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A Parenting Program to Reduce Disruptive Behavior in Hispanic Children with Acquired Brain Injury: A Randomized Controlled Trial Conducted in Mexico

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ABSTRACT

Children with acquired brain injury (ABI) are at risk of impairments in self-regulation and disruptive behavior. We aimed to investigate the effectiveness of the Signposts program to reduce disruptive behavior and improve self-regulation in Hispanic children with ABI, and reduce parental stress and improve parenting practices. Using a randomized controlled trial design, we assigned children ($n = 71$) and their parents to Signposts or generic telephone support. Blinded assessors conducted assessments at pre-intervention, immediately post-intervention, and at 3 months post-intervention. Signposts was effective in reducing dysfunctional parenting practices. Further, when analyzing participants at risk of behavioral disturbance ($n = 46$), Signposts was effective in reducing child disruptive behavior in the home environment and emotional self-regulation. No differences were found for parental stress, parent sense of competence, child disruptive behaviors at school, and child cognitive and behavioral self-regulation. The reduction in disruptive behavior was associated with the implementation of authoritative parenting practices (external regulation), and not associated with child self-regulation.

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Introduction

Acquired brain injury (ABI) refers to damage to the brain that occurs after birth.¹ ABI disrupts brain maturation and is associated with disruptive behavior that affect family functioning, including parenting practices, parental stress, and parent sense of efficacy.^{2,3} Parents of children with ABI tend to experience high levels of parental stress and low parent sense of competence, and to present with dysfunctional parenting practices,^{2,3} including overly permissive, authoritarian, and uninvolved parenting styles.⁴ Optimal parenting practices, commonly called authoritative, are characterized by (1) warmth: parent ability to adjust, accept, and support the child's needs and demands; (2) discipline: parent capacity for limit setting and clear expectations of child behavior; and (3) autonomy: parent fosters the child's ability to work out his/her own perspectives, opinions, and goals.⁴ Elevated levels of parental stress, dysfunctional parenting practices, and low sense of efficacy have been associated with disruptive behavior in children.⁴

Independent of parent characteristics, children with ABI demonstrate impairments in self-regulation,⁵ that is, how one responds to internal and external information.^{6,7} Self-regulation comprises three dimensions: (1) behavioral, (2) emotional, and (3) cognitive regulation.⁸ Poor self-regulation is characterized by impulsive or disruptive behaviors.^{9,10} Disruptive behaviors threaten children's safety and hinder

their participation in the community,¹¹ and have been associated with increased parental stress.¹² Of importance, self-regulation is strongly influenced by parenting practices and parental stress, representing potentially modifiable risk factors and thus an opportunity for intervention.¹³ Signposts for Building Better Behaviour (Signposts) is one such treatment approach, and may improve a child's self-regulation by reducing dysfunctional parenting and parental stress via delivery of psychoeducation regarding consequences of ABI and behavior management techniques.^{3,14}

Signposts promotes authoritative parenting by assisting parents to implement evidence-based behavioral strategies, such as labeled praise, daily routines, effective instructions, behavior support plans, and problem-solving family strategy. Labeled praise refers to verbal statements in which a child's adaptive behavior is labeled (e.g. "well done preparing your schoolbag") and has been associated with warm parent-child interactions.¹⁵ Practices that promote discipline include effective instructions (specific, direct, simple, and short), which require eye contact and indication of an action,¹⁶ and the use of behavior support plans in which caregivers recognize situations that trigger disruptive behavior, and so use advance warning and behavior supports.¹⁷ The implementation of family problem-solving strategies, in which family members brainstorm solutions together, has also been shown to enhance authoritative parenting practices.^{18,19}

In the pediatric ABI population, the effectiveness of Signposts in combination with an additional module called “Dealing with a head injury in the family” (ABI booklet) has been investigated in two studies.^{20,21} Woods et al.²² studied Signposts delivered via telephone in a case series of nine children. In that case series, Signposts was shown effective in reducing disruptive behavior and improving parenting practices, and not effective in reducing parental stress.²² Another study using a pre–post design investigated the effectiveness of Signposts delivered in face-to-face group sessions or via telephone in a sample of 42 children with ABI and their families.²⁰ Signposts was effective in improving parenting practices, reducing disruptive behavior, and reducing parental stress in participants who were at risk of behavioral disturbance prior to intervention (total T score ≥ 60) in the Child Behavior Checklist (CBCL).²⁰ In contrast, Signposts was not effective in reducing parental stress in participants who did not present with a high level of behavioral disturbance prior to the intervention (CBCL total T score ≤ 60).²⁰ Results were maintained 18 months after treatment completion.²³ To date, evidence of the effectiveness of Signposts in children with ABI is based on case series and pre–post group designs rather than the use of “gold standard” randomized controlled trials (RCTs). Further, these studies have been conducted in English-speaking countries (Australia), have not specifically addressed self-regulation, and did not study whether changes generalized to a school setting. To assess the acceptability of Signposts within a Mexican population, we conducted a case study of four children with ABI in Mexico and found promising results.²⁴

The effectiveness of other interventions has been studied using an RCT design with a pediatric ABI population. Wade et al.²⁵ found that an online family problem intervention was effective in reducing externalizing behavior. Another study conducted by Brown et al.²⁶ found that a parenting program implemented in combination with acceptance and commitment therapy (ACT) was effective in reducing disruptive behavior and improving parenting practices. This intervention was delivered via face-to-face group sessions and phone calls.²⁶ However, because of a lack of participation from school staff, it is not known whether improvements were transferred to school.²⁶ Further, the outcomes in these studies consisted of questionnaires answered by parents, child self-regulation was not assessed, and both studies were conducted in English-speaking countries (USA and Australia).^{25,26}

The implementation of parenting practices varies across the globe. Results from a meta-analysis showed that authoritarian and permissive parenting are, to a certain extent, tolerable in some cultural contexts.²⁷ Parents are also more likely to implement high behavioral control when they perceive disorganization and crime in the neighborhood in which they live.²⁸ Children with ABI in families with high social risk (e.g., lower economic income, lower educational achievement) are more likely to present with long-term neurobehavioral impairments and reduced participation in outside school activities over time.²⁹ Further, evidence-based treatments are less accessible in low- and middle-income countries.³⁰ Cultural differences are also relevant, in non-Western countries informal caregivers are commonly the primary caregivers

due to limited resources and family values.³¹ Caregiving of family members with a medical condition is described as a primary value among Mexican families and is usually provided by an extended family network.³¹ Further, in Mexico the limited access to social work education is a barrier for the inclusion of high-risk groups,³² such as the pediatric ABI population. There is no evidence of intervention programs aiming to improve behavioral outcomes in a Mexican population of children with ABI. As a result, an intervention for parents of Mexican children with ABI is needed.

The current study advanced the knowledge in the field by translating Signposts to Spanish and implementing the intervention in a Mexican population, including outcomes previously overlooked such as self-regulation. This study aimed (1) to investigate the effectiveness and feasibility of Signposts in (a) reducing disruptive behavior and improving self-regulation in Mexican children with ABI and (b) reducing dysfunctional parenting practices and parental stress, and improving parent sense of competence; and (2) to investigate, as a secondary aim, whether changes were maintained at 3 months post-intervention. We hypothesized that (1a) Signposts would be associated with improved child self-regulation and reductions in child disruptive behavior at home and school; (1b) Signposts would be associated with reduced parental stress and dysfunctional parenting practices, and increased parent sense of competence; and that (2) improvements would be maintained at 3 months post-intervention.

Methods

Trial Design

An RCT design was employed in which participants were randomly assigned to (1) Signposts or (2) a telephone-support group. Participants allocated to Signposts and the telephone-support group received the intervention during the same study period. Participants in the telephone-support group were offered the Signposts intervention once they completed the follow-up assessment. The intervention and assessments were conducted at Iskalti Condesa, one of the venues of Iskalti Centre of Psychological and Educational Support (Iskalti). The study protocol was registered and published (Universal Trial Number U1111-11936891).³³

Recruitment

Recruitment took place between March 2016 and May 2017. The University of Melbourne Human Research Ethics Subcommittee approved the study protocol (154587). Recruitment was conducted using posters and flyers distributed at local hospitals, universities, and Iskalti, which provided general information about the study and contact details of Iskalti and the researchers. Parents interested in participating contacted Iskalti or researchers via telephone or e-mail. During that contact, eligibility was assessed and, if confirmed, more information about the study was provided (e.g. number and duration of sessions) and a face-to-face interview was scheduled where parents provided

informed consent and pre-assessment was conducted. Children provided verbal assent before starting assessments.

Inclusion and Exclusion Criteria

The following inclusion criteria were required to participate in the study: (1) age between 6 and 12 years; (2) diagnosis of ABI (defined as damage to the brain diagnosed at least 28 days after birth) based on a medical description of the injury; (3) ABI at least 3 months prior to assessment; (4) participating parent having an active and current role with the child and over 18 years of age; and (5) parents able to write and read in Spanish. Exclusion criteria were as follows: (1) child/parent diagnosis of psychosis or borderline personality (determined by the Structure Clinical Interview II during the interview); (2) child receiving ongoing medical treatment (e.g. chemotherapy or neurosurgery); (3) child currently receiving behavioral treatment or parent previously trained in parenting practices; and (4) uncontrolled seizures in the child.

Randomization, Blinding, and Masking

Randomization occurred once eligibility was determined and informed consent provided. A randomization list was generated using Microsoft Excel. Participants were allocated to one of the two treatment arms by a researcher who was not involved in the assessments and intervention sessions. Assessments were conducted by volunteer interns who were blinded to treatment allocation, had a minimum of 3 years of study in psychology, and had received a 25-hour training session in the administration of assessment instruments. Assessments were conducted under the supervision of a neuropsychologist. Parents were masked to group allocation. Parents were aware that if assigned to the telephone support, the intervention would focus on academic skills rather than behavior problems.

Intervention Procedures

Signposts uses a cognitive behavior therapy approach to reduce disruptive behaviors by reducing dysfunctional parenting practices.³⁴ The strategies that parents learn in Signpost (labeled praise, daily routines, effective instructions, behavior support plans, and problem-solving family strategy) are well-known. A key ingredient of Signposts is that parents learn to choose and apply those strategies to their own family needs. For this study, the Signposts workbook was translated to Spanish using the back translation method with permission from the Parenting Research Centre, Victoria, Australia. The “Dealing with a head injury in the family” module (ABI module) was also translated with permission.²¹ Firstly, the Signposts workbook and the ABI module were translated to Spanish by a Mexican certified provider. Secondly, the Spanish translations were translated back to English by a bilingual psychologist who had not seen the original English version. Lastly, two Signposts-certified practitioners reviewed the translations to ensure content accuracy. Signposts was delivered to groups of parents in a room at Iskalti Condesa; groups usually included four to eight parents. Six sessions were delivered on a weekly basis, in which parents

were sitting in a circle together with the therapist. Each session lasted approximately 2.5 hours. Both parents were welcome to attend the sessions, but in most cases, only the main caregiver (parent who spent more time with the child) attended the session. Both parents of eight children attended together; in those cases, the main caregiver answered the questionnaires during all the assessments. Parents were encouraged to share the information with other adults in the family (usually grandparents) who spent considerable time with the child. The main researcher, accompanied by another clinician, delivered the sessions. Parents were provided with written information regarding the main concepts covered in each session, as illustrated in Table 1. The therapist completed a checklist of the topics covered during sessions to document therapist adherence to intervention content. Parents in the Signposts group who missed one session were provided with written information regarding the missed session and were offered a retake session. Parents in the Signposts group who missed two or more sessions were not contacted for further participation. Of note, no direct intervention was provided to improve school functioning. Child care and transportation were not provided to participants. To our knowledge there is no intervention for parents of children with ABI provided in Mexico City at the time of the study.

Control Group Intervention

Parents allocated to the generic telephone-support group received a phone call each week for 6 weeks in which exercises targeting their child’s academic skills (e.g. reading, writing, arithmetic) were provided. Parents chose the academic skill they considered was of main concern. Parents were informed that the clinician was not able to provide strategies to improve child behavior. Phone calls were always with the same parent and lasted approximately 6 minutes. In each phone call, specific exercises were provided according to the main concerns of the parents, and the clinician answered parents’ questions and provided clear instructions for home practice. Information was also provided via follow-up e-mail. Exercises including the reading of texts and conducting arithmetic operations were generated by the clinician. We used the generic telephone-support group to control for patient–therapist interactions because previous research shows that patient–therapist interactions, such as providing positive feedback, answering patient questions, and providing instructions for home practice, are associated with improved outcomes.³⁵ Further, the use of active control is considered better than the use of waiting lists.³⁶

Table 1. Content of the sessions.

Session	Module
1	Introduction
2	Dealing with a head injury in the family Measuring your child’s behavior Systematic use of everyday interactions
3	Replacing difficult behavior with useful behavior
4	Planning for better behavior
5	Teaching your child new skills
6	Dealing with stress Your family as a team

Measures

Parent and child injury and demographic characteristics, and study outcome measures, were collected during the pre-intervention phase (T1). T1 was followed by implementation of the intervention (T2). Study outcome measures were also collected immediately post-intervention (T3) and at 3 months post-intervention (T4). Feasibility was surveyed on treatment completion (T3). Questionnaires were provided to families in Spanish. Table 2 describes whether the child, parent (main caregiver), or teacher answered the questionnaires and tasks.

Child Characteristics

Child demographics. Information of child's sex, date of birth, and time since injury was obtained during the first interview with the caregiver.

Intellectual ability. An estimate of intellectual ability was obtained with the 5-subtest version (Similarities, Vocabulary, Arithmetic, Matrix Reasoning, and Coding) of the Wechsler Intelligence Scale for Children (WISC-IV; mean 100; SD 15) using Mexican norms.^{37,38} This 5-subtest version studied by Sattler, has proven to have a strong correlation ($r_{ss} = 0.93$; $r = 0.85$) with the total intellectual quotient score yield by the complete scale.³⁷

Parent Characteristics

Socioeconomic status. The Social Risk Index (SRI) captured family structure, education of the primary caregiver, and occupation of the primary income earner.³⁹ Each component has three levels in which high scores indicate higher social risk.

Family burden. The Family Burden Injury Interview (FBII) was used to assess the impact of ABI on the family.⁴⁰ The FBII was translated to Spanish with permission. Total raw scores were used for analysis, with higher scores indicating a higher

burden (the maximum score is 84).⁴⁰ This interview has been proved valid and reliable ($\alpha = 0.90$).^{20,40}

Parent depression. The raw score of the Beck Depression Inventory (BDI) was used to measure parent depressive symptoms.⁴¹ Depressive symptoms are categorized into four levels on the basis of intensity: severe depression (29–63), moderate depression (20–28), mild depression (14–19), and minimal depression (0–13).⁴¹ The Spanish version of the BDI has been proved valid and reliable ($\alpha = 0.89$).⁴¹

Parent anxiety. The anxiety trait subscale from the State-Trait Anxiety Inventory (STAI) was completed by parents.⁴² Higher scores indicate more anxiety symptoms. According to intensity of the symptoms, anxiety is categorized into three levels: low (<30), medium (30–44), and high (≥ 45).⁴² The Spanish version of the STAI has been proved a reliable and valid measure ($\alpha = 0.93$).⁴²

Parent self-regulation. The Behavior Inventory of Executive Function Adult Self-Report (BRIEF-A) was used to measure parent self-regulation.⁴³ T scores of the Global Executive Composite (mean 50; SD 10) were used in analysis. Scores of >65 indicate significant executive dysfunction. The BRIEF-A has been proved a reliable and valid measure ($\alpha = 0.93$ – 0.96).⁴³

Parent Outcomes

Parental stress. The Parent Stress Index–Short Form (PSI) assesses the level of parental stress experienced by the respondent in the role as a parent.¹² The total stress T score (mean 50, SD 10) was employed in analyses.¹² Scores ≥ 65 indicate a high level of parental stress.¹² The Spanish version has been proved to have good internal consistency ($\alpha = 0.92$) and reliability.⁴⁴

Dysfunctional parenting practices. The Parenting Scale (PS) assesses dysfunctional parenting practices associated with problematic child behavior.^{45,46} Total mean scores ≥ 3.2 represent clinically dysfunctional levels of disciplinary practices, whereas scores ≤ 3.2 represent average parenting practices.²⁰ We used the version translated to Spanish conducted by García-Piñeyrúa with permission of the author,⁴⁵ which has previously been used with Spanish-speaking populations.⁴⁷ The PS has adequate internal consistency ($\alpha = 0.84$) and test-retest reliability,⁴⁵ and these have been identified as valid by factor analysis and confirmatory factor analysis.⁴⁶

Parent self-efficacy. The Parent Sense of Competence Scale (PSOC) provides a self-report of parental self-efficacy.⁴⁸ The Spanish version of 10 items addresses perceived effectiveness in the parent role (mean 23.4, SD 6.3).⁴⁸ Perceived effectiveness scores range from 6 to 36, with higher scores indicating positive parental self-efficacy.⁴⁸ The Spanish version has been proved valid and reliable ($\alpha = 0.76$).⁴⁸

Child Outcomes

Disruptive behavior: home. The Eyberg Child Behavior Inventory (ECBI) and the CBCL assess disruptive behavior at home.^{49,50} For the ECBI, the Intensity (frequency of disruptive behaviors) and Problem (whether the parent considers the behavior a problem or not) T scores (mean 50, SD 10) were calculated. Scores ≥ 60 reflect clinically significant

Table 2. Person who completed the questionnaires or tasks.

	Child	Parent	Teacher
Parent outcomes			
Parenting practices		✓	
Parent sense of competence		✓	
Parental stress		✓	
Challenging behavior at home			
Intensity		✓	
Problem		✓	
CBCL total		✓	
Challenging behavior at school			
Intensity			✓
Problem			✓
TRF total			✓
Cognitive self-regulation			
Metacognition Index (BRIEF)		✓	
TEA-Ch	✓		
Matching Familiar Figure Test	✓		
Emotional self-regulation			
Emotional control (BRIEF)		✓	
Emotional regulation subscale		✓	
Lability subscale		✓	
Behavioral self-regulation			
Behavior Regulation Index (BRIEF)		✓	
Delayed Gratification Task	✓		

BRIEF: Behavior Rating Inventory of Executive Function–Parent Form; CBCL: Child Behavior Checklist; Parent: the parent who was the main caregiver; TEA-Ch: Test of Everyday Attention for Children Second Edition; Teacher: the teacher who spent more time with the child at school; TRF: Teacher Report Form.

behavior problems.⁴⁹ The total Problem score from the CBCL was also calculated (mean 50, SD 10), with ≥ 63 indicating clinically significant behavior problems and ≥ 60 used as a cut off to identify children clinically at risk.⁵⁰ The Spanish versions of the CBCL ($\alpha = 0.89\text{--}0.94$) and ECBI ($\alpha = 0.95$) have been proved to be reliable and valid measures.^{49,51}

Disruptive behavior: school. The Sutter-Eyberg Student Behavior Inventory–Revised (SESBI) and the Teacher Report Form (TRF) were administered to measure school behavior,^{49,50} with ≥ 60 indicating clinically significant behavior problems. The version translated to Latin American Spanish from the TRF from the Achenbach System of Empirically Based Assessment (ASEBA) was used with permission (License 1294-02-12-16). The SESBI ($\alpha = 0.98$) and TRF ($\alpha = 0.98$) have been proved to be reliable and valid measures.^{49,50}

Cognitive self-regulation. The Metacognition Index (MI; mean 50, SD 10) from the BRIEF-A was used to measure day-to-day executive skills; scores >65 indicate significant dysfunction.⁵² The Test of Everyday Attention for Children, Second Edition (TEA-Ch 2; Balloon-hunt and Hide and Seek [children aged 5–8 years],⁵³ Hector Cancellation and Hecuba Visual Search [children aged >8 years]) raw scores were used for analysis, with higher scores indicating more cognitive regulation capacity. The Matching Familiar Figures Test (MFFT) impulsivity score (mean 0, SD 1) was used to measure impulsivity; scores between -1 and 1 are within the normal range, and scores ≥ 1 indicate a high level of impulsivity.⁵⁴ The Spanish version of the MFFT has been proved to be valid and reliable ($\alpha = 0.94$).⁵⁵

Emotional self-regulation. Emotional self-regulation was assessed with the BRIEF Parent Form emotional control subscale (mean 50, SD 10) and the Emotion Regulation Checklist (ERCL),^{52,56} a 24-item questionnaire rated on a 4-point Likert scale (0–3) and generating two subscales: emotional regulation and negativity-lability. Higher scores on the emotion regulation scale reflect more adaptive emotional self-regulation, whereas higher scores in the negativity-lability scale indicate poor emotional self-regulation.⁵⁶ Although raw scores are not directly interpretable, high or low scores can give an appraisal of emotional regulation. The ERCL has been proved valid and reliable ($\alpha = 0.85$).⁵⁶ In the emotional control subscale from the BRIEF, scores >65 indicate significant dysfunction.⁵²

Behavioral self-regulation. Behavioral self-regulation was measured with the Behavior Regulation Index (BRI) from the parent BRIEF (mean 50, SD 10) and the 10-minute Delay Gratification Task (DGT) in which the child received an unwrapped chocolate and was subsequently asked to wait alone for 10 minutes in a room with no distractors to receive a second chocolate.^{52,57} There was a bell in the room, which the child could ring if she/he wanted the assessor to return. Behavior was rated from 1 to 4 points, and lower scores indicated better behavioral regulation. Children who remained seated received 1 point; children who stood up from their seat received 2 points; children who touched the chocolate received 3 points; those who ate the chocolate or rang the bell received 4 points. The Spanish version of the BRIEF has proven good internal consistency ($\alpha = 0.98$) and test–retest reliability.⁵⁸ In the BRI, scores ≥ 65 indicate significant dysfunction.⁵²

Feasibility

The feasibility of the intervention was assessed using the total raw score of the Abbreviated Acceptability Rating Profile–Parenting (AARP),⁵⁹ which consists of 8 items rated from 1 to 6. Scores range from 8 to 48, with higher scores indicating greater acceptability.⁵⁹ Raw scores are not directly interpretable, but high or low scores can provide an estimate of acceptability.⁵⁹ This measure has been proved to be valid and reliable ($\alpha = 0.98$).⁵⁹

Adverse Effects

No adverse effects were reported by parents.

Power Analysis

Sample size was calculated considering a difference of 0.8 standard deviation between the two treatment arms in the externalizing scale of the CBCL, significance level of 0.05, power of 0.8, and attrition of 20%. On the basis of this analysis, 66 participants, 33 per arm, were required to provide adequate statistical power.

Statistical Analysis

Statistical analysis was performed on IBM SPSS statistics software. First, we conducted statistical analysis as planned in the protocol before completing the data collection.³³ Baseline characteristics of the participants completing follow-up assessment were compared with those who dropped out prior to that point. Group differences were assessed by independent sample *t*-tests for continuous variables and chi-squared tests for categorical variables. Intervention efficacy was assessed by comparing the outcomes of the Signposts group and the telephone-support group post-intervention (T3) and at 3 months (T4) by using analysis of covariance (ANCOVA) with pre-assessment score a covariate. Potential confounds were explored (see Table 3) by comparing characteristics between the intervention and control groups. Intention-to-treat analyses were conducted using multiple imputation. Feasibility scores were compared using independent sample *t*-tests. A significance level of $p = .05$ was employed for all analyses. Effect sizes of the intervention outcomes were calculated and interpreted on the basis of the classification from Charman et al.,⁶⁰ in which 0.2 is considered a small effect, 0.5 a medium effect, and 0.8 a large effect. False discovery rate adjustment (FDR) was conducted to reduce probability of Type 1 error.

Second, results of children who were clinically at risk (CBCL total T score ≥ 60) were analyzed. These analyses were conducted because normal functioning can hinder the detection of treatment effects, and a high level of pre-intervention behavioral disturbance was not part of the inclusion criteria. The analyses conducted with all the participants were repeated with this subsample.

Table 3. Characteristics of the families enrolled.

Demographics	All participants				At-risk participants only			
	Total n	Signposts n (%)	Telephone support n (%)	p	Total n	Signposts n (%)	Telephone support n (%)	p
Education of the primary caregiver				0.361				0.501
Below year 11	26	10 (38.5)	16 (61.5)		19	9 (47.4)	10 (52.6)	
Completed year 11	26	15 (57.7)	11 (42.3)		15	10 (66.7)	5 (33.3)	
Tertiary education	19	10 (52.6)	9 (47.4)		12	6 (50)	6 (50)	
Family structure				0.759				0.527
Two parents living together	48	24 (50)	24 (50)		29	17 (58.6)	12 (41.4)	
Separated parents, dual custody	15	8 (53.3)	7 (46.7)		11	6 (54.5)	5 (45.5)	
Single parents	8	3 (37.5)	5 (62.5)		6	2 (33.3)	4 (66.7)	
Occupation of the primary income earner				0.066				0.034
Unskilled	29	11 (37.9)	18 (62.1)		21	10 (47.6)	11 (52.4)	
Semiskilled	25	17 (68)	8 (12.7)		15	12 (80)	3 (20)	
Skilled professional	17	7 (41.2)	10 (58.8)		10	3 (30)	7 (70)	
Maternal age at birth				0.566				0.688
Older than 21 years	54	28 (51.9)	26 (48.1)		33	19 (57.6)	14 (42.4)	
Between 18 and 21 years	13	6 (46.2)	7 (53.8)		10	5 (50)	5 (50)	
Less than 18 years	4	1 (25)	3 (75)		3	1 (33.3)	2 (66.7)	
Level of depression symptoms				0.626				0.558
Minimal depression (0–13)	51	26 (51)	25 (49)		30	18 (60)	12 (40)	
Mild depression (14–19)	13	7 (53.8)	6 (46.2)		10	5 (50)	5 (50)	
Moderate depression (20–28)	6	2 (33.3)	4 (66.7)		5	2 (40)	3 (60)	
Severe depression (29–63)	1	0 (0)	1 (100)		1	0 (0)	1 (100)	
Level of trait-anxiety symptoms				0.995				0.601
Low (<30)	2	1 (50)	1 (50)		1	1 (100)	0 (0)	
Medium (30–44)	43	21 (48.8)	22 (51.2)		25	14 (56)	11 (44)	
High (≥45)	26	13 (50)	13 (50)		20	10 (50)	10 (50)	

Results

Participants

A total of 164 participants responded to the study posters. Over half ($n = 93$) were ineligible to participate because of a diagnosis other than ABI (e.g. cerebral palsy and neurofibromatosis) or the presence of uncontrolled seizures. Seventy-one participants were recruited, randomized, and allocated to the Signposts and telephone-support groups and completed the initial assessment; 53 participants completed the post-assessment (25.4% attrition at T3), and 47 participants completed the 3-month follow-up assessments (33.8% attrition at T4) (see Figure 1). Teacher questionnaires were returned in 88.7% of the cases during the pre-assessment (T1), 83% of the cases at post-assessment (T3), and 60.4% of the cases at follow-up assessment (T4). Table 3 shows that family characteristics were not different between groups when comparing the entire sample ($n = 71$). Comparisons of participants at risk ($n = 46$) revealed that parents in the control group presented with more symptoms of depression ($p = .049$), were more likely to have a skilled occupation, and were less likely to have a semiskilled occupation ($p = .034$) (see Table 4). Families enrolled were not receiving any other behavioral-psychological interventions (at home, at school, or in a clinic). Families who completed the interventions presented with a longer time since diagnosis, compared with families who dropped out ($p = .033$) (see Table 5). There were no other statistically significant differences in child or caregiver characteristics between groups.

Effectiveness

Intention-to-treat analysis and FDR of all participants ($n = 71$) are described in Table 6. Significant treatment effects and large effect sizes were seen at T3 in dysfunctional

parenting practices ($p < .001$), frequency of disruptive behavior at home ($p < .001$), and cognitive ($p = .013$) and emotional ($p = .006$) regulation. At T4, the FDR showed significant treatment effects and large effect sizes for dysfunctional parenting practices ($p = .017$), but not for other measures.

Intention-to-treat analysis of participants at risk ($n = 46$) are displayed in Table 7. FDR revealed significant treatment effects and large effect sizes at T3 in dysfunctional parenting practices ($p = .009$), frequency of disruptive behavior at home ($p = .009$), and emotional regulation ($p = .011$). At T4, the FDR revealed significant treatment effects and large effect sizes in dysfunctional parenting practices ($p = .009$), disruptive behavior at home (Intensity $p = .030$, Problem $p = .011$, CBCL $p = .037$), and emotional regulation ($p = .009$). Disruptive behavior at school, cognitive regulation, behavioral regulation, and other measures of emotional regulation did not present significant changes.

Feasibility scores showed that Signposts was well accepted by the participants, compared with the telephone-support group ($p < .001$).

Discussion

As hypothesized, Signposts was effective in reducing the frequency of disruptive behavior at home and dysfunctional parenting practices immediately after the intervention was completed. Some improvements in cognitive and emotional regulation were seen immediately after the intervention was completed. Reductions in dysfunctional parenting practices were maintained 3 months later, while the other improvements were not maintained. When analyzing participants at risk only, we found that Signposts was effective in reducing the frequency of disruptive behavior at home and

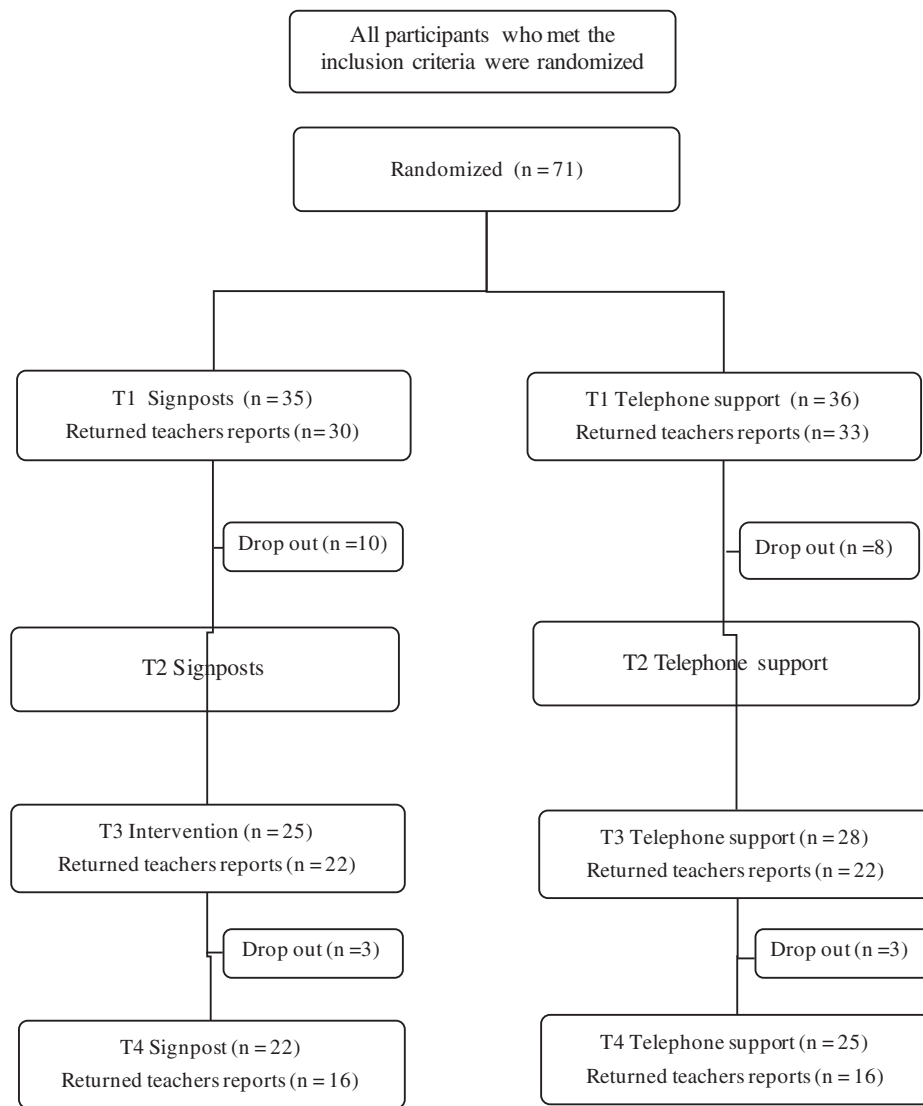


Figure 1. CONSORT flow diagram.

T1: pre-assessment, T2: intervention; T3: post-assessment, T4: follow-up assessment

dysfunctional parenting practices; these changes were maintained 3 months after treatment completion. Contrary to expectations, no differences were found for parental stress, parent sense of competence, child disruptive behavior at school, and most measures of self-regulation. Last, Signposts was found to be feasible within a Mexican population.

Parent Outcomes

Parenting Practices

Signposts was effective in reducing dysfunctional parenting practices by promoting authoritative parenting characterized by warm interactions, behavioral control, and autonomy support. The current study is in line with previous evidence supporting that cognitive behavior therapy in which parents develop skills to provide feedback, wait for the child to require assistance (rather than intervening directly), give hints or directions (instead of the solution), and let the child participate in decisions according to age is effective in building authoritative parenting practices associated with adaptive

behavior in children.^{15,17,61} The present results are in line with previous research describing that Signposts in combination with the ABI booklet can improve parenting practices in parents of children with ABI.²⁰ Further, a reduction in dysfunctional parenting practices was identified when analyzing the total sample including parents of children who were not at risk of behavioral disturbance. This suggests that parents of children with ABI can benefit from a parenting intervention, regardless of the level of disruptive behavior in their children.

Parental Stress and Parent Self-efficacy

Signposts did not appear to be helpful in modifying parental stress and parent self-efficacy. The current results are contrary to previous studies that reported the maintenance of reduced parental stress after completion of Signposts.^{23,24} However, these previous studies did not include a control group, which might have affected results. In addition, parents in the current sample did not present with clinical levels of parental stress, which can hinder the detection of treatment effects. Further, a different approach, such as

Table 4. Characteristics of participants in each group.

Demographics	All participants			At-risk participants only		
	Signposts	Telephone support	p	Signposts	Telephone support	p
Child						
n	35	36		25	21	
Age, years	9.4 (2.2)	9.3 (2.1)	0.884	9.6 (2.2)	8.9 (2.1)	0.338
Male sex, n	9	10	1.00	14	10	0.571
Age at diagnosis, years	5.9 (3.2)	5.9 (3.2)	0.929	6.1 (3.3)	5.7 (3.2)	0.695
Time since injury, years	3.5 (2.2)	3.5 (2.5)	0.990	3.5 (2.1)	3.2 (2.6)	0.735
IQ	82.6 (16.8)	86.6 (16.5)	0.317	81.0 (16.1)	83.9 (17.2)	0.565
Required surgery, n	24	21	0.462	14	10	0.571
Type of brain injury, n			0.058			0.230
Atrophy of unknown cause	0	1		0	1	
Tumor	12	11		6	6	
Cyst	10	10		8	8	
Infection	2	0		1	0	
TBI	7	10		6	4	
TBI and cyst	0	4		0	2	
Vascular lesion	4	0		4	0	
Caregiver						
Socioeconomic status	2.7 (1.6)	3.2 (1.7)	0.176	3.0 (1.5)	3.4 (1.8)	0.446
Family burden	26.1 (11.9)	23.3 (15.8)	0.415	26.9 (12.1)	30.14 (15.8)	0.446
Parent trait-anxiety	43.1 (7.9)	43.0 (9.8)	0.978	43.7 (10.1)	47.10 (2.2)	0.172
Parent depression	9.0 (6.2)	11.1 (7.8)	0.223	9.3 (6.5)	13.6 (7.8)	0.049*
Parent self-regulation	53.7 (9.9)	55.1 (8.9)	0.525	54.2 (9.1)	57.7 (9.45)	0.212
Feasibility (AARP)	46.2 (3.5)	29.1 (13.12)	<0.001	46.8 (3.8)	28.7 (14.16)	<0.001

Data are mean (SD) unless stated otherwise.

* Significant difference at $p < 0.05$.

AARP: Acceptability Rating Profile–Parenting; IQ: intellectual quotient; TBI: traumatic brain injury.

ACT, may be a more beneficial option to reduce parental stress and improve parent self-efficacy. In support of this, Take a Breath, a novel intervention that adapts ACT and problem-solving skills for parents of children with life-threatening conditions, has shown promising results in reducing parental stress.^{62,63}

Child Outcomes

Disruptive Behavior at Home

Signposts was effective in reducing disruptive behavior as reported by parents. Disruptive behavior in children with ABI can be exacerbated if children are exposed to authoritarian, permissive, and uninvolved parenting practices.^{2,3,13} Bernier et al.,¹³ explain that children go from external regulation (regulated by parents) to self-regulation. In the current study the reduction in disruptive behavior appears related to parents implementing authoritative parenting practices (external regulation), a finding supported by previous studies.²⁶ Signposts promotes the use of authoritative parenting practices as described by Prinzie et al.,⁶⁴ such as giving directions to the child in a rational form (effective instructions), encouraging verbal exchange and explaining the rationale of rules (family problem-solving strategy and effective communication skills), applying limits without overwhelming the child with restrictions (management of antecedents and consequences), recognizing child qualities (labeled praise), setting expectations for future behavior (behavior support plan), inculcating the child's autonomy (developing skills in the child), discipline (daily routines), and recognizing adult rights and child interests (setting household rules). In line with a previous pilot study,²⁴ the current study shows that the reduction in disruptive behavior continues once parents have completed the intervention. Since there were no

differences found in most measures of child self-regulation, the ongoing reduction in disruptive behavior appears related to parents implementing authoritative parenting practices (external regulation). Once the intervention is completed, parents can continue to consistently apply the strategies, while their children have more time to adapt to the changes in the home environment.

The “growing into deficits” effect in the pediatric ABI population refers to consequences of a brain insult that are initially silent and become evident over time.⁶⁵ Whereas participants at risk seem to benefit the most, it is important to prevent “growing into deficits” in children without behavioral disturbance. However, statistically significant treatment effects are more likely to be detected in participants with higher levels of behavioral disturbance prior to the intervention.

Disruptive Behavior at School

In line with the pilot study,²⁴ disruptive behavior was not reduced in school settings. We expected results to generalize to a school setting although reducing disruptive behavior at school was not a main target of this intervention. The absence of reduction in disruptive behavior at school can be related to the lack of consistent improvements in child self-regulation. To reduced disruptive behavior, children require an environment that exerts external regulation. Teachers may require training in evidence-based strategies to exert external regulation and reduce disruptive behavior. Further, school environment may be more demanding (e.g. peers, noise, and more distractors). Children may benefit from positive behavior support implemented by school staff, which has been reported to reduce disruptive child behavior at school in previous single case studies.⁶⁶

Table 5. Characteristics of participants who completed the follow-up and participants who dropped out.

Demographics	Completed follow-up assessment	Dropped out	Significance
Child			
n (sex male)	47 (28)	24 (12)	0.302
Intervention allocation, n (%)	22 (46.8)	13 (54.16)	0.621
Required surgery, n (%)	28 (59.5)	17 (70.8)	0.253
Age, years	9.4 (2.1)	9.2 (2.1)	0.729
Age at diagnosis, years	5.5 (3.2)	6.6 (2.9)	0.190
Time since injury, years	3.9 (2.3)	2.6 (2.2)	0.033*
IQ	84.4 (16.9)	85.0 (16.6)	0.892
ECBI-Intensity	55.95 (11.13)	54.16 (13.17)	0.549
ECBI-Problem	61.42 (11.50)	60.58 (10.66)	0.766
Caregiver			
Socioeconomic status	3.1 (1.5)	2.7 (1.9)	0.250
Family burden	24.8 (14.2)	24.5 (13.9)	0.924
Parent depression	10.3 (7.3)	9.6 (6.6)	0.707
Parent trait-anxiety	43.1 (8.7)	42.9 (9.2)	0.273
Parent self-regulation	54.2 (9.3)	54.8 (9.6)	0.801
Parental stress	54.63(10.43)	53.54 (10.06)	0.673
Dysfunctional parenting practices	3.51 (.50)	3.6 (.51)	0.384
Education of the primary caregiver, n (%)			0.489
Below year 11	15 (57.7)	11(42.3)	
Completed year 11	19 (73.1)	7 (26.9)	
Tertiary education	13 (68.4)	6 (31.6)	
Family structure			0.321
Two parents living together	29 (60.4)	19 (39.6)	
Separated parents with dual custody	12 (80)	3 (20)	
Single parents	6 (75)	2 (25)	
Occupation of the primary income earner, n (%)			0.299
Unskilled	19(65.5)	10 (34.5)	
Semiskilled	19 (76)	6 (24)	
Skilled professional	9 (52.9)	8 (47.1)	
Maternal age at birth, n (%)			0.309
Older than 21 years	34 (63)	20 (37)	
Between 18 and 21 years	9 (69.2)	4 (30.8)	
Less than 18 years	4 (100)	0 (0)	
Level of depression symptoms, n (%)			0.173
Minimal depression (0–13)	30 (57.7)	22 (42.3)	
Mild depression (14–19)	10 (83.3)	2 (16.7)	
Moderate depression (20–28)	2 (40)	3 (60)	
Severe depression (29–63)	2 (100)	0 (0)	
Level of trait-anxiety symptoms, n (%)			0.965
Low (<30)	1 (50)	1(50)	
Medium (30–44)	29 (67.4)	14 (32.6)	
High (≥45)	17 (65.3)	9 (34.61)	

Data are mean (SD) unless stated otherwise.

* Significant difference at $p < 0.05$.

ECBI: Eyberg Child Behavior Inventory; IQ: intellectual quotient.

Child Self-regulation

Contrary to our hypothesis, Signposts did not improve behavioral and cognitive self-regulation in children with ABI. Some improvements were reported in cognitive regulation immediately after the intervention, but these improvements were not maintained. Some improvements were seen in emotional self-regulation of participants at risk. A previous study showed that emotional self-regulation is the dimension of self-regulation more related to disruptive behavior in children with ABI.⁶⁷ Similarly, we found that in children with ABI who were at risk of behavioral disturbance, disruptive behavior and emotional self-regulation improved consistently, while behavioral and cognitive regulation did not.

Impairments in self-regulation in children with ABI are more likely to be related to disruption of brain maturation caused by the ABI onset than to parenting practices.⁵ The results suggest that children with ABI require more than authoritative parenting practices to improve self-regulation. Braga et al.⁶⁸ and Chan and Fong⁶⁹ found improvements in self-regulation after an intervention in which participants

learned metacognitive and problem-solving strategies. These interventions were applied directly to the children in face-to-face group sessions that took place twice a week.^{68,69} Poor self-regulation in childhood is a predictor of a variety of mental health problems in adulthood.⁸ Hence, it is important to find effective interventions to improve emotional, cognitive, and behavioral self-regulation in children with ABI.

Feasibility

A cognitive behavior therapy (Signposts for Building Better Behaviour) translated to Spanish is feasible in a Mexican population. Previous research highlights that dropout from treatment is particularly an issue in the pediatric ABI population.²⁶ Results from an RCT conducted in Australia reported a 30% attrition immediately after the intervention.²⁶ Similarly, we found a 25% attrition immediately after the intervention. It has been suggested that parents with higher levels of anxiety are more likely to drop out.²⁶ However, we did not find differences in level

Table 6. Results from intention to treat analysis.

	Telephone support						Signposts						Results at Post (T3)		Results Follow-up (T4)	
	Pre (T1)		Post (T3)		Follow-Up (T4)		Pre (T1)		Post (T3)		Follow-Up (T4)		FDRp partial eta		FDRp partial eta	
	M	(SD)	M	(SD)	M	(SD)	M	(SD)	M	(SD)	M	(SD)				
PARENT OUTCOMES																
Dysfunctional PP	3.6	(0.6)	3.6	(0.5)	3.4	(0.5)	3.6	(0.4)	3.0	(0.5)	2.9	(0.6)	<0.001	0.334	0.017	0.225
PSOC	19.9	(5.5)	16.9	(4.7)	17.4	(4.5)	19.2	(3.7)	17.9	(5.1)	17.8	(5.1)	0.476	0.015	0.775	0.008
Parental stress	54.3	(9.9)	53.0	(10.2)	50.6	(7.6)	54.3	(10.4)	49.7	(9.2)	50.0	(9.6)	0.370	0.028	0.685	0.007
DISRUPTIVE BEHAVIOR AT HOME																
Frequency	55.8	(12.5)	53.9	(10.6)	52.3	(11.4)	54.9	(10.8)	46.5	(8.3)	46.6	(10.4)	<0.001	0.213	0.190	0.059
problem	59.5	(11.3)	57.7	(12.5)	58.6	(12.4)	62.8	(10.6)	57.1	(11.6)	53.6	(11.4)	0.476	0.018	0.073	0.108
CBCL total	63.3	(10.1)	61.8	(11.8)	60.4	(9.4)	63.5	(10.6)	58.4	(9.4)	56.3	(9.5)	0.116	0.064	0.181	0.058
DISRUPTIVE BEHAVIOR AT SCHOOL																
Frequency	48.6	(7.7)	49.5	(8.8)	48.0	(10.4)	50.0	(7.1)	49.8	(8.9)	50.5	(11.4)	0.928	0	0.431	0.027
Problem	50.8	(7.4)	51.4	(7.9)	49.9	(8.9)	53.0	(9.2)	53.0	(10.0)	51.6	(8.6)	0.698	0.006	0.913	0.001
TRF total	57.0	(7.6)	57.0	(9.8)	53.7	(6.4)	58.2	(10.6)	56.8	(12.1)	56.7	(7.4)	0.117	0.064	0.190	0.058
COGNITIVE SELF-REGULATION																
MI	63.9	(12.9)	62.8	(11.1)	63.1	(11.4)	63.5	(12.2)	55.5	(10.4)	57.3	(14.9)	0.013	0.136	0.238	0.047
TEACH	64.1	(25.5)	79.4	(28.6)	85.1	(28.1)	62.7	(28.3)	70.9	(31.4)	74.3	(32.2)	0.105	0.077	0.074	0.116
MFFT	-0.1	(2.0)	-2.2	(9.7)	-0.2	(2.1)	1.1	(2.7)	1.3	(4.5)	1.4	(2.5)	0.164	0.053	0.431	0.022
EMOTIONAL SELF-REGULATION																
EC-BRIEF	57.9	(12.6)	54.3	(11.3)	53.8	(11.7)	58.1	(13.5)	53.6	(11.0)	53.2	(10.6)	0.928	0	0.922	0
ER	19.0	(5.4)	16.4	(3.7)	17.1	(5.6)	18.3	(5.7)	16.8	(4.0)	16.9	(5.7)	0.592	0.01	0.91	0.001
LN	14.7	(8.8)	12.3	(6.1)	11.0	(7.0)	14.0	(8.3)	8.3	(4.8)	8.6	(5.9)	0.006	0.17	0.302	0.035
EMOTIONAL SELF-REGULATION																
BRI	61.0	(12.8)	57.4	(11.9)	57.4	(11.9)	60.7	(13.0)	55.3	(11.2)	58.7	(12.6)	0.584	0.012	0.584	0.012
DGT	2.8	(1.2)	2.3	(1.2)	2.5	(1.3)	3.0	(1.2)	2.8	(1.2)	3.1	(1.2)	0.848	0.002	0.302	0.038

BRI: Behavioral regulation Index; CBCL: Child Behavior Checklist, DGT: Delay Gratification Task; EC: Emotional control subscale; ER-ERCL: Emotional regulation subscale; FDRp: False discovery rate p value between group, LN: Liability-Negativity; MFFT: Matching Familiar Figure Test, MI: Metacognition Index; PP: parenting practices; PSOC: Parent sense of competence; TEAC-h: Test of Everyday Attention for Children, TRF: Teacher Report Form.

Table 7. Participants at risk- results from intention to treat analysis.

	Telephone support						Signposts						Effectiveness post (T3)		Effectiveness follow up (T4)	
	Pre (T2)		Post (T3)		Follow-Up (T4)		Pre (T2)		Post (T3)		Follow-Up (T4)		FDRp partial n squared		FDRp partial n squared	
	M	(SD)	M	(SD)	M	(SD)	M	(SD)	M	(SD)	M	(SD)				
PARENT OUTCOMES																
Dysfunctional PP	3.7	(0.5)	3.6	(0.4)	3.5	(0.5)	3.7	(0.4)	3.0	(0.4)	3.2	(0.7)	0.009	0.262	0.009	0.279
PSOC	19.3	(5.8)	18.0	(4.7)	18.5	(4.3)	19.2	(4.0)	17.4	(4.2)	17.6	(4.4)	0.430	0.022	0.623	0.017
Parental stress	58.2	(9.5)	56.5	(11.4)	54.6	(6.2)	56.1	(10.8)	51.9	(7.4)	52.7	(8.4)	0.192	0.063	0.839	0.003
DISRUPTIVE BEHAVIOR AT HOME																
Frequency	61.9	(11.8)	58.5	(11)	57.8	(10.1)	57.6	(10.6)	48.7	(6.5)	49.5	(8.6)	0.009	0.413	0.030	0.188
problem	64.7	(10.7)	62.7	(12.2)	65.0	(11.3)	65.3	(10.4)	59.4	(10.8)	57.5	(9.6)	0.192	0.064	0.011	0.246
CBCL total	70.4	(5.5)	67.5	(9.0)	66.1	(7.3)	68.8	(6.5)	61.0	(7.03)	59.8	(7.1)	0.051	0.149	0.037	0.168
DISRUPTIVE BEHAVIOR AT SCHOOL																
Frequency	48.7	(6.9)	48.7	(9.5)	47.4	(10.2)	50.1	(6.9)	51.4	(7.9)	50.7	(6.5)	0.980	0.000	0.839	0.007
problem	51.9	(7.7)	50.2	(7.4)	50.6	(11.9)	55.4	(8.7)	55.3	(8.8)	51.1	(5.1)	0.407	0.032	0.883	0.001
TRF total	59.1	(5.2)	56.0	(6.8)	53.2	(7.6)	60.8	(8.9)	60.9	(7.8)	57.9	(4.6)	0.151	0.095	0.163	0.107
COGNITIVE SELF-REGULATION																
MI	66.6	(12.7)	64.8	(11.8)	65.5	(7.7)	65.6	(11.6)	57.2	(8.3)	61.5	(11.7)	0.051	0.142	0.281	0.057
TEACH	67.7	(27.0)	77.8	(32.4)	86.3	(33.7)	64.1	(25.9)	67.6	(30.4)	71.2	(30.9)	0.328	0.040	0.281	0.056
MFFT	-0.3	(1.9)	-4	(1.9)	-0.3	(1.5)	1.7	(2.3)	1.7	(1.6)	1.8	(2.2)	0.056	0.129	0.096	0.121
EMOTIONAL SELF-REGULATION																
EC-BRIEF	65.2	(9.0)	57.4	(11.9)	60.0	(11.7)	60.1	(13.0)	55.9	(9.2)	55.0	(8.8)	0.054	0.891	0.402	0.035
ER	19.0	(6.2)	15.8	(3.2)	17.4	(5.8)	18.1	(6.1)	16.2	(3.5)	17.4	(4.5)	0.407	0.026	0.839	0.004
LN	19.1	(8.1)	14.3	(6.4)	15.1	(5.4)	16	(8.0)	8.9	(3.9)	10.0	(4.5)	0.011	0.221	0.009	0.248
BEHAVIOURAL SELF-REGULATION																
BRI	68.8	(9.1)	61.9	(11.4)	64.2	(9.2)	63.9	(12.1)	58.1	(9.8)	59.6	(9.5)	0.538	0.013	0.340	0.045
DGT	3.1	(1.1)	2.5	(1.2)	2.8	(1.3)	2.8	(1.2)	2.6	(1.3)	2.9	(1.2)	0.657	0.008	0.883	0.001

BRI: Behavioral regulation Index; CBCL: Child Behavior Checklist, DGT: Delay Gratification Task; EC: Emotional control subscale; ER-ERCL: Emotional regulation subscale; FDRp: False discovery rate p value between group, LN: Liability-Negativity; MFFT: Matching Familiar Figure Test, MI: Metacognition Index; PP: parenting practices; PSOC: Parent sense of competence; TEAC-h: Test of Everyday Attention for Children, TRF: Teacher Report Form.

of anxiety between participants who dropped out and participants who completed the intervention. In the current study, participants who completed the intervention presented with more time since injury, compared with

participants who dropped out. Further, presenting with disruptive behavior was not part of the inclusion criteria, highlighting the feasibility of a parenting program regardless of the level of behavioral disturbance in children with

ABI. Of note, families participating were recruited in Mexico City which limits the generalization of the results.

Limitations

One of the limitations of this study is that, because of the heterogeneity of the sample and documentation of the brain injuries, the severity of the lesion was not determined. Therefore, the impact of injury severity on the intervention outcomes was not analyzed. However, we studied a heterogeneous sample because children with ABI and their families require psychological support, regardless of the etiology of the injury. In addition, not all the results were corrected by age because of the fact that not all the measures used were standardized. Another limitation is that the reduction in disruptive behavior was obtained from questionnaires answered by parents involved in the intervention rather than from measures applied directly to the child or by questionnaires answered by teachers. One more limitation is that there was no cultural adaptation of the intervention. Finally, the two arms of the study were not comparable in terms of duration and implementation (phone vs. face-to-face).

Future Directions

Future studies could combine Signposts with the Take a Breath program,⁶³ which has been shown to be effective in reducing parental stress in Australian population. Face-to-face sessions directly with children to train them in metacognitive and problem-solving strategies could be implemented to improve self-regulation.^{68,69} Future studies could improve behavior at school by implementing positive behavior support and ABI psychoeducation in this setting. For example,

In Mexico the Unit of Support Services for Regular Education (USAER) or Unit of Special Education and Inclusive Education (UDEEI) provide some schools with teachers who work with students that have special needs in the regular classroom.⁷⁰ To date, USAER and UDEEI teachers do not have an evidence based training to integrate children with ABI to the regular classroom. These teachers could benefit from a training that allows them to implement evidence based strategies for children with ABI at school. Lastly, future studies could study the effectiveness of Signposts using performance-based measures of behavior applied directly to the child and considering injury factors (e.g. type of ABI and age at diagnosis).

Conclusion

Signposts was effective in reducing dysfunctional parenting practices. In participants at risk of behavioral disturbance, Signposts was effective in reducing disruptive behavior, as reported by parents, and one domain of emotional regulation. These changes were maintained immediately post-intervention, with further reduction detected at 3 months post-intervention. No changes were present in parental stress, parent sense of competence, child cognitive and behavioral self-regulation, and child disruptive behavior in the school setting at 3 months post-intervention. The reduction in disruptive behavior was associated with the

implementation of authoritative parenting practices (external regulation), and not associated with child self-regulation.

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