Received: 24 July 2024 | Accepted: 9 February 2025

DOI: 10.1111/acer.70016

ALCOHOL CLINICAL & EXPERIMENTAL RESEARCH ISBRA

RESEARCH ARTICLE

Identifying family environment profiles in families of children with prenatal alcohol exposure

Riley J. Felicicchia[1] | Matthew T. Hyland[1] | Scott C. Roesch[2] | Sarah N. Mattson[1]

[1]Center for Behavioral Teratology and Department of Psychology, San Diego State University, San Diego, California, USA

[2]Department of Psychology, San Diego State University, San Diego, California, USA

Correspondence
Sarah N. Mattson, Center for Behavioral Teratology and Department of Psychology, San Diego State University, 6330 Alvarado Court, Suite 100, San Diego, CA 92120, USA.
Email: sarah.mattson@sdsu.edu

Funding information
National Institute on Alcohol Abuse and Alcoholism, Grant/Award Number: F31 AA031883, T32 AA013525 and U01 AA014834

Abstract

Background: Individuals with prenatal alcohol exposure (PAE) may face unique family environments that potentially influence adaptive functioning and behavioral challenges. This study aimed to identify profiles of families of children with PAE based on family characteristics, including cohesion, conflict, and organization, and to examine the relationship between family environment profiles and child outcomes.

Methods: Data were collected from caregivers of 283 youth (5–17 years) with histories of PAE. Caregivers completed several questionnaires, including the Child Behavior Checklist (CBCL), Vineland Adaptive Behavior Scales (VABS), and Family Environment Scale (FES). Latent profile analysis (LPA) was used to identify profiles in the family environment using three subscales from the FES (Cohesion, Conflict, and Organization). Model fit was determined by comparing 1-, 2-, 3-, 4-, and 5-profile solutions. One-way ANCOVA follow-up tests were conducted to explore differences in adaptive and behavioral functioning across family environment profiles.

Results: The 4-profile solution was considered the best fit for the data. Interpretation of conditional response probabilities indicated that Profile 1 was defined by low cohesion; Profile 2 was defined by low organization; Profile 3 was defined as high cohesion and organization; and Profile 4 was defined as high conflict. After controlling for race, sex, age, and ethnicity, there were significant profile differences on the Internalizing, Externalizing, and Total Problem Behavior scales of the CBCL. There were no significant differences in adaptive functioning across profiles.

Conclusions: The results of this study highlight the importance of the family environment in understanding the strengths and challenges experienced by children with PAE. Four unique profiles of family environments emerged in families of children with PAE. The high-conflict profile was associated with increased behavioral problems in children. These findings can be used to support families of children with PAE and to identify treatment targets for interventions for children with PAE and their caregivers.

KEYWORDS
behavior, family characteristics, fetal alcohol spectrum disorders, prenatal alcohol exposure

INTRODUCTION

Prenatal alcohol exposure (PAE) has been associated with cognitive, behavioral, and adaptive functioning challenges in children and adults that profoundly impact an individual's life (Jacobson et al., 2021; Mattson et al., 2019). These impairments persist from childhood through adulthood, leading to lifelong challenges (Moore & Riley, 2015). PAE currently remains a significant public health concern. Although the exact population rate of drinking during pregnancy is unknown, researchers estimate that one in 10 pregnancies is alcohol-exposed (Tan et al., 2015). Neurodevelopmental disorders attributed to PAE can be classified under the umbrella of fetal alcohol spectrum disorders (FASD), including fetal alcohol syndrome (FAS), partial fetal alcohol syndrome (PFAS), alcohol-related birth defects (ARBD), and alcohol-related neurodevelopmental disorder (ARND; Hoyme et al., 2016). There are several different diagnostic criteria for diagnosing FASD, which rely on a combination of documentation of PAE, physical and facial features, and neurobehavioral impairment (Myers et al., 2025). However, the complexity of different diagnostic systems and the lack of a gold standard assessment criterion contribute to challenges in accurate diagnosis (Coles et al., 2023; Myers et al., 2025). Diagnosing FASD has been historically challenging given sociocultural issues such as maternal stigma, challenges in determining PAE history, and comorbid diagnoses with similar symptoms (Dozet et al., 2021; Harding et al., 2024). Thus, many individuals with PAE are undiagnosed or misdiagnosed (Chasnoff et al., 2015). Due to these diagnostic challenges, the true prevalence of FASD is not precisely known, but recent estimates suggest that 1%–5% of school-aged children have FASD (May et al., 2018).

Individuals with PAE typically exhibit cognitive challenges and impairments in executive functioning, such as decreased attention and impaired working memory that significantly impact daily life functioning (Jacobson et al., 2021; Mattson et al., 2019). PAE has also been associated with an increased risk for mental health conditions, such as attention-deficit/hyperactivity disorder (ADHD), oppositional defiant disorder (ODD), conduct disorder (CD), anxiety, and depressive disorders (Easey et al., 2019; O'Connor & Paley, 2009). Physical health impacts, such as altered metabolic, cardiovascular, renal, and reproductive functioning, have been associated with PAE (Reid et al., 2019, 2023). PAE also impacts behavioral functioning, such as adaptive functioning skills and challenges with internalizing and externalizing behavior, which are the outcomes of interest in this study. Thus, these areas are further described in detail in this section.

Adaptive functioning

One of the domains most impacted by PAE is adaptive functioning (Crawford et al., 2020; Kautz-Turnbull & Petrenko, 2021). Adaptive functioning is defined as the skills individuals use to function independently in their daily lives, including social and practical skills (Sparrow et al., 2016). Children with PAE have been shown to have significantly lower adaptive functioning from parent and teacher reports than nonexposed controls across communication, daily living skills, and socialization (Crawford et al., 2020). In a recent review, individuals with PAE were also found to have significantly lower adaptive functioning than individuals with ADHD (Kautz-Turnbull & Petrenko, 2021). These adaptive functioning impairments in childhood lead to challenges in daily living that persist into adulthood. Adults with PAE experience significant challenges in daily living, such as independent living support needs, substance misuse, employment problems, and trouble with the law (McLachlan et al., 2020).

Problem behaviors

Children with FASD commonly exhibit behavioral challenges such as disruptive behaviors, impulsivity, social skill deficits, and oppositional behaviors (Khoury et al., 2018; Tsang et al., 2016). Children with FASD have significantly higher externalizing, internalizing, and total problem behaviors compared to children without FASD (Khoury et al., 2018; Tsang et al., 2016). Parents and teachers of children with FASD qualitatively report challenges with school behavior, rule-breaking, attention problems, and social problems (Tsang et al., 2016). Environmental factors have been shown to influence behavioral outcomes in children with PAE (Kautz-Turnbull et al., 2023). Increased exposure to adverse childhood experiences is associated with increased behavioral problems in children with PAE (Kautz-Turnbull et al., 2023).

Family environmental factors

Despite the challenges associated with PAE, many individuals with PAE are highly resilient and exhibit many strengths. In a recent narrative review, Flannigan et al. (2021) identified several critical strengths in these individuals, such as self-awareness and interpersonal skills, including helpfulness and compassion, and perseverance. It is important to consider these strengths in research and to develop ways to build upon these strengths. The family environment has been shown to be an important factor contributing to resiliency in children (Daniels & Bryan, 2021). The postnatal family environment may present unique risk and resilience factors in children with PAE due to the high frequency of children being separated from their biological mothers and placed in foster and adoptive care (Streissguth et al., 2004). Additionally, children with PAE may also face elevated rates of adverse early-life experiences, such as exposure to parents who use substances and a high number of living placements (Flannigan et al., 2021). The family environment and family cohesion have been identified as protective factors for those who have experienced childhood trauma and may serve as a buffer against adverse developmental outcomes (Daniels & Bryan, 2021). Thus, given the high incidence of adverse childhood experiences in children with PAE, the family environment is critical to further explore.

Family-focused interventions have been developed for children with FASD and have been shown to be effective (Flannigan et al., 2020). However, there is little research on the specific impact of family environment characteristics on cognitive and behavioral outcomes in children with PAE. PAE has been associated with insecure caregiver attachment (O'Connor et al., 2002). However, maternal responsiveness and support have been shown to mediate the relationship between PAE and attachment such that infants of mothers with high emotional support have increased emotion regulation skills and attachment security (O'Connor et al., 2002). Mattson et al. (2022) found that parental interaction that has an achievement orientation component is associated with increased executive functioning abilities in children with PAE. Thus, family environmental factors may be influential in promoting optimal behavioral outcomes in children with PAE.

Cohesion

A cohesive family environment has been shown to be an important factor contributing to positive outcomes in children, such as emotional and behavioral well-being (Daniels & Bryan, 2021; Greenlee et al., 2018). In early childhood, low family cohesion and high maternal relationship instability predict child externalizing behaviors (Coe et al., 2018). Lower levels of aggression are reported in families with high cohesion (Andreas & Watson, 2009). In autistic children, family factors such as cohesion, adaptiveness, social support, and family functioning have been associated with positive developmental outcomes (Greenlee et al., 2018). Similarly, in children with ADHD, family cohesion mediates the relationship between childhood risk factors and ADHD symptoms (Crea et al., 2014).

Conflict

Family conflict has been associated with problem behaviors and challenges in adaptive functioning in both children and adolescents (Gebru et al., 2023; Pressman et al., 2006; Trevino et al., 2024). Family conflict has been associated with increased externalizing problem behaviors such as aggression, rule-breaking, and disruptive behaviors in typically developing adolescents (Trevino et al., 2024). In adolescents, family conflict has been shown to be a factor contributing to impulsivity and engagement in risky behaviors such as substance use (Gebru et al., 2023). The impact of family conflict is also observed in children and adolescents with neurodevelopmental disorders (Pressman et al., 2006). High family conflict has been shown to be associated with increased impairment in children with ADHD, such as challenges in social functioning and increased externalizing and internalizing problem behaviors (Pressman et al., 2006). Similarly, in autistic children, high parent–child conflict is associated with elevated internalizing and externalizing problem behaviors (Chan et al., 2022; Pressman et al., 2006).

Organization

Disorganization in the family environment, such as a lack of consistency and structure and a disruptive home environment, has been associated with increased challenging behaviors and impaired social functioning and emotion regulation (Gordon-Hacker et al., 2023; Marsh et al., 2020). A recent systematic review found that household chaos is associated with impacted outcomes across several domains, including socioemotional, physical, and behavioral functioning (Marsh et al., 2020). Another study found that increased household chaos was associated with behavioral but not emotional problems (Gordon-Hacker et al., 2023). There is limited research on the impact of household organization on behavioral outcomes in children with neurodevelopmental disorders. One study identified household chaos as an important treatment target for families of children with ADHD due to the association between household chaos and ADHD symptoms (Wirth et al., 2019). Another study found that children with ADHD had more symptoms in a chaotic household environment, but a large part of the association was explained by genetic risk factors for ADHD (Agnew-Blais et al., 2022).

Current study

This study seeks to explore patterns in the family environment in children with PAE in order to better understand areas of strengths in these families and areas where families may be experiencing challenges. Additionally, this study will explore how different family environment profiles impact behavioral and adaptive functioning. Better understanding the family environment in children with PAE will directly inform clinical interventions for individuals impacted by PAE and provide information on critical areas to support caregivers of children with PAE.

MATERIALS AND METHODS

Participants

Participants in this study were caregivers of children between the ages of 5–17 years (Table 1) who were recruited as part of a larger research study, the Collaborative Initiative for Fetal Alcohol Spectrum Disorders (CIFASD). Participants were recruited through FASD clinics and the community. Recruitment strategies included professional referrals, flyers distributed through schools, and study promotion at local events. Data for this study were collected at the San Diego State University site during the 2nd (2007–2012) and 4th (2017–2022) CIFASD phases. As part of the larger study, child participants completed a neuropsychological examination to assess cognitive functioning, and parents completed a comprehensive series of questionnaires on topics such as alcohol exposure history, demographic background, and family functioning. Participants were the caregivers of children with histories of heavy PAE, defined as an average of 14 or more standard alcoholic

drinks per week or 4 or more drinks at least once per week during one or more trimesters of pregnancy (Mattson et al., 2010). PAE was determined through retrospective reporting from caregivers and exposure documentation such as CPS reports, legal reports, or medical records. When direct maternal report or precise amount or frequency of exposure were unavailable, participants were considered heavily exposed when collateral documentation (CPS report, legal documentation, and medical records) indicated alcohol dependence or use during pregnancy or if exposure was suspected and the child or adolescent met criteria for a diagnosis of FAS. An FAS diagnosis was indicated if individuals had two of the three key facial features (short palpebral fissures, smooth philtrum, thin vermillion) and either microcephaly (head circumference ≤10th percentile) and/or growth deficiency (height or weight ≤10th percentile) (Jones et al., 2010; Mattson et al., 2010). Diagnosis used as part of the CIFASD criteria is based on Hoyme criteria (Hoyme et al., 2016) but does not distinguish between FAS and PFAS. Individuals with unknown prenatal exposure to alcohol were not recruited for the study.

Caregivers were included in this study who had multiple children with PAE, each enrolled in the study. Caregivers completed all study measures for each enrolled child and answered separate questionnaires for each child. Thus, to accurately capture the experiences of each child in our study and to avoid sampling bias, we did not eliminate children from the same family in our analyses. This study was approved by the San Diego State University Institutional Review Board.

TABLE 1 Participant demographics.

Variable	*n* = 283
Dates of enrollment	2009–2022
Age [*M* (SD)]	10.2 (3.5)
Age range (years)	5.00–17.99
Sex [*n* (%) female]	127 (44.9)
Race [*n* (%)][a]	
White	182 (55.49)
Black or African American	70 (21.3)
Asian	4 (1.21)
American Indian/Alaska Native	13 (3.96)
Native Hawaiian/Other Pacific Islander	4 (1.21)
More than One Race	15 (4.57)
Unknown/other	40 (12.19)
Ethnicity (Hispanic or Latino [*n*])	102 (37.4)
Separation from biological mother [*n* (%) foster/adopted]	230 (81.3)
FAS [*n* (%)]	30 (10.6)

[a]Categories for race are not mutually exclusive.

Measures

Family Environment Scale (FES)

Parents completed the FES (Moos & Moos, 2009) as part of a set of questionnaires administered to caregivers as part of their child's testing. The FES is a self-report questionnaire that consists of 90 true-or-false items that align with 10 subscales across three dimensions: Relationship, Personal Growth, and System Maintenance. The Relationship dimension includes the cohesion, expressiveness, and conflict subscales. The Personal Growth dimension includes the independence, achievement orientation, intellectual-cultural orientation, active-recreational orientation, and moral-religious emphasis subscales. The System Maintenance dimension includes the organization and control subscales. The FES is used in both research and clinical settings to explore family dynamics, relationship patterns, and family functioning. This measure provides an understanding of how caregivers perceive their families.

Based on the previous literature on the relationship between family environmental factors and child behavioral outcomes (Crea et al., 2014; Daniels & Bryan, 2021; Gebru et al., 2023; Gordon-Hacker et al., 2023; Greenlee et al., 2018; Marsh et al., 2020; Pressman et al., 2006; Trevino et al., 2024) and for the purposes of this study, the cohesion, conflict, and organization subscales were included in this analysis (Table 2). These specific subscales were chosen out of the 10 subscales to eliminate redundant variables and to highlight specific areas in the family environment that have clinical implications to inform family-focused interventions. Variables were chosen from the Relationship and System Maintenance dimensions, as these environmental characteristics are often targeted in existing clinical interventions. For example, Parent–Child Interaction Therapy and Behavioral Parent Training are common treatments for children with neurodevelopmental disorders that strive to foster family cohesion and organization and reduce conflict (Eyberg, 2008; Pfiffner & Kaiser, 2016. Expressiveness and control were eliminated

TABLE 2 Family Environment Scale subscales.

Subscale	Definition	Example questions
Cohesion	The degree of commitment, help, and support family members provide one another (Moos & Moos, 2009)	"Family members will really help and support one another" and "There will be a feeling of togetherness in the family"
Conflict	The amount of openly expressed anger and conflict among family members (Moos & Moos, 2009)	"We fight a lot in our family" and "Family members rarely become openly angry"
Organization	The degree of importance of clear organization and structure in planning family activities and responsibilities (Moos & Moos, 2009)	"Activities in the family will be pretty carefully planned" and "Members will generally be very neat and orderly"

ALCOHOL CLINICAL & EXPERIMENTAL RESEARCH ISBRA

from the model to reduce redundancy with the chosen indicators. The Personal Growth dimension consists of family environmental characteristics such as religion, achievement, and intellect and thus was not included for the purposes of this analysis.

Child Behavior Checklist (CBCL)

The CBCL is a 100-item caregiver report questionnaire to assess emotional, behavioral, and social problems in children (Achenbach & Rescorla, 2001). There are multiple subscales on the CBCL, including syndrome scales and DSM-oriented scales. There are also higher order factor scales, which consist of internalizing, externalizing, and total problem behavior scales. In this study, the internalizing, externalizing, and total problem behavior scales were used as outcome measures for behavioral challenges in children with PAE.

Vineland Adaptive Scales—third edition (VABS-3)

The VABS-3 is a caregiver report measure designed to assess adaptive functioning across the lifespan (Sparrow et al., 2016). It is commonly used in research and clinical settings to assess individuals with intellectual and developmental disabilities. The Vineland assesses several domains, including daily living skills, communication, and socialization. For the purposes of this study, the overall adaptive behavior composite score was used as an outcome variable in children with PAE.

Statistical analyses

Latent Profile Analysis (LPA) was used to identify profiles in the family environment using three subscales from the FES (Cohesion, Conflict, and Organization). LPA is a person-centered mixture modeling analytic approach (Ferguson et al., 2020; Muthén & Muthén, 2000). LPA examines the data for patterns of characteristics and examines the likelihood that individuals belong to different groups and that these differences are meaningful (Ferguson et al., 2020). The Mplus 7.8 software was used to conduct the LPA. In this study, group profiles were created using the cohesion, conflict, and organization subscales from the FES. Model fit was determined by comparing 1-, 2-, 3-, 4-, and 5-profile solutions to determine the appropriate number of profiles. The optimal number of profiles was determined by comparing model fit indices such as the Akaike information criterion (AIC), Bayesian information criterion (BIC), Sample-adjusted BIC (SABIC), bootstrapped likelihood ratio test (BLRT), adjusted Lo–Mendell–Rubin test (Adjusted LMR), Entropy, and profile size.

Once family environment profiles were identified using LPA, follow-up chi-squared tests and univariate analysis of covariance (ANCOVA) tests were used to explore profile differences across demographic variables. Additionally, ANCOVA tests were conducted to examine differences in adaptive and behavioral functioning across profiles. Age, sex, race, and ethnicity were included as covariates in the ANCOVA analysis. Significant univariate results were followed up with pairwise comparisons.

RESULTS

Latent profile analysis

LPA testing 1-, 2-, 3-, 4-, and 5-profiles were fit to the data. Table 3 presents model fit indices used to determine the optimal number of profiles. The AIC, BIC, and ABIC values decrease as the number of profiles increases, indicating better model fit. However, compared with the 4-profile solution, the LMR *p*-value ($p = 0.228$) indicated that the model fit did not improve with the 5-profile solution compared with the 4-profile solution. Additionally, the smallest profile size in the 5-profile solution was 10 (3.8%) and the entropy value was higher for the 4-profile model. Furthermore, meaningful interpretations for profiles were considered in determining optimal model fit. For example, the 2-profile solution had similar model fit indices but less meaningful interpretation of profiles compared with the 4-profile solution. Thus, the 4-profile solution (AIC: 6425.408; BIC: 6491.026; LMRT: $p = 0.024$) was considered the best fit for the data due to model fit indices and for parsimony (Table 3).

Latent profiles were interpreted based on the estimated means of each indicator (cohesion, conflict, and organization). Profile 1 was defined by *low cohesion*, which contained approximately 6% of the sample ($n = 16$, 5.65%). Profile 2 was defined by *low organization* and contained approximately 30% of the sample ($n = 86$, 30.3%). The largest group

TABLE 3 Model fit criteria.

Models	AIC	BIC	ABIC	Entropy	BLRT *p*-value	BLRT meaning	LMR *p*-value	LMR meaning	Percent in profile (%)
1 Profile	6642.369	6664.242	6645.216	–	–	–	–	–	100
2 Profile	6520.003	6556.457	6524.747	0.927	<0.001	2 > 1	<0.001	2 > 1	14, 85
3 Profile	6469.486	6520.522	6476.128	0.884	<0.001	3 > 2	0.783	3 > 2	32, 8, 58
4 Profile	**6425.408**	**6491.026**	**6433.947**	**0.921**	**<0.001**	**4 > 3**	**0.024**	**4 > 3**	**6, 30, 56, 8**
5 Profile	6403.041	6483.241	6413.479	0.908	<0.001	5 > 4	0.228	5 > 4	3, 27, 50, 8, 8

Note: Bold font indicates best-fitting model.

TABLE 4 FES scores across profiles.

	Cohesion		Conflict		Organization	
Family environment profiles	***M***	**SE**	***M***	**SE**	***M***	**SE**
Profile 1: Low cohesion	24.184	6.115	50.305	3.894	61.581	0.852
Profile 2: Low organization	56.711	1.104	53.838	1.442	43.118	0.786
Profile 3: High cohesion and organization	58.878	0.820	46.048	0.919	62.409	0.412
Profile 4: High conflict	29.552	3.370	62.935	2.238	43.192	1.293

TABLE 5 Demographic characteristics of profiles derived from latent profile analysis.

	Profile 1	Profile 2	Profile 3	Profile 4
Family environment profiles	**Low cohesion ($n=16$)**	**Low organization ($n=86$)**	**High cohesion and organization ($n=159$)**	**High conflict ($n=22$)**
Gender [*n* (%)]				
Female	6 (37.5)	36 (42.4)	78 (49.1)	7 (31.8)
Male	10 (62.5)	49 (57.6)	81 (50.9)	15 (68.2)
Race [*n* (%)]				
White	9 (56.3)	34 (40.0)	86 (54.1)	15 (68.2)
Not White	7 (43.8)	51 (60.0)	73 (45.9)	7 (31.8)
Ethnicity [*n* (%)]				
Hispanic or Latino	4 (25)	31 (36.5)	63 (40.9)	4 (18.2)
Not Hispanic or Latino	12 (75)	49 (57.6)	91 (57.2)	18 (81.8)
Caregiver [*n* (%)]				
Foster or Adopted	15 (93.8)	74 (87.1)	121 (76.1)	19 (86.4)
Biological Mother	1 (6.3)	6 (7.1)	16 (10.1)	3 (13.6)
Other Guardian	0 (0)	6 (7.1)	20 (12.7)	0 (0)
Age [*M* (SD)]	9.3 (4.58)	10.6 (3.63)	9.8 (3.45)	11.9 (2.87)

was Profile 3, which was defined as *high cohesion and organization* and contained over half of the sample ($n=159$, 56.18%). Profile 4 contained the remainder of the sample and was defined as *high conflict* ($n=22$, 7.78%) (Tables 4 and 5 and Figure 1). Thus, four distinct profiles of family environments in children with PAE were determined.

There were no differences between profiles on race [X^2 ($df=3$)$=3.076$, $p=0.380$], ethnicity [X^2 ($df=3$)$=5.387$, $p=0.146$], sex [X^2 ($df=3$)$=3.205$, $p=0.361$], or caregiver (i.e., biological vs. nonbiological families) [X^2 ($df=3$)$=7.923$, $p=0.244$]. However, profiles differed significantly on age [F (3, 278)$=3.058$, $p=0.029$]. Pairwise comparisons indicated that the high conflict group had significantly older children than the low cohesion (mean difference of 2.641 (95% CI, 0.353 to 4.929), $p=0.024$), and high cohesion and organization (mean difference of 2.063 (95% CI, 0.479 to 3.648), $p=0.011$) profiles. The characteristics of participants in each profile are presented in Table 4.

ANCOVA

A one-way analysis of covariance (ANCOVA) was run to determine whether there were group differences in adaptive functioning and problem behaviors across different family environment profiles. There was homoscedasticity as assessed by visual inspection of a scatterplot. There were no extreme outliers in the data, as indicated by no cases with standardized residuals greater than 3 standard deviations. For the analysis of Internalizing Behavior, the assumption of homogeneity of variance was not met (Levene's test$=0.036$). Thus, we ran the ANCOVA's using Welch's test to address the significant heterogeneity of variances observed in the data.

After controlling for race, sex, age, and ethnicity, there were significant profile differences on the Internalizing (Welch's F (3, 37.097)$=3.363$, $p=0.024$), Externalizing (Welch's F (3, 37.574)$=3.302$, $p=0.031$), and Total (Welch's F (3, 36.792)$=4.206$, $p=0.012$) Problem Behavior scales of the CBCL. There was not a statistically significant difference between profiles on the Adaptive Functioning Composite scale on the VABS-3 (Welch's F (3, 43.116)$=0.342$, $p=0.795$).

Pairwise comparisons using Games–Howell were performed for statistically significant ANCOVA results (Table 6). The high conflict profile had statistically greater internalizing problem behaviors compared with the low organization profile (mean difference of 5.799 (95% CI, 0.86 to 10.73), $p=0.02$). The high conflict

ALCOHOL CLINICAL & EXPERIMENTAL RESEARCH

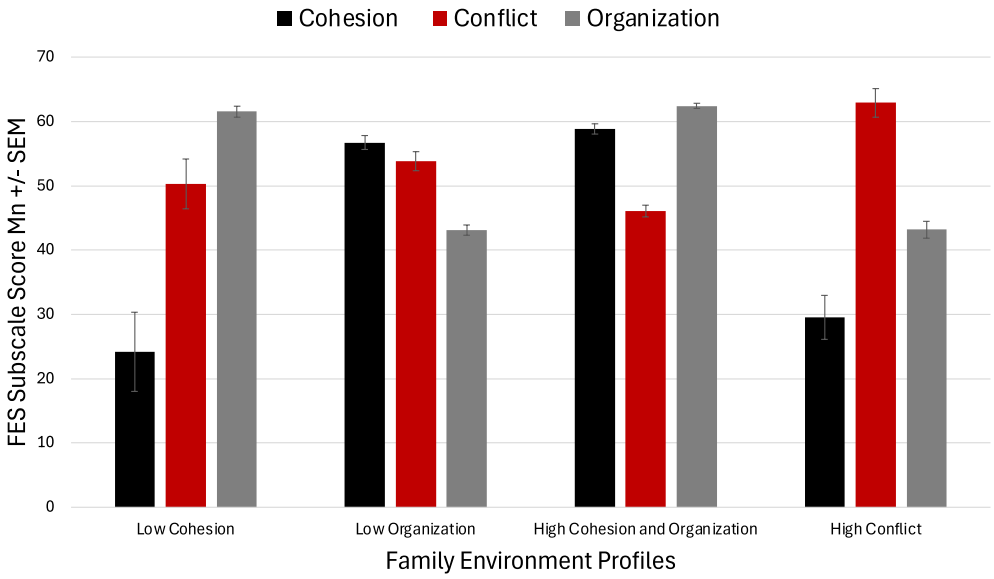

FIGURE 1 FES subscale scores across profiles for families of children with prenatal alcohol exposure.

TABLE 6 Behavioral and adaptive functioning outcomes across profiles.

Outcome variable	LPA profile	*M*	SE
Internalizing behavior	Low cohesion	66.27	4.359
	Low organization	59.88[a]	1.195
	High cohesion and organization	61.57	0.913
	High conflict	65.68[a]	1.427
Externalizing behavior	Low cohesion	66.91	2.946
	Low organization	64.21[a]	1.355
	High cohesion and organization	64.70[a]	0.939
	High conflict	70.91[a]	1.866
Total problem behaviors	Low cohesion	68.82	3.368
	Low organization	65.82[a]	1.243
	High cohesion and organization	67.57[a]	0.767
	High conflict	72.32[a]	1.392
Adaptive behavior functioning	Low cohesion	78.33	2.937
	Low organization	79.70	1.494
	High cohesion and organization	76.70	0.930
	High conflict	78.73	6.636

[a]Indicates a significant profile difference ($p < 0.05$).

profile had significantly greater externalizing problem behaviors compared to the low organization profile (mean difference of 6.701 (95% CI, 0.55 to 12.85), $p < 0.01$), and the high cohesion and organization profile (mean difference of 6.213 (95% CI, 0.55 to 11.87), $p < 0.01$). The high conflict profile had significantly greater total problem behaviors compared with the low organization profile (mean difference of 6.500 (95% CI, 1.56 to 11.44, $p \leq 0.01$)), and the high cohesion and organization profile (mean difference of 4.748 (95% CI, 0.46 to 9.03), $p = 0.02$).

DISCUSSION

This study identified patterns in the family environment in a large sample of children with a history of PAE using a latent profile analysis. Four distinct profiles emerged as the best model fit for families of children with PAE. The four profiles were: (1) low cohesion, (2) low organization, (3) high cohesion and organization, and (4) high conflict. This highlights the need to further explore the different family environments in children with PAE. Further, this study examined

how these patterns of family environments differed in child behavioral and adaptive functioning. Results revealed that profiles differed in internalizing, externalizing, and total problem behaviors but not in adaptive functioning.

Patterns of family profiles

Regarding the first aim of the study (i.e., to identify profiles of family environments), LPA identified four distinct patterns of family environments in children with PAE characterized by cohesion, conflict, and organization. The first profile was characterized by very low cohesion, high organization, and average conflict. This was the smallest profile of families (5.65%) out of the four profiles. Profile 2 was the second largest group (30.30%) and consisted of families with low organization, high cohesion, and average conflict. The third profile contained the majority (56.18%) of families. These families had high cohesion and organization and low conflict. The fourth profile consisted of families (7.78%) with high conflict and low cohesion and organization. While the sociodemographic characteristics were relatively similar across profiles, the high conflict profile (Profile 4) was older than the other profiles. Notably, our sample of caregivers was primarily foster or adoptive parents (>80%).

The results of this study were consistent with the hypothesis that there would be different patterns in the family environment in families of children with PAE. Previous research has indicated that home conflict increases in households with adolescents compared with younger children (Herrenkohl et al., 2009) which is consistent with our finding that the high conflict profile was older than the other profiles. The other demographic factors included in this study were similar across profiles. However, there are several demographic factors not included in this analysis that may contribute to different profiles, such as socioeconomic status (SES), parental mental health and stress, and childhood exposure to trauma. SES has been shown to influence patterns in the family environment such that economic hardship creates family stress, which negatively impacts family relationships (Conger et al., 2010). Additionally, intergenerational trauma can also impact the family environment and child behavioral outcomes (Fitzgerald et al., 2020). Future research should include these demographic factors to explore the impact on family environment patterns.

This study was novel in the approach to explore patterns of the family environment in families of children with neurodevelopmental disorders. Additionally, there is limited research on the family environment in children with PAE and no previous research to our knowledge on patterns in the family environment. However, this study adds to the small body of literature on emerging patterns in family environments, highlighting the diversity in families in different populations and the importance of identifying and exploring these different family profiles (Glatz et al., 2020; Simpson et al., 2018).

Behavioral outcomes

For the second aim of the study, we found that there were significant differences among profiles on the internalizing, externalizing, and total problem behavior scales of the CBCL. This is consistent with the literature that family environmental factors can significantly impact behavioral outcomes in children and adolescents (Simpson et al., 2018; Zilanawala et al., 2019). Family functioning has been shown to impact internalizing and externalizing behaviors in children and adolescents (Simpson et al., 2018; Zilanawala et al., 2019). There were no significant differences in adaptive functioning across profiles. However, given that the adaptive functioning standard scores have a population mean of 100 and a standard deviation of 15, each of the profiles had below-average adaptive functioning (mean adaptive scores ranging from 77 to 80). This suggests that the effect of PAE on adaptive functioning may be less influenced by the family environment or may be more universally impaired in this population (i.e., a core deficit; Crocker et al., 2009; Kautz-Turnbull & Petrenko, 2021). The results suggest that problem behaviors may be particularly susceptible to influences in the family environment. It is also possible that adaptive functioning may have been more susceptible to one of the other FES subscales (i.e., achievement orientation) that were not explored in this study.

The high conflict profile (Profile 4) had the most significant differences compared with the other profiles across internalizing, externalizing, and total problem behaviors. These findings resonate with the current literature that family conflict can have significant negative impacts on behavioral outcomes in typically developing children (Hosokawa et al., 2023; Yang et al., 2023). Family conflict has been associated with increased internalizing and externalizing behaviors in both children and adolescents (Hosokawa et al., 2023; Yang et al., 2023). Family conflict has not been specifically explored in children with PAE. However, in children with other neurodevelopmental disorders, conflict has been associated with an increased risk for problem behaviors (Chan et al., 2022).

The low cohesion profile also had elevated behavior problems that were trending toward significance. Previous literature has indicated that family cohesion is associated with positive outcomes in children, such as socioemotional development and decreased problem behaviors, such as lower rates of aggressive behaviors (Andreas & Watson, 2009; Crea et al., 2014; Daniels & Bryan, 2021; Greenlee et al., 2018). This is consistent with our finding that families with low cohesion exhibited high externalizing and internalizing behaviors. More research should be done to continue to explore family cohesion and its effect on behavioral outcomes.

Although there is research to support the relationship between family environment and child outcomes, there has been little research on the factors that influence this relationship. Previous research has found that in families of children with ADHD, family functioning is lower such that parents reported significantly more stress and a lower quality of life (Bhide et al., 2024; Breaux & Harvey, 2019). Research also suggests that there may be a

bidirectional relationship between family factors and child behavior outcomes such that in families of a child with ADHD, greater maternal stress predicts increased child ADHD symptoms, and greater child ADHD symptoms predict elevated maternal stress (Breaux & Harvey, 2019). Additionally, in a review of the family environment in children with FASD, researchers identified parent challenges in navigating stigma and stress in managing child behavior as factors that may impact the family environment and subsequently influence child outcomes (Olson et al., 2009). Thus, there may be similar bidirectional effects of child behavior and family environmental factors in families of children with FASD.

Clinical implications

This study provides information on patterns of family environment characteristics in children with PAE and the impact of the family environment on child outcomes. This has important clinical implications, as it provides novel insight into areas of strengths and challenges in families of children with PAE. Treatment targets can be identified based on family environment characteristics in individuals with PAE. For example, while the majority of families were in the family environment profile characterized by low conflict and high cohesion and organization, some families exhibited lower cohesion and organization and higher conflict, which were significantly associated with problem behaviors.

This study suggests that the family environment may influence problem behaviors in children with PAE. Thus, the family environment may be an important area to intervene in to increase positive outcomes in children with PAE. Several family-focused interventions have been recently developed for families of children with FASD (Petrenko et al., 2019; Reid et al., 2017). A systematic review of interventions for children with FASD has found family-focused interventions to be helpful in reducing child problem behaviors and increasing family well-being (Flannigan et al., 2020). Results from this study suggest that specifically reducing family conflict and fostering family cohesion may be important treatment targets for this population. Existing treatments, such as Parent–Child Interaction Therapy and behavioral parent training programs, have been used successfully in children with FASD and target parent–child relationship factors such as conflict and cohesion (Flannigan et al., 2020). Thus, these intervention strategies, as well as newly developed interventions for families with FASD specifically, should continue to be utilized by clinicians to target these key areas.

Limitations

There are several limitations that should be addressed when interpreting study findings. Our sample was 55% white and 37.4% Hispanic/Latino. While we did have many families from diverse backgrounds, the demographics of our sample mimic those of San Diego County (57.9% white, 34.5% Hispanic/Latino; US Census Bureau, 2022), our results may not generalize to all racial or cultural groups. All of our participants were recruited for participation at a university research site, which may lead to a biased sample of families who were willing to participate in research. Additionally, we chose not to remove child participants from the same family (i.e., nonbiological siblings) to avoid data loss. Many children in the sample are in foster or adoptive families. Thus, siblings often have different family experiences, which was reflected in the way the FES was completed by caregivers. Including siblings allowed us to best capture the experiences of children with PAE in our sample. However, due to the large number of foster or adoptive families, our sample may not capture the full range of caregiver experiences. Thus, this should be considered in future research in families of children with PAE. The study relies on caregiver reporting, which may also lead to bias. The FES was only completed by one member of the family, and this may not represent the experiences of the family as a whole. The child experiences of the family environment were not captured in this study. Additionally, while the full sample size was large, the profile groups varied in sample size, with two of the groups <10% of the sample. We chose to eliminate several subscales from LPA, which may have been significant family environment indicators. Despite these limitations, this study had many strengths and can be used to inform future research and clinical practice.

Future research

The family environment in children with PAE and the impact on cognitive and behavioral outcomes is not well understood. Thus, future research should continue to explore the family environment in children with PAE, especially in underrepresented families. To build upon this research, latent profile analysis should be conducted with additional outcome measures to explore profile characteristics such as cognitive functioning. The FES subscales that were not included in this analysis should be explored in a latent profile analysis, such as examining patterns in the three FES dimensions and the subscales from the Personal Growth dimension to inform the literature on novel clinical intervention targets and potential resiliency factors (e.g., religious and cultural factors). Additionally, different family environment indicators can be used, such as exposure to adversity and parent/caregiver stress and mental health, to explore the impact of different characteristics on caregiver and child outcomes. The impact on adaptive functioning should continue to be explored using different subscales on the FES and other family environment indicators. Family environment patterns should also be explored in typically developing children and other neurodevelopmental disorder populations in order to identify unique family environmental characteristics in children with PAE. Lastly, it is critical to further explore patterns of different family environments in children with PAE (e.g., foster caregivers).

Summary

This study provides novel information about patterns in the family environment in children with PAE. To the best of our knowledge,

this study is the first to use this analytic approach to study the family environment in children with PAE. LPA identified four distinct patterns of family environments in children with PAE characterized by cohesion, conflict, and organization: (1) low cohesion, (2) low organization, (3) high cohesion and organization, and (4) high conflict. In comparing the different profiles, significant differences were found on the internalizing, externalizing, and total problem behavior scales of the CBCL. There were no significant differences in adaptive functioning across profiles. The high conflict profile was associated with increased behavior problems. Overall, this study sheds light on the experiences of families of children with PAE, and findings can be used to inform family-focused interventions to meet the unique needs of this population.

ACKNOWLEDGMENTS

The authors thank the families who graciously participate in our studies. All or part of this work was done in conjunction with the Collaborative Initiative on Fetal Alcohol Spectrum Disorders (CIFASD, https://doi.org/10.5967/ntw9-h991), which is funded by grants from the National Institute on Alcohol Abuse and Alcoholism (NIAAA). Additional information about CIFASD, including about data-sharing opportunities, can be found at www.cifasd.org. Data from this study are part of Phase 2 (2007-2012) and Phase 4 (2017-2022). Research described in this paper was supported by NIAAA grant number U01 AA014834. Additional support was provided by NIAAA grant T32 AA013525 and F31 AA031883.

CONFLICT OF INTEREST STATEMENT

The authors have no financial or other conflicts of interest.

DATA AVAILABILITY STATEMENT

All or part of this work was done in conjunction with the Collaborative Initiative on Fetal Alcohol Spectrum Disorders (CIFASD, https://doi.org/10.5967/ntw9-h991), which is funded by grants from the National Institute on Alcohol Abuse and Alcoholism (NIAAA). Additional information about CIFASD, including information describing available data, can be found at www.cifasd.org.

ORCID

Sarah N. Mattson https://orcid.org/0000-0001-8499-9605

REFERENCES

Achenbach, T.M. & Rescorla, L.A. (2001) *Manual for the ASEBA school-age forms & profiles*. Burlington, VT: University of Vermont, Research Center for Children, Youth, & Families.

Agnew-Blais, J.C., Wertz, J., Arseneault, L., Belsky, D.W., Danese, A., Pingault, J.B. et al. (2022) Mother's and children's ADHD genetic risk, household chaos and children's ADHD symptoms: a gene-environment correlation study. *Journal of Child Psychology and Psychiatry*, 63(10), 1153–1163. Available from: https://doi.org/10.1111/jcpp.13659

Andreas, J.B. & Watson, M.W. (2009) Moderating effects of family environment on the association between children's aggressive beliefs and their aggression trajectories from childhood to adolescence. *Development and Psychopathology*, 21(1), 189–205. Available from: https://doi.org/10.1017/s0954579409000121

Bhide, S., Efron, D., Ukoumunne, O.C., Anderson, V., Nicholson, J.M., Silk, T. et al. (2024) Family functioning in children with ADHD and subthreshold ADHD: a 3-year longitudinal study. *Journal of Attention Disorders*, 28(4), 480–492. Available from: https://doi.org/10.1177/10870547231217089

Breaux, R.P. & Harvey, E.A. (2019) A longitudinal study of the relation between family functioning and preschool ADHD symptoms. *Journal of Clinical Child and Adolescent Psychology*, 48(5), 749–764. Available from: https://doi.org/10.1080/15374416.2018.1437737

Chan, K.K.S., Wang, Z. & Li, H. (2022) Longitudinal impact of mindful parenting on internalizing and externalizing symptoms among children with autism spectrum disorder. *Mindfulness*, 13(8), 1984–1993. Available from: https://doi.org/10.1007/s12671-022-01933-4

Chasnoff, I.J., Wells, A.M. & King, L. (2015) Misdiagnosis and missed diagnoses in foster and adopted children with prenatal alcohol exposure. *Pediatrics*, 135(2), 264–270. Available from: https://doi.org/10.1542/peds.2014-2171

Coe, J.L., Davies, P.T. & Sturge-Apple, M.L. (2018) Family cohesion and enmeshment moderate associations between maternal relationship instability and children's externalizing problems. *Journal of Family Psychology*, 32(3), 289–298. Available from: https://doi.org/10.1037/fam0000346

Coles, C.D., Bandoli, G., Kable, J.A., Del Campo, M., Suttie, M. & Chambers, C.D. (2023) Comparison of three systems for the diagnosis of fetal alcohol spectrum disorders in a community sample. *Alcohol: Clinical and Experimental Research*, 47(2), 370–381. Available from: https://doi.org/10.1111/acer.14999

Conger, R.D., Conger, K.J. & Martin, M.J. (2010) Socioeconomic status, family processes, and individual development. *Journal of Marriage and the Family*, 72(3), 685–704. Available from: https://doi.org/10.1111/j.1741-3737.2010.00725.x

Crawford, A., Te Nahu, L.T.H., Peterson, E.R., McGinn, V., Robertshaw, K. & Tippett, L. (2020) Cognitive and social/emotional influences on adaptive functioning in children with FASD: clinical and cultural considerations. *Child Neuropsychology*, 26(8), 1112–1144. Available from: https://doi.org/10.1080/09297049.2020.1771296

Crea, T.M., Chan, K. & Barth, R.P. (2014) Family environment and attention-deficit/hyperactivity disorder in adopted children: associations with family cohesion and adaptability. *Child: Care, Health and Development*, 40(6), 853–862. Available from: https://doi.org/10.1111/cch.12112

Crocker, N., Vaurio, L., Riley, E.P. & Mattson, S.N. (2009) Comparison of adaptive behavior in children with heavy prenatal alcohol exposure or attention-deficit/hyperactivity disorder. *Alcoholism: Clinical and Experimental Research*, 33(11), 2015–2023. Available from: https://doi.org/10.1111/j.1530-0277.2009.01040.x

Daniels, A.D. & Bryan, J. (2021) Resilience despite complex trauma: family environment and family cohesion as protective factors. *The Family Journal*, 29(3), 336–345. Available from: https://doi.org/10.1177/10664807211000719

Dozet, D., Burd, L. & Popova, S. (2021) Screening for alcohol use in pregnancy: a review of current practices and perspectives. *International Journal of Mental Health and Addiction*, 21, 1220–1239. Available from: https://doi.org/10.1007/s11469-021-00655-3

Easey, K.E., Dyer, M.L., Timpson, N.J. & Munafò, M.R. (2019) Prenatal alcohol exposure and offspring mental health: a systematic review. *Drug and Alcohol Dependence*, 197, 344–353. Available from: https://doi.org/10.1016/j.drugalcdep.2019.01.007

Eyberg, S. (2008) Parent-child interaction therapy. *Child & Family Behavior Therapy*, 10, 33–46. Available from: https://doi.org/10.1300/J019v10n01_04

Ferguson, S.L., Moore, G., W, E. & Hull, D.M. (2020) Finding latent groups in observed data: a primer on latent profile analysis in Mplus for applied researchers. *International Journal of Behavioral Development*,

44(5), 458–468. Available from: https://doi.org/10.1177/0165025419881721

Fitzgerald, M., London-Johnson, A. & Gallus, K.L. (2020) Intergenerational transmission of trauma and family systems theory: an empirical investigation. *Journal of Family Therapy*, 42(3), 406–424. Available from: https://doi.org/10.1111/1467-6427.12303

Flannigan, K., Coons-Harding, K.D., Anderson, T., Wolfson, L., Campbell, A., Mela, M. et al. (2020) A systematic review of interventions to improve mental health and substance use outcomes for individuals with prenatal alcohol exposure and fetal alcohol spectrum disorder. *Alcoholism: Clinical and Experimental Research*, 44(12), 2401–2430. Available from: https://doi.org/10.1111/acer.14490

Flannigan, K., Kapasi, A., Pei, J., Murdoch, I., Andrew, G. & Rasmussen, C. (2021) Characterizing adverse childhood experiences among children and adolescents with prenatal alcohol exposure and fetal alcohol Spectrum disorder. *Child Abuse & Neglect*, 112, 10488. Available from: https://doi.org/10.1016/j.chiabu.2020.104888

Gebru, N.M., Goncalves, P.D., Cruz, R.A., Thompson, W.K., Allegair, N., Potter, A. et al. (2023) Effects of parental mental health and family environment on impulsivity in preadolescents: a longitudinal ABCD study(®). *Frontiers in Behavioral Neuroscience*, 17, 1213894. Available from: https://doi.org/10.3389/fnbeh.2023.1213894

Glatz, T., Lippold, M., Jensen, T.M., Fosco, G.M. & Feinberg, M.E. (2020) Hostile interactions in the family: patterns and links to youth externalizing problems. *The Journal of Early Adolescence*, 40(1), 56–82. Available from: https://doi.org/10.1177/0272431618824718

Gordon-Hacker, A., Bar-Shachar, Y., Egotubov, A., Uzefovsky, F. & Gueron-Sela, N. (2023) Trajectories and associations between maternal depressive symptoms, household chaos and children's adjustment through the COVID-19 pandemic: a four-wave longitudinal study. *Research on Child and Adolescent Psychopathology*, 51(1), 103–117. Available from: https://doi.org/10.1007/s10802-022-00954-w

Greenlee, J.L., Winter, M.A. & Diehl, J.J. (2018) Family level processes associated with outcomes for individuals with autism spectrum disorder: a scoping review. *Research in Autism Spectrum Disorders*, 53, 41–52. Available from: https://doi.org/10.1016/j.rasd.2018.06.002

Harding, K.D., Burns, C., Lafontaine, C., Wrath, A., Groom, A., Flannigan, K. et al. (2024) Challenges and strengths experienced by fetal alcohol spectrum disorder diagnostic clinics in Canada. *Journal of Intellectual and Developmental Disability*, 49(3), 1–11. Available from: https://doi.org/10.3109/13668250.2023.2293336

Herrenkohl, T.I., Kosterman, R., Hawkins, J.D. & Mason, W.A. (2009) Effects of growth in family conflict in adolescence on adult depressive symptoms: mediating and moderating effects of stress and school bonding. *The Journal of Adolescent Health*, 44(2), 146–152. Available from: https://doi.org/10.1016/j.jadohealth.2008.07.005

Hosokawa, R., Tomozawa, R. & Katsura, T. (2023) Associations between family routines, family relationships, and children's behavior. *Journal of Child and Family Studies*, 32(12), 3988–3998. Available from: https://doi.org/10.1007/s10826-023-02687-w

Hoyme, H.E., Kalberg, W.O., Elliott, A.J., Blankenship, J., Buckley, D., Marais, A.S. et al. (2016) Updated clinical guidelines for diagnosing fetal alcohol spectrum disorders. *Pediatrics*, 138(2), e20154256. Available from: https://doi.org/10.1542/peds.2015-4256

Jacobson, J.L., Akkaya-Hocagil, T., Ryan, L.M., Dodge, N.C., Richardson, G.A., Carmichael Olson, H. et al. (2021) Effects of prenatal alcohol exposure on cognitive and behavioral development: findings from a hierarchical meta-analysis of data from six prospective longitudinal US cohorts. *Alcoholism: Clinical and Experimental Research*, 45(10), 2040–2058. Available from: https://doi.org/10.1111/acer.14686

Jones, K.L., Hoyme, H.E., Robinson, L.K., Del Campo, M., Manning, M.A., Prewitt, L.M. et al. (2010) Fetal alcohol spectrum disorders: extending the range of structural defects. *American Journal of Medical Genetics. Part A*, 152a(11), 2731–2735. Available from: https://doi.org/10.1002/ajmg.a.33675

Kautz-Turnbull, C. & Petrenko, C.L.M. (2021) A meta-analytic review of adaptive functioning in fetal alcohol spectrum disorders, and the effect of IQ, executive functioning, and age. *Alcoholism: Clinical and Experimental Research*, 45(12), 2430–2447. Available from: https://doi.org/10.1111/acer.14728

Kautz-Turnbull, C., Rockhold, M., Handley, E.D., Olson, H.C. & Petrenko, C. (2023) Adverse childhood experiences in children with fetal alcohol spectrum disorders and their effects on behavior. *Alcoholism, Clinical and Experimental Research*, 47(3), 577–588. Available from: https://doi.org/10.1111/acer.15010

Khoury, J.E., Jamieson, B. & Milligan, K. (2018) Risk for childhood internalizing and externalizing behavior problems in the context of prenatal alcohol exposure: a meta-analysis and comprehensive examination of moderators. *Alcoholism: Clinical and Experimental Research*, 42(8), 1358–1377. Available from: https://doi.org/10.1111/acer.13805

Marsh, S., Dobson, R. & Maddison, R. (2020) The relationship between household chaos and child, parent, and family outcomes: a systematic scoping review. *BMC Public Health*, 20(1), 513. Available from: https://doi.org/10.1186/s12889-020-08587-8

Mattson, J.T., Thorne, J.C. & Kover, S.T. (2022) Parental interaction style, child engagement, and zemerging executive function in fetal alcohol spectrum disorders (FASD). *Child Neuropsychology*, 28(7), 853–877. Available from: https://doi.org/10.1542/peds.2015-2542

Mattson, S.N., Bernes, G.A. & Doyle, L.R. (2019) Fetal alcohol Spectrum disorders: a review of the neurobehavioral deficits associated with prenatal alcohol exposure. *Alcoholism, Clinical and Experimental Research*, 43(6), 1046–1062. Available from: https://doi.org/10.1111/acer.14040

Mattson, S.N., Foroud, T., Sowell, E.R., Jones, K.L., Coles, C.D., Fagerlund, A. et al. (2010) Collaborative initiative on fetal alcohol spectrum disorders: methodology of clinical projects. *Alcohol*, 44(7–8), 635–641. Available from: https://doi.org/10.1016/j.alcohol.2009.08.005

May, P.A., Chambers, C.D., Kalberg, W.O., Zellner, J., Feldman, H., Buckley, D. et al. (2018) Prevalence of fetal alcohol spectrum disorders in 4 US communities. *JAMA*, 319(5), 474–482. Available from: https://doi.org/10.1001/jama.2017.21896

McLachlan, K., Flannigan, K., Temple, V., Unsworth, K. & Cook, J.L. (2020) Difficulties in daily living experienced by adolescents, transition-aged youth, and adults with fetal alcohol spectrum disorder. *Alcoholism, Clinical and Experimental Research*, 44(8), 1609–1624. Available from: https://doi.org/10.1111/acer.14385

Moore, E.M. & Riley, E.P. (2015) What happens when children with fetal alcohol spectrum disorders become adults? *Current Developmental Disorders Reports*, 2(3), 219–227. Available from: https://doi.org/10.1007/s40474-015-0053-7

Moos, R. & Moos, B. (2009) *Family Environment Scale manual and sampler set: development, applications, and research*. Palo Alto, CA, USA: Mind Garden. Inc.

Muthén, B. & Muthén, L.K. (2000) Integrating person-centered and variable-centered analyses: growth mixture modeling with latent trajectory classes. *Alcoholism, Clinical and Experimental Research*, 24(6), 882–891. Available from: https://doi.org/10.1111/j.1530-0277.2000.tb02070.x

Myers, G., Burd, M., Klug, M.G., Popova, S. & Burd, L. (2025) Comparing rates of agreement between different diagnostic criteria for fetal alcohol spectrum disorder: a systematic review. *Alcohol: Clinical and Experimental Research*, 49(1), 81–91. Available from: https://doi.org/10.1111/acer.15492

O'Connor, M.J., Kogan, N. & Findlay, R. (2002) Prenatal alcohol exposure and attachment behavior in children. *Alcoholism, Clinical and Experimental Research*, 26(10), 1592–1602. Available from: https://doi.org/10.1097/01.alc.0000034665.79909.f0

O'Connor, M.J. & Paley, B. (2009) Psychiatric conditions associated with prenatal alcohol exposure. *Developmental Disabilities Research*

Reviews, 15(3), 225–234. Available from: https://doi.org/10.1002/ddrr.74

Olson, H.C., Oti, R., Gelo, J. & Beck, S. (2009) "Family matters": fetal alcohol spectrum disorders and the family. *Developmental Disabilities Research Reviews*, 15(3), 235–249. Available from: https://doi.org/10.1002/ddrr.65

Petrenko, C.L.M., Demeusy, E.M. & Alto, M.E. (2019) Six-month follow-up of the families on track intervention pilot trial for children with fetal alcohol spectrum disorders and their families. *Alcoholism, Clinical and Experimental Research*, 43(10), 2242–2254. Available from: https://doi.org/10.1111/acer.14180

Pfiffner, L.J. & Kaiser, N.M. (2016) Behavioral parent training. In: Dulcan (Ed.) *Textbook of child and adolescent psychiatry*, 2nd edition. Washington, DC: American Psychiatric Publishing, Inc., pp. 901–935.

Pressman, L.J., Loo, S.K., Carpenter, E.M., Asarnow, J.R., Lynn, D., McCracken, J.T. et al. (2006) Relationship of family environment and parental psychiatric diagnosis to impairment in ADHD. *Journal of the American Academy of Child & Adolescent Psychiatry*, 45(3), 346–354. Available from: https://doi.org/10.1097/01.chi.0000192248.61271.c8

Reid, N., Akison, L.K., Hoy, W. & Moritz, K.M. (2019) Adverse health outcomes associated with fetal alcohol exposure: a systematic review focused on cardio-renal outcomes. *Journal of Studies on Alcohol and Drugs*, 80(5), 515–523. Available from: https://doi.org/10.15288/jsad.2019.80.515

Reid, N., Dawe, S., Harnett, P., Shelton, D., Hutton, L. & O'Callaghan, F. (2017) Feasibility study of a family-focused intervention to improve outcomes for children with FASD. *Research in Developmental Disabilities*, 67, 34–46. Available from: https://doi.org/10.1016/j.ridd.2017.06.004

Reid, N., Kent, N., Hewlett, N., Bagley, K., Tsang, T.W., Goldsbury, S. et al. (2023) Factors to be considered as part of a holistic assessment for fetal alcohol spectrum disorder: a scoping review. *Alcohol: Clinical and Experimental Research*, 47(11), 2007–2021. Available from: https://doi.org/10.1111/acer.15191

Simpson, E.G., Vannucci, A. & Ohannessian, C.M. (2018) Family functioning and adolescent internalizing symptoms: a latent profile analysis. *Journal of Adolescence*, 64, 136–145. Available from: https://doi.org/10.1016/j.adolescence.2018.02.004

Sparrow, S.S., Cicchetti, D.V. & Saulnier, C.A. (2016) *Vineland adaptive behavior scales*, 3rd edition (Vineland-3). San Antonio, TX: Pearson.

Streissguth, A.P., Bookstein, F.L., Barr, H.M., Sampson, P.D., O'Malley, K. & Young, J.K. (2004) Risk factors for adverse life outcomes in fetal alcohol syndrome and fetal alcohol effects. *Journal of Developmental & Behavioral Pediatrics*, 25(4), 228–238. Available from: https://doi.org/10.1097/00004703-200408000-00002

Tan, C.H., Denny, C.H., Cheal, N.E., Sniezek, J.E. & Kanny, D. (2015) Alcohol use and binge drinking among women of childbearing age – United States, 2011–2013. *MMWR. Morbidity and Mortality Weekly Report*, 64(37), 1042–1046. Available from: https://doi.org/10.15585/mmwr.mm6437a3

Trevino, A.D., Jamil, B., Su, J., Aliev, F., Elam, K.K. & Lemery-Chalfant, K. (2024) Alcohol use disorder polygenic risk scores and trajectories of early adolescent externalizing behaviors: examining the role of parenting and family conflict in the racially/ethnically diverse ABCD sample. *Behavior Genetics*, 54(1), 101–118. Available from: https://doi.org/10.1007/s10519-023-10155-w

Tsang, T.W., Lucas, B.R., Olson, H.C., Pinto, R.Z. & Elliott, E.J. (2016) Prenatal alcohol exposure, FASD, and child behavior: a meta-analysis. *Pediatrics*, 137(3), 1–20. Available from: https://doi.org/10.1542/peds.2015-2542

U.S. Census Bureau. (2022) Population and diversity, *San Diego County*. Available from: https://datausa.io/profile/geo/san-diego-ca

Wirth, A., Reinelt, T., Gawrilow, C., Schwenck, C., Freitag, C.M. & Rauch, W.A. (2019) Examining the relationship between children's ADHD symptomatology and inadequate parenting: the role of household chaos. *Journal of Attention Disorders*, 23(5), 451–462. Available from: https://doi.org/10.1177/1087054717692881

Yang, B., Anderson, Z., Zhou, Z., Liu, S., Haase, C.M. & Qu, Y. (2023) The longitudinal role of family conflict and neural reward sensitivity in youth's internalizing symptoms. *Social Cognitive and Affective Neuroscience*, 18(1), nsad037. Available from: https://doi.org/10.1093/scan/nsad037

Zilanawala, A., Sacker, A. & Kelly, Y. (2019) Internalising and externalising behaviour profiles across childhood: the consequences of changes in the family environment. *Social Science & Medicine*, 226, 207–216. Available from: https://doi.org/10.1016/j.socscimed.2019.02.048

How to cite this article: Felicicchia, R.J., Hyland, M.T., Roesch, S.C. & Mattson, S.N. (2025) Identifying family environment profiles in families of children with prenatal alcohol exposure. *Alcohol: Clinical and Experimental Research*, 00, 1–12. Available from: https://doi.org/10.1111/acer.70016