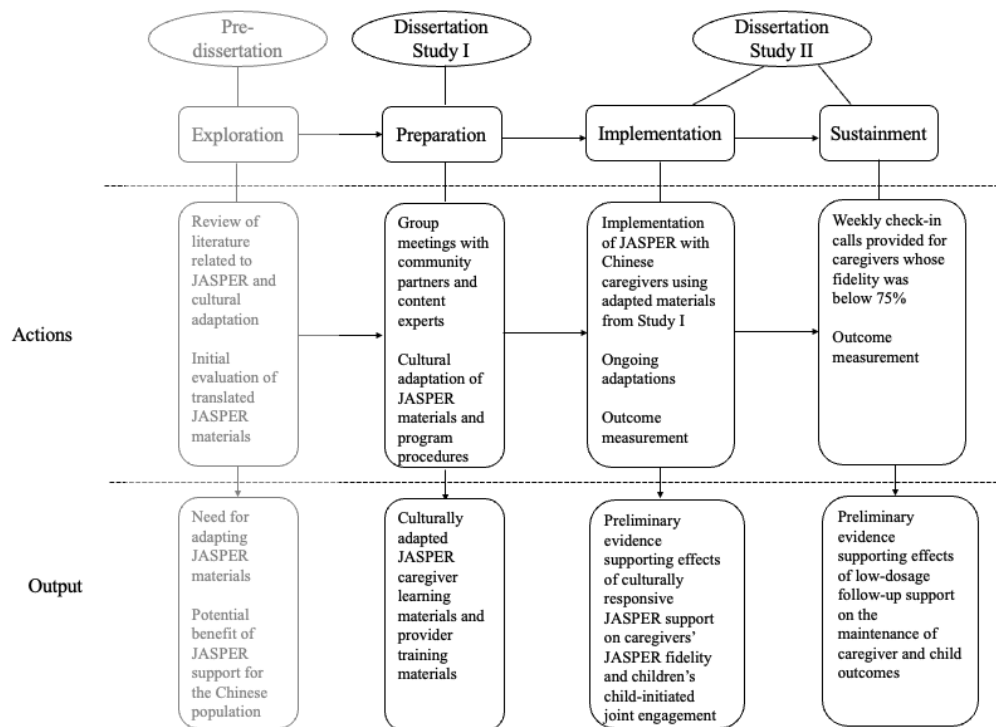
Joint Attention, Symbolic Play, Engagement, and Regulation (JASPER) is an evidence-based intervention (EBI) that caregivers can implement to improve children's engagement, social communication, and play (Kasari et al., 2010, 2015). Families of children with autism in resource-limited regions, such as China, may benefit from learning and implementing JASPER. As JASPER was developed and tested for efficacy and effectiveness primarily in North America (JASPER; e.g., Shire et al., 2017), it remains unclear whether JASPER caregiver-mediated intervention is suitable for Chinese caregivers. Therefore, this dissertation study was designed to collaborate with Chinese community partners as well as JASPER intervention and cultural adaptation experts to identify adaptations necessary to improve the fit of the JASPER caregiver learning materials and program procedures for Chinese communities and to examine the effects of the adapted JASPER caregiver-mediated intervention, guided by the Exploration, Preparation, Implementation, Sustainment (EPIS) model.

EPIS a multi-level, four-phase model of the implementation process developed by Aarons et al. (2010). The four phases include (a) Exploration, which focuses on identifying needs of the target population and selecting the most appropriate EBI (s) to meet the needs, (b) Preparation,

which involves addressing potential barriers and facilitators of implementation and developing an implementation plan, (c) Implementation, guided by the plan developed during the preparation phase, and (d) Sustainment, which emphasizes providing ongoing support to maintain implementation over time. In addition to the four phases, this model also includes key components like outer and inner contexts (e.g., policy environment, inter-organizational relationships; leadership, staffing, organizational structures), innovation factors (e.g., adaptation to increase fit of the EBP), and bridging factors (e.g., community academic partnership) (Aarons et al., 2010; Moullin et al., 2019). As shown in Figure 1, Study I and Study II in this dissertation were mapped onto the EPIS framework, along with the key actions and outputs associated with each phase.

Figure 1

Study I and Study II Mapped onto the EPIS Phases with Key Actions and Outputs



Study I of this dissertation focused on adapting the JASPER caregiver learning materials and program procedures based on input from community partners and content experts. Study II used an experimental single subject concurrent multiple baseline across participants design to examine the effects of remote caregiver mediated JASPER intervention using the adapted materials and procedures from Study I on Chinese caregivers' JASPER intervention fidelity and their children's joint engagement.

Dissertation Study I

In Study I, I collaborated with community partners including caregivers of children with autism and autism practitioners in China as well as JASPER intervention and cultural adaptation experts to adapt JASPER caregiver training materials to fit the needs of Chinese caregivers of children with autism, applying the Ecological Validity Model (EVM; Bernal et al., 1995) to get in front of known challenges in the deployment of US-based programs in the Chinese community. Additionally, surveys were administered to examine the acceptability and appropriateness of the checklist items developed for adapting JASPER materials. The following research questions were addressed in this study: (a) framed within the EVM, what adaptations do Chinese community partners recommend making to the translated caregiver-mediated JASPER handouts and caregiver support program procedures? (b) To what extent are the checklist items for adapting the handouts and program procedures considered as appropriate and acceptable by community partners, including caregivers of children with autism and autism intervention practitioners?

Dissertation Study II

After the JASPER materials and program procedures were adapted and evaluated in Study I, Study II utilized a single-subject multiple baseline across participants design to examine

effects of remote caregiver mediated JASPER intervention on caregivers' JASPER intervention fidelity and children's joint engagement using the adapted materials and procedures before testing with a larger group and scaling up the program. In this study, I answered the following research questions:

(a) Is there a functional relation between culturally responsive JASPER remote support and Chinese caregivers' JASPER intervention fidelity? *Hypothesis:* Chinese caregivers' JASPER intervention fidelity will improve during the intervention compared to the baseline condition. Based on prior JASPER literature (Shire et al., 2021), I predict a stable baseline with minimal variability, with an immediate change in level upon the introduction of the intervention followed by a gradual increase in caregivers' JASPER intervention fidelity during the intervention condition with some variability throughout the intervention condition.

(b) Is there a functional relation between culturally responsive JASPER remote support and an increase in child-initiated joint engagement? *Hypothesis:* Similar to the first question, I anticipate an immediate increase in level in child-initiated joint engagement a gradual change in trend, and higher variability in the intervention data.

(c) Is there a functional relation between culturally responsive JASPER remote support and a decrease in adult-initiated joint engagement? *Hypothesis:* I anticipate a decrease in adult-initiated joint engagement during the intervention because prior JASPER literature identified a negative association between caregivers' JASPER fidelity and adult-initiated joint engagement (Shire et al., 2022).

(d) Is there an association between follow-up support (weekly check-in calls) and improvement/maintenance of caregivers' JASPER intervention fidelity and children's

engagement? *Hypothesis:* Caregivers' JASPER intervention fidelity and children's engagement will be maintained with follow-up support.

(e) How do caregiver stress levels change across time during the study? *Hypothesis:* Caregivers may or may not experience a decrease in their stress levels, as measured by the Parenting Stress Index–Short Form, after receiving the JASPER intervention, because results from past studies have varied (Kasari et al., 2015; Kubo et al., 2021; Levato et al., 2025).

(f) How do child play types change across time during the study? *Hypothesis:* Children's play diversity (number of different play types) will increase following the intervention.

(g) To what degree are JASPER caregiver intervention fidelity items considered acceptable and appropriate by caregivers after they receive the JASPER intervention?

Hypothesis: JASPER caregiver intervention fidelity items will be rated as acceptable and appropriate.

Linkages Between the Two Studies

The Adapted Materials Developed in Study I were Tested in Study II

Study I focused on adapting the caregiver-mediated JASPER intervention materials to ensure cultural relevance for Chinese caregivers of children with autism in collaboration with community partners as well as cultural adaptation and JASPER intervention experts. The adapted culturally responsive materials were then evaluated through Study II, a single-subject multiple baseline design.

Study II Leveraged Study I to Advance Research

First, Study I evaluated the adapted JASPER learning materials based on community partners' perceptions of acceptability and appropriateness. Study II leveraged and furthered this work by employing a single subject experimental design to examine if there was a functional relation between culturally responsive JASPER support using the adapted materials and caregivers' JASPER intervention fidelity, as well as children's joint engagement.

Second, the community partners in Study I had no prior experience with JASPER, which may have limited their adaptation suggestions due to a lack of familiarity with JASPER concepts and strategies. Study II gathered feedback from participants who received JASPER intervention and used the adapted materials to support their learning. Their insights into both the learning materials and JASPER support procedures provided valuable input for further adaptations to the JASPER caregiver learning materials.

Finally, even among individuals from the same cultural background, learning preferences and needs can vary significantly. Therefore, it is crucial to actively adjust interventions and materials to fit individual family's unique needs rather than relying solely on pre-developed procedures and materials. In Study II, conducting brief weekly interviews with participants to obtain feedback on their session experiences allowed for continuous modifications to optimize the responsiveness of JASPER remote support. This practice highlighted that cultural adaptation is an ongoing process, and the materials developed in Study I were not final products but evolving resources.

Study I and II Together Strengthen JASPER for Broader Impact on Autism Communities in China

Cultural adaptation through community partnership in Study I, combined with empirical validation of culturally responsive JASPER support in Study II, strengthened the potential reach of JASPER. This integrated approach ensured that JASPER is well-prepared for larger scale testing and future dissemination efforts to reach families with children with autism in Chinese communities.

CHAPTER II. THE ADAPTATION OF CAREGIVER-MEDIATED JASPER FOR CHINESE CAREGIVERS OF CHILDREN WITH AUTISM IN MAINLAND CHINA

Introduction

Culture is a dynamic process that involves worldviews and ways of living that are shared by groups and passed from generation to generation (Whaley & Davis, 2007). Culture affects families' beliefs, attitudes, goals, and their daily life. For families of children with autism, culture can also influence their decision making with regard to diagnosis and intervention pathways. (Barrio et al., 2019). While research-based interventions can benefit developmental outcomes in young children with autism, most autism research is conducted in the United States and other high-income countries (Guler et al., 2017) and includes primarily White, middle-class participants (DuBay et al., 2018; Kasari & Smith, 2016). Consequently, our understanding of intervention efficacy beyond this specific population is limited. It is suggested that significant adaptations are needed to make services culturally appropriate when implemented among racially and ethnically diverse populations (Whaley & Davis, 2007). However, cultural adaptation is often overlooked when disseminating interventions to different contexts. In a systematic review including 21 parent-mediated interventions in mainland China, Hong Kong, and Taiwan, only three of them reported a cultural adaptation process (Liu et al., 2020).

Cultural adaptation is defined as a systemic modification that considers language, culture, and context to make evidence-based interventions (EBIs) compatible with the cultural aspects of diverse groups (Bernal et al., 2009). In addition, attention to social, political, and economic conditions is called for in this process (Baumann et al., 2014). Cultural adaptation helps improve the cultural competence of practices (e.g., intervention, education: Bernal et al., 2009), which can benefit the people who receive them (Soto, 2018). Studies indicate that cultural adaptation

improves the relevance, acceptability, effectiveness, and sustainability of interventions (Baumann et al., 2015).

There are procedures that can guide cultural adaptation, including the Ecological Validity Model (EVM: Bernal et al., 1995), the cultural sensitivity model (Resnicow et al., 2000), cultural adaptation process (CAP) model (Domenech Rodríguez & Wieling, 2004), and cultural adaptation stage models (Barrera, 2013). The EVM consists of eight dimensions of interventions—language, persons, metaphors, content, concepts, goals, methods, and context. Although this framework was originally developed for Hispanic populations, it can also be used as a guide for adapting intervention to other diverse groups (Bernal et al., 2009). The cultural sensitivity model distinguishes between deep and surface level adaptations (Baumann, 2015). The CAP model is combined with EVM, and it has three phases, including setting the stage, initial adaptations, and adaptation iterations (Baumann et al., 2014; Ferrer-Wreder et al., 2012). The cultural adaptation of EBIs integrating several models can be organized into five stages: information gathering, preliminary adaptation design, preliminary adaptation test, adaptation refinement, and cultural adaptation trial (Barrera, 2013). Relevant to services for young children with autism and their families, the EVM has been used to support the adaptation of World Health Organization Caregiver Skills Training Program to ensure the training is comprehensible, acceptable, feasible, and relevant to non-specialists in low-resource settings (Salomone et al., 2019). Further, the model was also served as a guide when adapting project ImPACT—a parent-mediated Naturalistic Developmental Behavioral Intervention (NDBI) to the Indian context (Sengupta et al., 2020). The CAP model was incorporated within an implementation framework when implementing Parent Management Training-Oregon Model (PMTO™) in Mexico City (Baumann et al., 2014).

NDBIs are evidence-based approaches that integrate applied behavior and developmental sciences, are implemented in natural settings, involve shared control between child and adult, and take advantage of naturalistic learning opportunities (D’Agostino et al., 2019; Schreibman et al., 2015). Joint Attention, Symbolic Play, Engagement, and Regulation (JASPER: Kasari et al., 2021) is a NDBI that caregivers can implement to improve children’s engagement, social communication, and play (Kasari et al., 2010, 2015). Chinese caregivers of children with autism can potentially benefit from receiving JASPER training; however, as JASPER was developed and tested for efficacy and effectiveness in North America (e.g., Shire et al., 2017), instead of assuming that the JASPER training materials and procedures are suitable for Chinese caregivers, it is important to examine what adaptations may be needed to ensure the acceptability and appropriateness of the intervention materials before disseminating them in Chinese communities. The following research questions guided this study: (a) framed within the EVM, what adaptations do Chinese community partners recommend making to the translated caregiver-mediated JASPER handouts and caregiver support program procedures? (b) To what extent are the checklist items for adapting the handouts and program procedures considered as appropriate and acceptable by community partners, including caregivers of children with autism and autism intervention practitioners?

Method

Study Design

This study collaborated with community partners in China and with cultural adaptation and JASPER intervention experts in the United States (US) to identify the adaptations needed to effectively modify the US-developed social communication intervention caregiver learning materials for use in mainland China. A multiple methods design, combining focus groups and

surveys, was employed to adapt the JASPER materials and to evaluate the acceptability and appropriateness of the checklist developed to guide the adaptations. Focus groups were used to gather input from community partners, as they are considered a potentially valuable means for improving culturally sensitivity (Resnicow et al., 2000).

Participants

Community partners including Chinese caregivers of children with autism and Chinese autism practitioners were recruited through virtual snowball sampling. A recruitment flyer was distributed among autism parent/practitioner groups hosted on WeChat, one of the most popular social media platforms in China. A Quick Response code was embedded in the flyer to guide individuals to confirm eligibility, and if they were eligible, they were directed to complete a consent form. This study was determined to be exempt from full review by the Institutional Review Board (IRB) of [blinded for review] (IRB #00000541).

A total of 25 participants took part in this study, including 11 Chinese caregivers of children with autism and 14 Chinese practitioners. Inclusion criteria for caregivers required that they have at least one child diagnosed with autism and reside in China. Practitioners were eligible if they (a) were Chinese, living in China, (b) had a minimum of three years of experience working with children with autism in China, and (c) had provided training to caregivers of children with autism. Table 1 presents participants' demographic information, and Figure 2 illustrates their geographic distribution.

Table 1*Family and Practitioner Sample Characteristics (N = 25)*

Caregivers (N = 11)	N (%) or M (SD)	Practitioners (N = 14)	N (%) or M (SD)
Caregiver variables		Practitioner variables	
Father	0	Male	2 (14.29%)
Mother	11 (100%)	Female	12 (85.71%)
Other caregivers	0		
Age	38 (6.07)	Age	34 (5.04)
Educational level		Educational level	
Middle school or below	0	Middle school or below	0
Vocational degree	0	Vocational degree	0
High school	0	High school	0
Some college	0	Some college	0
Associate degree	2 (18.18%)	Associate degree	2 (14.29%)
Bachelor's degree	6 (54.55%)	Bachelor's degree	6 (42.86%)
Master's degree	3 (27.27%)	Master's degree	6 (42.86%)
Doctorate	0	Doctorate	0
Employment status		Employment status	
Full-time job	4 (36.36%)	Full-time job	13 (92.86%)
Part-time job	3 (27.27%)	Part-time job	1 (7.14%)
Full-time caregiver	4 (36.36%)	Full-time caregiver	0
Retired	0	Retired	0
Unemployed	0	Unemployed	0
Current occupation		Current occupation	
Teacher	4 (5.71%)	Speech language pathologist	2 (14.29%)
Editor	1 (14.29%)	Occupational therapist	1 (7.14%)
Not reported	2 (28.57%)	Physical therapist	0
		Behavior therapist	6 (42.86%)
		Doctor	0
		Special education teacher	7
		Inclusive education teacher	1 (7.14%)
		Education administrator	4 (28.57%)
		Caregiver educator	4 (28.57%)
		Other	1 (7.14%)
Annual household income (CNY)		Annual income (CNY)	
Below 20,000	0	Below 20,000	1 (7.14%)
20,000-49,999	0	20,000-49,999	1 (7.14%)
50,000-99,999	1 (9.09%)	50,000-79,999	2 (14.29%)

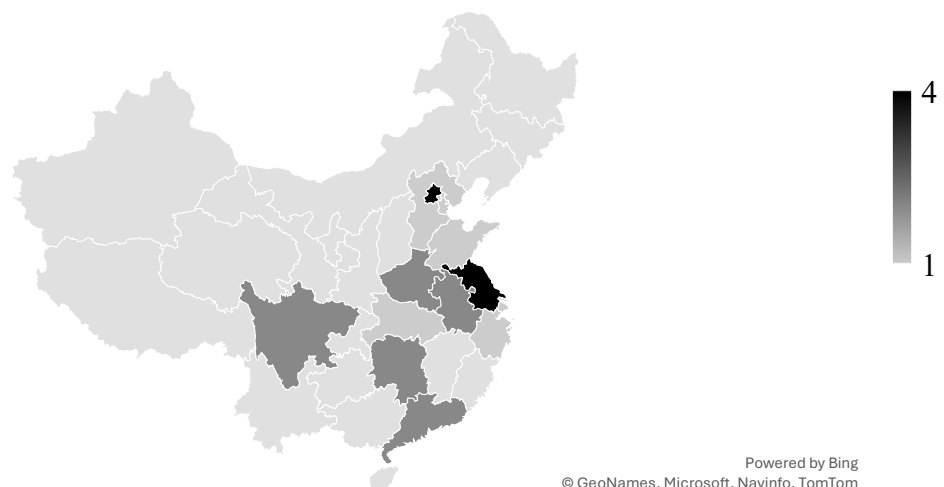
100,000-149,999	2 (18.18%)	80,000-109,999	2 (14.29%)
150,000-199,999	4 (36.36%)	110,000-139,999	1 (7.14%)
200,000-299,999	2 (18.18%)	140,000-169,999	2 (14.29%)
300,000-499,999	0	170,000-199,999	4 (28.57%)
500,000-999,999	2 (18.18%)	200,000-249,999	0
1,000,000 or above	0	250,000-299,999	0
		300,000 or above	1 (7.14%)
Hours of autism/SPED related caregiver education		Hours of delivering autism/SPED related caregiver education	
0	1 (9.09%)	5 hours or below	2 (14.29%)
0.1-9	2 (18.18%)	6-10	0
10-19	0	11-15	0
20-29	0	16-20	0
30-39	1 (9.09%)	21-30	2 (14.29%)
40-49	0	31-40	2 (14.29%)
50-59	1 (9.09%)	41 hours or above	8 (57.14%)
60 hours or above	6 (54.55%)		
Educational topic(s) received		Educational topic(s) delivered with caregivers	
Social Communication	8 (72.73%)	Social Communication	13 (92.86%)
Play	6 (54.55%)	Play	13 (92.86%)
Challenging behavior	9 (81.82%)	Challenging behavior	13 (92.86%)
Sleep	0	Sleep	5 (35.71%)
Daily living skills	4 (36.36%)	Daily living skills	10 (71.43%)
Caregiver mental health/stress coping	8 (72.73%)	Caregiver mental health/stress coping	5 (35.71%)
Intro to autism (e.g., symptoms and common interventions)	10 (90.91%)	Intro to autism (e.g., symptoms and common interventions)	11 (78.57%)
Other	2 (18.18%)	Other	1 (7.14%)
Child variables		Age group(s) working with	
Boy	11 (100%)	Birth-2	8 (57.14%)
Chronological age (year)	6 (3.82)	3-6	13 (92.86%)
Age at diagnosis (year)	3 (1.43)	6-12	10 (71.43%)
		13-15	5 (35.71%)
		16-18	3 (21.43%)
		19 or above	2 (14.29%)
Services/intervention child is currently receiving		Setting(s) working in	
Speech language therapy	4 (36.36%)	Classroom	8 (57.14%)
Occupational therapy	0	Home	4 (28.57%)

Physical therapy	0	Intervention agency	11 (78.57%)
Applied behavior analysis	4 (36.36%)	Hospital/clinic	6 (42.86%)
Pharmaceutical therapy	2 (18.18%)	Other	1 (7.14%)
Special education	1 (9.09%)		
Inclusive education	1 (9.09%)		
General education	4 (36.36%)		
Other	2 (18.18%)		
None	1 (9.09%)		

Services/intervention child has received		Type(s) of service provided	
Speech language therapy	9 (81.82%)	Speech language pathology	9 (64.29%)
Occupational therapy	2 (18.18%)	Occupational therapy	3 (21.43%)
Physical therapy	1 (9.09%)	Physical therapy	1 (7.14%)
Applied behavior analysis	7 (63.63%)	Applied behavior analysis	12 (85.71%)
Pharmaceutical therapy	2 (18.18%)	EI/ECSE/SPED	10 (71.43%)
Special education	3 (27.27%)	Inclusive education	6 (42.86%)
Inclusive education	1 (9.09%)	Transition	5 (35.71%)
General education	7 (63.64%)	Career guidance	3 (21.43%)
Other	1 (9.09%)	Other	2 (14.29%)
None	0		

Figure 2

Geographic Distribution of Study Participants in Mainland China



Consultation Team

Content consultants in the JASPER intervention and methodological consultants in cultural adaptation were also be involved in this study. To specify, two JASPER experts certified to train caregivers and practitioners in JASPER, including a co-author of the JASPER manual (Kasari et al., 2021) and two professors with expertise in cultural adaptation were on the consultation team to provide feedback on the checklist for adapting JASPER support for Chinese caregivers.

Research Team

The bilingual adaptation team included the principal investigator (PI) of this study, a Special Education (SPED) doctoral student, and a SPED professor. The PI is a certified JASPER interventionist, and she has had experience training and coaching caregivers and pre-service teachers to implement JASPER. The other bilingual adaptation team members have either received (a) JASPER training and coaching and in the process of obtaining certification or (b) an introduction to the JASPER intervention. A JASPER expert who co-authored the JASPER manual reviewed the back-translated JASPER materials. Five undergraduate and master's students majoring in education and fluent in both Chinese and English assisted with transcribing the focus group recordings from Chinese to English. Also, five SPED doctoral students coded the translated focus group transcripts.

Setting and Materials

As the research participants and research team members were not located in the same area, all research activities were remote. Zoom was the platform for meetings. Qualtrics was utilized for developing and distributing surveys, and JASPER materials were stored using

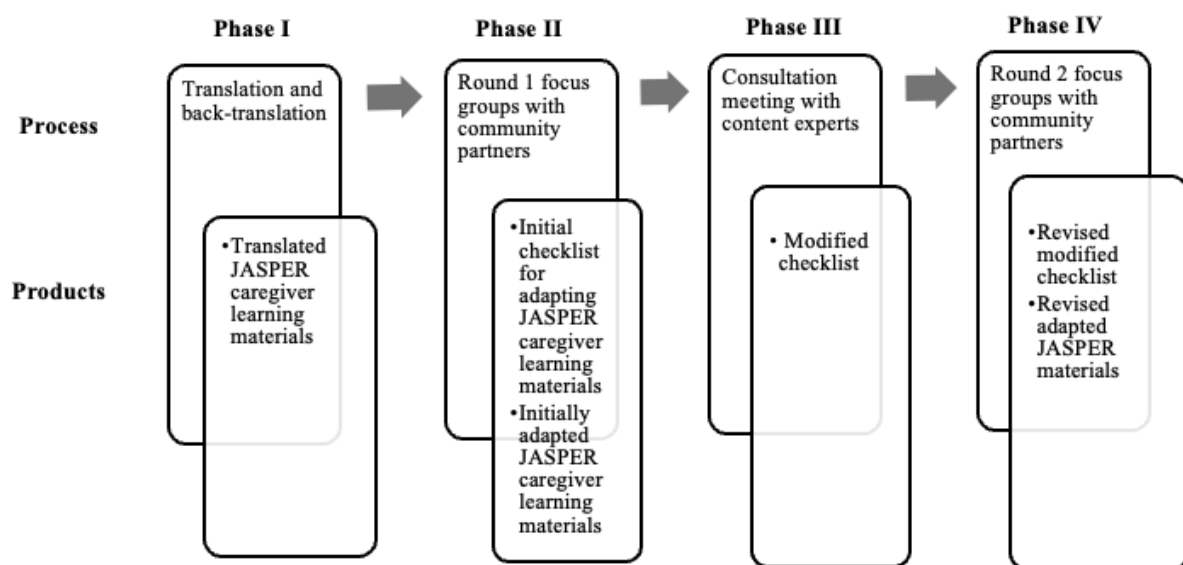
Microsoft OneDrive. The initial JASPER materials include handouts designed to share key JASPER content and strategies in brief, largely visual electronic or paper forms. These handouts are shared in advance and then reviewed at the beginning of a coaching session to support caregivers' understanding of JASPER. They also serve as a lasting resource families can revisit to reinforce their use of JASPER strategies over time.

Procedures

The cultural adaptation process comprised of translation, two rounds of meetings for feedback from community partners and one consultation meeting with consultants. We used an iterative, multi-component design (Gaume et al., 2021) to systematically adapt translated JASPER materials by collaborating with Chinese community partners, JASPER and cultural adaptation consultants. Figure 3 depicts the process for adapting JASPER materials and the products generated at each stage.

Figure 3

Process for Adapting JASPER Materials and the Products Generated at Each Stage



Phase I: Translation of Initial JASPER Materials

The JASPER handouts summarize key JASPER content for caregivers. In phase I, bilingual researchers translated the JASPER handouts from English to Chinese and back translate them from Chinese to English to ensure quality and accuracy. The handouts in English were translated to Chinese by the first author, then reviewed by a second coder and edited based on their feedback. The modified handouts were then back translated from Chinese to English by a third coder, and the back-translated handouts were reviewed by a certified JASPER clinician and co-author of the JASPER manual, to check accuracy. Content that needed adjustment was highlighted, discussed until consensus was reached, and then modified.

Phase II: Round 1 Focus Groups with Community Partners

We obtained community partners' ($n = 25$) feedback on the selected JASPER caregiver handouts through four focus groups ($n = 6-7$ per group) — two with caregivers and two with practitioners. Table 2 outlines the topics of JASPER caregiver handouts assigned to each participant group. Each group reviewed and provided feedback on two topics: (a) one JASPER concept (e.g., introduction to routine) and (b) one JASPER intervention strategy (e.g., balancing imitation and modeling). Because this was a proactive adaptation process conducted prior to the actual delivery of JASPER, participants provided feedback based solely on the information presented during the focus groups. Participants did not have access to full JASPER caregiver coaching to experience the use of the materials in the context of the intervention. Additionally, due to time constraints, each group reviewed only two topics and did not have access to the remaining JASPER materials. Krueger and Casey's practical guide for designing and conducting focus group interviews (2015) was used to develop the structure and instructions for conducting the focus groups. The focus groups began with a brief icebreaker and introductions. The

moderator (study PI) then outlined the purpose of the meeting, provided a description of the project, defined key terms, and reviewed the meeting agenda. Ground rules emphasizing respect and open-mindedness were shared. A series of questions were then used to gather participants' feedback on the handouts, including questions developed based on the dimensions of the EVM (e.g., what do you think about the words/ language used in the handouts? What components of the handouts are (or are not) a good fit for the needs of Chinese caregivers?). After completing the questions, the moderator asked if participants had any additional thoughts they would like to share.

Table 2

Topics of JASPER Caregiver Handouts Assigned to Each Group

Participant Group	Group Number	Topics Focused on JASPER Concepts	Topics Focused on JASPER Strategies
Caregiver Group	Group 2	Introduction to play	Imitation and modeling
	Group 4	Introduction to routine, components of routine	Establishing and expanding routines
Practitioner Group	Group 1	Introduction to engagement and regulation	Imitation and modeling
	Group 3	Introduction to joint attention (JA) and behavior regulation (BR)	Space to communicate and responding to communication

Analysis of Round 1 Focus Group Data. Round 1 focus group transcripts were transcribed, translated, and checked for accuracy by English Chinese bilingual research team

members, and the transcripts were analyzed using both inductive and deductive analysis to inform adaptations to be applied to JASPER learning materials and procedures.

The PI developed a coding form that outlined initial themes based on the EVM framework (e.g., language, content, context) and codes derived from the transcripts (e.g., easy to notice key points, concise and clear wording, need for video demonstrations). Each code was accompanied by a definition and its nature (positive or constructive). The coding form also provided space for coders to assign key feedback from community partners to relevant initial codes by marking “1” (indicating yes) next to a corresponding code, record the number of participants addressing this code, and include supporting information (e.g., participant ID, transcript line numbers, a quote or summary for justifying the code selection). Coders may create a new theme or code in the coding form as needed.

The PI then trained coders to use the coding form to extract the data. During the practice coding process, the coding form was refined as needed according to the coders’ feedback. Braun and Clarke’s (2006) six-step thematic analysis process was used as a framework to guide coders in systematically analyzing the focus group transcripts.

Step 1: Familiarizing with the Coding Form and Transcripts. Coders were instructed to review the initial themes, codes, and their definitions before reading and highlighting key information in their assigned transcript. They then read the transcript a second time for any additional relevant information.

Step 2: Assigning or Generating Initial Codes. Coders were instructed to sort the highlighted information using the coding form developed by the PI. For example, when a participant commented that “‘create a clear beginning to your story’ in the Expanding Routines

handout may be unclear, and the word ‘beginning’ is a bit abstract”, the coder would mark “1” next to the predetermined code “Need for improved word selection for greater accuracy and clarity”. If any highlighted information did not align well with the existing codes, the coders were instructed to generate a new code.

Step 3: Searching for Sub-themes and Additional Themes as Needed. After all transcripts were double coded, the PI compared the codes independently identified by two coders, flagged differences (e.g., incorrectly assigned excerpts or missed codes), and corrected straightforward inconsistencies. Any discrepancies that were unclear were discussed with the coders until consensus was reached. Subthemes were developed to organize related codes into coherent categories, and additional themes were developed as needed.

Step 4: Reviewing Themes, Sub-themes, and Codes. The PI reviewed the aggregated coding form to ensure that the data extracted matched the corresponding code and that the codes were appropriately placed under their respective themes and subthemes. Original transcripts were revisited and compared with the completed coding form to confirm consistency and coherence.

Step 5: Defining and Naming Themes and Sub-themes. The PI analyzed the themes, sub-themes, codes, and their supporting participant quotes, refining them to ensure internal homogeneity and external heterogeneity. Thematic maps were then created to visually present the themes, subthemes, and their associated codes.

Step 6: Report and Checklist Production. The PI summarized the findings with illustrative quotes and rephrased constructive feedback into specific and actionable checklist items for adapting caregiver-mediate JASPER materials for populations in mainland China.

Credibility and Dependability of Focus Group Data Analysis. Group and individual research meetings with secondary coders were held to ensure a clear understanding of focus group coding procedures. All secondary coders were trained to 80% coding reliability before independently coding a transcript. Each transcript was coded by the PI and at least one secondary coder (investigator triangulation). A second round of focus group meetings was held to share the checklist items developed from the first round with community partners for additional feedback (member checking).

Phase III: Consultation Meeting with JASPER and Cultural Adaptation Experts

The PI presented the checklist developed in Phase II with concrete examples to JASPER and cultural adaptation experts ($n = 4$) during a group consultation meeting to obtain feedback. During the meeting, the PI walked through each item on a shared Excel sheet, explained it using specific examples, and invited consultants to indicate their level of agreement by selecting one of three options: fully approved, revision needed, or rejected. When consultants selected “revision needed” or “rejected”, they were invited to explain how the item could be adjusted or why they rejected it. Their feedback was recorded, and modifications to the checklist and JASPER materials were made accordingly.

Analysis of Consultation Meeting Data. Data on consultants’ level of agreement with the adaptation checklist items were analyzed using descriptive statistics, and qualitative feedback from the consultation meeting was summarized to supplement the quantitative results.

Phase IV: Round 2 Focus Groups with Community Partners

Community partners who participated in the Round 1 focus groups were invited to participate in Round 2. Fifteen participants ($n = 9$ practitioners and $n = 6$ caregivers) joined the Round 2 focus groups ($n = 3$). The modified checklist items were presented with concrete

examples. Participants completed a survey evaluating the acceptability and appropriateness of each item and encouraged to share any additional feedback. The adaptation checklist and JASPER materials were further modified based on this feedback.

Analysis of Round 2 Focus Group Data. Quantitative survey data were analyzed using descriptive statistics, and qualitative feedback was summarized to supplement the quantitative results.

Measures

Demographic Form

Community partners were asked to report age, gender, occupation, education level, income, city of residence, etc. Caregivers were also asked to share their child's chronological age and age at autism diagnosis, as well as experience with autism related training/coaching. Practitioners reported the age range of the children they work with and experience in providing autism related training/coaching.

Measures of Acceptability and Appropriateness for Adaptation Checklist Items

During Round 2 focus groups, community partners provided feedback on the modified adaptation checklist that had been revised based on consultants' suggestions. The PI shared definitions of acceptability and appropriateness. Community partners then rated the perceived acceptability and appropriateness of each checklist item ($n = 31$) using a 7-point Likert scale ranging from 0 (totally disagree) to 6 (totally agree).

Results

Round 1 Focus Group: Community Partners' Perceptions of the Translated JASPER Caregiver Learning Materials and Broader Support

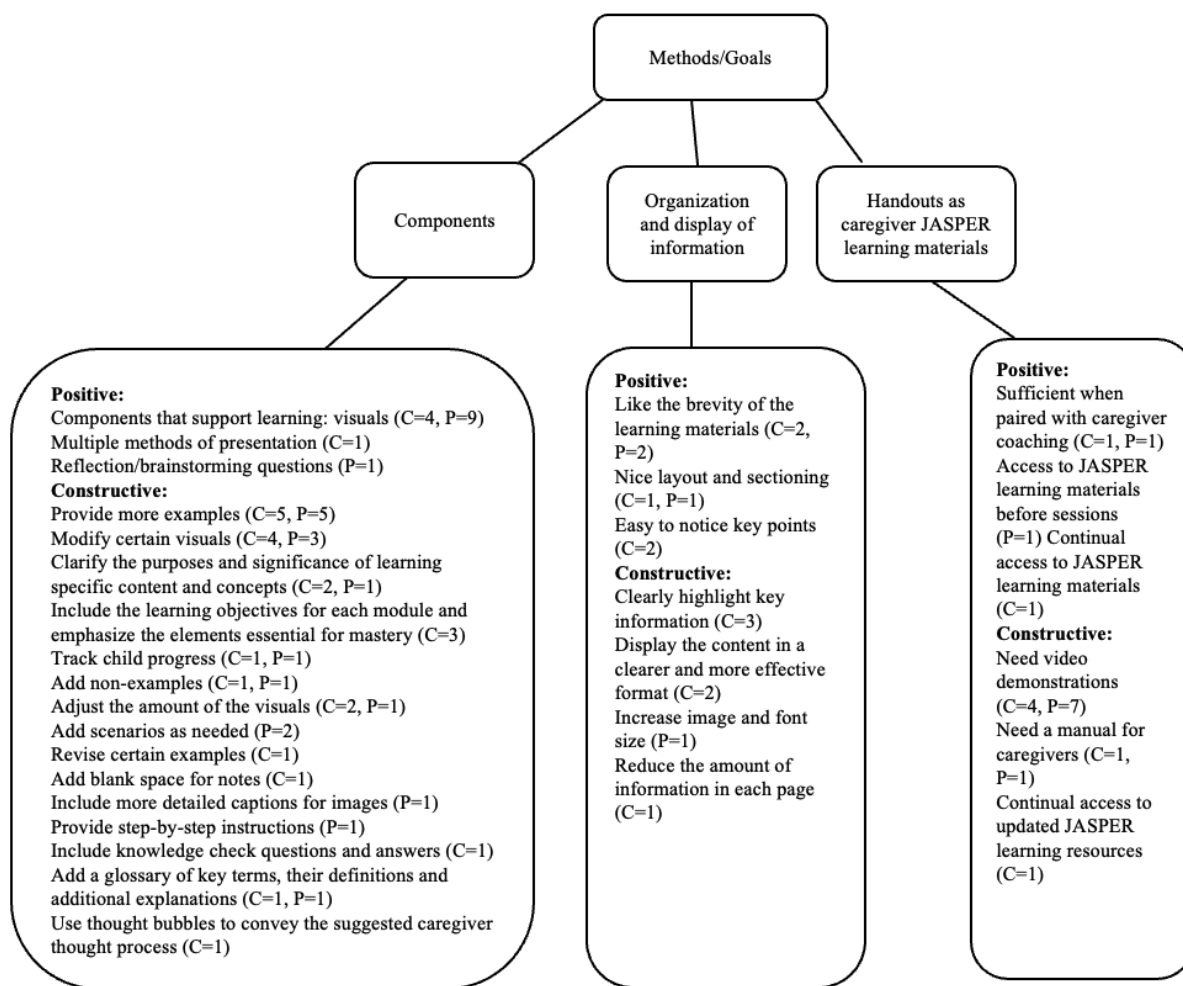
We used a combination of deductive and inductive approaches in our data analysis. Deductively, Round 1 focus group questions were developed based on Bernal et al.'s (1995) EVM themes, and community partners' input shared during the focus groups aligned well with these themes and was categorized accordingly. Inductively, subthemes emerged from the analysis of focus group transcripts. The results of the thematic analysis are presented below.

Theme 1: Methods/Goals

During Round 1 focus groups, participants discussed how JASPER caregiver handouts, including their design and components, served as methods to present key information, guide targets for coaching sessions, and provide a lasting resource to families. Participants identified several strengths of the handouts, such as their brevity, effective use of visuals, clarity of key points. They also emphasized modifications including providing additional modalities of supporting materials (particularly video examples), to enhance caregivers' understanding and implementation of JASPER strategies. See Figure 4 for the subthemes and corresponding positive and constructive codes identified under the theme of methods/goals.

Figure 4

Thematic Map Illustrating the Theme of Methods/Goals, Its Subthemes, and the Corresponding Positive and Constructive Codes



Note. C=caregiver; P=practitioner. The numbers indicate the number of participants mentioning the code.

Components of JASPER Handouts. Participants highlighted several components of the JASPER handouts that they found helpful, particularly the visuals ($n = 13$). Seven participants emphasized that the visuals supported their understanding of JASPER, while six appreciated the design features, such as the use of colors, shapes, pictures, and diagrams. In addition, some

participants valued the integration of text, visuals, and examples, as well as the inclusion of reflective questions for caregivers.

Participants also provided constructive feedback to modify existing components and incorporate additional elements. Twelve participants desired more examples or visuals, while eight participants highlighted the need to revise certain examples or visuals for greater clarity. Although some handouts already emphasized the importance of learning the content, included non-examples, provided step-by-step instructions, or added captions to images, these features were not consistently applied across all materials and were noted by participants. Additional suggestions included adding new elements such as a glossary, knowledge-check questions, and scenarios. Examples of participant feedback are provided below:

We could add non-examples to the Regulation handout. As you know, even when instructions are clear, parents might interpret them differently or not fully grasp your intentions. Their established habits or beliefs can influence how they learn new concepts or practices, potentially leading to misunderstandings. Including non-examples would help clarify your intended message. (P1009)

Balancing imitation and modeling seems to be a guiding principle, but the illustration here doesn't clearly show the principle. The drawing of the balance beam feels meaningless. Also, in fact, the two short sentences beside the illustration don't provide any clear explanation. To be more direct, it might be better to list the key points you want to emphasize—mark them as 1, 2, 3, 4, 5—to make them clearer. Does this picture really help with understanding? Maybe using text could even be clearer. (C2004)

Organization and Display of Information. Participants also shared their thoughts on how the components were organized and displayed. Four participants liked that the handouts were brief and clear. Two participants appreciated the layout of the information and noted that the key points were easy to identify. Selected participant feedback is presented below:

The handouts are neat, not messy. There aren't many words, and there are visuals. These are all excellent. The key points are clear that people can notice right away. For example, it uses shapes such as boxes and arrows, which help me see the key points at a glance.
(C4003)

Some participants also suggested that the handouts could benefit from greater clarity by clearly highlighting important information ($n = 3$), adjusting the amount and layout of content on each page ($n = 2$), and adopting a more effective method of displaying the content ($n = 2$). For example, one caregiver stated, "I think what's missing in the current version of the handouts is highlighting the areas where parents are likely to misunderstand or make mistakes during practice" (C4003).

Handouts as Caregiver JASPER Learning Materials. Participants indicated a need for additional supporting learning materials beyond the handouts such as video demonstrations ($n = 11$) and a caregiver manual ($n = 2$). In contrast, two participants believed that handouts were sufficient as they function as supplemental resources to live coached practice. A small number of participants ($n = 2$) also highlighted the value of accessing JASPER resources in advance of sessions and having continued access to updated materials (e.g., new videos). Representative participant feedback is shown below:

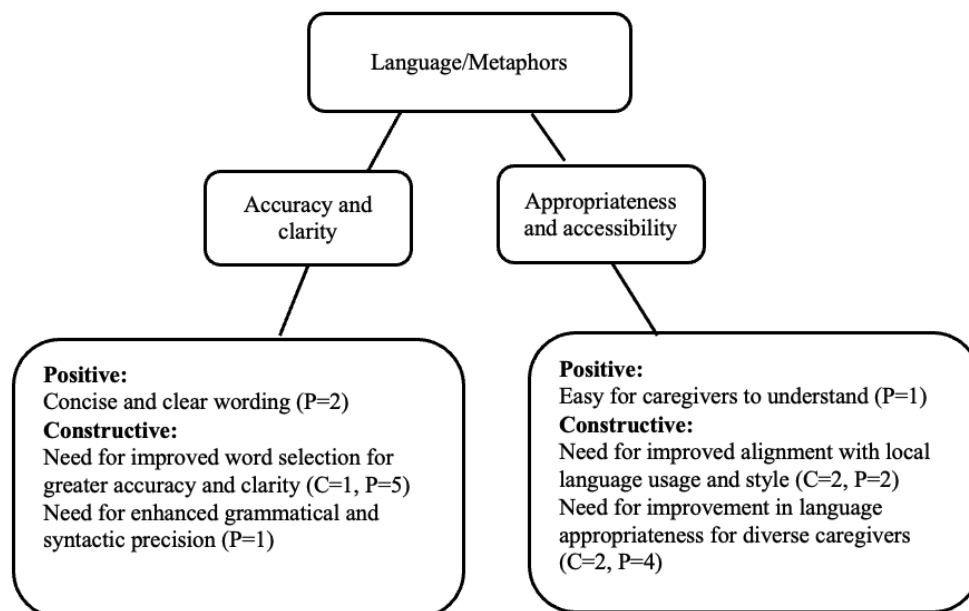
I think the fastest way for me to understand a concept is by watching a video of the whole activity. It doesn't have to be very long—just a few minutes to show a specific strategy and then analyzing it really helps make abstract ideas clearer. Handouts on their own don't do much to support understanding of play routines. If we can use videos to explain concepts or strategies, like showing an example of a play routine, parents will quickly get a sense of what it looks like, which can be really helpful. It will also be great to have a video library that caregivers can access even after the program ends. (C2004)

Theme 2: Language/Metaphor

Community partners provided their feedback on whether the handouts conveyed their messages with accurate and appropriate language. See Figure 5 for the subthemes and corresponding positive and constructive codes identified under the theme of language/metaphors.

Figure 5

Thematic Map Illustrating the Theme of Language/Metaphors, Its Subthemes, and the Corresponding Positive and Constructive Codes



Accuracy and Clarity. While two participants found the language in the handouts concise and clear, several participants ($n = 7$) noted the need for improvements in word choice, grammatical, and syntactic precision. For instance, two practitioners suggested alternative expressions: P1005 questioned whether “balancing imitation and modeling” should be clarified as “coordinating timing and opportunities for imitation and modeling” to be clearer, and P1009 suggested revising “noticing your child” to “paying attention to your child”.

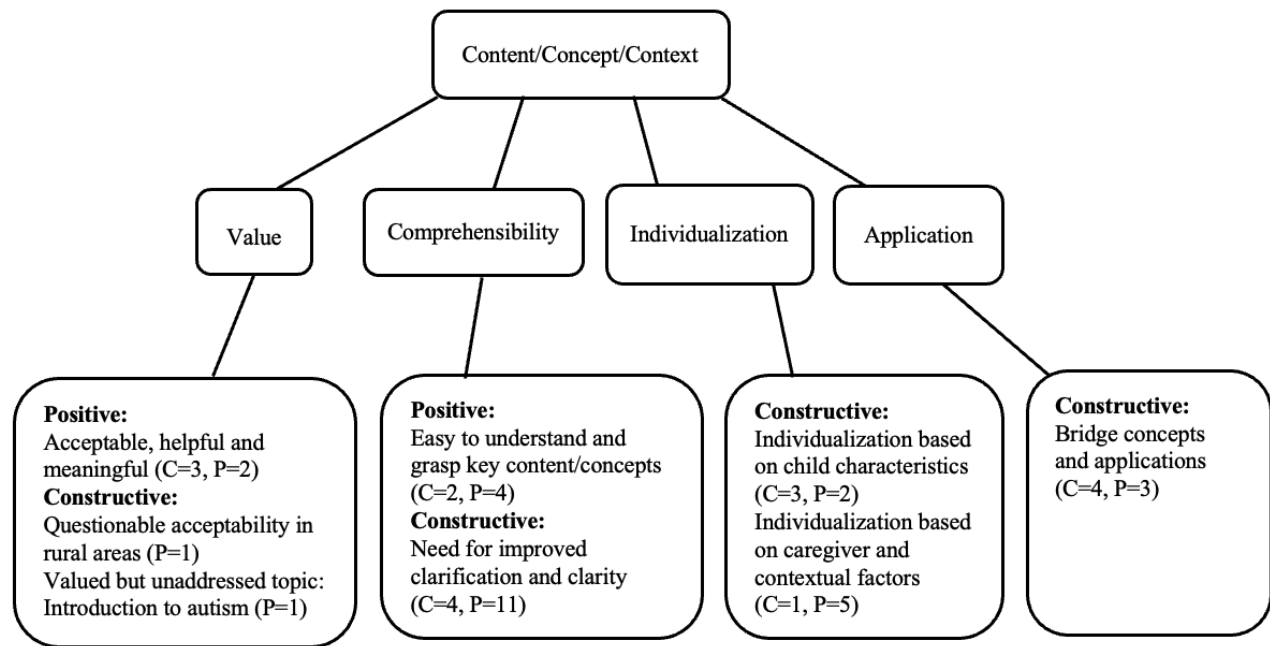
Appropriateness and Accessibility. In addition, participants also discussed the appropriateness and accessibility of the language used in the handouts for caregivers with various educational and autism-related knowledge backgrounds in mainland China. One participant noted that the language is easy for caregivers to understand, but several others ($n = 6$) highlighted the need to improve the readability for caregivers across all educational and experience levels, and four suggested using a more natural, authentic, and conversational language style. For example, a caregiver highlighted, “I think the biggest issue is that some parts of your translation don’t align well with how Chinese is typically spoken in China—it doesn’t feel very authentic” (C2007), and a practitioner noted, “For those unfamiliar with the field, such as new parents, it can be hard to understand what the descriptions mean or how to interpret them” (P1006).

Theme 3: Content/Concept/Context

Community partners shared their perspectives on the content and concepts in the handouts as well as contextual factors to consider when adapting them. See Figure 6 for the subthemes and corresponding positive and constructive codes identified under the theme of content/concept/context.

Figure 6

Thematic Map Illustrating the Theme of Content/Concept/Context, Its Subthemes, and the Corresponding Positive and Constructive Codes



Value. Several participants ($n = 5$) shared that the content and concepts were acceptable, helpful, and meaningful. One participant questioned the acceptability of the JASPER approach in rural areas. Another participant suggested an additional topic that could also be valuable: an introduction to autism for caregivers with limited prior knowledge on autism. Examples of participant feedback are provided below:

If you want to promote this intervention in rural areas where many parents are farmers, does it really match the local reality? I'm not sure if this play-based approach is suitable there. I know it's a really good approach, but we also need to consider whether it fits the local context. (P1003)

I think for parents who are just starting out, it would help to provide them some basic knowledge about autism. They might not really understand their child's difficulties yet, and they're still figuring out their role in supporting the child. So I think we could add some parenting knowledge to help them navigate the world of autism and education. That way, parents can see their child more objectively and set better goals to support them. (P1005)

The play levels described in the handouts helped me reflect on how I play with my child and whether some activities might be too difficult, which could explain why he doesn't always want to join me. At times he loves play, but other times, when I call him, he refuses. After reading the handouts, I began to wonder if certain activities were a bit too challenging for him, and that might be why he resisted playing. (C2003)

Comprehensibility. Six participants found the content and concepts easy to grasp while most participants ($n = 15$) suggested improvements for clarity, such as additional elaboration, more visuals or examples, or alternative methods of presenting the content and concepts (e.g., videos). For example, one caregiver found the imitating and modeling handout straightforward, whereas another caregiver raised a question about imitation, asking, "Who imitates whom?"

Individualization Based on Child and Contextual Characteristics. The initial JASPER handouts were broadly designed for any caregivers participating in the program. Several participants ($n = 11$) recommended tailoring the handouts to better reflect child, caregiver and overall family characteristics.

Individualization Based on Child Characteristics. Multiple participants ($n = 5$) suggested improving the relevance of the handouts for individual families by incorporating

pictures, images and examples tailored to individual child's levels. Moreover, a participant emphasized that for children with behavior challenges, caregivers first need to learn strategies for managing their child's behaviors; otherwise, implementing JASPER core strategies may be difficult.

Individualization Based on Contextual Characteristics. Content/Concept and Context were initially determined as separate themes. However, essential contextual factors identified by participants ($n = 6$) highlighted the need to individualize the content, so these two themes were integrated. When discussing context, participants emphasized caregivers' educational background, financial status, and parenting styles, and suggested tailoring and elaborating the handout content to enhance appropriateness and accessibility. Specifically, participants suggested providing examples using materials that are readily available in families' homes (P1006) and that are affordable and reusable (C2006). Other participants also emphasized the need for clarifications to support caregivers with varying educational levels (P1008) and those whose pre-existing parenting habits or beliefs might interfere with accurate understanding of JASPER (C4003).

Application. JASPER handouts addressed either concepts (e.g., developmental play levels) or intervention strategies. Several participants ($n = 7$) expressed the need to connect concepts to strategies within the concept-focused handouts.

Feedback Specific to JASPER Program Procedures

In addition to providing feedback on learning materials, community partners also shared their ideas for optimizing the effects of the caregiver-mediated JASPER program, including who should deliver it and how it should be implemented. See Table 3 for details.

Table 3*Community Partners' Feedback on JASPER Training/Coaching Procedures from Round 1 Focus**Group: Themes and Codes*

Feedback Specific to JASPER Training/Coaching Procedures		
Themes	Subthemes	Codes
Methods/ goals	Components	Discuss connections between relevant modules/topics (P = 2), offer examples before parents working on activities themselves (C = 1), frequent check-ins with caregivers (C = 1), incorporate a brief calming activity for the child at the start of JASPER sessions as needed (C = 1), follow-up support (P = 1), need a manual for service providers (P = 1)
	Modalities	In-person delivery is preferable to online delivery (P = 2), remote live coaching is preferable to delayed video feedback or self-paced learning modules (P = 2)
Persons	JASPER learning support team members	Prefer specialists as providers (C = 5, P = 1), include experienced caregivers of children with autism as team members (C = 2, P = 3), train general education teachers to be providers (C = 2, P = 1), promote provider-family fit when possible (C = 1)
	Service providers' linguistic/cultural background	Prefer providers who have shared cultural and linguistic backgrounds with caregivers (C = 5, P = 5), providers' linguistic/cultural backgrounds play a significant role (C = 5, P = 3), providers' linguistic/cultural backgrounds play a minimal role in certain situations (P = 2)
	Important provider qualities	Knowledgeable and experienced (C = 1, P = 3), rapport building with families (P = 2), sensitive and responsive to different family needs (P = 1), passionate and ethical (P = 1)

Note. C=caregiver; P=practitioner. The numbers indicate the number of participants mentioning the code. The codes were ordered based on the frequency being mentioned.

Methods/Goals: Components. A JASPER session is comprised of three main elements:

(a) brief didactic discussion with the caregiver to explain the goals and key content for the

session using the handouts, (b) live coaching to support the caregiver's strategy implementation with their child, and (c) a de-brief to reflect on the practice. Although participants had not yet had the opportunity to participate in caregiver-mediated JASPER sessions, participants generated some suggestions to adapt this process. One participant suggested the development of a provider manual, which could serve as a guide and reminder to ensure all critical components are addressed during each session. Participants ($n = 4$) also provided suggestions for improving the training elements. Two participants highlighted the need to discuss connections across relevant modules, as caregivers with limited background knowledge may struggle to integrate concepts and strategies on their own. For example, when introducing imitating and modeling, providers should also reference the handouts on play levels, so caregivers can locate and review the materials necessary for understanding their child's current and target play levels and determine when to imitate or model. Additionally, examples should be provided when activities (e.g., brainstorming play routines) are assigned for caregivers to complete during training, as these make the expectations clearer and easier to follow. A participant also suggested that providers should check in with caregivers regularly to ensure they are keeping up. This could involve inviting caregivers to share their understanding of a particular concept or strategy to confirm comprehension and allow providers to support accordingly. One participant provided feedback specific to the coaching element, suggesting the incorporation of a brief calming activity (e.g., reading or music) at the beginning of coaching as needed to support children's smooth transition and connection with their caregiver. Moreover, to enhance the sustainability of caregivers' JASPER implementation, a participant suggested offering follow-up support to the families after the JASPER program concludes.

Methods/Goals: Modalities. Regarding the modalities of the JASPER caregiver support program, participants ($n = 2$) preferred in-person delivery. However, if it must be remote, live coaching that provides real-time feedback was preferable to delayed video feedback or self-paced learning modules.

Persons: JASPER Learning Support Team Members. Community partners also shared their perspectives on who they think should comprise the JASPER learning support team. Several ($n = 6$) preferred specialists as providers, noting that specialists typically have experience with children with a range of needs and are likely more competent in addressing individual cases. Five participants suggested including experienced caregivers of children with autism as team members because caregivers participating in the JASPER program may more easily build trust and rapport with someone who share similar experiences. Experienced caregivers could also provide valuable insights and strategies for setting up the home environment for caregiver-mediated interventions. Given the limited number of autism specialists in China, two participants recommended supporting general education teachers to become qualified JASPER providers. Additionally, one participant suggested matching providers to families based on children's key developmental needs.

Persons: Providers' Linguistic and Cultural Background. We also explored whether community partners have preferences regarding providers' linguistic and cultural backgrounds. Many participants ($n = 8$) believed that linguistic and cultural backgrounds play a significant role, and ten participants indicated that local providers who share cultural and linguistic backgrounds with caregivers are more acceptable. Two participants noted that linguistic and cultural backgrounds play only a minimal role when explaining concepts. However, for explaining strategies and practical examples, providing demonstrations, and coaching, local

providers were seen as advantageous as there is no language barrier, and they are more likely to give examples appropriate to the local context.

Persons: Important Provider Qualities. Community partners highlighted several qualities they value in providers, including knowledge and experience, the ability to build rapport with families, sensitivity and responsiveness to diverse family needs, and a commitment to passion and ethical practice.

Development of A Checklist for Adapting JASPER Caregiver Materials and Program Procedures

Constructive feedback from community partners during the Round 1 focus groups was refined into specific, actionable checklist items to guide the adaptation of JASPER caregiver learning materials ($n = 22$) and training procedures ($n = 9$). Table 4 outlines checklist items, their adaptation rationale, and nature of the adaptations. Stirman et al.'s (2019) expanded framework for reporting adaptations and modifications to EBIs was adopted to guide coding of the nature of adaptations made to JASPER materials. The most common types of adaptations were adding elements (15 checklist items) and tailoring (8 items). These adaptations were intended to clarify the learning materials and customize them to meet the unique learning needs of children and caregivers.

Table 4

Adaptations to JASPER Caregiver Materials and Program Procedures, Rationale for the Adaptations, and Nature of the Adaptations

Adaptations Specific to JASPER Caregiver Materials			
Themes	Items	Rationale	Nature of the Adaptation
Methods/ Goals	Create interactive learning materials using PowerPoint	Interactive materials that allow caregivers to choose whether to expand and read additional information	Tailoring, adding elements, changes in materials
	Create a glossary of key terms	A glossary helps caregivers quickly find and review key concepts and strategies.	Adding elements
	Specify learning objectives and key points essential for mastery for each module	Clear learning objectives and priorities help caregivers identify what to focus on, which is particularly beneficial for those who may feel overwhelmed by excessive information.	Adding elements
	Include the importance of learning and applying key concepts or strategies when not readily included	Supporting caregivers' understanding of why specific concepts or strategies are important increases their acceptability and enhances caregivers' motivation to learn them.	Adding elements
	Include an individualized child profile (e.g., child's mastered and target skills) and make it easily accessible	Individualized child profiles make it easy caregivers to reference and tailor their support to their child's developmental level.	Tailoring, adding elements
	Develop a caregiver-friendly data collection form for tracking child performance	A caregiver-friendly data collection tool encourages regular use. Progress monitoring helps caregivers track their child's progress and update targets.	Tailoring, adding elements

	Add knowledge check questions and align them with individual child's profile	Caregivers can complete the knowledge check questions and review the answers with explanations to confirm their understanding of key content.	Adding elements
	Place thought bubbles by characters' heads to illustrate their thought processes	Thought bubbles can illustrate suggested thinking processes for caregivers (e.g., expansion choices).	Adding elements
	Include a note-taking area to JASPER handouts Enlarge the images and text	This benefits caregivers who are used to note-taking. This makes the learning materials easier and more comfortable to read.	Adding elements Refining
	Ensure the visuals and their captions are accurate and clear	Use visuals judiciously and ensure they are of high quality to maximize their effectiveness.	Refining, changing, adding elements
	Include sufficient examples and non-examples to clarify concepts and strategies	Providing non-examples alongside examples helps clarify concepts and strategies, thereby reducing potential misconceptions and supporting more accurate understanding.	Adding elements
Content/ Concepts/ Context	Ensure the key points are clear	Clear key points help caregivers save time when navigating learning materials.	Refining
	Ensure the content are appropriately tailored to individual children's developmental level	Tailoring the learning materials to each child allows caregivers to easily access relevant information, thereby increasing the likelihood of effective use.	Tailoring
	Ensure the content and concepts are accessible and easy to understand for caregivers from diverse backgrounds	Materials that are responsive to caregivers' levels and needs promote positive learning experiences and support successful learning outcomes.	Tailoring, adding elements

	Customize the content of learning materials to reflect individual family's context (e.g., materials, environmental setup)	Providing examples using materials that are easily accessible to caregivers makes the examples more relatable and increases the likelihood of implementation.	Tailoring
	Connect concept-focused content with meaningful applications or with application-focused content (e.g., use a hyperlink to link "Intro to Engagement and Regulation" with "Supporting Engagement and Regulation")	Linking concepts to practical application motivates caregivers to engage with the concepts. Incorporating how to apply the concepts provides caregivers with actionable ideas to try with their child.	Refining, adding elements
	Adjust the order of the content as needed (e.g., introduce regulation strategies earlier if a child's behavioral challenges affect caregivers' use of core JASPER strategies)	Prioritizing content that addresses child's immediate needs demonstrates the program's flexibility and responsiveness, supporting rapport building with families. By targeting challenges to the implementation of core JASPER strategies, this approach also promotes positive program outcomes.	Reordering segments, tailoring
	Incorporate optional modules that build foundational knowledge (e.g., an introduction to autism)	Introducing foundational knowledge supports caregivers' understanding and uptake of JASPER.	Tailoring, adding elements
Language/ Metaphors	Ensure that wording is accurate, and sentences are correctly structured and straightforward	Accurate use of language improves readability.	Refining
	Ensure the language is natural and aligns with conventional Chinese usage	Using culturally and linguistically appropriate expressions reduces potential confusion and enhances readability and comprehension for caregivers.	Refining

Enhance the readability of learning materials for caregivers across all educational and experience levels	Using accessible and appropriate language fosters equitable learning, enabling all caregivers to benefit from the learning materials.	Refining
Incorporate Chinese metaphors where appropriate	Metaphors were initially absent, but adding those could potentially enhance caregivers' understanding and acceptability of JASPER concepts and strategies	Adding elements

Adaptations Specific to Procedures		
Methods/ Goals	Provide examples when there are activities for caregivers to complete	Examples clarify expectations and increase the likelihood of correct responses.
	Make caregivers learning materials available to caregivers prior to sessions	Access to materials beforehand gives caregivers time to review them and prepare questions to ask during sessions as needed.
	Check in with caregivers regularly	Regular check-ins help ensure caregivers' questions and concerns are addressed promptly.
	Provide follow-up support	Follow-up support promotes the sustainable use of JASPER.
	Create a guide for providers	A provider guide ensures providers are clear about the expectations for them, including session structure, required standards, the flexibility allowed for reactive adaptations, etc.
Persons	Ensure providers are competent in providing individualized quality support to families	Provider competence is essential for maintaining fidelity to core intervention components while making necessary adaptations to address the unique needs of individual families.
	Match families with the most suitable provider whenever possible (e.g., shared cultural and linguistic background or expertise aligns with the child's needs)	Match the most suitable provider to families helps optimize support to meet families' unique characteristic and needs.

	Team up specialists and experienced caregivers	Teaming helps leverage specialists' expertise and caregivers' practical insights.
Context	Create individual family documents to record child (e.g., mastered and target skills) and family characteristics (e.g., caregiver's past experience with autism intervention, learning style, available materials) for supporting ongoing adaptations	By documenting child and family characteristic, providers can have a comprehensive understanding of the child, caregiver, and family, allowing them to tailor support accordingly.

Content Experts' Consultation

During the group consultation meeting, the PI explained each checklist item with concrete examples, and content experts rated the items and suggested revisions. Of the 31 checklist items, 19 were fully approved. For the remaining items, at least one expert recommended revisions. Suggested revisions fell into four categories, as shown below:

Optimizing Flexibility and Options

Experts suggested enhancing flexibility and providing options to better accommodate individual caregivers' learning needs and preferences. For example, instead of always providing examples before caregivers complete an activity, it was suggested to make examples optional and available for caregivers who prefer them, since some may wish to generate their own responses. Similarly, making knowledge check questions optional was advised, as caregivers may have mixed feelings about them. Experts also recommended building flexibility into the session structure (e.g., time allocated to training versus coaching).

Maximizing Comprehension and Implementation

Suggestions included visualizing complex concepts, using multiple methods to explain glossary terms, providing regular reminders (e.g., weekly practice expectations), and breaking down challenging tasks (e.g., introducing data collection one domain at a time rather than all at once).

Enhancing Individualization and Data-based Decision-making

Experts suggested individualizing the learning materials to each child and ensuring that data collected by caregivers are used effectively. For instance, knowledge check questions could be tailored to reflect a child's profile, and completed caregiver-friendly data collection forms could be utilized to emphasize the child's target skills.

Improving Clarity and Specificity

Experts highlighted the importance of specifying certain checklist items, such as clearly defining specialists' and caregivers' roles in the teaming item and including parameters for the item related to follow-up support.

Round 2 Focus Group: Community Partners' Follow-up Feedback

Following modifications to the initial adaptation checklist based on content experts' feedback, the revised items were brought back to the community partners ($n = 15$) with concrete examples. In the Round 2, the PI introduced definitions of acceptability and appropriateness, after which participants rated each checklist item on a 0–6 scale. Table 5 reports the mean and standard deviation of acceptability and appropriateness ratings for the checklist items. The mean acceptability and appropriateness scores for all items were 5 or above, indicating that community

partners generally perceived the checklist items as appropriate and acceptable, particularly those emphasizing individualization, content clarity, and ongoing support.

Table 5

Adaptation Checklist Items and Their Perceived Acceptability and Appropriateness by Community Partners

Themes	Items	Acceptability Ratings		Appropriateness Ratings	
		Mean	SD	Mean	SD
Adaptations Specific to Materials					
Methods/ Goals	Create interactive learning materials using PowerPoint and provide clear guidance on how to use them	5.54	0.66	5.54	0.66
	Create a glossary of key terms and use multiple methods to explain them	5.53	0.64	5.47	0.74
	Include learning objectives and priorities for each module and reiterate expectations	5.50	0.52	5.57	0.51
	Include the importance of learning and applying key concepts or strategies when not readily included	5.67	0.62	5.60	0.63
	Include an easily accessible individualized child profile	5.60	0.63	5.60	0.63
	Develop a caregiver-friendly data collection form for tracking child performance and use it to support caregivers' understanding of child's skill levels	5.47	0.92	5.13	1.06
	Add optional knowledge check questions and align them with individual child's profile	5.57	0.76	5.50	0.65
	Place thought bubbles by characters' heads to illustrate their thought processes	5.71	0.61	5.64	0.63

	Include a note-taking area to JASPER handouts	5.23	1.01	5.23	0.83
	Enlarge the images and text	5.85	0.38	5.54	0.88
	Ensure the visuals and their captions are accurate and clear	5.33	0.82	5.33	0.82
	Include sufficient examples and non-examples to clarify concepts and strategies	5.85	0.38	5.54	0.88
Content/ Concepts/ Context	Ensure the key points are clear	5.00	1.01	5.27	0.96
	Ensure the content are appropriately tailored to individual children	5.47	0.52	5.73	0.46
	Ensure the content and concepts are accessible and easy to understand for caregivers from diverse backgrounds	5.73	0.46	5.73	0.46
	Customize the content of learning materials to reflect individual family's context	5.73	0.46	5.80	0.41
	Connect concept-focused content with meaningful applications or with application-focused content	5.40	0.74	5.40	0.74
	Adjust the order of the content as needed	5.60	0.51	5.6	0.51
	Incorporate optional modules that build foundational knowledge to facilitate JASPER learning	5.71	0.47	5.71	0.47
Language/ Metaphors	Ensure that wording is accurate, and sentences are correctly structured and straightforward	5.80	0.41	5.73	0.46
	Ensure the language is natural and aligns with conventional Chinese usage	5.47	0.64	5.47	0.52
	Enhance the readability of learning materials for caregivers across all educational and experience levels	5.67	0.49	5.60	0.63

	Incorporate Chinese metaphors where appropriate	5.57	0.65	5.57	0.65
Adaptations Specific to Procedures					
Methods/ Goals	Offer optional examples when there are activities for caregivers to complete	5.54	0.52	5.69	0.48
	Make caregivers learning materials available to caregivers prior to sessions	5.71	0.47	5.71	0.47
	Check in with caregivers regularly	5.57	0.51	5.71	0.47
	Provide follow-up support with clearly defined parameters	5.87	0.35	5.87	0.35
	Create a provider guide with built-in flexibility	5.57	0.64	5.57	0.64
Persons	Ensure providers are competent in providing individualized quality support to families	5.80	0.41	5.67	0.49
	Match the most suitable provider to families	5.73	0.46	5.73	0.46
	Team up specialists and experienced caregivers and specify their roles	5.60	0.63	5.60	0.63
Context	Create individual family documents to record child and family characteristics for supporting ongoing adaptations	5.73	0.46	5.73	0.46

Note. The highlights reflect modifications made based on experts' suggestions.

During Round 2 focus groups, participants provided additional feedback to enhance the appropriateness, feasibility, and usability of the materials and procedures. For example, one participant noted that providing too much explanation to caregivers may not be as helpful as anticipated, emphasizing that expectations for caregivers need to be aligned with their current skill levels. Similarly, while some caregivers may view data collection as feasible and beneficial, others may perceive it as overly complicated and overwhelming. Furthermore, one participant acknowledged that metaphors could potentially support caregivers' acceptance and

understanding of JASPER but highlighted the importance of selecting accurate metaphors and explicitly linking them to JASPER concepts and strategies to ensure caregivers make the intended connections. Additional recommendations focused on enhancing usability of the materials, such as incorporating a glossary button on each page of the PowerPoint-based interactive materials and providing clear, consistent indicators to signal sections containing expanded information.

JASPER materials were then adapted using the finalized checklist and included two types: (a) caregiver learning materials, consisting of revised handouts and newly developed interactive resources, and (b) provider training materials, compiled as a program guide for providers.

Discussion

This community-based participatory study engaged community partners in China to adapt JASPER materials, improving their fit for Chinese families of children with autism and making JASPER one of the first few caregiver-mediated interventions culturally adapted for the Chinese population.

The process of adapting JASPER was guided by the EVM, which informed the design of focus group questions that elicited participants' feedback on adaptations, and Stirman's framework (2019) was applied to categorize and report the nature of these adaptations. Both surface and deep structure adaptations were made to the JASPER materials. Surface structure adaptations involve aligning intervention materials and messages with the observable characteristics (e.g., language, clothing) of a target population while deep structure adaptations address the fit of interventions within a specific cultural context (e.g., cultural, social, and

environmental factors; Resnicow et al., 2000). In the present study, example surface structure adaptations included refining the text in the learning materials to align with local language usage and style. Example deep structure adaptations involved presenting information in multiple formats to accommodate learners with diverse educational levels and learning styles, as well as highlighting the purpose and significance of specific content across modules to increase the acceptability of the content, particularly for caregivers from low-resourced areas and those new to NDBIs.

During the adaptation process, discrepancies in participants' feedback were identified. While some participants appreciated the brevity of the original JASPER handouts, others preferred either less or more information per page. Some participants valued the use of visuals, whereas some others felt text could be clearer in explaining certain concepts and strategies. Similarly, although some found the language in the handouts easy to understand, others questioned its appropriateness for caregivers with limited background knowledge in autism intervention and lower educational levels. Moreover, while some participants considered the original JASPER handouts sufficient when paired with training and coaching, others requested additional resources, such as video demonstrations, noting that they might not retain all the information from the learning sessions and that materials in multiple formats could support later review. These discrepancies suggest that caregivers have diverse learning needs and preferences, underscoring the importance of providing flexible materials and using multiple methods to present information to accommodate a wide range of learning needs. Therefore, to enhance the accessibility of the JASPER learning materials, interactive PowerPoint modules were developed by adding pop-up content to the adapted JASPER handouts. The use of animations allowed the inclusion of supplementary information, such as text, videos, examples and non-examples,

scenarios, and knowledge-check questions with answers, enabling caregivers to selectively access additional information by clicking buttons. The PowerPoint modules can help support learners with varying needs for detail and preferences for different formats of information when reviewing the materials. To optimize appropriateness and effectiveness, other caregiver support programs should also consider and accommodate the diverse needs of learners. The Universal Design for Learning (UDL; CAST, 2024), which emphasizes providing multiple options and flexibility in instruction, can serve as a valuable guiding framework for this purpose.

As this study took proactive steps to get in front of known challenges in the deployment of US-based programs in the Chinese community, community partners provided feedback only based on the information presented during the focus groups, without direct experience with the JASPER intervention program. Moreover, only two topics of JASPER handouts were reviewed in each focus group, so the participants did not have a comprehensive understanding of the JASPER materials and program procedures. Consequently, some of their suggestions overlapped with components that already exist in the program or program materials. For example, participants requested clear learning objectives for caregivers in each session, goals and objectives for the child, a cover page listing all JASPER topics by session, and flexibility in the order of content to accommodate caregivers' individual learning needs. Based on their feedback, some nuanced adjustments were made to these existing components: (a) in addition to caregiver learning objectives, key points essential for mastery were specified; (b) to make child goals more accessible, a button to open individualized child profile was embedded in each page of the PowerPoint-based interactive learning materials; and (c) to facilitate access to specific modules, hyperlinks were added to each topic on the cover page to link directly to the corresponding page. Future studies should collect feedback on the JASPER materials and program procedures from

caregivers who have directly participated in the JASPER support program to inform further adaptations.

Although proactive adaptations were made to the JASPER learning materials and program procedures, this does not mark the end of the adaptation. It is critical to view adaptation as an iterative, ongoing process and to continue systematic adaptations as the implementation of the JASPER program progresses (Kirk et al., 2020).

Conclusion

The JASPER caregiver learning materials and program procedures were adapted based on feedback from community partners and content experts. Findings indicate that even within a population sharing the same cultural background, individuals' learning needs and preferences can vary considerably. Thus, maximizing the flexibility and responsiveness of the materials and procedures is essential. It is also important to acknowledge that adaptation is an ongoing process, and that continuous adaptations are needed as the JASPER caregiver-mediated intervention is implemented with Chinese families.

Appendices

Appendix A. Focus Group Guide (An Example)

Adaptations of JASPER Caregiver Handouts Focus Group Moderator Guide (Group 1)

Project Description

Joint Attention, Symbolic Play, Engagement, and Regulation (JASPER: Kasari et al., 2021) is an evidence-based social communication intervention that targets the development of children's social engagement, regulation, and spontaneous play and social communication skills. It was developed and tested for both efficacy and effectiveness in North America. The intervention can be delivered in a clinician mediated, educator mediated, or caregiver mediated format. When mediated by caregivers, key content and strategies are summarized in visual handouts. Instead of assuming the handouts developed for North American caregivers are also appropriate and acceptable for Chinese caregivers, we are conducting a series of focus groups to obtain information about Chinese stakeholders' perspectives on the translated JASPER caregiver handouts and how the materials can be further adapted to meet the unique needs of Chinese caregivers.

The information collected from the focus groups will be used to inform a cultural adaptation of Chinese translated JASPER caregiver handouts to support their fit for Chinese caregivers of children with ASD.

Definition of Terms

JASPER: JASPER stands for joint attention, symbolic play, engagement, and regulation. It is an evidence-based social communication intervention for children with ASD.

Caregiver-mediated intervention: Caregiver-mediated intervention represents intervention that is implemented by caregivers, and the caregivers are often trained by practitioners to provide the intervention for their children.

Cultural adaptation: Cultural adaptation is a systematic modification made to the target materials to make them appropriate for diverse groups. The modification considers language, culture, context among other dimensions in a way that is compatible with a specific cultural value, pattern, etc.

Roles and Responsibilities

Moderator

Prepare the meeting

- ☐ Send handouts to participants a week prior to the focus groups
- ☐ Set up password protected Zoom link and share with participants
- ☐ Resend link and information 24 hours prior to the group meeting and remind participants of their participant ID

Start the meeting

- ☐ Make sure the Zoom recording is working
- ☐ Turn on iPad audio recording
- ☐ Make co-moderator a co-host
- ☐ Ask participants to use their assigned participant ID to rename themselves
- ☐ Make sure to enable captions and full transcription (speaking language: Chinese)—turn on “save transcript”
- ☐ Make sure JASPER handouts are ready to be screen shared

Facilitate the meeting

- ☐ Make participants feel welcome and feel their input is heard and valued.
- ☐ Encourage participants to participate by providing space for them to share and ask appropriate questions
- ☐ Actively respond to participants’ input and ask follow-up questions when needed
- ☐ Take notes when participants are talking, so the moderator can summarize points participants bring up, check the accuracy of them, and ask clarification questions
- ☐ Ask questions instead of making assumptions based on participants’ response
- ☐ Make sure each participant gets chances to share
- ☐ Follow the moderator agenda and keep centered on the purpose of the focus group
- ☐ Acknowledge participants’ input and avoid expressions that might make participants feel being judged
- ☐ Time management—cover all the planned content in two hours

End the meeting

- ☐ Check whether participants have final thoughts
- ☐ Appreciate participants’ contributions to this study
- ☐ Ask participants to share the recruiting flyer with other caregivers of children with ASD
- ☐ **Save transcript**

After the meeting

- ☐ Send out red envelope via WeChat to participants

Co-moderator

- ☐ Admit participants who are late for the Zoom meeting
- ☐ Send a private message to participant who has not renamed themselves using their participant ID
- ☐ Help the moderator ensure that the meeting is recorded throughout

- ☐ If the moderator misses any important information in the chat box, unmute and remind the moderator
- ☐ Monitor the meeting, and if you observe any problems, let the moderator know
- ☐ If you have any suggestions based on how the meeting goes, please provide your feedback to the moderator after the meeting to help make improvement

Moderator Agenda

Time	Activity
0:00-0:05	Turn on the recording and inform the participants that the recording is on and will be on for the whole meeting. Appreciate participants' participation, brief self-introductions, and an ice breaker activity
0:05-0:08	Introduce the project, review agenda and ground rules
0:08-0:10	Give a brief introduction to the JASPER intervention and how the handouts are used in caregiver mediated JASPER
0:10-1:50	Focus group questions
1:50-2:00	Wrap-up, appreciate participants' participation again, and end meeting

Materials

- Focus group guide
- JASPER caregiver handouts in PDF

Introduction to Focus Group Activities

Get to know each other

- Appreciate participants' participation
- Introduce yourself (school, major, role in the meeting) and the co-moderator
- Ask participants to introduce themselves by sharing where they are from, age of their child, and experience in caregiver-mediated intervention.
- Ask participants to share one positive thing that happened recently (might skip)

Get to know the project and meeting today

- State the purpose of the meeting: "Our goal today is to learn about how caregiver handouts that was developed in the US can be adapted to meet the needs of Chinese caregivers. The materials are for an intervention named Joint Attention, Symbolic Play, Engagement, and Regulation (JASPER). JASPER is an evidence-based social communication intervention that targets the development of children's social engagement, regulation, and spontaneous play and social communication skills. It was

developed and tested for both efficacy and effectiveness in North America. The intervention can be delivered in a clinician mediated, educator mediated, and caregiver mediated format. When mediated by caregivers, key content and strategies are summarized in visual handouts. Instead of assuming the handouts developed for North American caregivers are also appropriate and acceptable for Chinese caregivers, we are conducting a focus group to obtain information about your perspectives on the handouts and how they may be adapted to meet Chinese caregivers' needs. Today we are going to review and discuss two handouts from the JASPER training materials—one focused on imitation and modeling, and the other focused on play. Your input provided in this meeting will be used to adapt the JASPER handouts to enhance the appropriateness and acceptability of the materials for Chinese caregivers of children with ASD. The recording of the meeting today will only be shared with the research members who are going to adapt the JASPER materials, and when your input is shared with anyone else, it will be shared anonymously, so they will not be able to identify who provided the information.”

- Review the agenda by explaining: “In this meeting, we have four main components. The first one is to get to know each other, which we have done. The second is to get to know the project and meeting today. We have introduced the project, and we will keep reviewing the agenda and ground rules, then we will start our focus group questions. After that, we will wrap up and end the meeting. This meeting will last for about two hours. Any questions?”
- State the ground rules by saying: “Before we begin, we would like to highlight some rules that will help us have an efficient and respectful meeting. First, stay focused on the topic and questions. Second, participate actively while speaking one at a time. Third, treat everyone’s ideas respectfully. We would love to hear different perspectives, but we do not criticize other people’s perspectives because there are no right or wrong answers. Fourth, both positive and negative feedback on the translated JASPER handouts will be helpful for us, so please feel free to share what you are thinking.”

Assigned handouts:

1. Imitation and modeling
2. Intro to engagement and regulation

Practitioner Focus Group Questions

[Review materials together]

Screen share the handouts for practitioners to review. At the same time, instructions will be provided: “Now we have about 5 minutes to review these handouts. When you go through it, please take notes on any thoughts you have. After everyone finishes reading it, we will come back together to share thoughts out loud.

5 minutes later, check in with participants whether they need more time to read through the handouts. If not, you can start the focus group questions.

[Acceptability]

As you look at the handouts, what do you like about them? What do you dislike about them?

[Appropriateness]

What components of the handouts are a good fit for the needs of Chinese caregivers and may make them likely to use it? What components of the handout make you think they do not fit the needs of Chinese caregivers and may make them unlikely to use it?

What components should have been available (but missing) in this handout to address the unique needs of Chinese caregivers?

What changes would you make to help make it a better fit for a caregiver of a child with ASD living in China?

[Language/metaphors]

The handout was translated from English. Does anything stand out to you in terms of the words/language use? What do you think about the pictures/ images?

Follow-up questions: Is there anything that is not clear to you? Are there any expressions or visuals that are not familiar to you or hard to understand? [If participants answer yes to these two questions, moderator will ask the following questions:] What changes would you recommend to improve readability (alternative description, more explanation, or additional visual cues)?

[Content/concept]

What is your takeaway from the handout? Like what you said, this handout highlights... (key components).

Follow-up questions: What would you like to change? How would you change it? What components would you recommend adding/removing?

[Other]

Do you have any other suggestions to make the handout more appropriate or acceptable to Chinese caregivers of children with autism?

[General questions]

We just went through two of the JASPER handouts that are typically provided during JASPER education sessions. Have you seen or used similar materials?

Follow-up questions: What features of the materials can capture readers' attention?

[Goals/Methods]

JASPER caregiver education is to help caregivers use JASPER intervention strategies with their children at home to help children learn new skills. The goal of JASPER handouts is to provide key information on JASPER concepts or strategies, and they are used to guide JASPER coaching sessions. Also, we want to give families a permanent product like the handout that they can use as a reminder once the session ends. What do you think about using handouts to meet these goals?

Follow up: If handouts are not sufficient, what type of teaching tools do you think can help meet these goals?

Follow up: What are some other purposes that caregivers can use the handouts for?

[Persons]

A certified JASPER trainer typically walks through the handouts with caregivers during coaching sessions. In other caregiver support programs, instead of having specialists provide support for caregivers, they may train caregivers with similar background as trainers (e.g., caregivers who also have a child with ASD), teachers, or social workers to provide training. What do you think caregivers' preferences regarding who their service providers are?

Follow-up questions: What support from JASPER trainers would benefit caregivers' understanding and application of the content in the handouts?

[Context]

What are some contextual factors (factors that are not relevant to handouts themselves; examples include work schedule, time, caregiving demands—other kids, financial situation) that may affect caregivers' use of JASPER handouts and participation in JASPER training?

Follow-up questions (might skip): What (support from JASPER trainers) could potentially help improve caregivers' use of handouts and participation in JASPER training?

[Closing Question]

Is there anything else that you would like to add to our discussion today?

[Closing Focus Group]

Thanks for joining me today for the focus group! I really appreciate your time and participation! The feedback and ideas you provided today are very meaningful for us. They help us understand your thoughts on the translated handout and adaptations needed to make it more appropriate and acceptable for Chinese caregivers of children with autism. We definitely appreciate your contributions and will use them to adapt the handout. Thank you all again!

Appendix B. Demographic Survey for Caregivers

1. Your name

2. The city/town you currently live in

3. You are child's

- Mother
- Father
- Grandparents
- Other (please specify)

4. Please fill in your age

5. Please select your educational level

- Middle school or below
- High school
- Vocational degree
- Associate degree
- Some college/university
- Bachelor's degree
- Master's degree
- Doctorate
- Other (please specify)

6. Please select your employment status

- Full-time job
- Part-time job
- Full-time caregiver
- Retired
- Unemployed
- Other (please specify)

7. Your occupation (if applicable):

8. Please select the range of your annual household income (in CNY)

- Below 20,000
- 20,000-49,999
- 50,000-99,999
- 100,000-149,999

- 150,000-199,999
- 200,000-299,999
- 300,000-499,999
- 500,000-9,999,999
- 1,000,000 or above

9. Please fill in your child's:

- age: _____ years _____ months

- sex: _____

10. Please fill in your child's age when diagnosed with autism: ____ years ____ months

11. What intervention/services has your child received (please select all that apply and specify the duration of the services-- ____ hours/week for ____ weeks)?

- Speech language therapy
- Occupational therapy
- Physical therapy
- Applied behavior analysis
- Pharmaceutical therapy
- Other (please specify)

12. What types of autism related caregiver education have you received (please select all that apply)?

- Communication
- Play
- Challenging behavior
- Sleep
- Daily living skills
- Other (please specify)

13. How many hours of caregiver education (e.g., training, coaching, consultation) have you received?

- 0 hour
- 1-9 hours
- 10-19 hours
- 20-29 hours
- 30-39 hours
- 40-49 hours
- 50-59 hours
- 60 hours or more (please fill in the approximate hours)

Appendix C. Demographic Survey for Autism Practitioners

1. Your name
2. The city/town you currently live in
3. Please fill in your age
4. Please select your educational level
 - High school
 - Vocational degree
 - Associate degree
 - Some college/university
 - Bachelor's degree
 - Master's degree
 - Doctorate
 - Other (please specify)
5. Please select your employment status
 - Full-time job
 - Part-time job
 - Full-time caregiver
 - Retired
 - Unemployed
 - Other (please specify)
6. What is your professional background (please select all that apply)?
 - Special education
 - Early childhood education
 - Rehabilitation
 - Psychology
 - Speech language pathologist
 - Occupational therapist
 - Physical therapist
 - Medicine
 - Other (please specify)
7. What is your current position (please select all that apply and specify the duration in each position you select--year/month)?
 - Speech language pathologist
 - Occupational therapist
 - Physical therapist

- Behavior therapist
- Doctor
- Special education teacher
- Inclusive education teacher
- Administrator
- Caregiver trainer
- Other (please specify)

8. Please select your annual salary range (in CNY)

- Below 20,000
- 20,000-49,999
- 50,000-799,999
- 80,000-109,999
- 110,000-139,999
- 140,000-169,999
- 170,000-249,999
- 250,000-299,999
- 300,000 or above

9. What age group(s) do you work with (please select all that apply)?

- Birth to 3
- 3 to 6
- 6-12
- 12-18
- Above 18

10. What type(s) of setting do you currently work in (please select all that apply)?

- Classroom
- Home
- Intervention agency
- Hospital/clinic
- Other (please specify)

11. What types of services have you provided to people with autism (please select all that apply)?

- Speech language therapy
- Occupational therapy
- Physical therapy
- Applied behavior analysis
- Pharmaceutical therapy
- Early intervention/special education
- Other (please specify)

12. What types of caregiver education have you provided (please select all that apply)?

- Social communication
- Play
- Challenging behavior
- Sleep difficulties
- Daily living skills
- Other (please specify)

13. How many hours of caregiver education have you provided?

- 0 hour
- 1-5 hours
- 6-10 hours
- 11-15 hours
- 16-20 hours
- 21-30 hours
- 31-40 hours
- 40 hours or more (please fill in the approximate hours)

Appendix D. Adaptation Approval Form

[illegible]

CHAPTER III: CULTURALLY RESPONSIVE JASPER REMOTE SUPPORT FOR CAREGIVERS OF CHILDREN WITH AUTISM IN CHINA: A SINGLE-SUBJECT STUDY

Introduction

Autism is a developmental disorder that affects all racial and ethnic groups (Maenner et al., 2020; Siu et al., 2016). A recent systematic review and meta-analysis estimated the prevalence of autism in China at 7 per 1,000 (0.7%; Jiang et al., 2024), which remains lower than the prevalence reported in Western countries, likely due to factors such as underdiagnosis (Sun et al., 2019). Sun et al. (2019) reported an autism prevalence of approximately 1% based on data collected from three Chinese cities, a rate comparable to that found in the West, suggesting that millions of children in China may be affected by autism.

While early intervention is critical, barriers including limited special education policy, lack of free appropriate services, and financial constraints, often prevent children with autism from receiving timely interventions (Huang et al., 2013). Given that families usually have to pay out of pocket for services provided by professional institutions, caregiver-mediated interventions offer a cost-effective and sustainable alternative. Such interventions empower caregivers with strategies to support their child's development within daily routines (Brian et al., 2015; Gao & Drani, 2024).

Caregivers of children with autism are more likely to experience higher levels of parenting stress compared to caregivers of children without developmental disabilities or with other types of developmental disabilities (Yesilkaya & Magallón-Neri, 2024). High parenting stress have been linked to lower parental quality of life and increased challenging behaviors in children with autism (Feng et al., 2025). While mindfulness-based interventions have been shown to reduce caregiver stress, findings regarding the impact of caregiver-mediated

interventions on caregivers' mental well-being have been mixed (Feng et al., 2025; Kasari et al., 2015; Kubo et al., 2021; Levato et al., 2025). Schlink et al. (2021) suggested that reductions in parenting stress may be associated with improved caregiver-mediated intervention efficacy. Therefore, there may be bidirectional relationships between caregiver-mediated interventions and caregivers' well-being, highlighting the need for further research.

Social communicative abilities such as imitation, joint attention, and play are pivotal abilities in early development. Because children with autism may benefit from additional support in these key skills, these abilities have been identified as important intervention targets for the majority of young children with autism (Warreyn et al., 2014). Joint engagement is another critical skill that predicts children's developmental outcomes, particularly in language, and has been identified as a potential mechanism for increasing initiations of joint attention (Shih et al., 2021). There are two main types of joint engagement, including adult-initiated joint engagement and child-initiated joint engagement. While adult-initiated joint engagement is related to directive caregiver interaction style, where caregivers lead the play and communication via prompting and commands leading to child compliance, child-initiated joint engagement is related to caregivers' responsivity, where caregivers responded to children's social behaviors, providing them with opportunities to initiate play and social communication (Patterson et al., 2014).

Joint Attention, Symbolic Play, Engagement, and Regulation (JASPER; Kasari et al., 2021) is an evidence-based social communication intervention that caregivers can implement to improve child initiated joint engagement as well as children's spontaneous social communication, and play skills (Kasari et al., 2010, 2015). Chinese caregivers of children with autism may benefit from learning and implementing JASPER; however, since JASPER was developed and tested primarily in North America (e.g., Shire et al., 2017), its appropriateness and

effectiveness cannot be assumed in other cultural contexts. Cultural adaptation increases the responsiveness of evidence-based interventions (EBIs) to the needs and preferences of diverse populations, thereby enhancing their adoption and sustainability (Cabassa & Baumann, 2013). Cultural adaptation has been previously applied in various context, including ABA-based telehealth services outside of the US (Sivaraman & Fahmie, 2020), parent-mediated autism interventions for Latin American families (DuBay, 2022), trainings aimed at reducing children's challenging behaviors for culturally diverse caregivers (Vargas Londono et al., 2023), among others. Regarding the use of cultural adaptation processes in Chinese-speaking regions, Liu et al. (2020) reviewed parent-mediated interventions for children and adolescents with autism in mainland China, Hong Kong, and Taiwan. Only three of the 21 studies reported cultural adaptation, whereas most employed models or elements developed in Western contexts. Limited cultural adaptation raises concerns about the suitability of Western-developed interventions in Chinese-speaking regions. Prior to implementing the JASPER program with caregivers of children with autism in China, both surface- and deep-structure cultural adaptations (Resnicow et al., 2000) were made to the caregiver learning materials and program procedures, guided by the Ecological Validity Model (EVM; Bernal et al., 1995) and informed by input from community partners in China and content experts in the US (Bao et al., 2025).

This study utilized an experimental single subject concurrent multiple baseline across participants design to examine effects of JASPER remote caregiver-mediated intervention using adapted learning materials and training procedures on caregivers' JASPER intervention fidelity and children's joint engagement. This study explored the following questions: (a) is there a functional relation between culturally responsive JASPER remote support and Chinese caregivers' JASPER intervention fidelity? (b) Is there a functional relation between culturally

responsive JASPER remote support and an increase in child-initiated joint engagement? (c) Is there a functional relation between culturally responsive JASPER remote support and a decrease in adult-initiated joint engagement? (d) Is there an association between follow-up support (weekly check-in calls) and improvement/maintenance of caregivers' JASPER intervention fidelity and children's engagement? (e) How do caregiver stress levels change across time during the study? (f) How do child play types change across time during the study? (g) To what degree are JASPER caregiver intervention fidelity items considered acceptable and appropriate by caregivers after they receive the JASPER intervention?

Method

Participants

Participants were recruited through virtual snowball sampling by distributing a recruitment flyer among autism caregiver/practitioner groups hosted on WeChat. Four mothers and one father of children with autism participated in this study. Qualifying children (a) were of preschool age (3–6 years), and (b) had an autism diagnosis. Qualifying caregivers (a) were Chinese and lived in China, (b) lived with their child and had opportunities to interact with their child every day during the study, (c) had Internet access and wireless headphones, and (d) had not received JASPER education before. One caregiver–child dyad (dyad 5) dropped out during the baseline phase due to relocation to the United States and difficulty finding time to participate. Table 6 summarizes the characteristics of child participants, and Table 7 presents caregiver and family characteristics. Any other caregivers from each family who were interested in learning JASPER were invited to join the remote sessions; however, no additional family members participated.

Table 6*Child Characteristics*

Child Name (Dyad #)	Sex	Age at Recruitment (Years, Months)	Age at Diagnosis (Years, Months)	Caregiver Reported Autism Severity	Comorbidities	Services Received to Date
Matt (dyad 1)	M	6; 0	2; 0	Requiring substantial support	None	Occupational therapy (OT)
John (dyad 2)	M	6; 5	3; 0	Requiring substantial support	None	Speech language therapy (SLT), OT, physical therapy (PT), applied behavior analysis (ABA), inclusive education, general education
Zak (dyad 3)	M	5; 5	3; 3	Requiring support	ADHD	SLT, OT, ABA, general education
Frank (dyad 4)	M	5; 9	3; 3	Requiring substantial support	None	Inclusive education

Table 7*Caregiver and Family Characteristics*

Caregiver Name (Dyad #)	Age (Years)	Relationship to the Child	Marital Status	Location (City)	Education	Employment	Family Size and Annual Income (CNY)
Tom (dyad 1)	45	Father	Married	Shenzhen	Bachelor's degree	Part-time; business/ trade	3; below 20k
Zoe (dyad 2)	36	Mother	Married	Luoyang	Some college/ associate degree	Homemaker	3; 20k- 50k
Lucy (dyad 3)	39	Mother	Married	Hefei	Master's degree	Homemaker	4; 300k- 500k
Hannah (dyad 4)	38	Mother	Married	Hangzhou	Bachelor's degree	Full-time; middle school teacher	5; 300k- 500k

Setting

As caregiver-child dyads were physically located in mainland China, and the researcher delivering JASPER services was based in the United States, all sessions were remote and synchronous via Zoom video conferencing, with caregivers implementing JASPER with their child in their own space.

JASPER Caregiver Coach

The researcher (PI) was the JASPER caregiver coach, supporting caregivers' JASPER learning and implementation. She is a doctoral student enrolled in a Special Education program.

She is a certified JASPER clinician-child interventionist, and she has had experience training and coaching caregivers and pre-service teachers in implementing JASPER.

Materials

Each participating family had a phone with Internet access to join Zoom meetings. In addition, they had wireless headphones for live coaching so the researcher could talk directly with the caregiver without the sound distracting their child.

The required materials for assessments including the Short Play and Communication Evaluation (SPACE: adapted from Shire et al., 2018) and Caregiver Child Interaction (CCX: adapted from Kasari et al., 2010) were provided along with their administration instructions by the researcher and mailed to caregivers. Caregivers were asked to use the assessment materials only during assessments while they were active in the study; after exiting, they were free to use them as they wished.

Play materials for the JASPER caregiver-mediated intervention outside of assessments included toys from each family's home. In addition, a \$50 budget was allocated to purchase developmentally appropriate toys for each family.

Regarding JASPER learning materials, caregivers received the JASPER Intervention Fidelity Checklist items during the orientation. After the final baseline data point was collected, they were provided with the full package of adapted interactive JASPER slides (PowerPoint format), which incorporated multiple methods—such as text, videos, examples and non-examples, scenarios, and knowledge-check questions with answers—to present key JASPER content. In addition, caregivers received the adapted electronic JASPER handouts that summarized key JASPER concepts and strategies three days before the intervention session in

which the handouts were to be used. When two sessions within the same week were scheduled less than three days apart, the handouts for the second session were provided immediately after the first session ended.

Experimental Design and Procedures

A single subject concurrent multiple baseline designs (MBD) was utilized to evaluate the effects of culturally responsive JASPER support for Chinese families. Caregiver-child dyads entered the intervention phase in a staggered order, with at least three data points between each entry. Dyads with a more stable baseline began the intervention first. Baseline stability was determined through visual inspection of session data, with stability defined as low variability and the absence of a clear increasing trend in caregivers' JASPER intervention fidelity. The sequence of phases in the study design included: (a) orientation, (b) baseline, (c) intervention, and (d) follow-up.

Phase 1: Orientation

Before beginning baseline, caregivers participated in a group training that introduced the study (e.g., expectations for caregiver involvement), the JASPER intervention (e.g., key concepts and the JASPER Intervention Checklist), and the learning materials they would receive during the study, along with guidance on how to use them. Toward the end of the training, caregivers received instructions for administering the SPACE and CCX assessments. The assessment results were used to identify children's current (mastered) and goal (target) play and communication levels. The orientation session took approximately 90 minutes.

Phase 2: Baseline

During baseline, the researcher met with caregivers on Zoom weekly to record the 10-minute CCX. A minimum of three baseline sessions were recorded for each participant. The researcher rated caregivers' intervention fidelity during the baseline sessions. When stability in fidelity was demonstrated for one caregiver in a group, they entered the intervention phase, while at least three additional baseline sessions were recorded for the remaining participants until stability was demonstrated for another caregiver. If multiple caregivers demonstrated a stable baseline simultaneously, one was randomly selected to enter the intervention phase. According to a previous study examining the effects of caregiver-mediated JASPER intervention (Shire et al., 2021), we anticipated baseline stability in caregiver strategies.

Phase 3: Intervention

During intervention, caregivers attended two 60-minute intervention sessions per week. Each session consisted of approximately 30 minutes of training with the caregiver alone before the child was present, 20 minutes of live coaching to support the caregiver's use of strategies with their child, and 10 minutes for debriefing. The exact time spent on training and coaching varied depending on the session content, as well as the caregiver's learning needs and preferences. During training, the researcher checked in to warm up and get familiar with updated family/child conditions, briefly reviewed past content, explained concepts/strategies in the learning materials designed for that session through examples and case scenarios, provided opportunities for caregivers to ask questions, and summarized key strategies for caregivers to practice during the following 20-minute coaching. The child was not expected to be present for the training. However, if the child had to be present, caregivers was suggested to make some toys and snacks available for the child near them, so they could attend the training while keeping an

eye on the child. During live-coaching, caregivers were asked to play with their child using materials from their home. The researcher provided real time guidance to help the caregiver apply the target JASPER strategies, followed by a short de-brief where caregivers could reflect on their practice, ask questions, and the interventionist could highlight strengths and planning for the next session including specific strategies to focus on. Caregivers were asked to practice JASPER strategies with their child for at least five minutes per day during the first three weeks and for 10 minutes per day from the fourth through sixth week. After each session, they received a brief list of strategies to practice before the next session via WeChat message, along with a reminder to practice, review learning materials, and attend the next session. A survey link to complete the weekly practice and service update log was provided to caregivers one day before the start of each new week. After the second intervention session and before the first session of the following week, a CCX video was recorded for data analysis. Table 8 lays out JASPER topics that were addressed each week. Table 9 summarizes the mean weekly time caregivers spent reviewing JASPER materials and practicing with their child.

Table 8

JASPER Topics for Each Session

Week	Session	Topics
1	1	Goal Setting; Introduction to Environmental Arrangement: Setting Up the Play Area and Choosing Play Materials
	2	Imitation and Modeling
2	3	Introduction to Routines; Establishing the Base
	4	Introduction to Restarting and Expanding Routines; Advanced Environmental Arrangement: Choosing Play Materials and Managing the Environment

3	5	Communication Strategies: Space to Communicate; Notice and Respond to Children's Communication
	6	Communication Strategies: Modeling Language and Gestures
4	7	Play Routines: Establishing the Base, Expanding and Restarting Routines
	8	Supporting Engagement and Regulation (Floating)
5	9	Advanced Communication Strategies: Programming for Joint Attention & Requesting
	10	Progress Monitoring through Data Collection
6	11	Troubleshooting, Practice, Generalization of JASPER Strategies to Home Routines
	12	Troubleshooting and Practice; Goal Adjustment and Next Steps

Table 9

Caregivers' Means and Standard Deviation of Weekly Minutes of JASPER Practice Per Week

Participant	Intervention				Follow-up			
	Material Review		Practice with Child		Material Review		Practice with Child	
	M	SD	M	SD	M	SD	M	SD
Tom (dyad 1)	35	25.17	25	5.77	17.50	5	22.5	5
Zoe (dyad 2)	14	4.18	19	6.52	21.25	10.31	35	5.77
Lucy (dyad 3)	68.33	33.71	100	70.14	51.43	35.79	90	30
Hannah (dyad 4)	25	15.17	63.33	20.66	5	5	63.33	25.17

Proactive Adaptations of JASPER Support for Chinese Families. The JASPER materials provided to caregivers were culturally and linguistically adapted based on input from Chinese community partners, including caregivers of children with autism, autism practitioners and experts in cultural adaptation and JASPER to optimize their appropriateness for families in China (Bao et al., 2025). Additionally, program procedures were designed to be responsive to each family's unique needs and background. These included collecting information to understand

family contexts, joint planning, frequent check-ins, collaborative troubleshooting, and incorporating caregiver feedback to adjust session structure and content.

Ongoing Adaptations throughout the Intervention. Right after the second session each week, the JASPER coach interviewed caregivers to gather feedback on the previous two sessions, using a set of open-ended questions are listed in the Adaptation Interview Log. Caregivers' requests for adaptations were accommodated when they were within the flexibility of the study protocol.

At the end of the six-week intervention, caregivers were asked to rate each JASPER Intervention Fidelity Checklist item in terms of its acceptability and appropriateness, which could help identify components of JASPER that may require further adaptation.

Phase 4: Follow-up

Data collection. Data was collected weekly for six weeks during the follow-up phase. The researcher recorded a 10-minute CCX. If caregiver was receiving a follow-up check-in call, the CCX was scheduled after the check-in call.

Caregiver supports. During this phase, caregivers had continuous access to all JASPER caregiver learning materials. Caregivers who did not achieve 75% JASPER fidelity by the end of the intervention phase received 30-minute weekly check-in calls during the follow-up phase until they reached 75% fidelity. Similarly, caregivers who initially reached 75% fidelity but dropped below this threshold during follow-up also received weekly check-in calls until they regained 75% fidelity. If caregivers dropped below 75% again after gaining or regaining fidelity during follow-up, additional check-in calls were resumed three weeks later, after collecting three data points.

During weekly check-in calls, caregivers had opportunities to troubleshoot challenges in implementing JASPER strategies and to review and discuss specific strategies with the researcher. They could also share video clips for feedback. However, no real-time coaching took place during these calls. Caregivers received two to six check-in calls, and all of them submitted a video at least once for delayed video feedback. Specifically, Tom (dyad 1) completed six check-in calls and received delayed video feedback during four of them. Zoe (dyad 2) completed two check-in calls and received video feedback once. Lucy (dyad 3) completed four check-in calls and received video feedback twice, and Hannah (dyad 4) completed three check-in calls and received video feedback twice.

Treatment Integrity

To ensure the JASPER support program was delivered as intended, the researcher's performance was monitored by a senior JASPER trainer, who is certified to provide JASPER training to caregivers and practitioners. The trainer used a 13-item coach fidelity form to rate the researcher's implementation fidelity (Shire et al., 2020). Each item was rated on a 6-point scale from 0 (strategy not present) to 5 (high-quality implementation of coaching strategies). Twenty-five percent of the intervention sessions were randomly selected for fidelity evaluation. Fidelity scores were calculated by dividing the total points earned by the total possible points and multiplying by 100 to obtain a percentage. As the senior JASPER trainer does not understand Chinese, English captions were added to randomly selected intervention session videos.

Baseline Measures

Demographic Questionnaire

A Demographic Questionnaire was used to collect family information, including the caregiver's age, gender, occupation, educational background, income, city of residence, marital

status, family structure (e.g., family size), the child's current age and age at autism diagnosis, and the intervention or educational services the child had received.

Measures for the Dependent Variables

The primary outcome of the study is caregivers' JASPER intervention fidelity, and the secondary outcome is children's joint engagement. Both outcomes were coded from the weekly 10-minute caregiver child interaction (CCX) videos.

Families were provided with a standard toy set across developmental play levels to use when recording CCX videos. Toys included two scarfs, foam rockets (6 rockets and two squeeze bulbs), pizza play set, shape sorter, dinosaurs, stacking boxes, playhouse, Peppa Pig and friends, furniture, fruit and vegetable cutting toys with knives and dishes, magnetic tiles, and two magnetic cars. CCX materials also included up to three other types of toys from families' home. Caregivers were asked to use the CCX materials, reference JASPER Intervention Fidelity Checklist items, and apply them as much as possible during CCX. The researcher did not provide any additional guidance (e.g., selecting appropriate toys or strategies for engaging the child in play).

Primary Dependent Measure: JASPER Caregiver Intervention Fidelity Checklist

A JASPER Caregiver Intervention Fidelity Checklist was used to measure caregivers' JASPER fidelity. There are seven subscales of JASPER strategies, including: (a) supporting engagement and regulation, (b) environmental arrangement, (c) balancing imitation and modeling, (d) establishing play routines, (e) expanding play routines, (f) programming for joint attention and requesting skills, and (g) language strategies (Kasari et al., 2015). Caregivers' JASPER intervention fidelity was rated for both quality and quantity. The Caregiver Intervention

Fidelity Checklist is a 30-item rating system capturing seven core JASPER strategies. Each item was rated from 0 (incorrect or lack of strategy use) to 5 (accurate and appropriate strategy implementation: Shire et al., 2020). Caregivers' total JASPER fidelity was measured by dividing the total points scored by the total possible points and multiplying by 100 to get the percentage.

Secondary Dependent Measure: Children's Engagement Coding Protocol

An established engagement coding protocol (e.g., Shire et al., 2019) was applied for second-by-second coding of five mutually exclusive engagement states. States included: (a) disengagement (child not engaged with an object or a person), (b) onlooking (child watching the adult or the adult's actions on the objects), (c) person-engagement (child engaging with the adult without involving an object), (d) object-engagement (child engaging with an object while ignoring the adult), (e) adult-initiated supported joint engagement (SJE AI; child and adult interacting with objects together, with the child in the role of the responder to adult instructions, complying with adult direction), (f) child-initiated supported joint engagement (SJE CI; child and adult interacting with objects together, with the child initiating the interactions while the adult follows in on the child's productive play and communicative initiations), and (g) coordinated jointly engagement (CJE; child and adult interacting with objects together, with the child explicitly directing or coordinating the interaction with the adult). Both SJE CI and CJE are child-initiated joint engagement. An engagement state must last at least five consecutive seconds to be coded. Children's time spent in each engagement state was calculated by dividing the total seconds in that state by the total duration of the coded CCX videos and multiplying by 100 to obtain a percentage.

Coder Training and Inter-Rater Reliability

The dependent variables were coded by trained coders, graduate students in special education. Coders were trained to reliability (Intra-class correlations (ICCs) of minimum of .80 per variable) with master coders before coding the study videos. Two independent trained coders rated JASPER intervention fidelity. ICCs with master coders prior to coding study videos was as follows: Engagement and Regulation ($\alpha = 0.86\text{--}0.98$), Environment ($\alpha = 0.87\text{--}0.94$), Imitation and Modeling ($\alpha = 0.90\text{--}0.94$), Routines ($\alpha = 0.84\text{--}0.91$), Expansions ($\alpha = 0.97\text{--}0.99$), Programming ($\alpha = 0.89\text{--}0.92$) and Communication ($\alpha = 0.92\text{--}0.95$). One trained coder coded children's engagement. ICCs with master coders prior to coding study videos was as follows by subscale: SJE AI ($\alpha = 0.98$), SJE CI ($\alpha = 0.95$), and CJE ($\alpha = 0.92$).

The researcher (primary coder) coded all the videos, while secondary coders scored a random 25% of the CCX videos from each study phase (baseline, intervention, and follow-up). Because the researcher also served as the JASPER caregiver coach, she was not blinded to the intervention condition. Secondary coders were blind to study conditions and timepoints. After completing data coding, the researcher compared the coding done by the primary and secondary coders to identify any consistent discrepancies. These discrepancies were reviewed and discussed with a master coder until consensus was reached. The coders then revised their codes based on the discussion results before conducting the reliability analysis.

Measures for Secondary Outcomes

Secondary outcome measures, including the remote caregiver-assisted SPACE and the Parenting Stress Index–Short Form (PSI-SF; Abidin, 1990), were administered at four time points throughout the study.

Remote Caregiver-Assisted SPACE

The SPACE was administered within seven days before collecting the first baseline datapoint, within seven days before the first intervention session, within seven days after the intervention ended, and again within seven days after the follow-up to compare with the initial SPACE to examine children's spontaneous play. The SPACE videos were coded for types and frequencies of play acts, from simple through symbolic play levels (Lifter et al., 1993), which were then categorized into functional (including simple, combination, and presymbolic play levels) and symbolic play. The SPACE items included: (a) bubbles, (b) toy set 1 (nesting cups, puzzle, foam blocks, dump truck, ring stacker, a small white bag), (c) toy set 2 (house, figures, food, plates, bowls, cups, utensils, furniture, beddings, a small white bag, a package of tissue paper), (c) wind-up toy, and (d) ball. Caregivers administered the assessment with the researcher's live support on Zoom. The SPACE took about 20 minutes to complete.

PSI-SF

The PSI-SF is a 36-item self-report questionnaire with five Likert-type response options ranging from 1 (strongly disagree) to 5 (strongly agree) to assess parental stress levels. Higher total scores indicate greater parental stress, with raw scores of 90 or above suggesting a clinically significant level of stress (Abidin, 1990). Caregiver stress was measured to examine how the JASPER caregiver-mediated intervention might influence caregivers' stress level associated with parenting. This outcome was measured at multiple timepoints using the PSI-SF—within seven days before the orientation, after the last baseline point was collected, and before the first intervention session, within seven days after the last intervention session, and within seven days after the last follow-up data point was collected.

Social Validity, Acceptability, and Appropriateness

Social Validity Survey

A social validity survey was completed by caregivers at intervention exit to assess whether the program addressed significant goals, had socially acceptable procedures, and led to socially important outcomes. The survey was adapted from the sample social validity survey (Antill, 2020). Caregivers were asked to rate their agreement with the following items, including (a) the JASPER support sessions were organized and easy to understand; (b) I have increased my knowledge of JASPER concepts and strategies; (c) my skills in meaningfully interacting with my child have improved during the program; (d) my child's play, communication, and engagement have improved as a result of my learning from the JASPER support program; (e) my service provider (WB) was effective in clarifying key JASPER concepts and strategies, addressing my questions, and providing helpful feedback. Each item was scored on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree), and the mean of each item was calculated to obtain social validity scores for the program.

Acceptability and Appropriateness Scale of JASPER Fidelity Items

An Acceptability and Appropriateness Scale was used to assess caregivers' perceived acceptability and appropriateness of the 30 JASPER strategy items from the fidelity checklist within seven days following their last intervention session. The researcher clarified the definitions of acceptability (how much the caregiver liked and agreed with each fidelity item) and appropriateness (how well each item matched the caregiver's learning needs), and these definitions were presented as caregivers completed the ratings. Each fidelity item was scored on a 7-point Likert scale (0 = totally unacceptable/inappropriate, 6 = totally acceptable/appropriate). Mean acceptability and appropriateness scores were calculated for each item.

Intervention Measures

Adaptation Interview Log

An Adaptation Interview Log included a set of open-ended questions to elicit caregivers' positive and constructive feedback on the sessions they attended each week. The log addressed what caregivers liked, what could be done differently, and asked for modifications for the coming week. The questions were informed by Stirman et al.'s (2019) expanded framework for reporting adaptations and modifications to EBIs.

Caregiver Weekly Practice and Service Update Log

Caregivers used this log to report the amount of time they spent reviewing JASPER materials and practicing with their child outside of their sessions during the intervention and follow-up phases. The log also provided space for caregivers to update any service change starting in that week (e.g., the end or start of school/speech therapy).

Data Analysis Plan

Caregivers' JASPER intervention fidelity was graphed and was analyzed using visual analysis (Gast et al., 2014). The level, trend, and variability within each condition as well as changes in data patterns, immediacy of change, and overlap across conditions were interpreted to see whether caregivers' JASPER intervention fidelity improved within and across conditions. Tau-U was applied to estimate the effect size as well as analyze within phase trends and between phase differences (Parker et al., 2011). Web-based calculators for single case research analysis were used to calculate Tau-U (Vannest et al., 2016). Through vertical analysis and weighted Tau-U effects, we examined the consistency and magnitude of the functional relations between the JASPER support program and caregivers' JASPER intervention fidelity. Children's joint

engagement data were analyzed in the same way as caregivers' JASPER intervention fidelity (described above), applying visual analysis and Tau-U.

Moreover, descriptive analysis was conducted to report caregiver stress, caregivers' perceived acceptability and appropriateness ratings of JASPER fidelity items, as well as social validity of the JASPER remote support program.

Results

Dyad 1: Tom and Matt

Caregiver's JASPER Intervention Fidelity (Tom)

Visual analysis of Tom's caregiver JASPER intervention fidelity showed a generally low baseline level, spanning the upper end of the low range into the lower moderate range, with a decreasing trend (range = 30.71%–42.14%, $M = 36.88\%$). For descriptive purposes, scores were divided into three equal ranges: low (0–33), moderate (34–66), and high (67–100) to facilitate interpretation of caregivers' and children's baseline performance. An immediate increase in level was observed following the introduction of the intervention, after which caregiver fidelity remained stable with minimal trend (range = 52.86%–69.29%, $M = 61.25\%$) and no overlap with baseline data points. Variability was slightly greater during intervention but occurred within a consistently higher performance level. During the follow-up phase, Tom's JASPER fidelity levels remained high and demonstrated an increasing trend (range = 55.71%–72.41%, $M = 62.83\%$), indicating maintenance and continued improvement of JASPER strategy use. Figure 7 shows the tiered, graphed fidelity data for each dyad's baseline, intervention, and follow-up. Table 10 presents the means and ranges of caregivers' JASPER intervention fidelity and children's joint engagement across phases.

Figure 7

Caregivers' JASPER Intervention Fidelity

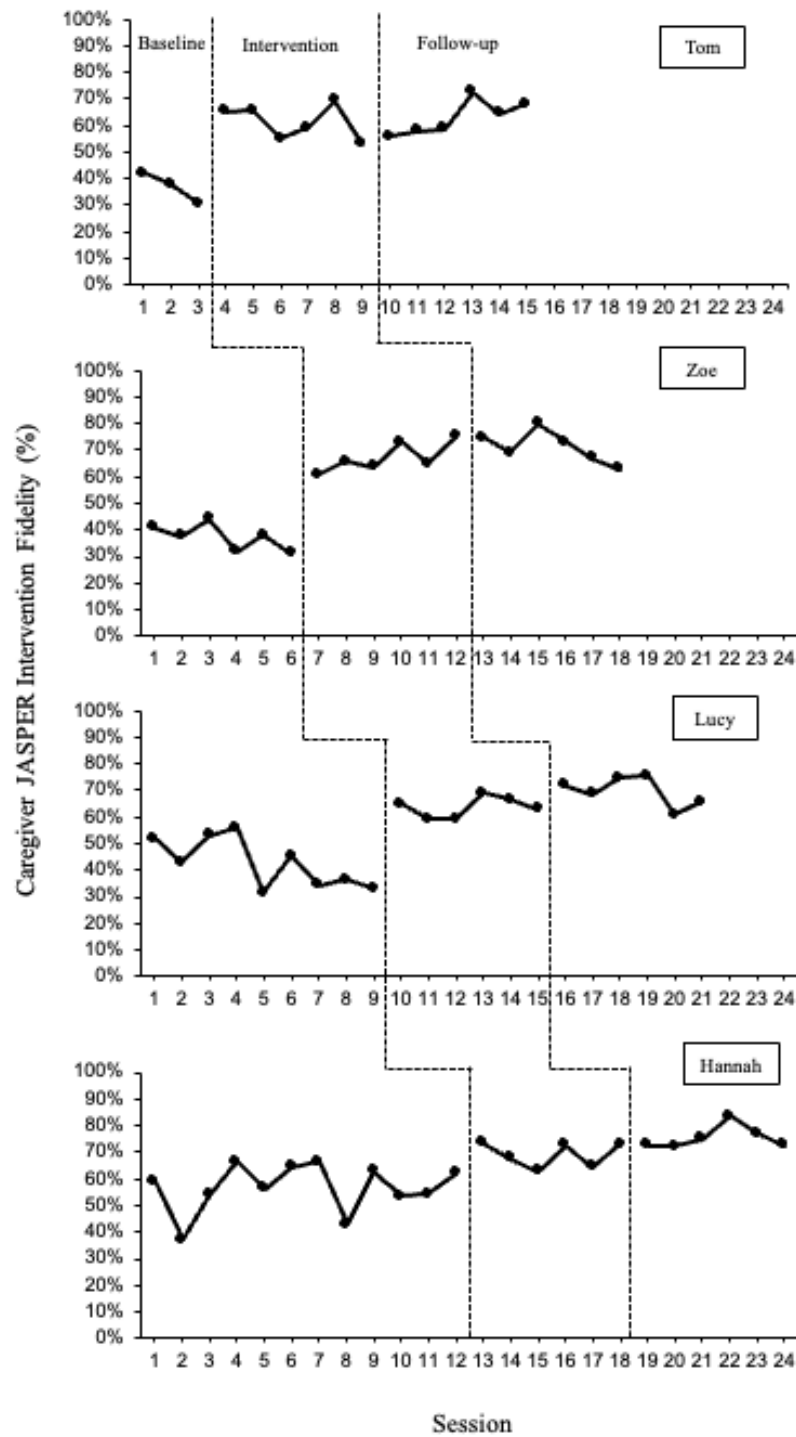


Table 10*Means and Ranges of Caregivers' JASPER Intervention Fidelity and Children's Joint**Engagement*

	Baseline				Intervention				Follow-up			
	Caregiver Fidelity	SJE AI	SJE CI	CJE	Caregiver Fidelity	SJE AI	SJE CI	CJE	Caregiver Fidelity	SJE AI	SJE CI	CJE
Dyad 1	36.88% (30.71%-42.14%)	4.17% (2.50%-6.33%)	7.72% (5.50%-10%)	0	61.25% (52.86%-69.29%)	1.35% (0-3.50%)	37.06% (19.17%-62.33%)	0	62.83% (55.71%-72.41%)	3.97% (0-7%)	38.14% (20%-63.17%)	0
Dyad 2	37.23% (31.03%-44.29%)	33.06% (10-66.33%)	13.89% (0-25.67%)	0	67.15% (60.71%-75.17%)	0.28% (0-1.67%)	48.95% (20.17%-70.50%)	0	71% (62.76%-80%)	0	46.19% (36.50%-60.65%)	0
Dyad 3	42.66% (31.54%-55.86%)	6.54% (0-14.83%)	36.80% (14%-53%)	0.67% (0-6%)	63.67% (59.29%-68.89%)	0.36% (0-2.17%)	60.42% (32.50%-89.33%)	1.39% (0-3.50%)	69.54% (60.80%-75.38%)	0	59.83% (38.33%-78%)	3.28% (0-9.50%)
Dyad 4	56.62% (37.14%-66.43%)	16.85% (0-47.50%)	53.95% (5%-89.83%)	0	68.89% (64.29%-73.57%)	1.61% (0-6%)	75% (60.33%-88.17%)	1.92% (0-4.33%)	75.51% (72.14%-83.70%)	0	90.23% (80.83%-94.53%)	1.05% (0-4.44%)

Tom's JASPER intervention fidelity improved significantly from the baseline to the intervention phase, as reflected by the nonoverlap effect size measure ($\text{Tau-U} = 1.00$, $\text{CI}_{90} = [0.29, 1.00]$, $p = .02$). Because Tom's baseline trend was decreasing and non-significant, Tau-U was reported without baseline-trend correction. Tom's JASPER fidelity maintained during the follow-up, as demonstrated by small increases relative to the intervention phase data ($\text{Tau-U} = 0.11$, $\text{CI}_{90} = [-0.46, 0.68]$, $p = .75$) and large increases as compared with baseline data ($\text{Tau-U} = 1.00$, $\text{CI}_{90} = [0.29, 1.00]$, $p = .02$). Tau-U values comparing caregivers' JASPER intervention fidelity from baseline to intervention and baseline to follow-up are shown in Table 11.

Table 11

Tau-U Values Comparing Caregivers' JASPER Intervention Fidelity from Baseline to Intervention and Baseline to Follow-up

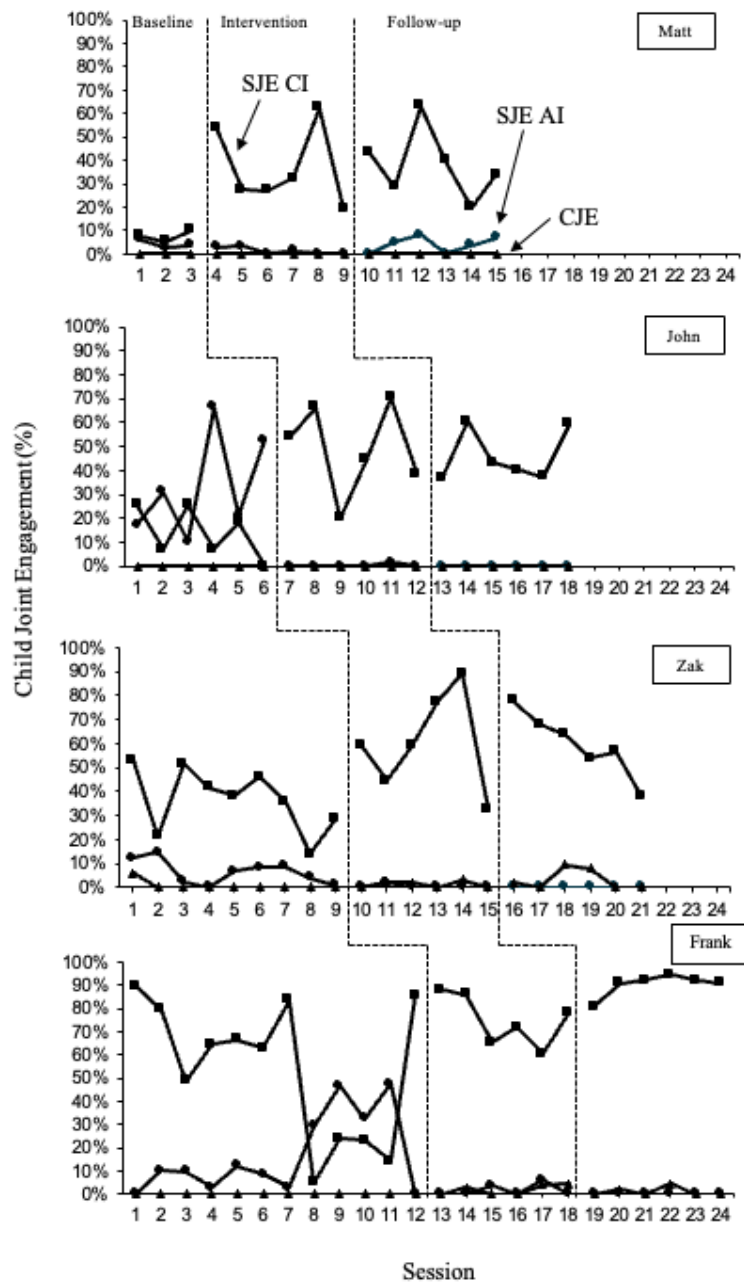
Participant	Baseline vs. Intervention		Baseline vs. Follow-up	
	Tau-U (90% CI)	p-value	Tau-U (90% CI)	p-value
Tom (dyad 1)	1.00 ([0.29, 1.00])	.02	1.00 ([0.29, 1.00])	.02
Zoe (dyad 2)	1.00 ([0.43, 1.00])	.00	1.00 ([0.43, 1.00])	.00
Lucy (dyad 3)	1.00 ([0.48, 1.00])	.00	1.00 ([0.48, 1.00])	.00
Hannah (dyad 4)	0.83 ([0.35, 1.00])	.00	1.00 ([0.51, 1.00])	.00
Weighted	0.95 ([0.61, 1.00])	.00	1.00 ([0.71, 1.00])	.00

Child's Joint Engagement (Matt)

During baseline, Matt exhibited a low percentage of time spent in SJE CI during caregiver–child interactions (range = 5.5%–10%, M = 7.72%), with minimal trend and low variability. Following the introduction of the intervention, there was an immediate increase in SJE CI. Although levels dropped over the subsequent few sessions, they later rose to a peak of 62.33% during the intervention phase, showing greater variability than during baseline. However, SJE CI remained substantially higher than baseline, with no overlapping data points (range = 19.17%–62.33, M = 37.06%). During the follow-up phase, Matt's SJE CI was maintained at levels comparable to the intervention phase, demonstrating relatively high performance with no overlap with baseline data (range = 20%–63.17%, M = 38.14%), indicating sustained intervention effects, although a slight decreasing trend was observed. Figure 8 shows the tiered, graphed engagement data for each dyad's baseline, intervention, and follow-up.

Figure 8

Children's Joint Engagement



Note. SJE AI = adult-initiated supported joint engagement; SJE CI = child-initiated supported joint engagement; CJE = coordinated joint engagement.

Matt's improvement in SJE CI was supported by Tau-U, showing a strong, statistically significant effect when comparing baseline and intervention phases (Tau-U = 1.00, CI₉₀ = [0.29, 1.00], $p = .02$). Small, non-significant increases were observed during the follow-up phase compared with the intervention phase (Tau-U = 0.22, CI₉₀ = [-0.39, 0.79], $p = .52$).

Regarding SJE AI, Matt also exhibited a low percentage of it during baseline (range = 2.50%-6.33%, $M = 4.17\%$). Levels dropped during the intervention phase (range = 0-3.50%, $M = 1.35\%$) with a non-significant decreasing trend. The Tau-U of -0.78 indicated a large negative effect of the intervention on SJE AI. During the follow-up phase, SJE AI showed a non-significant increasing trend, although the mean level remained slightly below baseline (range = 0%-7%, $M = 3.97\%$). Tables 12 and 13 present Tau-U values for children's SJE CI and SJE AI, respectively, comparing baseline to intervention and baseline to follow-up.

Table 12

Tau-U Values Comparing Children's SJE CI from Baseline to Intervention and Baseline to Follow-up

Participant	Baseline vs. Intervention		Baseline vs. Follow-up	
	Tau-U (90% CI)	p -value	Tau-U (90% CI)	p -value
Matt (dyad 1)	1.00 ([0.29, 1.00])	.02	1.00 ([0.29, 1.00])	.02
John (dyad 2)	0.89 ([0.32, 1.00])	.01	1.00 ([0.43, 1.00])	.00
Zak (dyad 3)	0.67 ([0.15, 1.00])	.03	0.83 ([0.32, 1.00])	.00
Frank (dyad 4)	0.39 ([-0.01, 0.88])	.18	0.92 ([0.43, 1.00])	.00
Weighted	0.71 ([0.42, 1.00])	.00	0.93 [0.64, 1.00]	.00

Table 13

Tau-U Values Comparing Children's SJE AI from Baseline to Intervention and Baseline to

Follow-up

Participant	Baseline vs. Intervention		Baseline vs. Follow-up	
	Tau-U (90% CI)	p-value	Tau-U (90% CI)	p-value
Matt (dyad 1)	-0.78 ([-1.00, -0.07])	.07	0.06 ([-0.65, 0.76])	.90
John (dyad 2)	-1.00 ([-1.00, -0.43])	.00	-1.00 ([-1.00, -0.43])	.00
Zak (dyad 3)	-0.83 ([-1.00, -0.32])	.00	-0.89 ([-1.00, -0.37])	.00
Frank (dyad 4)	-0.67 [-1.00, -0.18]	.02	-0.83 ([-1.00, -0.35])	.00
Weighted	-0.82 ([-1.00, -0.53])	.00	-0.71 ([-1.00, -0.43])	.00

No CJE was recorded for Matt across phases.

Dyad 2: Zoe and John

Caregiver's JASPER Intervention Fidelity (Zoe)

Similar to Tom, Zoe's caregiver JASPER intervention fidelity showed a moderately low baseline level with a decreasing trend (range = 31.03%-44.29%, M = 37.23%), with scores near the boundary between the low and moderate ranges. Fidelity increased immediately following the introduction of the intervention, with the last baseline point at 31.03% and the first intervention point at 60.71%. No overlap occurred between baseline and intervention data points, and an upward trend was observed during the intervention phase. This increasing trend continued into the follow-up phase, reaching a peak of 80% before declining. Nonetheless, Zoe's JASPER fidelity remained high relative to baseline levels (range = 62.76%-80%, M = 71%).

The improvement in Zoe's JASPER fidelity observed through visual analysis was supported by Tau-U results, indicating a strong, statistically significant effect when comparing baseline and intervention phases (Tau-U = 1.00, CI₉₀ = [0.43, 1.00], p = .00). Tau-U was reported without baseline-trend correction because Zoe's baseline trend was decreasing and non-

significant. During the follow-up phase, Zoe's JASPER fidelity remained at levels similar to the intervention phase, with slight, non-significant increases (Tau-U = 0.36, CI₉₀ = [-0.21, 0.93], p = .30).

Child's Joint Engagement (John)

During baseline, John's SJE CI and SJE AI demonstrated opposite directional patterns – when SJE CI levels were higher, SJE AI levels were lower. SJE CI was at a moderately low level with a decreasing trend (range = 0-25.67%, M = 13.89%), while SJE AI showed high variability with an increasing trend (range = 10%–66.33%, M = 33.06%). The immediacy of effect was evident for both variables following the introduction of the JASPER intervention, with SJE CI increasing from 0% to 53.67% and SJE AI decreasing from 52.50% to 0%. Greater variability was observed in SJE CI during the intervention phase. Levels were generally high, with only one overlapping data point with baseline. SJE AI remained at 0% throughout the intervention and follow-up phases, except for a single intervention data point at a very low level (1.67%). During follow-up, SJE CI was maintained at levels comparable to the intervention phase, with reduced variability, indicating more consistent child-initiated joint engagement.

Tau-U analyses comparing baseline and intervention data confirmed effects of the JASPER support on changes in joint engagement, with a strong increase in SJE CI (Tau-U = 0.89, CI₉₀ = [0.32, 1.00], p = .01) and a strong decrease in SJE AI (Tau-U = -1.00, CI₉₀ = [-1.00, -0.43], p = .00).

Dyad 3: Lucy and Zak

Caregiver's JASPER Intervention Fidelity (Lucy)

During baseline, Lucy's JASPER fidelity was low to moderate (range = 31.54%–55.86%, $M = 42.66\%$) and showed a slight decreasing trend. An immediate increase was observed following the introduction of the JASPER intervention, with fidelity remaining stable and showing limited variability, and no overlap with baseline data points (range = 59.29%–68.89%, $M = 63.67\%$). Lucy reached her highest fidelity levels during the follow-up phase (range = 60.80%–75.38%, $M = 69.54\%$), indicating sustained use of JASPER strategies. Variability increased during the follow-up phase relative to the intervention phase but remained lower than that observed during baseline.

Tau-U results indicated a large intervention effect when comparing Lucy's fidelity between the baseline and intervention phases ($\text{Tau-U} = 1.00$, $\text{CI}_{90} = [0.48, 1.00]$, $p = .00$). A subsequent comparison between the intervention and follow-up phases showed continued improvement in fidelity ($\text{Tau-U} = 0.61$, $\text{CI}_{90} = [0.04, 1.00]$, $p = .08$).

Child's Joint Engagement (Zak)

During baseline, Zak's SJE CI was low to moderate with a decreasing trend (range = 14%–53%, $M = 36.80\%$), and variability was high. Following the introduction of JASPER, an immediate improvement in SJE CI was observed. Although variability remained high, the overall level during the intervention phase increased, with two overlapping data points with baseline (range = 32.50%–89.33%, $M = 60.42\%$). Levels during the follow-up phase were comparable to those during the intervention (range = 38.33%–78%, $M = 59.83\%$), but a significant decreasing trend was observed.

SJE AI was low during baseline (range = 0-14.83%, M = 6.54%) and dropped to 0% during both the intervention and follow-up phases, except for a single data point at 2.17% during the intervention phase. Variability was higher during baseline compared with the other phases, and a decreasing trend was observed.

CJE was rarely observed during baseline (one of nine sessions) but occurred more frequently during the intervention and follow-up phases (half of the sessions), resulting in higher levels and greater variability during these phases. No immediacy of effect was observed following the introduction of the intervention, and 50% of intervention and follow-up data points overlapped with baseline.

The nonoverlap effect size measure Tau-U confirmed a large effect of the JASPER intervention in increasing SJE CI (Tau-U = 0.67, CI₉₀ = [0.15, 1.00], p = .03) and decreasing SJE AI (Tau-U = -0.83, CI₉₀ = [-1.00, -0.32], p = .00) when comparing baseline and intervention phases. Because the baseline trends for SJE CI and AI were decreasing but non-significant, Tau-U values were reported without baseline-trend correction. For CJE, a moderate but non-significant effect was observed (Tau-U = 0.33, CI₉₀ = [-0.18, 0.85], p = .29).

Dyad 4: Hannah and Frank

Caregiver's JASPER Intervention Fidelity (Hannah)

Hannah demonstrated moderate and highly variable fidelity during baseline (range = 37.14%-66.43%, M = 56.62%). Following the introduction of the JASPER, her fidelity showed an immediate improvement in level from 62.14% to 73.57%, and it was more stable during the intervention and follow-up phases compared with baseline, indicating more consistent use of JASPER strategies. Overall levels were higher during the intervention (M = 68.89%, range =

64.29%–73.57%) and follow-up phases ($M = 75.51\%$, range = 72.14%–83.70%). Two intervention data points overlapped with baseline, whereas none of the follow-up data points overlapped with baseline.

Tau-U analyses confirmed a large effect of the intervention on Hannah's fidelity between baseline and intervention (Tau-U = 0.83, $CI_{90} = [0.35, 1.00]$, $p = .00$) and a moderate effect between intervention and follow-up (Tau-U = 0.58, $CI_{90} = [0.01, 1.00]$, $p = .09$), reflecting continuous but non-significant improvement after the intervention phase.

Child's Joint Engagement (Frank)

Frank's SJE CI and AI levels were highly variable during baseline. His SJE CI ranged from low to high (range = 5%–89.83%, $M = 53.95\%$), whereas his SJE AI ranged from low to moderate (range = 0–47.50%, $M = 16.85\%$). No immediate effect was observed for SJE CI or AI following the introduction of the JASPER intervention. However, variability decreased during the intervention and follow-up phases, indicating that Frank's joint engagement was more consistently moderate to high for SJE CI and consistently low for SJE AI across observations. Notably, Frank exhibited some high SJE CI scores during baseline (up to 89.83%), resulting in complete overlap between baseline and intervention CI data points. SJE CI levels showed improvement during follow-up, displaying an increasing trend with only one data point overlapping baseline values. SJE AI, which was low to moderate during baseline, remained at 0% throughout the intervention and follow-up phases, except for two low-level intervention data points (3.67% and 6%). This pattern clearly indicates that SJE AI was more variable during baseline than in the subsequent phases. CJE was absent in all baseline sessions ($n = 12$) but emerged at low levels during the intervention phase (range = 0–4.33%, $M = 1.92\%$). No immediate effect was detected, and variability remained low, though higher than during baseline.

Consistent with the visual analysis above, a moderate but non-significant effect was found for SJE CI when comparing baseline and intervention data (Tau-U = 0.39, $CI_{90} = [-0.01, 0.88]$, $p = .18$). However, SJE CI showed a significant improvement during the follow-up phase compared with baseline (Tau-U = 0.92, $CI_{90} = [0.43, 1.00]$, $p = .00$). A large negative effect was observed for SJE AI between baseline and intervention (Tau-U = -0.67, $CI_{90} = [-1.00, -0.18]$, $p = .02$). A moderate but non-significant effect was found for CJE (Tau-U = 0.50, $CI_{90} = [0.01, 0.99]$, $p = .09$).

Vertical Analysis Across Dyads and Weighted Tau-U Effects

Caregivers' JASPER Intervention Fidelity

Vertical analysis of the data revealed a consistent pattern of improvement in JASPER fidelity across all four caregivers. While baseline levels varied across participants, each caregiver demonstrated an immediate increase in JASPER fidelity. Variability was mixed between baseline and intervention, but overall fidelity levels were higher and more stable during intervention and follow-up. Across all caregivers, weighted average Tau-U values indicated large, statistically significant effects for caregiver JASPER intervention fidelity (Tau-U = 0.95, $CI_{90} = [0.61, 1.00]$, $p = .00$). The effects remained large and significant during follow-up (Tau-U = 1.00, $CI_{90} = [0.71, 1.00]$, $p = .00$). These findings suggest a functional relation between the JASPER intervention with low-dosage follow-up support and sustained increase in caregiver fidelity.

Children's Joint Engagement

SJE AI was low to moderate during baseline across the four children and dropped to nearly zero with low variability during the intervention phase for all participants, indicating a functional relation between the JASPER intervention and decreases in SJE AI. Patterns for SJE CI were more variable across four children. All children demonstrated overall higher levels of

SJE CI during the intervention. For most children, there was limited overlap with baseline data points, whereas one child's intervention data fully overlapped with baseline. Immediacy of effect was observed in two children but not in the other two. Variability between baseline and intervention across four children was mixed, with only one child showing lower variability during the intervention phase. The JASPER intervention appears to be associated with increases in SJE CI, with stronger effects for some children than others. Regarding CJE, it was absent for two children throughout the study, emerged in one child during the intervention, and was more frequently observed during the intervention and follow-up phases for another child, though its level remained relatively low (below 10%). A functional relation between the JASPER intervention and CJE cannot be established because it occurred in only two children, with low levels and limited frequency.

Across all children, weighted average Tau-U values indicated large and statistically significant effects of the JASPER support on increased SJE CI (Tau-U = 0.71, $CI_{90} = [0.42, 1.00]$, $p = .00$) and decreased SJE AI (Tau-U = -0.82, $CI_{90} = [-1.00, -0.53]$, $p = .00$) during the intervention phase. The effects remained large and significant during follow-up for SJE CI (Tau-U = 0.93, $CI_{90} = [0.64, 1.00]$, $p = .00$) and SJE AI (Tau-U = -0.71, $CI_{90} = [-1.00, -0.43]$, $p = .00$). These findings suggest a functional relation between the JASPER intervention, supplemented with low-dosage follow-up support, and sustained increases in SJE CI and decreases in SJE AI.

Tau-U was not computed for CJE because of the limited data and the lack of meaningful interpretation for the effect size.

Tailoring JASPER Support for Individual Families

Implemented Adaptation Requests

Brief weekly interviews with caregivers obtained input from caregivers to tailor JASPER support for them. Two caregivers (Tom & Hannah) showed strong interest in applying strategies across settings, so additional generalization examples were provided. They would also like to shorten the training portion while extending coaching because one (Tom) found it difficult to focus on coaching after lengthy strategy discussions, while the other (Hannah) found the concepts and strategies easy to understand but needed additional coaching to address entrenched caregiver–child interaction patterns that were predominantly adult-led and characterized by extensive adult talking. For Tom, training time was shortened upon request but slightly extended when he had difficulty implementing strategies during coaching due to limited understanding and challenges explaining them in real time. Hannah also asked for more concrete examples and feedback during debriefing, and this request was fulfilled. Moreover, in response to one caregiver’s request, recorded sessions were shared with this family and offered to all others; one additional caregiver requested a session in which the JASPER coach summarized all the strategies.

In addition to adjustments to the elements and pacing of the JASPER program, a specific JASPER strategy was adapted for one family to ensure its appropriateness. Typically, caregivers are expected to pair their language at the child’s language level during their play turns. For a child who preferred to play alone, the caregiver’s consistent commenting on their turn made the child more likely to ask them to leave the play area. After consulting a senior JASPER interventionist, the JASPER coach confirmed with the caregiver that communication turns could be omitted when appropriate.

All caregivers found the adapted JASPER materials helpful, and requests for additional videos ($n = 2$) and reading materials ($n = 1$) were accommodated.

Unimplemented Adaptation Requests

A caregiver also requested feedback on videos of their JASPER practice with their child during the intervention phase. After consulting with a senior researcher, providing delayed video feedback was deemed a deviation from the study protocol and was therefore not offered. However, the family was informed that they could submit videos for feedback during the follow-up phase.

During the final interview, one caregiver shared that receiving minimal feedback in real time, with the remainder provided during debriefing, would be more beneficial. They explained that managing the environment and interacting with their child while simultaneously listening to the coach's feedback and trying to incorporate it was overwhelming. However, because this feedback was from the last interview, it could not be addressed.

Parenting Stress

Three of the four caregivers had scores near or above 90 at multiple timepoints, indicating “significant parenting stress” (Abidin, 1990). One caregiver's stress scores were consistently below the clinical threshold. Patterns of parenting stress across the four timepoints were highly variable for each caregiver. Table 14 presents caregivers' stress levels across the four timepoints.

Table 14

Caregiver Stress Levels Across Timepoints

Participant	PSI-SF Total			
	Entry	Post Baseline	Post Intervention	Post Follow-up
Tom (dyad 1)	105	82	104	104
Zoe (dyad 2)	107	106	104	101
Lucy (dyad 3)	114	136	—	103
Hannah (dyad 4)	73	81	41	72

Note. Higher scores indicate greater parenting stress; scores ≥ 90 are considered significant parenting stress. “—” indicates missing data.

Child Play Types

Children’s number of different play types (play diversity) across the four timepoints are presented in Table 15. Although patterns varied for each child, all demonstrated the highest number of play types, whether functional, symbolic, or both, during the intervention or follow-up phases.

Table 15

Child Play Types Across Timepoints

Participant	Entry		Post Baseline		Post Intervention		Post Follow-up	
	Functional	Symbolic	Functional	Symbolic	Functional	Symbolic	Functional	Symbolic
Matt (dyad 1)	14	0	11	0	18	0	8	0
John (dyad 2)	5	0	9	0	14	0	—	—
Zak (dyad 3)	18	0	25	2	21	3	38	5
Frank (dyad 4)	23	7	12	12	8	10	10	19

Social Validity

Three of the four caregivers scored 5 (strongly agree) on all social validity items using a 1–5 scale, while one caregiver scored 4 on all items, indicating generally high social validity of the JASPER support program. Means and ranges of social validity scores for each item are presented in Table 16. The qualitative feedback indicated that one caregiver appreciated the coach’s understanding of their learning needs. Two caregivers highlighted the value of learning to follow the child’s lead and to be an equal, active, and respectful play partner rather than an instructor. Two caregivers also emphasized that they had gained strategies to support the child’s play, communication, and initiations. Additionally, one caregiver reported rapid child progress after starting the intervention, while another noted their child had become more imaginative,

begun to enjoy pretend play, and that they found the program beneficial for promoting their child's communication skills and parent-child relationships.

Table 16

Means and Ranges of Social Validity Scores by Item

Item	Mean (Range)
1. The JASPER support sessions were organized and easy to understand	4.75 (4, 5)
2. I have increased my knowledge of JASPER concepts and strategies.	4.75 (4, 5)
3. My skills in meaningfully interacting with my child have improved during the program.	4.75 (4, 5)
4. My child's play, communication, and engagement have improved as a result of my learning from the JASPER support program.	4.75 (4, 5)
5. My service provider was effective in clarifying key JASPER concepts and strategies, addressing my questions, and providing helpful feedback.	4.75 (4, 5)

Caregivers also expressed interest in learning more about applying JASPER strategies in daily routines and generalizing learned skills to real social contexts, such as peer interactions. One caregiver wished for more reading materials, and another expressed frustration with the long wait time before receiving the intervention and the number of assessments required.

Acceptability and Appropriateness of JASPER Fidelity Items

As shown in Table 17, mean acceptability and appropriateness scores for each category of JASPER strategies were above 5 on a 0–6 scale, indicating high perceived acceptability and appropriateness of the strategies.

Table 17

Mean and Standard Deviation of Acceptability and Appropriateness Scores by Categories of JASPER Strategies

	Acceptability		Appropriateness	
	Mean	SD	Mean	SD
Supports for Engagement and Regulation	5.60	0.32	5.25	0.46
Environment	5.55	0.30	5.45	0.38
Balancing Imitation and Modeling	5.45	0.46	5.45	0.46
Play Routines	5.50	0.40	5.38	0.41
Expanding Play Routines	5.50	0.40	5.38	0.41
JA/BR Skills	5.58	0.36	5.42	0.43
Language	5.44	0.45	5.13	0.54

Discussion

The JASPER intervention has been evaluated when implemented by caregivers (e.g., Kasari et al., 2015). It has also been examined with caregivers receiving remote rather than face-to-face coaching to implement JASPER (Shire et al., 2021). The present study extends this body of research as the first investigation of the JASPER intervention conducted in China. The use of a concurrent multiple baseline design strengthened the study's methodological rigor by controlling for historical, environmental, and other external variables.

Comparison to Existing JASPER Literature

Findings from this study are largely consistent with results from recent JASPER caregiver-mediated interventions conducted in North America (e.g., Shire et al., 2021, 2022), which demonstrated significant improvements in caregivers' JASPER fidelity and children's joint engagement. In JASPER, we expect to increase child-initiated joint engagement because improving children's spontaneous initiations of play and communication is a key objective of each session (Kasari et al., 2021) versus adult initiated joint engagement, a variable designed to

capture children's compliance to adult direction. While Shire et al. (2022) found concurrent increases in SJE CI and well as SJE AI, the present study observed a decrease in SJE AI across participants. This reflects that caregivers initially engaged their children through more frequent instructions or questions, but as they progressed in learning JASPER strategies, they shifted toward creating developmentally appropriate environments that encouraged children's spontaneous play and joined in through imitation rather than relying on prompts. Importantly, Shire et al. (2022) also identified a negative association between caregivers' JASPER fidelity and SJE AI. In the present study, participants achieved higher mean fidelity scores during the intervention and follow-up phases than the average scores reported by Shire et al. at exit and follow-up, which may help explain the observed pattern in SJE AI.

Mixed results have been reported regarding the effects of JASPER interventions on child outcomes at follow-up (Waddington et al., 2021). In the present study, large and significant intervention effects for both SJE CI and AI were maintained at follow-up. Boosters are typically not provided during the follow-up phase in prior studies (e.g., Kasari et al., 2010, 2014, 2015). However, the current study provided 30-minute weekly check-in calls for caregivers who were below 75% JASPER intervention fidelity. The current study provides a preliminary signal that low-dosage follow-up support may be both beneficial and cost-effective for sustaining child outcomes. High quality brief follow-up meetings not only address challenges encountered during JASPER practice but also help caregivers feel supported and connected, providing them with opportunities to share updates and discuss concerns, and to recognize both their own and their children's strengths and progress with encouragement.

Individualization of JASPER Support

Universal Design for Learning (UDL; CAST, 2024), widely applied in school settings to ensure that all learners can engage meaningfully, emphasizes providing multiple options and flexibility in instruction. Reflecting this principle, JASPER caregiver learning materials and program procedures were culturally adapted prior to the intervention (Bao et al., 2025), with additional ongoing adaptations made during implementation to tailor the program to each family's unique needs.

Brief weekly interviews with each caregiver played a critical role in gathering their input and generate ideas for adaptations. No feedback was offered by caregivers prior to the first interview, and during the first interview with one caregiver, they expressed a strong preference to decrease training time, noting that they had not raised this earlier because they felt it would be inappropriate. This underscore the importance of providing structured opportunities for caregivers to offer feedback throughout the program, rather than assuming that they will communicate their needs and preferences spontaneously, especially in cultures where speaking up may be seen as impolite. Generally, ongoing adaptations to JASPER support were minor, primarily involving adjustments to pacing and existing elements. Based on input from participants in this study, future JASPER programs should consider providing an optional video library, reading materials (e.g., book chapters), session recordings, and greater flexibility in the study or service protocol (e.g., offering delayed video feedback an option).

While accommodating families' requests is important, clinical judgment is essential to balance these requests with what will best support caregivers' learning outcomes. In striving to meeting families' individual and needs, it is also critical to maintain professional boundaries and clearly define the extent of permissible adaptations, ensuring fidelity to the core components of

the intervention and program procedures. Future caregiver support programs could consider providing an intake survey listing all available adaptation options, allowing caregivers to customize the support according to their needs.

Caregiver Psychosocial Experiences

The caregiver-mediated JASPER intervention should serve to empower caregivers by enhancing their confidence in supporting their children's learning at home, rather than adding burden or stress to their lives. During the JASPER program, the researcher was committed to fostering a positive and successful learning experience for caregivers by tailoring support to their current skill levels, balancing positive and constructive feedback, and adjusting the pacing of the intervention accordingly. For some of the JASPER strategies, reiteration was necessary because they differed from caregivers' previous interaction styles (e.g., giving space for children to communicate). Multiple caregivers expressed frustration at understanding these strategies yet finding it difficult to implement them consistently during practice. The researcher acknowledged the challenge and the time required to change a habit and helped set more manageable targets for caregivers (e.g., pausing after a sentence for caregivers who were used to speaking in paragraphs). This highlights the need to attend to caregivers' emotional states during caregiver support programs, rather than solely focusing on strategy acquisition, which in turn may help reduce intervention-related stress, build confidence, enhance caregivers' engagement, and promote implementation of strategies.

Most caregivers exhibited significant stress throughout the study. No post-intervention or follow-up stress scores exceeded entry levels, and the current data do not suggest a potential effect of JASPER support on reducing caregiver stress. To better support caregivers' mental well-being, a complementary module targeting stress reduction could be incorporated to the JASPER

intervention. Improved mental well-being may also enhance caregivers' JASPER implementation.

Limitations

While several families expressed interest in participating in this study, the requirement of three weekly sessions (two intervention sessions and one assessment session) involving both caregivers and children during the intervention phase made participation impossible for some families. As a result, the sample primarily included families able to accommodate this intensive schedule, which may limit the generalizability of the findings to broader populations. Future studies should incorporate greater flexibility in weekly family participation and provide adapted support to accommodate family schedules, while also investigating the dosage needed for JASPER caregiver-mediated intervention to be effective, thereby enabling a wider range of families to benefit from the intervention.

Conclusion

Findings provide preliminary evidence supporting the feasibility and efficacy of delivering individualized caregiver-mediated JASPER remotely with Chinese families, highlighting its potential for efficacious application in cross-cultural contexts. Future research with larger samples is needed to confirm these effects and examine long-term outcomes. Additionally, future research should investigate supporting local interventionists in delivering the adapted caregiver-mediated JASPER intervention to scale up the program and promote effective dissemination.

Appendices

Appendix A. Social Validity Survey

Please review the statements below and rate the following statements based on how much you agree or disagree with them.

1. The JASPER support sessions were organized and easy to understand.
 - Strongly disagree
 - Disagree
 - Neither disagree nor agree
 - Agree
 - Strongly agree

2. I have increased my knowledge of JASPER concepts and strategies.
 - Strongly disagree
 - Disagree
 - Neither disagree nor agree
 - Agree
 - Strongly agree

3. My skills in meaningfully interacting with my child have improved during the program.
 - Strongly disagree
 - Disagree
 - Neither disagree nor agree
 - Agree
 - Strongly agree

4. My child's play, communication, and engagement have improved as a result of my learning from the JASPER support program.
 - Strongly disagree
 - Disagree
 - Neither disagree nor agree
 - Agree
 - Strongly agree

5. My service provider (WB) was effective in clarifying key JASPER concepts and strategies, addressing my questions, and providing helpful feedback.
 - Strongly disagree
 - Disagree
 - Neither disagree nor agree

- Agree
- Strongly agree

Appendix B. Caregiver Weekly Practice and Service Update Log

Caregiver Weekly Practice and Service Update Log					
Study Phase	Week	Date	Material Review Minutes	Practice Minutes	Service Update

Appendix C. Adaptation Interview Log

Adaptation Interview Log		
Participant ID	Week	Date
1. What do you like about this week's sessions?		
2. What could have been done differently in these sessions to better support your JASPER learning?		
3. What modifications should have been made to the content addressed this week?		
4. What modifications should have been made to the way the sessions were delivered?		
5. What modifications should have been made to the service provider's training and coaching approaches?		

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CHAPTER IV: CONCLUSION

This two-article dissertation focused on adapting a US-developed, evidence-based social communication intervention (JASPER) for use in Chinese communities and testing the efficacy of the adapted caregiver-mediated JASPER intervention using a single-subject research design. The goal was to make JASPER more accessible and appropriate for Chinese caregivers of children with autism through systematic cultural and linguistic adaptations, thereby supporting its sustained implementation in new contexts.

By applying the EPIS framework, this dissertation illustrates how community partnerships and contextual understanding can guide systematic adaptations of EBIs. The checklist developed for adapting JASPER materials and program procedures was rated as acceptable and appropriate by community partners, offering a practical and replicable tool for adapting other caregiver-mediated interventions across cultural settings. The materials and procedures were culturally and linguistically adapted prior to the study that examined the functional relations between the adapted JASPER intervention and caregiver and child outcomes. Ongoing adaptations were made throughout the intervention based on caregiver feedback, highlighting the importance of iterative adaptations to optimize the fit of JASPER for individual families.

Findings demonstrated large, statistically significant effects of the intervention in improving caregivers' JASPER intervention fidelity, increasing SJE CI, and decreasing SJE AI. Notably, low-dosage follow-up support effectively sustained the intervention effects. Social validity data collected at the end of the program indicated that caregivers perceived meaningful improvements in both their interaction skills and their children's development. These findings

support the potential for efficacious application of JASPER in cross-cultural contexts after systematic adaptations.

Future research with larger samples is needed to confirm these effects and examine long-term outcomes. Subsequent work should examine the dosage of JASPER caregiver-mediated intervention and follow-up support required for effective and sustained implementation. In addition, studies could explore modules aimed at reducing caregiver stress and enhancing caregiver well-being to be added to caregiver-mediated interventions, thereby improving the overall quality of life for families of children with autism.