Preschool Parent Training for Traumatic Brain Injury Prevention and Response

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Abstract

This study evaluated a training procedure designed to increase low income parents' awareness of TBI, knowledge of what to do for a suspected head injury, and confidence related to TBI response. Participants included 40 parents from low-income households who attended one of six identical one-hour training sessions about preschool injury and TBI. The training utilized direct instruction, videos, discussion of scenarios, and an in-person helmet fitting. Results of a pre- and post-test indicated that the training significantly increased parent awareness, knowledge, and confidence related to TBI. Suggestions are provided for how educators and mental health professionals can structure and implement educational training programs about TBI for parents of preschoolers.

Keywords: traumatic brain injury, concussion, early childhood, preschool, parent training, early intervention

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Preschool students are at an increased risk for traumatic brain injury (TBI) when compared to children in other age groups. According to the National Center for Health Statistics (2016), children ages 0-4 had the highest rate of TBI-related emergency department visits from 2001-2010. This was almost twice the rate of those in the next highest age group (15-14 year olds).Such injuries can lead to long-term difficulties in a number of areas, including executive functioning and school performance.

Children from low-income households are at an increased risk for injuries (Durkin, Davidson, Kuhh, O'Connor, & Barlow, 1994; Whiteside-Mansell et al., 2010). They also tend to have poorer outcomes post-TBI (Kirkwood et al., 2000; Muscara, Catroppa, Eren, & Anderson, 2009). This may be due, in part, to a lack of awareness about TBI risk factors; poor knowledge about signs, symptoms, and prevention strategies; and low confidence in responding to a possible brain injury. Direct parent training could be one way to improve these factors; however, little is known about the efficacy of preschool parent training for TBI.

Effects of Early Childhood TBI

During the preschool years, the brain undergoes significant changes. Neural connections expand and the cortical areas expand in both thickness and volume (Brown & Jernigan, 2012). Disruption to normal brain development can have long-lasting adverse effects. Children who sustain TBIs are at an increased risk for executive functioning impairment (i.e., goal-directed behaviors, attentional control, cognitive flexibility/working memory, processing speed, and goal setting); when the injury occurs at age three or younger, children experience even more deficits (Anderson et al., 2010). In addition to severity of injury, fewer family resources are a predictor of more executive deficits (Potter et al., 2011).

TBIs in early childhood can also cause deficits in school readiness, performance (Prasad, Swank, & Ewing-Cobbs, 2017) and emotional/behavioral impairments, such as an increased risk for anxiety, attention-deficit/ hyperactivity disorder (ADHD), and oppositional defiant disorder (ODD; McKinlay, Grace, Horwood, Fergusson, & MacFarlane, 2010). The severity of TBI is associated with the severity of behavioral deficits, specifically in preschool students (McKinlay et al., 2010). However, even a mild TBI can cause behavioral and social problems, such as difficulties with theory of mind or understanding the perspective of others (Bellerose, Bernier, Beautoin, Gravel, & Beauchamp, 2015).

Known Risk Factors Associated with TBI in Preschool Aged Children

Factors that contribute to preschool injury are complex and multifaceted (Simpson, Turnbull, Ardagh, & Richardson, 2009) and include biological contributions like pre-existing attention-deficit/hyperactivity disorder (ADHD; Ayaz, Ayaz, & Soylu, 2015), which can lead to an impulsive action resulting in a fall. Household dynamics and environment are also risk factors for preschool injury (Andrade, Cordovil, & Barreiros, 2013).

Biological and developmental risks. If a child is diagnosed with ADHD prior to injury, they are at an increased risk of sustaining a TBI. Liou et. al. (2018) suggests a person may be four times as likely to sustain a TBI if he or she has a prior diagnosis of ADHD. A hallmark symptom of ADHD is deficits in executive functioning skills, such as impulse control, decision making, and inhibitory control (Van Dessel et. al., 2018). Executive functioning deficits, specifically impulsivity, are linked to risky behavior (Liou et. al., 2018). When a child partakes in risky behavior, such as riding a bike down a steep hill without wearing a helmet or climbing to the top of the monkey bars when no one is around to watch them, he or she increases the chance of injury.

An injury to a child’s brain affects a vital organ that is still in development. The younger the child at the time of the injury, the greater possibility the child has of long-term developmental challenges (Haarbauer-Krupa et. al., 2018). Young children’s cognitive impairments may not be apparent immediately following the injury but emerge as the child gets older and fails to meet developmental milestones in learning and behavior. Because of these risk factors, it is vital that treatment and therapy begin as soon after the injury as possible. Early intervention services are a range of targeted services to help children with specific health conditions or developmental delays (Haarbaur-Krupa et. al., 2018). These programs also involve collaboration with parents to educate them about treatment options and strategies parents can use at home to help their child.

Sleep is another risk factor for TBI in children. Koulouglioti, Cole, and Kitzman (2008) collected injury data from a longitudinal study of 278 mothers and their preschool children. In his study, mothers reported on their child’s sleep. Children who did not get enough sleep (as reported by the mothers) sustained a higher number of medically attended injuries. Gender is also a factor, with double the fatal injuries and 23% more serious non-fatal injuries for males than females (Child Trends Databank, 2014), possibly due to their greater tendency to engage in rough and tumble play (Storli & Sandseter, 2015).

Environmental risks. A meta-analysis on social, health, and developmental data throughout the first five years of life suggested that injury risk was higher in children with younger mothers, non-white mothers, mothers who smoked, mothers who drank more than 21 units of alcohol a week, and mothers who had lower social levels of support (Reading, Jones, Haynes, Daras, & Emond, 2008). Interestingly, children of mothers with higher levels of educational attainment also saw an increased risk of injury. The authors attributed this to a readiness to report injury in mothers with higher levels of education and not necessarily a higher risk of injury.

Parent perceptions may also play a factor in injury risk. Simpson et al. (2009) interviewed 100 caregivers of children from birth to four years old who were seen in the emergency department for an injury that occurred in the home. Two prevalent factors included 1) unrealistic expectations of children, meaning parents expected their toddler to remember to not engage in a risky activity (i.e., jumping down the stairs) when the child may have never been taught to avoid the behavior, and 2) the acceptance of injury as the norm. Because injuries are prevalent in this age group, parents believed injury was unavoidable in their own children. The study also found that the highest type of injury sustained in this sample of zero to four-year-old was intracranial, meaning the child sustained an injury to the head. The most common cause of injury within this sample was the child falling.

The socioeconomic status (SES) of a family is also a risk factor in children sustaining TBIs. For example, Amram et. al. (2015) conducted a study examining the relationship between socioeconomic status (SES) and pediatric traumatic brain injury. The study found that having parents with a low level of education was a strong predictor of traumatic brain injury in children. Another study found that poor social outcomes for children who sustained a TBI were exacerbated by lower SES and poor family functioning (Yeates et. al., 2004).

Whiteside-Mansell et al. (2010) screened families from Head Start centers (an early learning program for low-income families, serving children age three to five) and found that many Head Start children are at risk for potential long-term bodily harm. Loberg, Heyward, Fessler, and Edhayan (2018) found a correlation between race and traumatic injury admission in hospitals. African American patients experienced higher rates of traumatic injury and mortality compared to White patients. However, the authors attributed this pattern, in part, to a difference in socioeconomic status (SES; Loberg et. al., 2018). The study suggests that people in lower SES areas often delay medical treatment due to lack of health insurance. This often exacerbates symptoms or severity of injury. Further, a meta-analysis of 119 United States injury studies found that socioeconomic status (SES) is an important predictor of injury. Specifically, SES was found to have a significant effect on injury in 78 (66%) of the studies (Yuma-Guerrero, Orsi, Lee, & Cubbin, 2018). These findings substantiate a need for injury prevention efforts that target low-income parents.

Household and parental factors can also lead to weak safety conditions, such as limited adult supervision, physically abusive discipline, and lack of funds to visit the doctor following what may look like a minor injury. Pinto, Poretti, Meoded, Tekes, and Huiseman (2012) assert that a TBI can be caused by physical abuse or by an accident, and the mechanism of the injury looks the same whether the impact was deliberate or not. Extra axial hemorrhages, or bleeding that occurs within the skull, in children is most commonly caused by shaking. Anoxia is often caused by neck strangulation.

Parent Training

Parents whose children are in Head Start programs are generally reliable in reporting at-home safety factors; further, they are more likely to report problems with home safety if they believe they will receive assistance for those problems (Hatfield et al., 2006). Thus, providing education and support to parents is one way to improve the health and safety of young children. Carrillo Zuniga et al. (2012) evaluated the effectiveness of an educational intervention about asthma for parents of children in Head Start Centers. The intervention consisted of an asthma and health homes curriculum in the form of a one-time PowerPoint presentation. The study found positive results for parent participants; specifically, the program led to environmental changes (e.g., opening windows, cleaning the house more frequently, throwing out trash, etc.) in participants' households.

This strategy for change—educational interventions—can be carried over into injury prevention and response. For example, training programs on topics such as how to appropriately use child restraints (car seats) have been developed (Ivers et al., 2011). Family problem solving training as part of pediatric TBI treatment is another research-based strategy that involves parent education and engagement (Wade et. al., 2018; Wade et al., 2009). Evaluating the quality of such strategies is essential, as interventions addressing preschool injury often do not address the complex environments in which injuries occur, are poorly delivered, or the intervention may not be implemented exactly as intended (Simpson & Nicholls, 2012).

Purpose of the Present Study

The purpose of this study was to evaluate a TBI training program for low-income parents of preschoolers. Because environmental disadvantage and lack of family resources are associated with more adverse effects from TBI (Potter et al., 2011), the present study involved providing training and resources in a supportive environment for families whose children attended Head Start or preschool in a low-income school district.

The study aimed to answer the following research question: What is the effect of a training program on preschool parents' 1) awareness, 2) confidence, and 3) knowledge about TBI prevention and response? It was predicted that the training would increase parent awareness, confidence, and knowledge about TBI prevention and response. This hypothesis was based on research that found educational interventions can create change in at-home safety practices in low-income parents (Carrillo Zuniga et al., 2012). The hypothesis was tested by comparing participants' responses to a questionnaire that was administered both before and after a one-hour in-person training. The study contributes to brain injury prevention and response by examining the efficacy of a preschool parent training program.

Method

This study utilized a one-group pretest/posttest design (Mertens, 2010) and produced quantitative data. This design was selected because it allowed the researchers to evaluate the effect of the training method across participants. The independent variable was the parent training program and the three dependent variables were the parents' 1) awareness, 2) knowledge, and 3) confidence about TBI prevention and response.

Participants and Setting

Because of the heightened risk for injury in children from low-income families, parents of children who attend Head Start programs or who attended preschool in a low-income district (100% free and reduced lunch) were targeted as participants. A specific measure was not used to determine the definition of low-income; however, the Head Start programs are designed to serve low-income families and may only enroll up to 10 percent of children from families that have incomes above the Poverty Guidelines (Head Start and Early Head Start, 2019). Convenience sampling was used to recruit participants through local Head Start programs and a low-income school district in the Midwestern United States. While a limitation of convenience sampling is that participants may not represent the population being studied, the nature of the project lent itself to inviting all members of the school community to the training. Parents were invited to attend the training sessions as part of parent education events hosted by the schools. The same training was offered on six different occasions at different times of day to increase opportunities for participation and to provide the training close to participants' homes in a small group setting. This also allowed the researchers to attain a sufficient number of participants for data analysis. The training sessions were advertised using fliers provided by the researchers and through collaborative efforts with school administrators. This involved administrators announcing and inviting potential participants by word of mouth.

Participants (see Table 1) included (N = 40) parents of preschool children in southwestern Ohio. Overall, the majority of participants indicated they were White (63%) and had at least a high school degree (90%) Most of their children were enrolled in Head Start Programs (N=32) and the others were enrolled in a low-income school district (N=8). Group sizes ranged from 4-10.

Table 1
Participant Demographics

		N
Source	Head Start Parents	32
	Non-Head Start Parents	8
Children	Mean number of children	2.2 (range 1-6)
Age	Mean age of participants	32.7 (range 18-61)
Ethnicities	Caucasian	24
	African American	9
	Hispanic	0
	Other	5
	No Response	2
Highest Completed Education Level	Some high school	1
	High school	13
	GED	1
	College	18
	Masters	5
	No Response	2
Marital Status	Single	15
	Married	19
	Divorced	4
	Widowed	0
	No Response	2

Measure

A pretest/posttest was created by the researchers to measure parents' awareness, knowledge, and confidence about TBI prevention and response. The questions on the pretest and posttest were identical, designed to measure participant gains in awareness, confidence, and knowledge before and after the training. The test was created by the researchers and was revised in consultation with content experts, including a brain injury researcher and a statistics professor, who also independently coded the specific domains assessed. The test was piloted on a small group (N=6) similar to the sample population (i.e., parents of preschoolers in low income households) to test for question quality. The wording of some questions was edited based on pilot participant feedback.

The final version of the test consisted of 10 questions (see Table 2); three questions assessed parent awareness of TBI using a Likert scale, three questions assessed parent confidence in responding to TBI using a Likert scale, and four open-ended questions assessed parent knowledge about TBI. The Likert scale questions were answered on a five-point (strongly disagree, disagree, neutral, agree, strongly agree) scale. The open-ended items were scored independently by two researchers using a 0-2 point rubric. Participants were also asked to complete a questionnaire answering demographic questions. Both measures were administered in paper and pencil format.

Table 2
Pre- and Post-Test Questions

Questions	Question Categories
I have a good understanding of what a traumatic brain injury is.	Awareness
I have seen people talking about traumatic brain injury in the media (e.g., television, newspaper, social media).	Awareness
I have thought about what I would do if my child had a traumatic brain injury.	Awareness
I am confident that I know what steps to take to try to prevent my child from having a traumatic brain injury.	Confidence
I am confident that I would know if my child experienced a traumatic brain injury.	Confidence
I am confident that I would know what to do if my child experienced a traumatic brain injury.	Confidence
Your child is climbing on the kitchen counter one afternoon, falls, and hits her head. She seems okay, but the next morning, she sleeps until 10 am, when she usually gets up at 7 am. When you go into her room to wake her up, she is unusually sluggish and slow to get moving. What should you do?	Knowledge
Your child is playing tag in the house and runs into a wall. Afterwards he's not acting like himself and complains of a stomach ache. What should you do?	Knowledge
Your child falls from the monkey bars on the playground and hits her head. She doesn't lose consciousness, but just appears stunned. A little later, you see her struggling to keep her balance. What should you do?	Knowledge
When should your child wear a helmet?	Knowledge

Participants also completed a treatment acceptability measure which asked 1) if they found the training helpful (1=not at all helpful, 2=not very helpful, 3=neutral, 4=helpful, 5=very helpful), 2) if they felt it was a good use of their time (1=strongly disagree, 2=disagree, 3=neutral, 4= agree, 5=strongly agree), and 3) ways it could be improved. The first two questions were asked on a five-point Likert scale; the final question was open-ended. This measure was designed by the researchers for the purpose of this study.

Procedures

The research study was approved through the Institutional Review Board (IRB) prior to data collection. At each training session, participants' baseline levels of TBI awareness, confidence, and knowledge were established by a paper and pencil pre-test taken before the training began. Participants then participated in one of six identical one-hour trainings delivered by one of the researchers; the same presenter was used for all six of the training groups.

The one hour training session, developed by the researchers, included a 26-slide PowerPoint presentation. The training was interactive and scenario-based. The content of the training included:

- the definition of TBI
- local data concerning bike and head injuries and helmet use
- causes of TBI
- potential effects of TBI
- how to respond to TBI

- what happens when a parent takes a child to the doctor because of a suspected TBI
- TBI prevention and safety practices, including fall prevention
- practice scenarios involving possible TBI
- how to appropriately fit a bike helmet on a child

Multimedia resources and handouts were used throughout to reinforce concepts and provide a parent perspective. For example, parents watched a brief YouTube video on the challenges related to installing a car seat; they then received a handout of local organizations that can help them with proper installation. Discussion questions and case studies were embedded throughout the presentation. The PowerPoint presentation portion of the training session lasted approximately 45 minutes. When the presentation ended, the trainer guided the participants through fitting bike helmets on their children so they could practice one of the skills they had just learned. These helmets were provided as an incentive for attending the presentation.

Post-intervention data was collected via a paper and pencil post-test administered immediately following the training. Participants were also asked to complete a demographic questionnaire and answer three questions to provide feedback about the training. In order to maintain participant anonymity, the presenter was not present while post-test questionnaires were completed and responses were collected by a representative from the educational center.

Data Analysis

Awareness. The pre- and post-test Likert-scale questions assessing awareness of TBI were assigned point values (Strongly Disagree = 1; Disagree = 2; Neutral = 3; Agree = 4; Strongly Agree = 5). Points were totaled to calculate each participant’s awareness score. The data were analyzed using a paired t-test to determine if the means differ significantly at the $p = .05$ level in SPSS.

Confidence. The pre- and post-test Likert-scale questions assessing awareness of TBI confidence to respond to TBI were assigned point values (Strongly Disagree = 1; Disagree = 2; Neutral = 3; Agree = 4; Strongly Agree = 5). Points were totaled to calculate each participant's confidence score. The data were analyzed using a paired t-test to determine if the means differ significantly at the $p = .05$ level in SPSS.

Knowledge. The four open-ended questions assessing knowledge of what to do in a possible TBI situation were scored using a 0-2 point coding system. For example, for question 9, responses were scored as 2 points if the participant said he or she would seek medical attention. Responses were scored as 1 point if the participant indicated that he or she recognized a problem, but postponed action (e.g., "Keep an eye on his behavior," "See how she feels the next day," etc.). Responses were scored as 0 points if the participant indicated that he or she would not do anything or gave any other type of answer. Points were totaled to calculate each participant's knowledge score. An interrater reliability (IRR) analysis was performed to assess the degree that coders consistently assigned the same ratings to participants' responses. Cohen's (1968) kappa statistic (κ) measures inter-rater agreement for qualitative, or categorical, items. This statistic was computed using SPSS to determine consistency among two raters; kappa scores were then averaged across the four knowledge questions to provide a single index of IRR (Light, 1971). As a rule of thumb, values of Kappa from 0.40 to 0.59 are considered moderate, 0.60 to 0.79 substantial, and 0.80 outstanding (Landis & Koch, 1977).

Demographic factors. To determine whether demographic factors were related to pre-test performance, correlations were run using Pearson product-moment correlations. Two participants did not answer several of the demographic questions.

Treatment acceptability. Participants anonymously rated the training on a 1-5 scale on how helpful it was (not at all helpful to very helpful) and whether it was a good use of their time (strongly disagree to agree). Mean scores on the treatment acceptability questions were calculated. Responses to the open-ended question asking for suggestions for program improvement were coded for themes.

Results

Awareness. The results indicated that the mean post-test awareness (M = 13.11, SD = 1.286) was significantly greater than the mean pre-test awareness (M = 11.08, SD = 1.286), $t(36) = 7.45$, $p < .01$, as shown in Table 3 and Table 4.

Confidence. The mean post-test confidence (M = 13.62, SD = 1.441) was significantly greater than the mean pre-test confidence (M = 10.22, SD = 2.699), $t(36) = 7.34$, $p < .01$, as shown in Table 3 and Table 4.

Knowledge. The mean post-test knowledge *(*M = 7.38, SD = 1.570) was significantly greater than the mean pre-test knowledge (M = 6.49, SD = 1.967), $t(36) = 2.25$, $p < .05$, as shown in Table 3 and Table 4. The interrater reliability between the two raters indicated near perfect agreement on both the pretest, κ =0.898, (p <.0.001) and posttest, κ =0.854, (p <.0.001; Landis & Koch, 1977). Kappa scores on the four pretest knowledge questions ranged from .739 to 1.0;

Kappa scores on the same four posttest knowledge questions ranged from .790 to 1.0, indicating substantial agreement between raters on all questions.

Table 3
Pre- and Post-Test Means

		Mean	Std. Deviation
Pair 1	AwarePre	11.08	1.801
	AwarePost	13.11	1.286
Pair 2	ConfPre	10.22	2.699
	ConfPost	13.62	1.441
Pair 3	KnowPre	6.49	1.967
	KnowPost	7.38	1.570

Table 4
Differences in Means for Pre- and Post-Tests

		Paired Differences							
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper	t	d. 00 f	Sig. (2-tailed)
Pair 1	AwarePre - AwarePost	-2.027	1.658	.273	-2.580	-1.474	-7.436	36	.000
Pair 2	ConfPre - ConfPost	-3.405	2.823	.464	-4.347	-2.464	-7.337	36	.000
Pair 3	KnowPre - KnowPost	-.892	2.413	.397	-1.7696	.087	-2.249	36	.031

Demographic factors. To determine whether demographic factors were related to pre-test performance, correlations were run using Pearson product-moment correlations. No significant correlations were indicated, as shown in Table 5. The sample size differs for the various demographic factors due to some respondents leaving questions blank. Two respondents did not answer the question about their age and one respondent did not answer the question about marital status.

Table 5

Correlations between Demographic Factors and Knowledge Prior to Training

		Pre-test
Children	Pearson Correlation	.086
	Sig. (2-tailed)	.609
	N	38
Age	Pearson Correlation	-.005
	Sig. (2-tailed)	.978
	N	34
Ethnicity	Pearson Correlation	-.095
	Sig. (2-tailed)	.570
	N	38
Education	Pearson Correlation	.161
	Sig. (2-tailed)	.335
	N	38
Marital	Pearson Correlation	-.133
	Sig. (2-tailed)	.433
	N	37

Treatment acceptability. Participants anonymously rated the training on a 1-5 scale on how helpful it was (not at all helpful to very helpful) and whether it was a good use of their time (strongly disagree to strongly agree). All participants rated the training as either “helpful” or “very helpful” (M=4.64). When evaluating if the training was a good use of their time, all participants except for one (who rated it as neutral) either “agreed” or “strongly agreed”

(M=4.56). When asked for suggestions for improvement the participants, no one offered corrective feedback.

Discussion

This study involved educating low-income parents at a time when their children were most vulnerable to TBIs. Parents of preschoolers demonstrated increased awareness of TBI, confidence to respond to TBI, and knowledge of what to do in a possible TBI situation after participating in the training session. These results are similar to those of Carrillo Zuniga et al. (2012) who found success in an educational intervention for Head Start parents about asthma, and provide a promising strategy for injury prevention.

The increase in awareness about TBI demonstrates that parents who participated in the training may be more alert to the possibility their child has sustained a head injury, as well as what to do post-injury. The significant increase in confidence to respond to TBI indicates that parents who participated in the training felt more prepared to respond to a TBI than they did prior to the training. For example, parents more strongly agreed with the statement that they would know what to do if their child sustained a TBI after the training than before the training. The significant increase in knowledge of what to do in a possible TBI situation indicates that parents who participated in the training knew specific signs and symptoms to look for that may indicate a TBI in an injury situation. Additionally, their knowledge increased related to when their child should wear a helmet. For example, parents were more likely to correctly identify when their child should wear a helmet or indicate that they would seek immediate medical attention if their child was injured and displayed symptoms of a TBI (e.g., change in sleep patterns, change in motor coordination, etc.). Treatment acceptability was also strong, with participants rating the training as very helpful and a good use of their time. This is critical to gain participant attendance and buy-in.

Results indicated that no significant correlations existed between the selected demographic factors and knowledge prior to the training. While other research has shown non-white mothers and more persons in the house to be risk factors associated with an increased risk for injury (Reading et al,, 2008) and more severe deficits following a TBI in preschoolers (Potter et al., 2011; Andrade et al., 2013), this study did not support the demographic factors of age, number of children, level of education, marital status, or ethnicity to be significantly correlated with knowledge of what to do in a possible TBI situation.

Limitations

Because the trainings were held across six different sessions, with different participants in each group, questions and conversations among participants varied from group to group. Parents were encouraged to share their own experiences; thus, some sessions had more discussion than others. Further, while the knowledge domain was assessed through open-ended questions with coded answer scoring, the awareness and confidence domains were self-report Likert-scales. Participants could have reported more growth than they experienced. Further, one of the questions related to TBI awareness (I have seen people talking about traumatic brain injury in the media [e.g., television, newspaper, social media] provided good baseline data, but did not necessarily assess the efficacy of the training program.

While the goal of the training was to reach low-income parents of preschool students, no questions were asked about socio-economic status. Instead, the assumption was made that all participants had low-income levels because of the Head Start setting or the income status of the school their child attended (100% free and reduced lunch). Additionally, the pre-post study design poses as a limitation, due to that the post-test was administered immediately following the training. It would be beneficial to also collect data at a later point to determine whether the training had long-term effects on participants' TBI awareness, confidence, and knowledge.

The relatively small sample size limits generalizability of results. Despite collaborative relationships and widespread advertising, parent attendance at each training was relatively low and was a barrier to the study. Conducting multiple training sessions with relatively low numbers of attendees may not be the most efficient way of reaching parents of preschoolers. Further, because the participants were a convenience sample of parents who were willing to come to the training, the sample may not have been representative, as parents who attended the training sessions may have been more open to learning new skills than the general population.

Implications for Future Research

While in-person trainings can be effective and engaging, it can also be difficult to gather parents together in person, due to work schedules and childcare constraints. Future studies might examine the efficacy of asynchronous trainings, which might reach more participants. These might employ brief videos disseminated over time to maximize attention and to "dose" the training information. However, low-income families do not always have access to computers or other devices through which to receive the training information. Thus, other formats, such as providing the information at logical junctures, such as preschool registration, may be viable. Educators and mental health professionals offering such trainings might also consider offering a meal and childcare to increase attendance at future trainings.

Further, more rigorous study designs can strengthen our understanding of training efficacy. In addition to a survey questionnaire, more focused interview questions asked to parents in a one-on-one setting might provide more nuanced data regarding attitudes and knowledge surrounding TBI. A larger sample size than the one provided in this study would also output stronger data.

Conclusion

Children who are preschool-aged are at increased risk for sustaining traumatic brain injuries (TBIs). Environmental disadvantage and fewer family resources are associated with more adverse effects following TBI; these effects may include impaired cognitive functioning, academic skill deficits, and behavior problems. Thus, educating parents about brain injury prevention and response is critical. The present study examined the efficacy of a TBI prevention and response parent training program. Findings from this study are promising and show that even a brief, one-hour intervention can be effective at increasing parents' awareness of TBI, confidence to respond to TBI, and knowledge of what to do in a possible TBI situation. Further, parents reported that they found the training valuable and a good use of their time. Future studies might examine a more efficient way of providing the training information, such as online formats or at daycare or preschool registration.

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