

Language outcomes in high-risk Hawaiian children at *Ka Pa'alana*: A family-child interaction learning program

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Abstract: The importance of high-quality early childhood education programs in young children's learning outcomes is well established. However, minority and Indigenous children are widely underrepresented in these programs. Early childhood education programs that implement culture-based education and encourage family partnerships are designed to support Indigenous children and their families. One such program is *Ka Pa'alana* Homeless Family Education Program and Preschool, a Family-Child Interaction Learning program in Hawai'i, created to support Native Hawaiian families who historically experienced homelessness and poor educational outcomes. Here, we evaluated the efficacy of literacy and language professional development for program educators by examining associated language outcomes in a sample of Native Hawaiian preschool-age children (N=45) from a low-socioeconomic, high-risk community. Results revealed significant improvements in both expressive and receptive language, as measured by the formative GOLD® assessment system and the standardized Peabody Picture Vocabulary Test, 5th edition. Compared to other similar programs serving low-socioeconomic-status minority populations, children enrolled in *Ka Pa'alana* demonstrated higher language scores. Given the small sample sizes and lack of control groups, results should be viewed as exploratory. Nonetheless, this study serves as an initial examination of the potential outcomes associated with *Ka Pa'alana* educators' language and literacy professional development, *Ka Pa'alana*'s Family-Child Interaction Learning program model and its Hawaiian culture-based education approach to promoting language development, and fostering cultural appreciation in a diverse, at-risk community.

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Introduction

Various studies have consistently highlighted disparities in Native Hawaiian ("Hawaiians," hereafter) educational outcomes, particularly in reading and language performance (Collins, 2010; Kana'iaupuni & Ishibashi, 2003; Kana'iaupuni et al., 2010; Singh et al., 2014). The educational well-being of children in Hawai'i ranks in the bottom third among states (Hawai'i Children's Action Network, 2022). A 2023 state report showed that fewer than one-third of children entering kindergarten were behind in language, math, physical development, and social skills (Armstrong, 2023). Alarming, no schools across the islands reported full readiness in language and literacy. A 2024 state report found that less than one-third of children entering kindergarten in Hawai'i do not meet the expected academic skills and knowledge for kindergarten entry (Hawai'i State Department of Education, 2024). These reports underscore the importance of ensuring Hawai'i's young children develop adequate language skills before kindergarten, as language development is a strong predictor of later academic and social success (Armstrong, 2023; Morgan et al., 2015).

Proposed factors contributing to this achievement gap include higher rates of poverty, domestic violence, and criminal activity experienced by Hawaiians as a minority group compared to other ethnic and socioeconomic communities in Hawai'i (Kana'iaupuni et al., 2010; Singh et al., 2014). The correlation

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between children from disadvantaged households and low school performance compared to children from more advantaged households is well-documented (Campbell et al., 2008; Finneran et al., 2020; Ladd, 2012), with young children from minority communities at an increased risk of poor academic outcomes (Finneran et al., 2020; Wood et al., 2016). Hawaiian children and other indigenous groups, however, are widely underrepresented in such studies (Kitson & Bowes, 2010; Singh et al., 2014). *Ka Pa‘alana* Homeless Family Education program is a Family-Child Interaction Learning program (FCIL) that incorporates Hawaiian culture-based education (CBE) to provide a culturally relevant learning environment for children and their families. *Ka Pa‘alana* was specifically created to address the educational and socioeconomic gap experienced by Hawaiian communities. *Ka Pa‘alana* has numerous mobile preschool sites and outreach services for homeless and at-risk families in Hawai‘i. At *Ka Pa‘alana*, families receive food, supplies, and support services from local shelters, parenting classes, and other community resources. The program’s unifying factor emphasizes the importance of *‘ohana* (family) in the Hawaiian community.

What is a Family-Child Interaction Learning Program (FCIL)?

Ka Pa‘alana is a FCIL program inspired by and adapted from the four-component framework for family literacy developed by the National Center for Families Learning (Jacobs et al., 2019). These components include (1) supporting caregivers as their child’s first teacher through adult education, (2) early childhood education, (3) parent training, and (4) parent and child classroom engagement (Jacobs et al., 2019). This integration is accomplished through the *Ka Pa‘alana*’s program structure, which characteristically features “Parent and Children Together” (PACT), a designated time when caregivers engage with their children in various learning centers and outdoor activities, intentionally designed to be child-led and play-based. FCIL programs provide an alternative early childhood education setting in which caregivers remain with their children in the classroom, as opposed to traditional drop-off child care or preschool centers (DeBaryshe et al., 2017). FCIL programs serve families of children from birth through age five who are cared for by a designated caregiver. Recognizing the importance of parental involvement in children’s education, FCIL programs are designed to support families in their role as a child’s first and primary teachers. Families attend class together, typically twice a week for half a day, and enrollment in the program is free.

A central feature of FCIL programs is their dual focus on parent education and child development (DeBaryshe et al., 2017). This is reflected in the program’s structure, which includes a parent education class where caregivers learn topics such as parenting, child development, job readiness, and other relevant subjects. While caregivers attend their parenting class, children participate in a preschool class (which can be a multi-age blend or divided by age group) and are taught by an accredited preschool teacher using a developmentally appropriate curriculum. FCIL programs aim to support vulnerable families, including low-income, immigrants, or those experiencing homelessness (DeBaryshe et al., 2017). The programs primarily rely on federal grants and other awards to remain operational.

While FCIL programs have not been specifically described in the ECE literature, their framework has been conceptualized by two-generation programs (Chase-Lansdale & Brooks-Gunn, 2014; Schmit et al., 2014; Smith, 1995; St. Pierre et al., 1995). The concept was introduced by the 1965 launch of Head Start, an early childhood education program specifically designed to serve low-socioeconomic-status minority populations (U.S. Department of Health and Human Services, Administration for Children and Families 2010). Two-generation programs are intended for low-income parents and children from the same family, aiming to integrate families into their children’s education while also working to improve their own livelihoods (Chase-Lansdale & Brooks-Gunn, 2014; Schmit et al., 2014). Services for parents may include parenting, literacy, English language learning, and General Education Development (GED) preparation, among other opportunities (Chase-Lansdale & Brooks-Gunn, 2014; Schmit et al., 2014). Participation in two-generation programs is associated with improvements across developmental domains in children, enhanced parental psychosocial outcomes, and a decreased risk of child maltreatment (Benzies et al., 2014; St. Pierre et al., 1995; Urban Institute, 2024).

Similarly, *complementary learning* is a conceptual framework developed by the Harvard Family

Research Project (Henderson & Mapp, 2002; Temkin, 2006; Weiss, 2014). It is guided by the principle that family involvement in their children's education positively influences their social and academic outcomes. Its efficacy in supporting child learning outcomes is widely documented (Anderson, 2000; Henderson & Mapp, 2002; Scott-Jones, 1995; Weiss, 2014). Family involvement includes parent participation in child-centered activities, forming partnerships with their children's schools and educators, and taking responsibility for children's learning outcomes (Temkin, 2006). In early childhood, this responsibility often focuses on how parents can support children's language and literacy development. Studies show that children who are read to at home by their parents develop letter recognition and writing skills more rapidly (Nord et al., 2000; Temkin, 2006). *Ka Pa'alana's* curriculum is informed by this research and places particular emphasis on language and literacy development. To support this, the program provides language and literacy professional development for educators to improve their language instruction with children. *Ka Pa'alana* also provides professional literacy and language workshops for families, where caregivers are taught language and literacy strategies and receive free books to read with their children.

At its core, two-generation programs and complementary learning emphasize that the well-being of caregivers and children is inextricably linked, and their presence in each other's lives complements each other's success (Benzies et al., 2014; Schmit et al., 2014). The originality of *Ka Pa'alana* FCIL program stems from how Hawaiian values—which are centered on *'ohana* (family) and extended communal support—structure the program, its incorporation of Hawaiian CBE, and how the program scaffolds children's life experiences in their education, which have been shaped by Hawaiian and local culture.

A Sociocultural Framework: *Ka Pa'alana's* FCIL Program Structure and Hawaiian Culture-Based Education (CBE)

CBE pedagogy integrates Indigenous history, language, knowledge, values, and norms into educational systems in culturally appropriate ways (Demmert, 2011; Kana'iaupuni, 2007). CBE programs will vary by community to reflect the diverse needs of different Indigenous student groups (Demmert, 2011). CBE is vital to the cultural identity of Indigenous groups who struggle to find connection in a decontextualized, homogenous curriculum that does not reflect their cultures or lived experiences (Christman et al., 2008; Demmert, 2011). Early childhood education programs that implement CBE and encourage family partnerships are designed to support Indigenous children and their families (Kana'iaupuni, 2007).

Hawaiian families have traditionally favored informal home care provided by relatives or family friends. The arrival of New England Missionaries in the early 1800s and the illegal overthrow of the Hawaiian Monarchy by the U.S. in 1893 culturally restructured this system. Traditional family care shifted to more "formal" education, and replaced Hawaiian culture, language, and identity with Anglo-Saxon language and values (Grace & Serna, 2013; Kaiwi & Kahumoku, 2006). 21st-century school reforms shifted Hawaiian and other low-income children from their "at-risk" homes into "high-quality, formal" early education programs, with purportedly better academic outcomes (Grace & Serna, 2013; Kaomea, 2005). However, these programs continued to lack representation of Hawaiian culture in the classroom (Grace & Serna, 2013). In response, community efforts have been made to revive Hawaiian cultural identity by implementing Hawaiian CBE programs and involving families in their children's cultural education (Kana'iaupuni, 2004; Kana'iaupuni et al., 2010; Yamauchi et al., 2008). 'Ōlelo Hawai'i (the Hawaiian language) and/or English are spoken in these programs (Grace & Serna, 2013; Kana'iaupuni et al., 2010; Yamauchi et al., 2008).

Ka Pa'alana's FCIL program model incorporates a Hawaiian culture-based curriculum, which reflects the Hawaiian cultural value of *'ohana* (family) in children's learning. As part of their CBE curriculum, families engage in culture-based activities (e.g., poi pounding, cultivating taro, fishing), learn and use 'Ōlelo Hawai'i, learn Hawaiian values such as "*Aloha*" (love and compassion), "*Mālama*" (to care for), and "*Lōkahi*" (unity), and visit cultural history sites. Research shows that family environments rich in Hawaiian cultural traditions and values enhance children's early learning experiences (Kana'iaupuni, 2004; Kana'iaupuni & Else, 2005). Additionally, prior research shows that CBE improves academic outcomes,

including math and reading, among middle and high school students (Kana'iaupuni et al., 2010). While some studies have described Hawaiian CBE in early childhood programs in Hawai'i, no studies have explored its potential influence on child developmental outcomes, such as language development (Grace & Serna, 2012; Schonleber, 2011). Evaluating *Ka Pa'alana's* FCIL program model, which incorporates Hawaiian CBE, is particularly timely. This is due to the ongoing disparities in access to early childhood education for Hawaiian children and the renewed interest in culturally responsive, family-centered interventions in early learning (Collins, 2010; Hawai'i Children's Action Network, 2022; Kana'iaupuni & Ishibashi, 2003; Kana'iaupuni et al., 2010; Singh et al., 2014).

FCIL programs that use a culture-based education curriculum inherently reflect Vygotsky's socio-cultural theory, which places education between an individual and culture (Vygotsky, 1978, 1986). This framework posits that a child's mental and educational development is shaped by the social, cultural, and historical context in which they are embedded. Their learning begins through interaction with their broader social world, like more knowledgeable peers, parents, and teachers (Blake & Pope, 2008; Daniels, 2001; Panhwar et al., 2016; Polly et al., 2017; Vygotsky, 1978, 1986). This study will evaluate *Ka Pa'alana* FCIL program structure in the broader context of socio-cultural theory and learning.

This study assessed the efficacy of literacy and language professional development of *Ka Pa'alana's* educators by examining the associated language outcomes in Hawaiian children enrolled in the program. Here, we will also consider how other program elements, such as the FCIL program model and CBE curriculum, may contribute to measurable language development in children. By evaluating *Ka Pa'alana* within this theoretical framework, we investigate how teaching practices scaffold language development in a program that considers and incorporates the cultural and historical context of Hawaiian children.

The Importance of Oral Language in Hawaiian Communities

Oral language is a central component of Hawaiian culture. *Mo'olelo* is the oral storytelling tradition of ancient Hawai'i, which passes down knowledge and history across generations. It encompasses narratives with rich descriptions, from the telling of myths and legends to instruction for Polynesian ocean navigation, all of which relied solely on memory (De Silva & Hunter, 2021; Lilomaiava-Doktor, 2020). Oral storytelling has persisted in Hawaiian and local communities, now colloquially referred to as "Talk Story," which involves sharing personal stories and experiences with friends, family, and members of one's community. This cultural Indigenous speech event is a deeply rooted Hawaiian tradition that fosters connection, community, and the preservation of oral history (De Silva & Hunter, 2021). It is such a central feature of local communication that its implementation in school curricula has been associated with increased reading achievement (Au, 1980).

Another linguistic element of Hawaiian and local communities is the local dialect of Hawai'i Creole English (HCE), commonly referred to as Pidgin (Collins, 2010; Yamauchi et al., 2024). Like other non-mainstream English dialects, Pidgin has its own dialect and grammatical structure, incorporating elements from Hawaiian and Pidgin English, as well as meanings from diverse sources (Collins, 2010; Da Pidgin Coup, 1999; Yamauchi et al., 2024). Following the illegal overthrow of the Hawaiian Monarchy, the Hawaiian language was banned in schools, leading to a decline in use and fluency among subsequent generations (Wilson & Kamanā, 2006; Yamauchi et al., 2024). In its place, Pidgin became the most common language form for families of Hawaiian descent and other local ethnic groups (Collins, 2010; Yamauchi et al., 2024). Today, Pidgin serves as a marker of local identity and is spoken as a means of connecting local people to one another and to Hawai'i (Eades et al., 2006; Da Pidgin Coup, 1999; Yamauchi et al., 2024).

Although oral language is a crucial component of Hawaiian history and culture, few studies have assessed early language development in Hawaiian preschool children (DeBaryshe & Gorecki, 2005; Martini, 2005; Sumida & Gillespie, 1985).

Assessing *Ka Pa'alana* Children's Language Outcomes

Hawaiian and other local children (i.e., children who are not of Hawaiian descent but have grown up in Hawai'i) are immersed in these cultural language events, reflecting Vygotsky's theory of sociocultural

learning and communication (Vygotsky, 1978, 1986; Yamauchi et al., 2024). Because oral language is a central feature of Hawaiian culture, families traditionally engage in storytelling and conversational practices with their children. As a result, children in Hawaiian and local communities enter early childhood programs with culturally grounded experiences in oral communication (Lilomaiaava-Doktor, 2020; De Silva & Hunter, 2021). *Ka Pa'alana* builds on this foundation by using evidence-based oral language and literacy strategies to scaffold children's existing language knowledge. This provides an opportunity to examine whether program implementation fosters measurable growth in children's language skills.

Ka Pa'alana is partially funded by the 2019-2024 Comprehensive Literacy State Development grant. Hawai'i's Department of Education was awarded funds to execute the grant; *Ka Pa'alana* was specifically involved in the Early Literacy Project (birth to age five) within the grant. This project aims to develop young children's language and literacy skills, thereby better preparing them for kindergarten and subsequent education. The Early Literacy Project focuses on professional development, instructional coaching, parent coaching, family engagement, and culture-based learning. *Ka Pa'alana*'s preschool teachers, parent educators, and caregivers receive training in evidence-based literacy and language strategies, including learning dialogic reading, phonological awareness, and alphabet knowledge (Lonigan & Shanahan, 2010).

Minority children, particularly Indigenous children, in high-risk communities who have a documented history of educational achievement gaps are widely underrepresented in early childhood education efforts and research (Guiberson & Vining, 2023; Loeb & Bassok, 2012). Government-funded early childhood education programs like Head Start, a two-generation program, were created to improve access to early childhood education for minority children (Finneran et al., 2020). However, ECE programs incorporating Indigenous knowledge and culture remain limited (Kitson & Bowes, 2010). To date, no studies have measured the language development of Hawaiian children in an FCIL preschool program that uses a CBE curriculum.

It is crucial for ECE programs to assess their effectiveness, if any, on the participants in the program, especially programs that serve marginalized Indigenous children. Here, we examined the language outcomes of Hawaiian and other minority children enrolled in *Ka Pa'alana* Homeless Family Education Program who live in the Wai'anae community—a community considered high-risk on the island of O'ahu (Okiihiro et al., 2014). We also compared *Ka Pa'alana*'s children's PPVT scores with those from similar childhood education programs (e.g., Head Start and community-based preschools). Our research aims were as follows:

- 1) If *Ka Pa'alana* educators are implementing oral language and literacy strategies with fidelity, then an increase in children's language progress is expected. To test these expectations, we measured differences in language proficiency levels from the beginning to the end of one year of attendance (e.g., Fall 2022/2023 to Spring 2022/2023) at *Ka Pa'alana*. We also measured differences in children's Peabody Picture Vocabulary Test (PPVT) scores, a standardized assessment of children's receptive vocabulary (Dunn & Dunn, 1981), from October 2022 to September 2023.

- 2) To assess how *Ka Pa'alana*'s children's PPVT scores compared to similar early childhood education programs that serve minority children in high-risk communities.

To our knowledge, this is also the first paper to describe FCIL programs in the early childhood education literature.

Method

Participants

The researchers did not directly recruit or interact with the program's participants. *Ka Pa'alana* routinely collects standardized assessment data on children's language development as part of its internal monitoring and reporting to program funders. This study involved a retrospective analysis of *Ka Pa'alana*'s existing dataset of children's language scores, which was provided to the research team in de-identified form to ensure anonymity and confidentiality. The George Washington University Institutional Review

Board (IRB) reviewed our study and determined that it did not meet the definition of human subjects research. It therefore did not require IRB approval or participant consent.

We assessed language development using two different measures in two independent groups of children. The *Hawaiian Longitudinal Language* group (n = 18) was tested using a receptive language battery, the Peabody Picture Vocabulary Test (PPVT), from 30 to 67 months, at both pre- and 6-month post-tests. Of the eighteen participants, fifteen children were Native Hawaiian, making up 83% of the sample, while the remaining 17% reported miscellaneous ethnic backgrounds (e.g., Asian, Samoan, Caucasian). The sample consisted of 56% males and 44% females. 63% were reported to be below 200% of the federal poverty level.

A second group, the *Language Expectations* group (n = 27), included children of different ages: "2-3 years" (12-36 months) (n = 10), "Preschool 3" (37 - 47 months) (n = 11), and "Pre-K 4" (48 - 60 months) (n = 6). Within each age group, children were categorized as "Below," "Meeting," or "Exceeding" language expectations. This included receptive and expressive language assessments for the Fall 2022/2023 and Spring 2022/2023 school year. Individual data (e.g., ethnicity, age, sex) were unattainable for this group.

Assessments

Ka Pa'alana employs two language measures to assess children's progress in both receptive and expressive language development: the Peabody Picture Vocabulary Test (Dunn & Dunn, 1981), which measures receptive language skills, and the Teaching Strategies GOLD® Assessment System (Dodge et al., 2002; Lambert et al., 2015), a formative measure of both receptive and expressive language progress for preschool-age children. *Ka Pa'alana* uses these two language measures to ensure a robust assessment of children's language progress within the program.

Peabody Picture Vocabulary Test

Ka Pa'alana's protocol is to administer the Peabody Picture Vocabulary Test upon a child's enrollment and at six months post-enrollment to monitor the developmental progress of language milestones. The Peabody Picture Vocabulary Test (PPVT) is a standardized assessment tool to evaluate children's receptive vocabulary (Dunn & Dunn, 1981). The results provide norm-referenced scores, including standard scores and percentile ranks, that reflect a child's receptive language ability relative to same-age peers. The primary aim is to estimate the participant's verbal intelligence without requiring reading or writing skills. In this study, the PPVT is administered by a trained *Ka Pa'alana* Assessment Specialist in English, which is the primary language spoken at *Ka Pa'alana*. Children eligible for the assessment must be at least 2.5 years old and have sufficient proficiency in English. *Ka Pa'alana* utilizes the most current version of the test, the PPVT-5.

The Creative Curriculum®'s Teaching Strategies GOLD® Assessment System—Language Only

To measure language expectations and other areas of development, *Ka Pa'alana* educators use The Creative Curriculum®'s Teaching Strategies GOLD® assessment system, a formative, classroom-based measure of both expressive and receptive language. Educators observe and document children's language use throughout the school day, using GOLD® objectives and indicators aligned with age-based expectations from current research, professional literature, and state early learning standards (Barry, 2006; Blair & Razza, 2007; Kalmar, 2008; Lambert et al., 2015). GOLD® complements the standardized measure of the PPVT-5 by capturing both structured test performance (PPVT-5) and everyday functional language use in the classroom. Although GOLD® tracks children's developmental growth across multiple domains, this study focuses solely on oral language outcomes due to insufficient observational data in other domains.

Curriculum

The Creative Curriculum®

Ka Pa'alana utilizes The Creative Curriculum®, a nationally recognized early childhood education curriculum that can be purchased and tailored to meet the specific needs of early childhood education

programs (Dodge et al., 2002). The curriculum provides guidance on child development, classroom organization, teaching strategies, family engagement, and project-based investigations. These projects nurture inquiry skills and support the development of social-emotional, physical, cognitive, literacy, mathematics, and language skills. Activities include teacher-led and group discussions, which particularly enhance oral language skills (Dodge et al., 2002; U.S. Department of Education, 2013).

Comprehensive Literacy State Development Grant Professional Development

Ka Pa'alana is supported by the 2019–2024 Comprehensive Literacy State Development grant, which funds its early literacy project for children from birth through age 5. This initiative includes professional development in literacy and language strategies; instructional coaching to implement these strategies in classrooms and to reflect them in lesson plans; parent coaching on how to teach these strategies to families; family engagement; and culture-based learning.

Professional Development Timeline

Throughout the 2019-2024 grant period, *Ka Pa'alana* educators received two years of training (2021–2023) from the National Center for Families Learning (NCFL), which specializes in literacy and language training for early childhood educators in family learning centers. Additionally, they received one year of training (2021–2022) from a private Language and Literacy Specialist.

Training and Implementation

Training programs included monthly full-day workshops, in-class observations with post-lesson debriefing, and weekly coaching by *Ka Pa'alana*'s Curriculum Specialist to support educators in incorporating learned literacy and language strategies into lesson planning and classroom instruction. Each monthly workshop focused on evidence-based oral language and literacy strategies, including dialogic reading, the use of open-ended questions, phonological and phonemic awareness, alphabet, and print knowledge (Lonigan & Shanahan, 2010). Lesson plans were created using The Creative Curriculum®, which *Ka Pa'alana* selected for its emphasis on language and literacy development. In-class observations by *Ka Pa'alana*'s Curriculum Specialist and NCFL training specialists provided ongoing support to ensure successful implementation. Professional development also emphasized how educators could teach these strategies to participating families to reinforce literacy skills at home. Families were also provided with professional literacy and language workshops and received free books to read with their children.

Comparison Groups

Non-Hawaiian Cross-Sectional Minority Group Comparison

Because this was a retrospective study with a convenience sample of children, no comparison (control) group was available in Hawai'i. To address this limitation, we sought published data on other minority children from similar economic backgrounds and educational settings. One study by Finneran et al. (2020) focused on African American and Hispanic children enrolled in Head Start programs, community-based preschools, and/or kindergarten classrooms. These children were assessed using the PPVT-4 and matched by age, following a similar approach used in the present study. Finneran et al. (2020) investigated the potential influences of cultural and linguistic backgrounds on PPVT-4 performance by analyzing item-level performance in a community sample of preschool-age children from low-SES households drawn from several projects on language and literacy development.

Non-Hawaiian Longitudinal Language Minority Group Comparison

Although the Finneran et al. (2020) dataset provided a useful comparison against our sample, a limitation we encountered was its cross-sectional study design, which only measured PPVT results at one point in time, whereas our study measured pre- and post-PPVT results. We sought to find another dataset that was also a longitudinal study measuring pre- and post-PPVT results to examine change in scores over time for a more comparable comparison between samples. Similar to our study, Xu and Liu (2021) evaluated the impact of an intensive early childhood literacy project on children's vocabulary knowledge,

measured through PPVT scores at two time points. The study also sampled minority children (e.g., Hispanic and African-American children) from low socioeconomic backgrounds who attended Head Start programs. Therefore, their dataset offers a more direct and meaningful comparison between populations.

Measures

PPVT-5

Mean scores were calculated for “*Raw Score*,” the total number of correct answers calculated by subtracting the number of errors made between the “*Basal*” (starting point) and “*Ceiling*” (highest level) items on the PPVT from the total number of items attempted within that range; “*Standard Score*,” calculated from the raw score based on a child’s chronological age and the standardized normal curve for this assessment; “*Percentile Rank*,” which represents the percentage of scores that fall at or below a given score; “*Normal Curve Equivalent*,” an equal-interval standardization that adjusts for improvements in individuals’ raw scores with age; “*Stanine*,” a method for scaling test scores on a nine-point standard scale; “*Growth Scale Value*,” which assesses individual changes in each child’s vocabulary level over time; “*Test-Age Equivalent*,” which reflects the difference between children’s chronological age and their receptive vocabulary skills, expressed as an age equivalent.

GOLD® Assessment System – Language Expectations

Mean scores were calculated to describe the average number of students who were “*Below Expectations*,” “*Meets Expectations*,” and “*Exceeds Expectations*,” as assessed by the GOLD® Assessment System. “*Below Expectations*” is defined as children who are not meeting language milestones typical for their age group; “*Meets Expectations*” is defined as children who are meeting language milestones typical for their age group; “*Exceeds Expectations*” is defined as children who are surpassing language milestones typical for their age group.

Data Analysis Plans

Data Analysis Plan for Language Expectations Group

For *Language Expectations*, two different time measurements were compared from the beginning (Fall 22/23) to the end of one school year (Spring 22/23). A series of paired sample t-tests was conducted to evaluate differences across *Language Expectations*. All analyses were performed using R Statistical Software (v4.3.1; R CORE TEAM 2023).

Data Analysis Plan for the Hawaiian Longitudinal Language Group’s PPVT Scores

Two time measurements, represented by pretest and posttest scores in the PPVT, were compared. To evaluate differences across the PPVT-5, a series of paired sample t-tests was conducted. All analyses were performed using R Statistical Software (v4.3.1; R CORE TEAM 2023).

Data Analysis Plan for Assessing the Hawaiian Longitudinal Language Group’s PPVT Scores to the Non-Hawaiian Cross-Sectional Minority Group

We compared our *Hawaiian Longitudinal Language* group’s PPVT-5 post-raw and standard scores with the PPVT-4 raw and standard scores of Hispanic and African American children from Finneran et al. (2020). According to a Pearson (2018) technical summary report, the PPVT-4 and PPVT-5 are highly correlated ($r^2 = .71$). We used a one-way ANOVA to examine whether there were differences in pretest scores between Hawaiian students and African American and Hispanic students from Finneran et al. (2020). A second one-way ANOVA was conducted to examine whether Hawaiian students’ posttest scores differed from those of African American and Hispanic students.

Data Analysis Plan for Assessing the Hawaiian Longitudinal Language Group’s PPVT Scores to the Non-Hawaiian Longitudinal Language Minority Group’s PPVT Scores

We compared our *Hawaiian Longitudinal Language* group’s PPVT-5 pretest standard scores to the PPVT-4 pretest standard scores from Xu and Liu (2021). Additionally, we compared our group’s PPVT-5

posttest standard scores to Xu and Liu's (2021) PPVT-4 posttest standard scores. We used a one-way ANOVA to examine whether there were any differences across the two PPVT pretest standard scores. We followed up with a one-way ANOVA to determine whether there were any differences between the two PPVT posttest standard scores. Xu and Liu (2021) reported only PPVT standard scores. Therefore, only standard scores across groups were compared.

Results

Table 1

Summary of the PPVT-5: Mean Scores, t-scores, and Effect Sizes for the Hawaiian Longitudinal Language Group

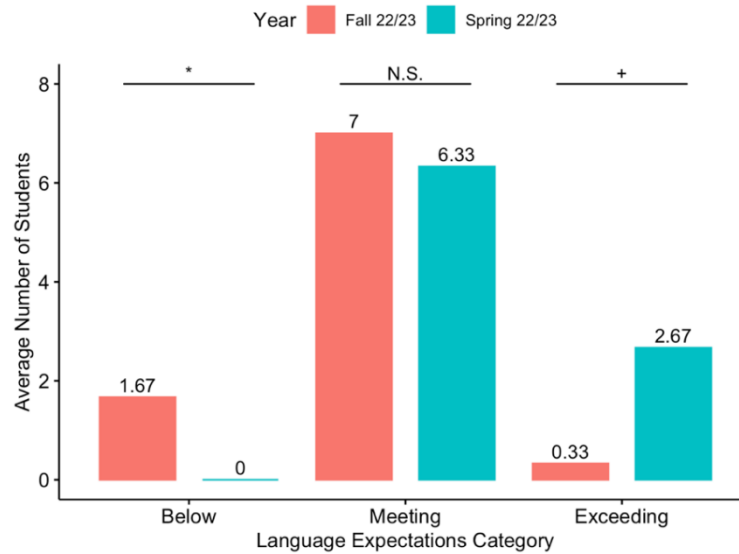
Scores	Pretest			Posttest			<i>t</i>	<i>d</i>
	Mean	SD	Expected	Mean	SD	Expected		
Raw	53.61	26.62	-	83.83	28.35	-	-8.86***	-2.09
Standard	90.67	11.33	100	105.50	18.90	100	-3.97***	-0.94
P.R.	30.72	23.64	50	56.27	28.48	50	-5.15***	-1.21
N.C.E.	36.78	15.85	50	55.72	21.30	50	-4.88***	-1.15
Stanine	3.67	1.50	5	5.56	2.00	5	-5.38***	-1.27
G.S.V.	453.28	12.60	100	467.22	11.78	100	-10.30***	-2.43
C.A.	43.94	10.95	-	49.77	10.92	-	-	-3.04
T.A.E.	38.66	9.45	-	51.50	14.09	-	-6.50***	-1.53

Note: * $p < .05$. ** $p < .01$. *** $p < .001$. Raw = Raw Score; Standard = Standard Score; P.R. = Percentile Rank; N.C.E. = Normal Curve Equivalent; G.S.V. = Growth Scale Value; C.A. = Chronological Age in Months; T.A.E. = Test Age Equivalent. "Expected" refers to test performance within the PPVT's average range of scores. N=18.

Research Aim 1

Table 1 summarizes data for 18 children who completed the pretest and posttest assessments. At pretest, the children had a mean age of 3.5 years (SD = 10.95 months). Children had a mean raw score of 53.61 at pretest (SD = 26.62), which increased to 83.83 (SD = 28.35) at posttest. Standard scores had a mean of 90.67 at pretest (SD = 11.33), which increased to 105.50 (SD = 18.90) at posttest. One outlier with a score of 160 was identified in the posttest condition. Analyses were conducted both with and without the outlier. Results remained statistically significant in both ($p < .001$). The children's average Percentile Rank (P.R.) was 30.72 at pretest (SD = 23.64), indicating that, on average, the children scored higher than 30.72% of all children who took this assessment. At posttest, the average Percentile Rank increased to 56.27 (SD = 28.48), showing that as a group, the participants scored higher than 56.27% of all children who took the assessment. The children's average Normal Curve Equivalent (N.C.E.) was 36.78 at pretest (SD = 15.85), which increased to 55.72 (SD = 21.30) at posttest. For Stanine, children had a pretest average of 3.67 (SD = 1.50), which increased to 5.56 (SD = 2.00) at posttest. The children's Growth Scale Value (G.S.V.) averaged 453.28 (SD = 12.60) at pretest, which increased to 467.22 (SD = 11.78) at posttest. The Test-Age Equivalent reflects the difference between children's chronological age and their receptive vocabulary skills, expressed as an age equivalent. At pretest, children scored below their chronological age, with a mean age of 38.66 months (SD = 9.45). By posttest, their scores had improved to an average of 51.50 months (SD = 14.09), exceeding their chronological age.

Figure 1
Language Expectations by Year



Note. * $p < .05$; N.S. = Not statistically significant; + $p < .10$. The average number of students classified per language expectation category was calculated across age group categories.

Research Aim 1

A repeated-measures t-test was conducted to compare the average number of students below language expectations from the beginning to the end of one year’s attendance at *Ka Pa’alana* Preschool. Figure 1 shows classes for the Fall 22/23 quarter had an average number of students that were below language expectations ($M = 1.67, SD = 0.58$) that exceeded the average number of students that were below language expectations for the Spring 22/23 quarter ($M = 0, SD = 0$), a statistically significant mean increase of 1.67, 95% CI [0.23, 3.10], $t(2) = 5, p = .04, d = 2.89$; a large difference. There was no significant difference in the test comparing the average number of students meeting language expectations, $p = .53, d = 0.44$; a medium effect size. The average number of students exceeding language expectations approached significance, $p = .07, d = - 2.02$; a large effect size.

Non-Hawaiian Cross-Sectional Minority Group and Hawaiian Longitudinal Language Group

Table 2

Descriptive Summary of Raw and Standard PPVT Scores from the Hawaiian Longitudinal Language Group and the Non-Hawaiian Cross-Sectional Minority Group

Variable	Hawaiian		African American	Hispanic
	Pretest	Posttest		
n	18	18	166	166
Age	43.94 (10.95)	49.77 (10.92)	47.70 (8.0)	48.3 (7.30)
Raw	53.61 (26.62)	83.83 (28.35)	40.70 (19.20)	39.0 (19.0)
% Male	56%	56%	53%	59%
Standard	90.67 (11.33)	105.50 (18.90)	83.20 (11.50)	79.30 (14.30)

Note: African American and Hispanic statistics were obtained from Finneran et al. (2020), who used the PPVT-4, whereas the Hawaiian children in this study used the PPVT-5.

Research Aim 2

A series of ANOVAs were conducted to compare the pretest and posttest PPVT-5 raw and standard scores of the *Hawaiian Longitudinal Language* group (“Hawaiian” children, hereafter) to African American and Hispanic students from Finneran et al. (2020). For a complete summary of the descriptive statistics, refer to Table 2. Using a web-based ANOVA calculator for summary data (Interactive Statistical Pages,

2023), we found no statistically significant differences in ages between groups ($p \geq .05$).

Tukey post hoc tests showed that Hawaiian children's PPVT-5 raw scores were greater than those for African American children at pretest, $p = .022$, and at posttest, $p < 0.001$, and for Hispanic children at pretest, $p = .008$, and at posttest, $p < .001$.

As shown in Table 2, standard scores differed between groups at pretest, $F(2, 347) = 8.35$, $p < .001$, partial $\eta^2 = .05$; a moderately small effect, and posttest, $F(2, 347) = 31.82$, $p < .001$, partial $\eta^2 = .15$; a large effect. Tukey post hoc tests showed that Hawaiian children's PPVT-5 standard scores differed from those of African American children at pretest, a marginally significant finding ($p = .053$); however, they were significantly greater at posttest ($p < .001$). Standards scores differed significantly from those of Hispanic children at both the pre-test ($p = .001$) and post-test ($p < .001$).

Hawaiian Longitudinal Language Group and Non-Hawaiian Longitudinal Language Minority Group

Figure 2

PPVT Mean Difference Scores by Longitudinal Language Group



Research Aim 2

A series of ANOVAs was conducted to compare PPVT pretest standard scores between Hawaiian children in the *Hawaiian Longitudinal Language* group and the *Non-Hawaiian Longitudinal Language Minority* group to test for differences across PPVT posttest standard scores. Using a web-based ANOVA calculator for summary data (Interactive Statistical Pages, 2023), we found no statistically significant differences in pretest standard scores between groups ($p = 0.668$). However, standard scores differed significantly between groups at the posttest, $F(1, 264) = 18.46$, $p < .001$, partial $\eta^2 = .07$; a moderate effect. Posttest standard scores for Hawaiian children ($M = 105.50$, $SD = 18.90$) were significantly higher than the posttest standard scores for the *Non-Hawaiian Longitudinal Language Minority* group ($M = 90.75$, $SD = 13.67$).

Because the two groups differed at pretest, the average difference between pre- and post-standard scores was calculated for each group. Figure 2 shows Hawaiian children had an average difference score ($M = 14.83$, $SD = 15.87$) that was significantly higher than the average difference score for the *Non-Hawaiian Longitudinal Language Minority* group ($M = 1.13$, $SD = 13.28$), $F(1, 264) = 17.38$, $p < 0.001$; a difference of 13.70, 95% CI [7.23, 20.17]. The difference score was calculated as posttest standard score minus pretest standard score. Positive scores indicate improvement from pretest to posttest.

Discussion

In both measures of language performance, children showed improvement in language outcomes. Results for the *Language Expectations* group, which measured receptive and expressive language, showed that no children were below language expectations at the end of the school year (see Figure 1). The results

suggest that children who spend one year in *Ka Pa 'alana* tend to improve in language development, moving from “*Below*” language expectations to “*Meeting*” or “*Exceeding*” language expectations.

All PPVT-5 scores, which measured receptive vocabulary, improved. The children also ranked above the normal standard score (100), which is notable considering the participants’ high-risk backgrounds. These results suggest that children who spent six months in *Ka Pa 'alana* Preschool showed improved receptive language development from their initial enrollment.

To further assess the program’s quality and language-instruction standards, we compared our children’s PPVT raw and standard scores with those of African American and Hispanic children enrolled in Head Start programs, community-based preschools, and kindergarten classrooms (Finneran et al., 2020; Xu & Liu, 2021). Head Start is comparable to *Ka Pa 'alana* in that it is a government-funded, two-generation educational program with a community-based preschool that serves low-income communities. All three groups (e.g., African American, Hispanic, and Hawaiian) are considered minority groups within low socioeconomic populations and considered at-risk for academic difficulties due to living in low-SES communities. They are similar in age and use non-mainstream English dialects (Finneran et al., 2020; Xu & Liu, 2021). When compared to the *Non-Hawaiian Cross-Sectional Minority* group (Finneran et al., 2020), we found that Hawaiian children had higher PPVT raw scores than African American and Hispanic children's PPVT scores at both pre- and post-tests. While Hawaiian children showed only a marginal (not statistically significant) difference in PPVT standard scores at pretest compared to African American and Hispanic children, they had higher posttest standard scores.

We found no significant differences between Hawaiian children’s PPVT pretest standard scores and those of the *Non-Hawaiian Longitudinal Language Minority* group (Xu & Liu, 2021). However, the standard scores of both groups were significantly different at posttest; Hawaiian children had higher posttest standard scores. Additionally, Hawaiian children demonstrated substantially greater average improvement in language outcomes over time than the *Non-Hawaiian Longitudinal Language Minority* group. This group served as a significant comparison group. Xiu and Liu (2021) similarly evaluated the impact of an intensive early childhood literacy project on children’s vocabulary knowledge measured by PPVT scores at two time points, who were also from low socioeconomic backgrounds and enrolled in Head Start. Like *Ka Pa 'alana* educators, Head Start educators received professional development in early literacy and language development, classroom design, instructional strategies, assessments, English language learning, and family involvement. Despite demographic (e.g., minority children in low SES communities) and program similarities, children at *Ka Pa 'alana* showed greater improvement in post-test scores.

It is essential to recognize that our comparisons across African American, Hispanic, and Hawaiian populations should not be treated as equivalent, as these groups have unique cultural, social, and environmental factors that may affect outcomes. While they are considered minority groups and may share some experiences (e.g., systemic challenges), their specific contexts differ. These comparison groups are intended to inform discussion; however, direct equivalence should not be assumed.

Nevertheless, our findings indicate that children at *Ka Pa 'alana* show statistically stronger receptive language outcomes than their counterparts in comparable programs. A possible explanation for this difference is the unique features of *Ka Pa 'alana* that support learning, which may lead to positive outcomes and potential advantages for children enrolled in its program. For example, its FCIL program structure requires families to be present in the classroom and be part of their children’s learning. In parent education classes, caregivers learn how to use and implement literacy and language strategies and are given free books to read with their children. Additionally, *Ka Pa 'alana*’s culture-based curriculum contextualizes Hawaiian culture and history within children’s learning, which is rich in oral tradition. Ongoing professional development for educators in literacy and language strategies, which scaffolds children’s existing knowledge, also appears to support greater learning gains for its children. However, further research is needed to confirm these potential contributing factors.

Ka Pa 'alana’s focus on language and literacy development is influenced by Hart and Risley’s (1995) study, which found higher vocabulary growth in children from professional families compared to those

from welfare families. The study underscored the influence of socioeconomic factors on language development, emphasizing the crucial role of early language exposure in shaping children's linguistic skills. To bridge this achievement gap, *Ka Pa'alana* received the Comprehensive Literacy State Development (CLSD) grant, which included professional training for its staff to support language and literacy development among children enrolled in the program from low-income communities in Hawai'i.

Low language test performance may be associated with families speaking languages other than mainstream American English, such as Hawai'i's aforementioned and described Pidgin. However, most standardized assessments are designed for mainstream English, and the influence of low socioeconomic status (SES) on PPVT performance is well established (Champion et al., 2003; Finneran et al., 2020; Qi et al., 2006; Terry et al., 2010). Despite the influence of SES on PPVT performance and the prevalence of Pidgin in Hawaiian communities, children in *Ka Pa'alana* showed improved PPVT scores after just six months of enrollment. Although African American and Hawaiian children are dual-dialect learners (Finneran et al., 2020), compared to the PPVT scores of Hispanic and African American children (the *Non-Hawaiian Cross-Sectional Minority* group), Hawaiian children's pre-test scores were already higher.

Finneran et al. (2020) and Xiu & Liu (2021) explored the cultural-linguistic influence on PPVT performance, showing that an English-language standardized assessment like the PPVT may not fully capture meaningful language differences relevant to the child's background or lived experience. Despite the PPVT's shortcomings in capturing the full spectrum of language knowledge among minority children, which can result in lower language scores, dual-dialect Hawaiian children still attained higher PPVT scores compared to minority children in Finneran et al. (2020) and Xiu and Liu (2021). A possible explanation for higher PPVT scores is that *Ka Pa'alana*'s educational structure effectively scaffolds the linguistic background and language knowledge of Hawaiian and local children. However, as this was an exploratory study, further research is needed to determine whether this relationship is correlational or causal.

A possible explanation for these higher initial test scores may be attributed to children in Hawai'i often being raised in multi-generational homes, with at least one family member present throughout the day, which provides more interactive language opportunities (Laforteza, 2022). There is evidence that the impact of poverty varies across sociocultural groups, with significant differences in the quality of the home environment among families living in poverty. Cultural, linguistic, demographic, and psychological factors interact with SES to shape parenting patterns and practices. Mediating factors, such as the caregiving context, can act as protective mechanisms, providing low-SES language-minority children with essential sustenance, stimulation, support, and structure (Bradley et al., 1994; González, 2001). The presence of a committed and effective adult can serve as a scaffold, providing opportunities, protective mechanisms, and emotional support that enable children facing at-risk ecological factors, such as poverty, to develop resilience (González, 2001).

Another possible explanation for the disparity in initial higher PPVT test scores is the aforementioned Hawaiian cultural practice of oral storytelling (*Mo'olelo*) that children are exposed to, colloquially referred to as "Talk Story" (De Silva & Hunter, 2021). Au (1980) demonstrated that reading lessons incorporating "Talk Story" elements facilitated greater engagement and participation among Hawaiian children, which was associated with increased reading achievement. In sum, Hawaiian children may have certain inherent social and cultural advantages that other minoritized children lack. Conversely, other minoritized groups in the US may have additional disadvantages relative to Hawaiians (e.g., more intense and sustained levels of racism and discrimination). Of course, both may be true. Future research should focus on replicating these results and on designing studies that provide answers to these questions. Specifically, do Hispanic and African American preschoolers face unique obstacles relative to Indigenous groups in the U.S.? If not, are there quantifiable social and cultural rearing practices among Indigenous groups that circumvent the challenges associated with poverty and racism?

In environments where adults use complex sentences and diverse vocabulary in daily conversations, children demonstrate enhanced expressive language, perform better on literacy tasks in kindergarten, and achieve significantly higher scores on vocabulary and language tests (Britto & Brooks-Gunn, 2001;

Dickinson & Tabors, 2001; Martini, 2005). Quality teacher-child conversations in the classroom also play a critical role in fostering children's oral language growth (DeBaryshe & Gorecki, 2005; Dickinson et al., 2001). Moreover, quality teaching significantly influences student achievement, with evidence linking improved student outcomes to teachers' professional development in their subject areas (Blank & de las Alas, 2009; Didion et al., 2019; Hattie, 2009, 2012; Yoon et al., 2007).

These findings illustrate how scaffolding, as outlined in Vygotsky's Zone of Proximal Development, applies to language learning—a strategy actively implemented by *Ka Pa'alana* educators. *Ka Pa'alana* educators prioritize interactive and cooperative language learning that builds on children's prior knowledge in areas where their understanding is still developing. Educators were instructed in dialogic reading strategies and open-ended questioning, which engage children in a reciprocal dialogue that places the child at the center of their learning (Wasik & Hindman, 2013; Zevenbergen & Whitehurst, 2003). Dialogic reading strategies and scaffolding opportunities include encouraging children to be active “readers” by asking them to describe what they see in the book's pages, make simple predictions about the story's plot based on what they have observed, infer the characters' emotional states based on facial illustrations, and so forth (Zevenbergen & Whitehurst, 2003). It also scaffolds children's learning by introducing “higher-learning” words—for example, extending a familiar word like “big” to synonyms such as “giant” or “enormous”, increasing vocabulary knowledge. Open-ended questions operate in a similar fashion (Wasik & Hindman, 2013). *Ka Pa'alana* educators use inquiry-based, culturally relevant learning activities to prompt rich oral language dialogue by asking, “How did we make *poi* in class today?” “What did we see at the taro farm during our field trip?” “How do you dance *hula*?” These strategies scaffold learning while promoting vocabulary development, comprehension, and expressive language in a culturally sensitive context.

Ka Pa'alana staff participate in professional training on evidence-based language and literacy practices. The training focused on learning how to foster dialogue through open-ended questions, introducing new vocabulary through thematic studies and aloud, and incorporating descriptive language into everyday interactions (Lonigan & Shanahan, 2010; Wasik & Hindman, 2013; Whitehurst et al., 1994). Our findings demonstrate that concentrated professional development in language and literacy strategies for program educators, which scaffolds Hawaiian and local children's existing language knowledge shaped by their culture, is associated with improved language outcomes in our sample of children.

Limitations and Future Directions

This study faced several limitations. First, the transient nature of the population *Ka Pa'alana* serves (e.g., families experiencing homelessness) posed challenges for longitudinal data collection, leading to lower retention rates and smaller sample sizes, which are typical for these types of studies (Booth et al., 1999). Despite these challenges, reporting data on Native Hawaiians remains essential due to their underrepresentation in the literature.

Second, the limitation encountered for Hawaiian children was the comparison against other students. We did not have data from a control preschool group (e.g., children in Head Start programs in Hawai'i). We struggled to find comparable datasets. While Finneran et al. (2020) provided a comparable group, their study only included single PPVT test scores, unlike our pre- and posttest design. Xu and Liu (2021) presented a comparable group with pre- and posttest scores, but provided only standard scores and summary statistics. This required us to run separate analyses for pretest and posttest scores rather than a two-way repeated-measures ANOVA due to the absence of raw data. Future collaborations with local and national Head Start programs could address these limitations by enabling more robust comparisons and assessing the impact of Indigenous culture-based programs, like *Ka Pa'alana*, on language outcomes, among other predictors of academic success.

Third, because we lacked a control preschool group, we made comparisons across studies and populations, which may have confounding variables when comparing their participants with ours. For example, these studies have different sampling methods, vary in sample size and settings, and are

conducted in different contexts. These differences could affect the internal validity of our comparisons. Therefore, any differences could be attributed to research settings and protocols, rather than true differences between populations.

Fourth, we used the PPVT-5, whereas Finneran et al. (2020) and Xu and Liu (2021) used the PPVT-4. While this is not ideal, the assessments are highly correlated ($r^2 = .71$) and share a comparable format, with the PPVT-5 incorporating upgrades to digital applications (Dunn, 2019).

Finally, due to limited sample sizes, categories were averaged across age groups for the *Language Expectations* group. Without individual participant data, we could not track progress as we did for the children in the *Hawaiian Longitudinal Language* group. Future research should aim to collect individual-level data and explore whether language expectation effects persist across different age groups.

Conclusion

We assessed how professional development for educators at *Ka Pa 'alana* Homeless Family Education Program, a Family-Child Interaction Learning program, was related to the language development of Hawaiian and other minority children. Through professional development provided by the Comprehensive Literacy State Development grant, educators learned and implemented evidence-based oral language and literacy strategies in the classroom. In both measures of language performance (PPVT-5 and *Language Expectations*), children showed marked improvement in receptive and expressive language outcomes. When compared to similar programs that also serve low-SES minority populations (Finneran et al., 2020; Xu & Liu, 2021), children at *Ka Pa 'alana* had higher receptive language scores, as measured by the PPVT-5, suggesting potential positive outcomes and advantages of *Ka Pa 'alana* Homeless Family Education Program. To our knowledge, this is the first study to discuss Family-Child Interaction Learning programs (FCIL) in the early childhood education literature.

Family is central to Hawaiian culture. Respect for parents and elders and the cherishing of children make families more receptive to efforts that promote family involvement in preschool education (DeBaryshe & Gorecki, 2005). Hawaiians are marginalized in their own land and suffer from historical trauma and generational poverty, resulting in higher rates of crime, mortality rates, and poor educational outcomes (Kana'iaupuni & Else, 2005; Kana'iaupuni et al., 2010). Family Child-Interaction Learning programs, which incorporate culture-based education like *Ka Pa 'alana*, are dedicated to strengthening and supporting Hawaiian families and at-risk communities by providing high-quality child and parent education that celebrates Hawaiian cultural identity.

Declarations

Authors' Declarations

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Authors' contributions: PG and FS conceived and designed the study. PG collected the data, performed the data analysis, and wrote the manuscript. FS served as an academic advisor, providing feedback and guidance to improve the manuscript's content and quality.

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