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# Development and validation of a goal attainment scale for families affected by maternal substance use

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## Abstract

The Team for Infants Exposed to Substance use (TIES) Program is a long-standing home-based family support program that provides a multidisciplinary, community-facing model to address the complex needs of families with young children affected by maternal substance use. The model required a comprehensive assessment tool to guide creation of individualized family goals with steps to achievement and measurement of progress on those goals. This article describes the development of a goal attainment scale and the analysis conducted to validate the scale for the service population. TIES model developers and community partners developed the goal attainment scale to assess outcomes in key domains: maternal substance use, parenting, child and maternal health, income, and housing. Data were collected from 2012 to 2019 from 220 participants and analyzed in 2020. Exploratory factor analysis (EFA) and confirmatory factor analysis were conducted. Twenty-five of the original 30 items were retained in a six-factor structure. The total percentage of variance explained was 64.44% with six factors, and Cronbach's alpha was .90. For the split-half method, the reliability of scale was .90 for unbiased conditions. Therefore, the scale reached acceptable reliability and validity. The scale provides a comprehensive approach to measure family outcomes across multiple domains addressing key risk and protective factors. This family-centered scale serves both therapeutic and evaluation purposes, acting as an intervention guide and a goal attainment measurement tool.

## KEYWORDS

assessment validation, family goal setting, goal attainment, home visiting, maternal-child health, maternal substance use

## 1 | INTRODUCTION

Home-based family support programs provide interventions to support high-risk families by promoting child-caregiver attachment, facilitating linkage to resources,

and preventing child maltreatment (Azzi-Lessing, 2013). Home visiting models target key risk factors among pregnant and postpartum women including trauma history, mental and behavioral health issues, limited support networks, low academic achievement, and low income, all of

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which are known to disrupt the caregiver–child relationship (Ammerman et al., 2015; Dauber, John et al., 2017). Maternal substance use, a specific risk factor for child maltreatment, is common among high-risk populations, but rarely the focus of home visiting programs (Connelly et al., 2013; Dauber, Ferayorni et al., 2017; Michalopoulos et al., 2015; Novins et al., 2018). Most home-visiting models designated as evidence-based under Home Visiting Evidence of Effectiveness (HomVEE) review do not systematically collect data or track outcomes related to substance use (Novins et al., 2018). When maternal substance use is identified, research indicates that home visitors do not feel prepared to effectively respond to the complex needs of these mothers and their families (Dauber, Ferayorni et al., 2017; Dauber, John et al., 2017; Schreier et al., 2018; Tandon et al., 2008). Education and training requirements vary across home visiting models. Many models employ paraprofessionals who lack the extensive training and clinical background necessary for effective implementation of therapeutic modalities addressing substance use and mental health issues (Azzi-Lessing, 2013; Dauber, Ferayorni et al., 2017; Dauber, John et al., 2017; Green et al., 2018; Novins et al., 2018).

### 1.1 | The TIES Program

The Team for Infants Exposed to Substance use (TIES) Program is a longstanding home-based family support program that provides a multidisciplinary, community-based model to address the complex needs of families with young children affected by maternal substance use. The program was created in 1990 with funding as a demonstration project within the Abandoned Infants Assistance Program of the U.S. Department of Health and Human Services (DHHS), a response to an increasing number of infants being born to mothers whose caregiving capabilities were compromised by cocaine and other drug use. The TIES Program has been in continuous operation for 30 years, has evolved significantly over time, and is currently designated as a promising approach by the Kansas Maternal Infant Early Childhood Home Visiting (MIECHV) Program funded by U.S. DHHS.

The TIES model targets intervention to: (a) reduce parental substance use; (b) build parenting skills and capacity to support child development; (c) enhance parent response to child health/behavioral health care needs; (d) enhance parent response to self-health/behavioral health care needs; (e) improve access to stable income; and (f) improve access to stable housing by developing goals with families and tracking progress over time. Staff provide both direct services (e.g., counseling, crisis intervention, transportation, support for substance use disorder treatment,

### KEY FINDINGS AND IMPLICATIONS

1. Our findings indicate that the TIES Individualized Family Service Plan (IFSP) goal attainment scale is a validated tool to both guide and measure the effectiveness of goal setting partnerships with families affected by maternal substance use and their young children.
2. The TIES IFSP goal attainment scale provides a comprehensive approach to measure family outcomes across multiple domains that address key risk and protective factors.
3. The instrument's goal areas and rubric domains can be used to guide the training and preparation of workers who serve families affected by maternal substance use.

### STATEMENT OF RELEVANCE TO THE FIELD

The present study focused on the validation of an instrument that provides a comprehensive approach to measure family outcomes. The tool promotes involvement of families in assessment and assuring the authenticity of scale items; and, thereby, guides identification of pivotal goals and corresponding content of services. This family-centered scale addresses environment, physical and behavioral health, and responsive parenting in families affected by maternal substance use to promote infant and early childhood mental health.

access to a women's support group) as well as helping coordinate the services of other community agencies (e.g., recovery treatment/support, child welfare, health care, criminal justice).

TIES participants are pregnant and postpartum women and their families affected by maternal substance use. Mothers must be 18 years of age or older at enrollment, and either pregnant or have an infant less than 6 months of age. If born at the time of referral, the infant must be in the custody of parents or a relative caregiver. The whole family is served by the program including all other children to whom mother has access. Every effort is made to identify and engage fathers or other adult partners, with the family and its members defined by the mother who consents for program participation and provides access. Others served may include fathers, partners, grandparents, or other

relative caregivers, and services may be provided jointly or individually depending on family circumstances. Program participation lasts until the index child reaches 24 months of age. Participation in the TIES Program is voluntary and free of charge but is contingent on mother's willingness to acknowledge that substance use is creating issues for herself and her family and that she is willing to address those issues in some way.

The TIES Program provides individualized, culturally appropriate services including crisis intervention, support for substance use treatment, supportive counseling, child development and parenting education, and connection to other community services. The TIES model is delivered by master's-prepared social workers alongside endorsed infant family specialists (O'Malley et al., 2021).

The TIES model involves assessment of family resources and needs, engagement of families in a problem-solving relationship, and development of a home-based intervention plan. Specialists build a unique rapport with families by providing support, counseling and education, concrete assistance, and highlighting family resources to help families meet their own identified needs. Family Support Specialists—masters prepared social workers—assist the family in obtaining services and dealing with crises by both providing direct services and coordinating the services of other resources. Families are empowered as they harness their own abilities to meet challenges and set goals. These Specialists infuse the parenting modeling into the tasks/activities being completed with the participant as opportunities arise. Support Specialists provide information, education, and support in building connections between parents and their children. They provide supportive counseling, promote self-esteem, and model advocacy in meeting parents' own needs as well as those of their children. The frequency and intensity of visits and support vary according to the needs of the family.

TIES Parent Resource Specialists—early childhood parent educators with infant and early childhood mental health expertise—provide additional capacity to focus on the parent-child relationship. They provide coaching and observation and highlight for parents, their value to the infant, their skills in responding to baby's cues, the baby's responsiveness to them preferentially, and other areas of strength. They assist parents to gain nurturing skills, build strong and positive attachment with the child(ren), set appropriate child development expectations, and provide caring and responsive parenting. The Parent Resource Specialist serves as a support for all of the children in the home, facilitating the parent's adaptation to the unique parenting changes that may occur based on each child's growth and development.

Assessment feedback is shared to assist in building parents' cognitive, behavioral, and emotional capacities.

Together, the Specialists in two roles support families to decrease parental stress, increase capacity for positive parenting, increase maternal self-esteem, and enhance the family's ability to support positive change and children's healthy development.

This two-role model addresses gaps and challenges in other home-based family support models, including the lack of specialized clinical preparation among program staff. The extensive education and training requirements for TIES staff ensure that the staff have the skills necessary to form effective therapeutic relationships with program participants. A positive therapeutic relationship is foundational to success, as the working alliance has been shown to be a predictor for program engagement in home visiting (Brooks-Gunn et al., 2000; Burrell et al., 2018; Nix et al., 2018; Sierau et al., 2012) and psychotherapy outcomes (Horvath & Symonds, 1991; Korfmacher et al., 2007).

A Community Consortium exists to provide review of program operations and promote coordination of services for families served by the TIES Program. The Consortium includes agency members representing substance use treatment, physical and mental health care, intimate partner violence services, childcare and early intervention programs, child protection and family court services, and other social services. The Community Programs Advisory Council, comprised of program alumni and community advocates, reviews program evaluation data and resource needs to provide community feedback on the TIES Program and to promote sustainability.

## 1.2 | Instrument development

A home-visiting model for this special population requires reliable instruments to track progress across multiple domains. Extensive research on home-visiting models has shown that home-based family support can improve outcomes related to family economic self-sufficiency, maternal health, infant health, family relationships, and child maltreatment (Duffee et al., 2017). The US DHHS assesses outcomes in eight domains as part of the HomVEE review. These domains are (1) maternal health; (2) child health; (3) positive parenting practices; (4) child development and school readiness; (5) reductions in child maltreatment; (6) family economic self-sufficiency; (7) linkages and referrals to community resources and supports; and (8) reductions in juvenile delinquency, family violence, and crime. No known single tool tracks outcomes in these multiple domains, along with reduction in parental substance use, in both an analytical and a therapeutic way. Development of the goal attainment scale sought to address several HHS-designated domains in addition to maternal substance use.

Research has indicated that mother and home-visitor alignment on goals is a key predictor for program engagement (Burrell et al., 2018). While goal setting using a participatory approach and regular feedback has been shown to be successful in therapeutic contexts, it has rarely been used in community-based interventions (Kolip & Schaefer, 2013). While goal attainment scaling has been used to some extent in social service interventions, a single tool has not been used for both therapeutic and evaluation purposes (Bovend'Eerd et al., 2009). From the outset, the TIES model employed multiple validated assessments to identify family strengths and challenges, but no single tool provided a comprehensive evaluation of goal setting and problem-solving efforts in partnership with enrolled families. The model required a systematic way to discuss and document the short- and long-term plans with families. This process had to be family-centered, context-specific, and capable of informing service planning and reviewing progress. This process had to address goals and steps to achievement as well as progress on individualized family goal attainment. The model developers set out to create a therapeutic tool to encompass the work as well as provide needed evaluation data.

Development of the current TIES goal attainment scale was a lengthy process started at the program's inception. As the program was funded as a demonstration project, there was no blueprint. The founding Consortium was made up of agencies representing health care, child welfare, substance use treatment, early childhood, and others. The original TIES staff were from across child welfare, including child abuse/neglect investigation, family centered services, and adoptions, as well as from community social work focused on work with low-income families and integration of community resources. Staff were seasoned and adept at engaging families in building effective relationships. There was intentional focus on sharing power and family-centered practice. Multiple assessments were available and employed to identify family strengths and challenges, and the model quickly evolved to one stressing goal setting and problem solving in partnership with enrolled families. The question was how to document the work being done both by families and Specialists. Model developers borrowed from child welfare practices, health care, substance use treatment, child development, and parenting practices to draft the initial tool. Background development of the TIES goal attainment scale started with defining the construct. Literature in maternal and child health outcomes especially pertaining to substance use was thoroughly reviewed, as well as existing instruments that measure family service outcomes to identify the constructs of the scale. A fill-in-the-blank form was created to address individualized family goals. Specialists continued to stress reducing parental drug use in order to build

safety for their children. In this iterative process, common themes emerged. Feedback was solicited regularly from Specialists and families and shared with community partners for review. The TIES team also worked closely with its Community Consortium and Advisory Council. Thirty items were written to the six-factor structured instrument. Three to eight items were written for each domain to cover the depth and breadth of each goal. Both the Community Consortium and the Advisory Council were consulted repeatedly to review tool language for clarity to minimize ambiguity and misinterpretation on each item, and to examine content validity to ensure the items covered all the facets of each goal. The tool was refined over time based on feedback from TIES staff and community partners to create an Individualized Family Service Plan (IFSP) including a 30-item goal attainment scale addressing six common goals.

TIES developers together with the research team have now psychometrically validated this comprehensive tool, the IFSP goal attainment scale, to assess outcomes in key domains: maternal substance use, parenting, child and maternal health, and income and housing stability. This article discusses the validation of this comprehensive goal attainment scale for this special population.

## 2 | METHODS

### 2.1 | Study sample

The validation test sample included 220 participants in the TIES Program from 2012 to 2019, who had completed at least one IFSP goal attainment scale timepoint. Table 1 provides a description of the 220 families who participated in the TIES Program during this period. Over half of the participants (56.4%) were White and over a third (37.3%) were African American. The majority of participants were non-Hispanic (87.7%) and single moms (81.4%). A little over a third (39.1%) were between the ages of 25 and 29 years at enrollment, followed by 18–24 years old (27.7%) and 30–34 years old (21.4%). Nearly 41% of participants enrolled prenatally (40.5%), 43.2% enrolled postpartum when the child was less than 3 months old, and 16.4% enrolled postpartum when the child was greater than 3 but less than 6 months old. At enrollment, most participants were unemployed (84.1%) and nearly half had not completed high school (44.1%). The average monthly income for participants was \$315. Over one-third of the participants (36.8%) rented/shared a home/apartment, and 30% lived with family/friends. For nearly 21% of moms, the index child was their only child, and 79.1% of participants had at least one additional child to whom the mother had access. Many participants used multiple substances, with 49.1%

TABLE 1 Participant descriptive statistics at enrollment

	<i>n</i>	% of total
<b>Enrollment group</b>		
Prenatal	89	40.5%
Child < 3 months	95	43.2%
Child 3–6 months	36	16.4%
<b>Age group</b>		
18–24	61	27.7%
25–29	86	39.1%
30–34	47	21.4%
35–40	25	11.3%
41+	1	.5%
<b>Race</b>		
African American	82	37.3%
American Indian/Alaska Native	3	1.4%
Asian	1	.5%
Caucasian	124	56.4%
Multiracial	8	3.6%
Native Hawaiian/Pacific Islander	–	–
Other	2	.9%
<b>Ethnicity</b>		
Hispanic/Latino	25	11.4%
Not Hispanic/Latino	193	87.7%
Not provided	2	.9%
<b>Marital status</b>		
Single	179	81.4%
Married	15	6.8%
Separated/Divorced	16	7.2%
Domestic partner	5	2.3%
Common law	1	.5%
Not provided	4	1.8%
<b>Educational attainment</b>		
Less than high school	97	44.1%
High school diploma/GED	61	27.7%
More than high school	62	28.2%
<b>Employment status</b>		
Employed full time	13	5.9%
Employed part time	22	10.0%
Unemployed	185	84.1%
<b>Additional children to whom mother has access</b>		
0	46	20.9%
1–2	106	48.2%
3+	68	30.9%
<b>Housing status</b>		
Rents/Shares own home/Apartment	81	36.8%
Lives with family/friends	66	30.0%
Residential treatment	9	4.1%
Shelter	12	5.5%

(Continues)

TABLE 1 (Continued)

	<i>n</i>	% of total
Supportive housing	7	3.2%
Transitional housing	36	16.4%
Homeless	8	3.6%
Correctional facility	1	.5%
<b>Substance use type</b>		
Alcoholic beverages (beer, wine, spirits, etc.)	80	36.4%
Amphetamine type stimulants (speed, diet pills, ecstasy, etc.)	62	28.2%
Cannabis (marijuana, pot, grass, hash, etc.)	108	49.1%
Cocaine (coke, crack, etc.)	47	21.4%
Hallucinogens (LSD, acid, mushrooms, PCP, Special K, etc.)	16	7.3%
Inhalants (nitrous, glue, petrol, paint thinner, etc.)	5	2.3%
Opioids (heroin, morphine, methadone, codeine, etc.)	24	10.9%
Sedatives or sleeping pills (Valium, Serepax, Rohypnol, etc.)	11	5.0%
Tobacco products (cigarettes, chewing tobacco, cigars, etc.)	149	67.7%
<b>Mean monthly income (USD)</b>	315	

reporting cannabis, 36.4% reporting alcohol, 28.2% reporting amphetamines, and 21.4% reporting cocaine. Nearly 68% of participant also used tobacco products.

Institutional Review Board (IRB) approval for program evaluation was secured through Children's Mercy Hospital. A written consent form was presented to participants at the first visit, and formal consent was obtained before participants enrolled in the program.

## 2.2 | Measures

The goal attainment scale is a part of an IFSP created specifically for each family, developed jointly by parent(s) and TIES Specialists, and shared with involved community agencies in regularly scheduled conferences. The plan includes assessments, infant health information, and other agency participation. The scale is also used to track the changes in family goal planning, goal accomplishment, and progress over time. As part of the plan, each goal and domain area are jointly scored with the family and Specialists and used to produce goals and action steps for the next period.

The goal attainment scale guides and informs family progress toward the six long-term goals. This scale allows both the Specialists and the participants to rate

family progress on each of these six goals. The information obtained through this collaborative process informs the next steps in the intervention and tracks individual participant growth and change. As goals are met by the participant, new goals and plans are developed. Participants are encouraged to work on no more than three separate goal areas at any given time.

TIES Specialists use the IFSP goal attainment scale with families during home visits to (1) score their status in each goal area, and (2) to track their growth over time. The TIES Specialists score a family's status in goal areas on the Likert scale at intake (Time 1) and discharge (Time 5), and, together with parents, chart progress over time at child's age of 3–7 months (Time 2), 9–13 months (Time 3), and 18–22 months (Time 4). On the five-point Likert scale, 1 represents very low (crisis); 2, low (vulnerable); 3, adequate (stable); 4, high (advanced) and 5, very high (thriving). Goal areas are scored by calculating a mean score from subscale items. No total summary score of the subscales is considered. TIES staff enter all participant level data into a program-specific REDCap (Research Electronic Data Capture) database, a web-based, HIPAA-compliant software platform used for data management (Harris et al., 2009).

### 3 | RESULTS

We conducted exploratory factor analysis (EFA) in SPSS (IBM Corp., 2019), with principal axis extraction to investigate the structure of the ratings of the items and to determine whether we could reduce the number of items. The scale was not designed to have a predetermined number of domains. Therefore, we did not specify the number of domains in the EFA process and allowed the Promax rotation to produce interpretable solutions. In addition, eigenvalue was set to the 1 for all EFA procedures, given that we do not have a predetermined structure for any of the scales. Following the EFA, we adopted three criteria to identify any problematic items. First, we eliminated items with a factor loading smaller than .4. Second, we excluded items, which did not fall into any domain, and rather formed independent factors with less than three items (i.e., health insurance items). Third, we calculated Cronbach's alpha to examine the internal consistency of the remaining items, including review of Cronbach's alpha if Item Deleted index. We then conducted the EFA again to double check the structure after examining the internal consistency. Confirmatory factor analysis was then adapted in R (R Core Team, 2017) using "lavvan" package (Rosseel, 2011) to reaffirm the structure found in EFA.

TIES Specialists, along with program participants, scored family goal attainment at five timepoints during program participation. In the validation process, half of

Time 1 data was used for EFA (item reduction and factor extraction) to find the underlying structure of the instrument. A few items fell out according to our criteria. Specifically, the item regarding "basic needs" had a small factor loading ( $\lambda = .26$ ) thus was excluded, as were the "recovery management and maintenance" item ( $\lambda = .32$ ) and "relationship" (i.e., presence/absence of abuse in family relationships) item ( $\lambda = .18$ ). Health insurance items (mother's and children's) formed their own domain with only two items, and thereby were excluded from the model. The health insurance items as well as the relationship item will be retained in a separate form for service purposes (e.g., provide supports to families on applying for health insurance). Hence, at the end of EFA analysis, 25 items in a six-factor structure were retained for further analysis. The Kaiser–Meyer–Olkin Measure of Sampling Adequacy for the final structure was .63, which is higher than the recommended value of .6, and the Bartlett's test of sphericity is significant,  $\chi^2(300) = 680.257, p < .001$ . The total percentage of variance explained was 64.44% with six factors, and the Cronbach's alpha was .90.

The structure that emerged from EFA was then confirmed in CFA using the second half of Time 1 and Time 5 data combined for the purpose of reaching enough power to detect a solid structure. The final structure retained the six factors we hypothesized and emerged from EFA with an acceptable fit,  $\chi^2(260) = 457.89, p < .001$ , CFI = .93, TLI = .92, RMSEA = .06, SRMR = .07. Therefore, the final TIES goal attainment scale consists of 25 items in a six-factor structure. Table 2 presents the item-level statistics including factor loadings, residual variances, and  $R^2$ . In addition, the latent correlations among the six factors ranged from .36 to .74 and were all significant at the alpha level of .05 (see Table 3).

For reliability, internal consistency was checked using Cronbach's alpha, split-half test, and parallel test. Internal consistency of scale items for the overall scale was in the high range ( $\alpha = .93$ ) using Cronbach's alpha (Cronbach, 1951). Table 4 presents the coefficients for each subscale. In addition, split-half and parallel tests were conducted. For split-half method, the Spearman–Brown coefficient was .74 for both equal length condition and unequal length condition. The parallel test,  $\chi^2(323) = 591.66, p < .001$ , and the reliability of scale was .90 for unbiased conditions. In addition, the internal consistency between white and African American participants was comparable (see Table 4), both for the overall scale as well as for the individual subscales. Therefore, the scale has reached acceptable reliability for this population regardless of racial group.

For validity, all standardized factor loadings were higher than .4 (ranged from .47 to .93) and were significant at the alpha level of .05, providing strong convergent evidence for

TABLE 2 Item-level factor loadings, residual variances, and  $R^2$ 

Item	$\lambda_{\text{EFA}}$	$\lambda_{\text{CFA}}$	SE	$p$	$\sigma^2$	$R^2$
<b>(A) Maternal substance use</b>						
1. Substance abuse	.80	.89	.06	<.001	.21	.79
2. Stage of change or change recovery	.85	.91	.06	<.001	.18	.82
3. Support groups and specialist involvement	.66	.63	.08	<.001	.61	.39
4. Drug treatment program involvement	.74	.81	.07	<.001	.35	.65
5. Recovery management and maintenance (environment)	.60	.86	.07	<.001	.26	.74
6. Recovery management and maintenance (relapse management)	.74	.92	.05	<.001	.15	.85
<b>(B) Parenting skills</b>						
1. Parent-child interaction	.86	.89	.06	<.001	.21	.79
2. Appropriate expectations	.93	.85	.07	<.001	.28	.72
3. Parenting strategies and problem-solving	.86	.88	.07	<.001	.23	.77
4. Access of resources and services	.51	.47	.12	<.001	.78	.22
5. Safety and supervision	.59	.81	.07	<.001	.34	.66
<b>(C) Child physical/mental health</b>						
1. Preventative care (immunizations)	.69	.63	.09	<.001	.51	.39
2. Preventative care (well-visit appointment)	.67	.76	.09	<.001	.42	.58
3. Response to health concerns (typical issues)	.48	.69	.07	<.001	.52	.48
4. Response to health concerns (specialty and mental health)	.88	.90	.05	<.001	.19	.81
5. Response to health concerns (provider recommendations)	.84	.93	.06	<.001	.13	.87
<b>(D) Maternal physical/mental health</b>						
1. Preventative care (scheduling)	.66	.79	.08	<.001	.37	.63
2. Response to health concerns (specialty and mental health)	.70	.88	.07	<.001	.23	.77
3. Response to health concerns (provider recommendations)	.87	.92	.06	<.001	.15	.85
<b>(E) Income stability</b>						
1. Income	.82	.78	.09	<.001	.39	.61
2. Employability	.65	.64	.09	<.001	.60	.40
3. Money management	.63	.88	.06	<.001	.23	.77
<b>(F) Housing stability</b>						
1. Stability	.46	.63	.08	<.001	.60	.40
2. Safety	.51	.77	.09	<.001	.40	.60
3. Family planning	.46	.51	.12	<.001	.74	.26

Note:  $\lambda$  is the standardized factor loading;  $R^2$  = total variance – residual variance.

this scale. Previous research has suggested that once factor loadings are significantly loaded on their distinct latent constructs, convergent validity is also achieved (Anderson, 1987). In addition, we examined the correlation between IFSP goal attainment subscales with related existing measures with the same participants for criterion validity (see Table 5). The parallel measures include The Life Skills Progression (LSP) (Wollesen & Peifer, 2006) and Keys to Interactive Parenting Scale (KIPS) (Comfort et al., 2011), and the Parenting Interactions with Children: Checklist of Observations Linked to Outcomes (PICCOLO) (Roggman et al., 2013). The Parenting Skills subscale of the goal attainment scale is significantly correlated with the KIPS mean score,  $r(75) = .35$ ,  $p < .01$ ; with affection domain,  $r(66) = .33$ ,  $p < .01$ , and encouragement domain,  $r(66) = .39$ ,  $p < .01$ ;

with LSP relationships with children items, attitudes to pregnancy,  $r(43) = .34$ ,  $p = .03$ ; nurturing,  $r(63) = .45$ ,  $p < .001$ , discipline,  $r(44) = .39$ ,  $p < .01$ , support for development,  $r(62) = .59$ ,  $p < .001$ , and safety,  $r(60) = .53$ ,  $p < .001$ . The child physical/mental health domain of the goal attainment scale was significantly correlated with the health and medical care items in the LSP, with prenatal care,  $r(34) = .36$ ,  $p = .04$ , with child well care,  $r(57) = .41$ ,  $p < .01$ , with child sick care,  $r(57) = .49$ ,  $p < .001$ , and with child immunizations,  $r(57) = .40$ ,  $p < .01$ . Content validity was ensured by professional and service provider input on the development of scale items, as well as ongoing review and verification by a consortium of community service providers. Hence, this instrument has reached an adequate reliability and validity.



TABLE 3 Factor correlation matrix

	A	B	C	D	E	F
A	1	–	–	–	–	–
B	.59***	1	–	–	–	–
C	.36***	.48***	1	–	–	–
D	.62***	.59***	.48***	1	–	–
E	.67***	.60***	.44***	.63***	1	–
F	.62***	.56***	.39***	.54***	.74***	1

Factor A. Maternal drug use; Factor B. Parenting skills; Factor C. Child physical/mental health; Factor D. Maternal physical/mental health; Factor E. Income stability; Factor F. Housing stability.

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

TABLE 4 Reliability coefficients ( $\alpha$ ) by race

	African American/Black	Caucasian/White	All participants
Maternal drug use	.82	.91	.89
Parenting skills	.90	.87	.87
Child physical/mental health	.85	.88	.86
Maternal physical/mental health	.85	.88	.86
Income stability	.77	.73	.77
Housing stability	.46	.60	.61
Overall scale	.93	.91	.93

TABLE 5 Correlation of IFSP with parallel measures

		Parenting skills	Child physical/mental health
Life Skills Progression (relationship with children)	Attitudes to pregnancy	.34*	
	Nurturing	.45***	
	Discipline	.39**	
	Support for development	.59***	
	Safety	.53***	
KIPS		.35**	
PICCOLO	Affection	.33**	
	Encouragement	.39**	
Life Skills Progression (health and medical care)	Prenatal care		.36*
	Child well care		.41**
	Child sick care		.49***
	Child immunizations		.40**

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

## 4 | DISCUSSION

### 4.1 | Reliability and validity

The goal attainment scale has been developed to identify families' needs, but also to assess and track families' goal attainment over time in six domains: maternal substance use, parenting, child physical and mental health, maternal physical and mental health, income stability, and housing stability. Psychometric analysis provided support for a six-factor solution of goal attainment for families who are affected by maternal substance use. The overall scale structure had acceptable model fit; the program is still refining the scale (e.g., modifying items, adding in more items) to meet the evolving nature of the program. Convergent validity was evidenced with acceptable factor loadings, significant correlations between factors (see Table 3). In addition, criterion validity was evidenced with significantly correlated subscales with multiple validated measures of similar construct. Given the fact that IFSP goal attainment scale itself is an outcome measure, additional predictive validity is not feasible. Instead, the predictive validity is examined under the umbrella of criterion validity. Reliability was established by examining the Cronbach's alpha for the overall scale and across its subscales. The low alpha for housing stability, especially for the African American participants was due to the fact that the items in this subscale need refining, either by rewording existing items or adding more items to measure the same construct. After examining the item-level factor loadings in this subscale and the Cronbach's alpha if item deleted index, item 3 "family planning" was perceived "not relevant" to housing stability by African American participants, as the alpha value went up when this item was removed. Though the instrument is still being refined, it is ready to be adapted by other home visiting programs who serve a similar population. In addition, an important future use of this instrument is to employ statistical analyses such as multilevel models or structural equation models that allow multiple responses per family to be included to examine the growth trajectory of families in the program.

### 4.2 | The impact of the tool to the program and to families

This TIES goal attainment scale is a valuable tool for programs serving families affected by maternal substance use. The use of the scale is integrated into the IFSPs specific to each family, and parents and staff work together and mutually agree on goals based on individual needs of the family. The family plan details the support and services the

family will receive, including when, where, and how often the services will be delivered. Specific supportive activities are provided during home visits to increase participant knowledge, skills, abilities, and attitudes toward the chosen goal. Hence, the scale is a valuable tool both to guide planning and track goal attainment for program evaluation. Program staff must be trained on the use of the tool and the collaborative nature of the goal attainment scoring. As the program model is one of partnership with families in a goal setting and problem-solving relationship, the tool underscores this foundation. A brief manual of the process of scoring the goal attainment scales (when completed solely by Specialists and when and how to present to families for discussion of joint scoring over time) and the use of the rubric and its multiple factors to arrive at scores on the Likert scale is helpful. Shadowing experienced staff in conduct of IFSP conferences and supervision of initial IFSP conferences with new staff promote fidelity to the process and uniformity in scoring as well.

### 4.3 | Implications for service delivery

The present study focused on the validation of an instrument that can be used as an outcome measure of service delivery. The instrument promotes a family-centered service delivery system and facilitates active participation of families in their own assessment and goal setting. Agreement on goals and a strong working alliance between home visitors and program participants are key predictors of program engagement. The goal attainment scale is grounded in this therapeutic relationship. The TIES Program formally assesses the relationship between staff and participants using the working alliance inventory (WAI), a validated assessment of therapeutic alliance (Horvath & Greenberg, 1994; Tracey & Kokotovic, 1989). Further research should explore how the therapeutic relationship affects not only program engagement, but also program outcomes as measured by the goal attainment scale.

In the field, there has always been a demand to provide individualized and wrap around services to families, and this new instrument not only provides a comprehensive approach to measure family outcomes, but also promotes increasing involvement of families in identifying and assuring the authenticity of items in the scale and thereby identifying the real goals and content of services. Second, the use of the scale tracks families' progress and growth in six goal areas, in addition to identifying the unmet needs of families. Finally, the instrument, along with the goal areas and items listed, can be used to guide the training and preparation of workers who serve families affected by maternal substance use.

### 4.4 | Limitations

A few limitations need to be considered in interpreting the findings presented in this study. First, the sample in this study is limited to an urban setting with certain characteristics and features, and therefore the findings may not be generalizable to other settings like rural or suburban areas without further research. Second, the administration of the tool requires a home-visiting setting, where families and workers are in a trusting relationship and are comfortable in responding to the items on the tool and open to discussion about the discrepancies in the scoring from the workers' and the families' appraisal. In addition, although convergent validity analyses were conducted for some of the goals (e.g., parenting skills and child physical/mental health), they were not conducted for all goals. Unfortunately, it was difficult to find other validated quantitative measures with which to relate some of the subscales (e.g., reduced maternal drug use). Future research should assess the relationships of this instrument and its subscales to other similar instruments if appropriate measures are determined.

## 5 | CONCLUSIONS

The IFSP goal attainment scale has been psychometrically validated for this population and been determined to be a reliable and valid instrument. The tool promotes involvement of families in identifying and assuring the authenticity of scale items, thereby identifying the pivotal goals and content of services. The instrument provides a comprehensive approach to measure family outcomes across multiple domains addressing key risk and protective factors. This family-centered scale serves both therapeutic and evaluation purposes, acting as an intervention guide and goal attainment measurement tool.

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## CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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## REFERENCES

- Ammerman, R. T., Altaye, M., Putnam, F. W., Teeters, A. R., Zou, Y., & Van Ginkel, J. B. (2015). Depression improvement and parenting in low-income mothers in home visiting. *Archives of Women's Mental Health, 18*(3), 555–563. <https://doi.org/10.1007/s00737-014-0479-7>
- Anderson, J. C. (1987). An approach for confirmatory measurement and structural equation modeling of organizational properties. *Management Science, 33*(4), 525–541. <https://doi.org/10.1287/mnsc.33.4.525>
- Azzi-Lessing, L. (2013). Serving highly vulnerable families in home-visitation programs. *Infant Mental Health Journal, 34*(5), 376–390. <https://doi.org/10.1002/imhj.21399>
- Bovend'Eerd, T. J., Botell, R. E., & Wade, D. T. (2009). Writing SMART rehabilitation goals and achieving goal attainment scaling: A practical guide. *Clinical Rehabilitation, 23*(4), 352–361. <https://doi.org/10.1177/0269215508101741>
- Brooks-Gunn, J., Berlin, L., & Fuligni, A. (2000). Early childhood intervention programs: What about the family? In *Handbook of early childhood intervention* (pp. 549–587).
- Burrell, L., Crowne, S., Ojo, K., Snead, R., O'Neill, K., Cluxton-Keller, F., & Duggan, A. (2018). Mother and home visitor emotional well-being and alignment on goals for home visiting as factors for program engagement. *Maternal and Child Health Journal, 22*(1), 43–51. <https://doi.org/10.1007/s10995-018-2535-9>
- Comfort, M., Gordon, P. R., & Naples, D. (2011). KIPS: An evidence-based tool for assessing parenting strengths and needs in diverse families. *Infants & Young Children, 24*(1), 56–74. <https://doi.org/10.1097/IYC.0b013e3182001bd3>
- Connelly, C. D., Hazen, A. L., Baker-Ericzen, M. J., Landsverk, J., & Horwitz, S. M. (2013). Is screening for depression in the perinatal period enough? The co-occurrence of depression, substance abuse, and intimate partner violence in culturally diverse pregnant women. *Journal of Women's Health (Larchmt), 22*(10), 844–852. <https://doi.org/10.1089/jwh.2012.4121>
- Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika, 16*(3), 297–334.
- Dauber, S., Ferayorni, F., Henderson, C., Hogue, A., Nugent, J., & Alcantara, J. (2017). Substance use and depression in home visiting clients: Home visitor perspectives on addressing clients' needs. *Journal of Community Psychology, 45*(3), 396–412. <https://doi.org/10.1002/jcop.21855>
- Dauber, S., John, T., Hogue, A., Nugent, J., & Hernandez, G. (2017). Development and implementation of a screen-and-refer approach to addressing maternal depression, substance use, and intimate partner violence in home visiting clients. *Children and Youth Services Review, 81*, 157–167. <https://doi.org/10.1016/j.childyouth.2017.07.021>
- Duffee, J. H., Mendelsohn, A. L., Kuo, A. A., Legano, L. A., & Earls, M. F. (2017). Early childhood home visiting. *Pediatrics, 140*(3). <https://doi.org/10.1542/peds.2017-2150>
- Green, B., Sanders, M. B., & Tarte, J. M. (2018). Effects of home visiting program implementation on preventive health care access and utilization: Results from a randomized trial of healthy families oregon. *Prevention Science, https://doi.org/10.1007/s11121-018-0964-8*
- Harris, P. A., Taylor, R., Thielke, R., Payne, J., Gonzalez, N., & Conde, J. G. (2009). Research electronic data capture (REDCap)—a metadata-driven methodology and workflow process for providing translational research informatics support. *Journal of Biomedical Informatics, 42*(2), 377–381. <https://doi.org/10.1016/j.jbi.2008.08.010>
- Horvath, A. O., & Greenberg, L. S. (Eds.). (1994). *The working alliance: Theory, research, and practice* (Vol. 173). John Wiley & Sons.
- Horvath, A. O., & Symonds, B. D. (1991). Relation between working alliance and outcome in psychotherapy: A meta-analysis. *Journal of Counseling Psychology, 38*(2), 139–149. <https://doi.org/10.1037/0022-0167.38.2.139>
- IBM Corp. (2019). *IBM SPSS statistics for windows*. (Version 26.0) IBM Corp.
- Kolip, P., & Schaefer, I. (2013). Goal attainment scaling as a tool to enhance quality in community-based health promotion. *International Journal of Public Health, 58*(4), 633–636. <https://doi.org/10.1007/s00038-013-0471-4>
- Korfmacher, J., Green, B., Spellmann, M., & Thornburg, K. R. (2007). The helping relationship and program participation in early childhood home visiting. *Infant Mental Health Journal, 28*(5), 459–480. <https://doi.org/10.1002/imhj.20148>
- Michalopoulos, C., Lee, H., Duggan, A., Lundquist, E., Tso, A., Crowne, S., Burrell, L., Somers, J., Filene, J. H., & Knox, V. (2015). *The mother and infant home visiting program evaluation: Early findings on the maternal, infant, and early childhood home visiting program*.
- Nix, R. L., Bierman, K. L., Motamedi, M., Heinrichs, B. S., & Gill, S. (2018). Parent engagement in a head start home visiting program predicts sustained growth in children's school readiness. *Early Childhood Research Quarterly, 45*, 106–114. <https://doi.org/10.1016/j.ecresq.2018.06.006>
- Novins, D. K., Ferron, C., Abramson, L., & Barlow, A. (2018). Addressing substance-use problems in tribal home visiting. *Infant Mental Health Journal, 39*(3), 287–294. <https://doi.org/10.1002/imhj.21706>
- O'Malley, D., Chiang, D. F., Siedlik, E. A., Ragon, K., Dutcher, M., & Templeton, O. (2021). A promising approach in home visiting to support families affected by maternal substance use. *Maternal and Child Health Journal, 25*(1), 42–53. <https://doi.org/10.1007/s10995-020-03015-0>
- R Core Team. (2017). R: A language and environment for statistical computing. R Foundation for Statistical Computing. <https://www.R-project.org/>
- Roggman, L. A., Cook, G. A., Innocenti, M. S., Jump Norman, V., & Christiansen, K. (2013). Parenting interactions with children: Checklist of observations linked to outcomes (PICCOLO) in diverse ethnic groups. *Infant Mental Health Journal, 34*(4), 290–306. <https://doi.org/10.1002/imhj.21389>
- Rossee, Y. (2011). lavaan: An R package for structural equation modeling. *Journal of Statistical Software, 48*, <https://doi.org/10.18637/jss.v048.i02>

- Schreier, A., McCoy, K., Flood, M. F., Wilcox, B. L., & Hansen, D. J. (2018). Understanding perceptions of child maltreatment risk: A qualitative study of early head start home visitors. *Children and Youth Services Review, 88*, 416–425. <https://doi.org/10.1016/j.childyouth.2018.03.035>
- Sierau, S., Brand, T., & Jungmann, T. (2012). Parental involvement in home visiting: Interpersonal predictors and correlates. *Infant Mental Health Journal, 33*(5), 489–495. <https://doi.org/10.1002/imhj.21322>
- Tandon, S. D., Mercer, C. D., Saylor, E. L., & Duggan, A. K. (2008). Paraprofessional home visitors' perspectives on addressing poor mental health, substance abuse, and domestic violence: A qualitative study. *Early Childhood Research Quarterly, 23*, 419–428.
- Tracey, T. J., & Kokotovic, A. M. (1989). Factor structure of the working alliance inventory. *Psychological Assessment: A Journal of Consulting and Clinical Psychology, 1*(3), 207–210.
- Wollesen, L., & Peifer, K. (2006). *Life skills progression LSP: An outcome and intervention planning instrument for use with families at risk*. Paul H Brookes Publishing Company.

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