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Profiles of Child Internalizing and Externalizing Problems During the COVID-19 Pandemic in Jordan and Differences in Mothers' Psychosocial Functioning

ملامح مشاكل التنشئة الداخلية والخارجية لدى الأطفال خلال جائحة كوفيد-١٩ في الأردن، والاختلافات في الأداء النفسي والاجتماعي للأمهات

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Abstract

The COVID-19 pandemic upended children's lives worldwide, with severe effects on low-income families. Longitudinal studies on child mental health trajectories during crisis periods are scarce, in particular in the Arab region. This study contributes knowledge about children's mental health and helps to identify children at risk of mental health problems. We explored patterns of change in Jordanian preschool-aged children's externalizing and internalizing problems during the COVID-19 pandemic and examined associations with mothers' psychosocial functioning. Fifty mothers (38% from low-income families) reported on their child's mental health in 2019 and three times during the pandemic (June 2020, December 2020, and June 2021). In June 2021, mothers also reported on their own psychological functioning. Using a longitudinal k-means clustering algorithm, we identified three internalizing problem profiles (low and stable, moderate and stable, high and increasing) and three externalizing problem profiles (low and stable, moderate and decreasing, high and stable). Externalizing problem profiles differed with regard to child sex (F [2,47] = 3.20, P = 0.050, η^2 = 0.12). Furthermore, externalizing problem profiles differed in relation to mothers' depressive symptoms (F [2,42] = 3.62, P = 0.04, η^2 = 0.15). We found that young children from Jordan responded differently to the stressors of the COVID-19 pandemic. This heterogeneity can inform interventions targeting vulnerable children.

الملخص

قلبت جائحة كوفيد-19 حياة الأطفال حول العالم رأسًا على عقب، مخلفةً آثارًا بالغة على الأسر ذات الدخل المحدود. وتُعدّ الدراسات الطولية حول مسارات الصحة النفسية للأطفال خلال فترات الأزمات نادرة، لا سيما في المنطقة العربية. تُسهم هذه الدراسة في تعزيز المعرفة بالصحة النفسية للأطفال، وتُساعد في تحديد الأطفال المعرضين لخطر الإصابة بمشاكل الصحة النفسية. استكشفنا أنماط التغيير في المشكلات الخارجية والداخلية لدى أطفال ما قبل المدرسة الأردنيين خلال جائحة كوفيد-19، ودرسنا ارتباطها بالأداء النفسي والاجتماعي للأمهات.

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أفادت خمسون أمًا (38% من أسر منخفضة الدخل) عن الصحة النفسية لأطفالهن في عام 2019 وثلاث مرات أثناء الجائحة (يونيو 2020 وديسمبر 2020 ويونيو 2021). وفي يونيو 2021، أفادت الأمهات أيضًا عن أدائهن النفسي. وباستخدام خوارزمية التجميع الطولي k-means، حددنا ثلاثة ملفات تعريف للمشاكل الداخلية (منخفضة ومستقرة، ومتوسطة ومستقرة، وعالية ومتزايدة) وثلاثة ملفات تعريف للمشاكل الخارجية (منخفضة ومستقرة، ومتوسطة ومتناقصة، وعالية ومستقرة). اختلفت ملفات تعريف المشاكل الخارجية فيما يتعلق بجنس الطفل ($F[2, 47] = 3.20$، $P = 0.050$، $\eta^2 = 0.12$). علاوة على ذلك، اختلفت ملفات تعريف المشاكل الخارجية فيما يتعلق بأعراض الاكتئاب لدى الأمهات ($F[2, 42] = 3.62$، $P = 0.04$، $\eta^2 = 0.15$). وجدنا أن الأطفال الصغار في الأردن يستجيبون بشكل مختلف لضغوطات جائحة كوفيد-19. يمكن لهذا التنوع أن يُسهم في توجيه التدخلات التي تستهدف الأطفال المعرضين للخطر.

Keywords: *Child mental health, Internalizing problems, Externalizing problems, COVID-19 pandemic, Low-income, Jordan*

الكلمات المفتاحية: الصحة النفسية للطفل، المشاكل الداخلية، المشاكل الخارجية، جائحة كوفيد-١٩، ذوي الدخل المحدود، الأردن

1. Introduction

Mental health is a key component of child development and an essential ingredient for becoming healthy and competent members of society. As a critical component of overall health and well-being, mental health influences children's actions, feelings, thoughts, and ability to make healthy choices, manage stress, and build relationships (Centers for Disease Control and Prevention [CDC], 2024). Over the past decade, national and international reports have documented a rise in mental health problems among children and youth (e.g., Abrams, 2023; Organization for Economic Cooperation and Development [OECD], 2018; United Nations Children's Fund [UNICEF], 2021; World Health Organization [WHO], 2022a). Since the onset of the COVID-19 pandemic, a further dramatic increase in the number of children experiencing (or being at risk for) mental health challenges has been reported, as the pandemic brought unprecedented disruptions to children's daily routines, most importantly social isolation due to social distancing mandates and closure of childcare services (Levante et al., 2023; Ng & Ng, 2022; UNICEF, 2021). Recent meta-analyses focusing on the effects of COVID-19 on preschool-aged children reveal increases in emotional symptoms, conduct problems, anxiety, depression, and aggressive behaviors (Alcon et al., 2024; Jing et al., 2024). Preschoolers also experienced decreased fine motor and personal-social skills (Alcon et al., 2024; Finegold et al., 2023). As such, it is crucial to place young children's mental health at the forefront of policy and practice (OECD, 2018; UNICEF, 2021).

Economic and social inequalities increase the risk of mental health challenges, with the poorest groups being disproportionately affected (WHO, 2022b). Although the COVID-19 pandemic upended the lives of most children worldwide, the economic fallout of the pandemic is particularly devastating for children from low-income households (Hevia & Neumeyer, 2020; Kola et al., 2021; Saleem et al., 2022; Sánchez-Páramo, 2020). As the number of low-income families is higher in low- and middle-income countries (compared to high-income countries), while access to mental health services is often limited due to human and financial constraints, the pandemic likely exacerbated the vulnerability of children in these countries, thus

increasing concerns about the worsening mental health of children (Kola et al., 2021; Tanaka et al., 2023; Yoshikawa et al., 2020).

When the COVID-19 pandemic unfolded, we were conducting an ongoing longitudinal data collection with low-income families of young children in the greater Amman region of Jordan. Jordan is an upper-middle-income country that hosts the world's second-highest share of refugees per capita, with around 13% of its population being Syrian refugees, of whom 48% are children (United Nations, 2020). Although Jordan is a stable country within the widely conflict-affected Middle East, the Syrian refugee crisis, compounded with the pandemic, led to tensions between Jordanian and Syrian communities over the high burden placed on water, healthcare, education, shelter, and jobs (Francis, 2015; Slaih, 2013).

The first COVID-19 case in Jordan was reported on March 2, 2020. On March 15, the Jordanian government suspended daycare, kindergartens, and schools in response (Alqutob et al., 2020). At the same time, a nationwide lockdown was imposed for four days, followed by several weeks of a night curfew from 6 pm to 10 am, with travel only permitted during daylight hours for food and essential services. Public health restrictions were slowly eased from April 30 to June 6, but kindergartens and schools remained closed until the end of the academic year. As in many other countries, the summer period (July and August) of 2020 was marked by decreased cases and relaxed public health measures. However, more restrictive regulations were reinstated in September because of rising infection rates. This included kindergarten and school closures and weekly lockdowns on Fridays, the traditional day for family and social gatherings. By December 2020, the COVID-19 death rate had tripled from the previous month (United Nations High Commissioner for Refugees [UNHCR], 2020a). In March 2021, cases began to decline, reaching approximately 500 cases per day by the end of June 2021, a significant decrease compared to the high of more than 9500 cases in January and February 2021 (Qaqish et al., 2022).

The social isolation and mobility restrictions posed mental health challenges due to the disruption of immediate and extended family connections (Alcon et al., 2024; Jarvers et al., 2023; Shoup, 2007). For children, the adverse effects of social isolation were exacerbated by the lack of social interactions with peers at school during the extended school closures (Tanaka et al., 2023). Further threats to children's mental health were related to the negative economic impact of the pandemic for many families in Jordan, resulting in increased household stress (Jones et al., 2022). A World Bank Report found a 38-percentage-point increase in poverty rates in the Jordanian population during the first months of the pandemic due to income loss and unemployment (United Nations High Commissioner for Refugees [UNHCR], 2020b). Indeed, a study that assessed Jordanian parents' perceived change in children's mental health before and during the COVID-19 pandemic found that while most parents noticed behavioral changes, children of parents who lost their jobs due to COVID-19 were the most affected (Al-Rahamneh et al., 2021). Interviews with 20 Jordanian families, who shared their mental health experiences during the pandemic, indicated mental health problems such as anxiety, depression, disturbed sleep patterns, and elevated stress due to worries about job security (Al Gharaibeh & Gibson, 2022).

The concerns about the mental health of children in Jordan due to the COVID-19 pandemic came as rates of mental health problems among children and adolescents were already climbing (Tanaka et al., 2023). In a nationally representative sample of Jordanian youth (aged 14–25 years), 66% reported experiencing sadness and 43% felt a loss of hope in living (Ismayilova et al., 2013). High prevalence rates of mental health problems among children and adolescents in Jordan (aged 6–19 years), in particular rates of depression, anxiety, and general emotional and behavioral difficulties, were also reported in a recent scoping review of studies published between 2010 and 2023 (AlHamawi et al., 2023).

Longitudinal studies that include pre-pandemic data can help illuminate changes in children's mental health before and during the pandemic (Jegatheeswaran et al., 2024; Miao et al., 2023; Saleem et al., 2022). However, a major limitation of past longitudinal studies is the focus on North America and Europe, while other parts of the world, including the Arab region, are underrepresented (Cénat et al., 2022; Miao et al., 2023). Other limitations include age exclusions (omitting children younger than 6; Miao et al., 2023) and infrequent data collection (Cénat et al., 2022; Miao et al., 2023). Our study seeks to fill these research gaps.

1.1. The present study

The present study examined patterns of change in reactions to the pandemic in terms of the mental health of young children from low-income households in Jordan. Using a latent profile analysis, we aimed to identify groups of children based on their similarities in mental health response patterns in terms of declines, improvements, or stability. Expanding on two studies with samples of young children from low-income households in Toronto, Canada (Jegatheeswaran et al., 2024; Saleem et al., 2022), we explored patterns of change in children's internalizing and externalizing problems across four different time points: (t1) 2019, before the onset of the pandemic; (t2) June 2020, the end of the first pandemic wave, when a nationwide lockdown was implemented in Jordan and schools were suspended; (t3) December 2020, during the second pandemic wave with increasing COVID-19 infection rates and deaths, and another period of school closures and nationwide lockdowns on Fridays; and (t4) June 2021, after a period of three months during which infection rates declined and restrictions were lifted. We also explored whether the profiles differed regarding child and family demographic characteristics. The second objective of the study was to explore differences in mothers' psychosocial functioning after 15 months of the COVID-19 pandemic (t4) between profiles of change in children's mental health.

Longitudinal studies on mental health trajectories during crisis periods, in particular with samples of children, are scarce in the Arab region (Cénat et al., 2022). This study thus contributes knowledge about children's mental health and helps identify groups of children at risk of experiencing mental health problems.

2. Methodology

2.1. Participants

Mothers of preschool-aged children were recruited from the greater Amman region in Jordan. The study materials and procedures were reviewed and approved by the Institutional Review Board of the first author before the study commenced (Human Research Protection Program Number 2019-32), and thoroughly re-evaluated before each data collection. Consent procedures adhered to ethical standards, with informed consent obtained at each data collection, allowing mothers to withdraw at any time. Baseline data were collected in 2019 (fall/winter) from 77 families (t1). However, the conditions of the COVID-19 pandemic did not allow us to complete the study as planned. Despite restrictions for human subject research during the pandemic, we were able to recontact mothers to collect online survey data in June 2020 (t2), December 2020 (t3), and June 2021 (t4). Of the original sample, 50 mothers participated in all three follow-up data collections during the pandemic. All subsequent details pertain to these participants. Reasons for dropout included: participants could not be reached (mainly due to contact numbers being permanently disconnected, $n = 21$), refusal to participate ($n = 4$), moving to a different city ($n = 1$), and no reason specified ($n = 1$).

Most mothers were Jordanian (86%); the remaining were urban Syrian refugees. Half of them hold a two-year college degree or higher (54%). The other half completed secondary or primary education, and 8% did not report their highest education degree. In 2019, 42% of mothers were employed. Of those mothers who reported their family's monthly income (45 out of 50), 38% reported an income at or below the poverty line in Jordan (<350 JOD which translates to less than USD 500 per month; UNICEF Jordan, 2020), 44% reported a low income (350–850 JOD), and 18% a middle-to-high income (>850 JOD). Children (58% female) were between 4 and 5 years old ($M = 53.42$ months, $SD = 3.5$) at the time of recruitment. Most children (78%) attended daycare or kindergarten three to five days per week in 2019.

2.2. Measures

2.2.1. Children's mental health

Mothers reported on their child's mental health at all four waves of data collection, using the Arabic version of the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997). This measure comprises 20 items assessing emotional problems (sample item: "My child is often unhappy, downhearted."), conduct problems (sample item: "My child often fights with other children."), hyperactivity (sample item: "My child is restless, overactive."), and peer problems (sample item: "My child is picked on or bullied by other children."). Items were rated on a 3-point scale ("not true" [1], "somewhat true" [2], "certainly true" [3]). Because our sample reflected a relatively low-risk community sample regarding clinical problems, two scores – externalizing

and internalizing problems – were used (Goodman et al., 2010). While externalizing problems broadly refer to behaviors directed at the environment, such as aggression, internalizing problems describe behaviors directed at the self, such as emotional problems. The externalizing problems score reflected the mean of the hyperactivity and conduct problems subscales (Cronbach's alpha externalizing problems: 0.62–0.72); the internalizing problems score reflected the mean of the peer problems and emotional problems subscales (Cronbach's alpha internalizing problems: 0.62–0.69).

2.2.2. Mothers' psychosocial functioning

Aspects of mothers' psychosocial functioning, assessed at t4, covered signs of depressive symptoms, perceived parenting stress, and self-reported parenting practices. The Arabic version of the Patient Health Questionnaire (PHQ, short version; AlHadi et al., 2017; Al-Amer et al., 2020) was used to measure depressive symptoms over the previous two weeks. The items were rated on a 4-point scale ("not at all" [0], "several days" [1], "more than half the days" [2], "nearly every day" [3]). A sum score of all nine items was created, with higher scores indicating more depressive symptoms (Cronbach's alpha was 0.89).

Perceived parenting stress was assessed with four items derived from the Fragile Families and Child Wellbeing Study (Cooper et al., 2009), measuring the extent to which parenting demands exceed personal or social resources. A sample item is: "I often feel tired, worn out, or exhausted from raising a family." Items were rated on a 4-point scale ranging from 1 ("strongly disagree") to 4 ("strongly agree"). A mean score was created, with higher values reflecting higher levels of perceived parenting stress (Cronbach's alpha was 0.68).

Mothers' parenting practices (warmth and control) were assessed using the self-report version of the Child Rearing Practices Report (CRPR; Deković et al., 1991). Mothers rated each statement (nine items for warmth and six items for control) on a 7-point scale (ranging from "not at all descriptive of me" [1] to "very descriptive of me" [7]). Mean scores were created for both parenting practices. For warmth, higher scores reflected higher levels of affection and responsiveness in mothers' parenting practices. Higher scores for control reflected higher levels of disapproval and correction in mothers' parenting practices. Cronbach's alpha was 0.94 for warmth and 0.64 for control.

2.3. Demographics

Information on mothers' age, education, nationality, employment, and monthly family income was collected in 2019 (t1). Binary variables were created for education (1 = two-year college degree or higher, 0 = any other lower levels), nationality (1 = Jordanian, 0 = otherwise), and employment (1 = working, 0 = otherwise). Family income was categorized into 1 = poverty (<350 JOD), 2 = low income (350–850 JOD), and 3 =

middle–high income (>850 JOD). At t1, mothers also reported on child age and sex (1 = male, 0 = female), and if the child was the firstborn child (1 = yes, 0 = no).

2.3.1. Procedure

Local researchers contacted mothers interested in participating in the study to schedule the data collection. At t1 and t4, mothers were visited at their homes; at t2 and t3, pandemic restrictions did not allow for in-person human subject research. Instead, data were collected during a phone call. At all four time points, mothers first provided written or online informed consent before they completed the questionnaires described above (Google Forms were used at t2 and t3). Mothers received monetary compensation for their time.

2.3.2. Statistical analyses

The first objective was to identify profiles reflecting changes in children's mental health (internalizing and externalizing problems) from prior to during the pandemic. Internalizing and externalizing problem scores (derived from the SDQ) across four time points were used for the clustering. Individual children's trajectories of internalizing and externalizing problems were grouped using a longitudinal k-means clustering algorithm (with the R package *kml*; Genolini et al., 2015, 2023), using all four time points (Genolini & Falissard, 2010). Because *kml* requires missing values to be filled, the longitudinal data were first scanned for missing values that were replaced using mean imputation at each time point. *Kml* was run twice, once using internalizing problem scores and once using externalizing problem scores. Observations were grouped into k different groups, and the cross-sectional variability and the temporal variability or the trajectory of members over the four time points were considered. The number of groups was selected in a way that minimized variance within each group of observations.

Additionally, the Calinski-Harabasz Index was used to provide a score on the quality of the clustering that was used to inform the decision regarding the optimal number of clusters (Liu et al., 2010). The resulting clusters were then analyzed to identify and describe the distinct patterns of each group of children. After identifying the clusters, we tested whether the average internalizing and externalizing problem scores significantly differed across time and clusters. Pairwise comparisons using *t*-tests with pooled standard deviation were run. The *P*-values were adjusted using Bonferroni. We then described the clusters, reporting the mean and standard deviation of demographic characteristics, and formally tested if clusters differed with regard to demographic characteristics. This was done with one-way analysis of variance (ANOVA). In a final step, we explored any potential relationships between demographic characteristics and children's mental health trajectories during the pandemic, as described by cluster

membership. A multinomial logistic regression model was fitted to the data. Cluster membership was used as a categorical outcome variable, and the demographic characteristics were the predictor variables.

The second objective was to explore differences in mothers' psychosocial functioning after 15 months of the COVID-19 pandemic (t4) between profiles of children's mental health trajectories. ANOVAs were used with depressive symptoms, perceived parenting stress, and self-reported parenting practices entered as separate dependent variables. Significant findings were followed up with pairwise *t*-tests using the Bonferroni correction method.

All analyses were run using R Statistical Software (v4.2.2; R Core Team, 2022).

3. Results

3.1. Identifying profiles based on children's mental health trajectories

Kml was performed with two to five clusters on internalizing and externalizing problem scores across four time points (t1–t4). The Calinski-Harabasz Index and Bayesian Information Criterion (BIC) value for each solution are shown in Table **1**. Results suggested that the three-cluster model best fit the present data.

Table 1

Calinski-Harabasz Index and BIC value for Kml.

Number of clusters	Clustering variable			
	Internalizing problems		Externalizing problems	
	Calinski-Harabasz	BIC	Calinski-Harabasz	BIC
2	50.21	–73.49	40.75	–103.67
3	37.11	–77.55	35.77	–92.33
4	31.37	–88.66	29.92	–98.56
5	27.84	–95.80	26.85	–110.99

Next, we formally tested for differences between clusters' average internalizing problems score. At all four time points, the clusters differed significantly with regard to internalizing problems (t1 – 2019: F [2,47] = 25.16, $P < 0.001$, $\eta^2 = 0.52$; t2 – June 2020: F [2,47] = 54.65, $P < 0.001$, $\eta^2 = 0.70$; t3 – December 2020: F [2,47] = 35.65, $P < 0.001$, $\eta^2 = 0.60$; t4 – June 2021: F [2,47] = 33.07, $P < 0.001$, $\eta^2 = 0.59$). We followed up on these significant differences with pairwise comparisons using *t*-tests with pooled standard deviation and found that at each time point, all three clusters differed significantly in terms of children's internalizing problems. Means and standard deviations are shown in Table **2**. Based on the patterns and mean differences, the profiles in terms of change in internalizing problems were labeled *low and stable* (28%, n = 14), *moderate and stable* (40%, n = 20), and *high and increasing* (32%, n = 16; Figure **1**a).

Table 2

Total sample and profile means and standard deviations for internalizing and externalizing problems over time.

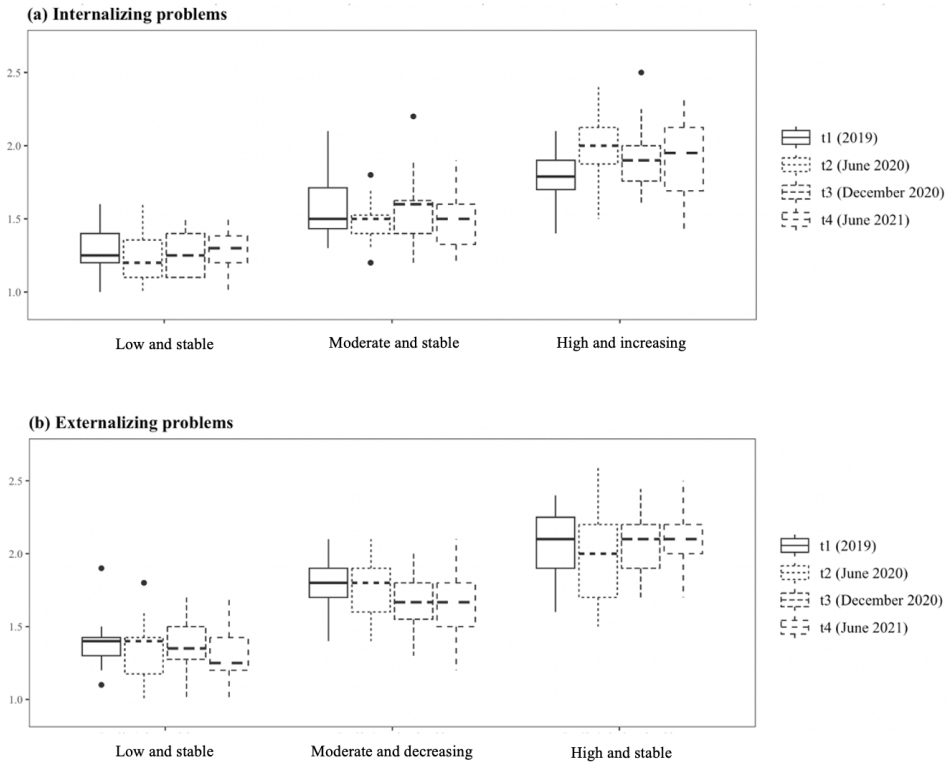
	t1 (2019)		t2 (June 2020)		t3 (Dec 2020)		t4 (June 2021)	
	M	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**
	Internalizing problems							
Total sample (*n* = 50)	1.56	0.27	1.58	0.36	1.59	0.34	1.57	0.33
Profiles								
(1) Low and stable (*n* = 14)	1.28	0.18	1.24	0.22	1.25	0.15	1.28	0.15
(2) Moderate and stable (*n* = 20)	1.59	0.20	1.48	0.15	1.56	0.24	1.50	0.20
(3) High and increasing (*n* = 16)	1.78	0.19	1.99	0.24	1.92	0.24	1.92	0.29
F value	25.16***		54.65***		35.64***		33.07***	
η^2	0.52		0.70		0.60		0.58	
P-value pairwise comparison[a]								
(1) versus (2)	0.000		0.004		0.001		0.015	
(1) versus (3)	0.000		0.000		0.000		0.000	
(2) versus (3)	0.016		0.000		0.000		0.000	
	Externalizing problems							
Total sample (*n* = 50)	1.79	0.32	1.72	0.33	1.72	0.34	1.69	0.36
Profiles								
(1) Low and stable (*n* = 12)	1.40	0.19	1.36	0.23	1.35	0.19	1.32	0.19
(2) Moderate and decreasing (*n* = 23)	1.82	0.18	1.76	0.20	1.66	0.19	1.62	0.23
(3) High and stable (*n* = 15)	2.05	0.24	1.96	0.32	2.10	0.21	2.10	0.21
F value	34.03***		19.63***		49.89***		47.55***	
η^2	0.60		0.46		0.68		0.70	
P-value pairwise comparison[a]								
(1) versus (2)	0.000		0.000		0.000		0.001	
(1) versus (3)	0.000		0.000		0.000		0.000	
(2) versus (3)	0.004		0.067		0.000		0.000	

Note. ***$P < 0.001$. [a]*P*-values were adjusted using Bonferroni.

Children in the *low and stable* profile had the lowest level of internalizing problems in 2019 prior to the pandemic (mean score lower than 1 standard deviation from the sample mean). They remained at low levels during the pandemic (mean scores 0.9–1 standard deviation lower than the sample mean). Children in the *moderate and stable* profile were rated near the sample mean (mean scores within 0.1–0.3 standard deviation from the sample mean) in internalizing problems at all four time points. Children in the *high and increasing* profile started off with the highest level of internalizing problems prior to the pandemic (mean score 0.8 standard deviation higher than the sample mean). Further increases in internalizing problems were observed during the pandemic (mean scores around 1 standard deviation higher than the sample mean, range 0.97–1.10 standard deviation).

Figure 1

Identified profiles of internalizing and externalizing problems over time.



We repeated the analyses for externalizing problems. At all four time points, the clusters differed significantly with regard to externalizing problems (t1 – 2019: F [2,47] = 34.03, $P < 0.001$, $\eta^2 = 0.60$; t2 – June 2020: F [2,47] = 19.63, $P < 0.001$, $\eta^2 = 0.46$; t3 – December 2020: F [2,47] = 49.90, $P < 0.001$, $\eta^2 = 0.68$; t4 – June 2021: F [2,47] = 47.55, $P < 0.001$, $\eta^2 = 0.70$). Most pairwise comparisons between clusters were significant, except one comparison at t2. Means and standard deviations are shown in Table **2**. Based on the patterns and mean differences, the profiles in terms of change in externalizing problems were labeled *low and stable* (24%, n = 12), *moderate and decreasing* (46%, n = 23), and *high and stable* (30%, n = 15; Figure **1**b). Children in the *low and stable* profile had the lowest level of externalizing problems in 2019 before the pandemic and remained lowest with regard to externalizing problems (all mean scores lower than 1 standard deviation from the sample mean). Children in the *moderate and decreasing* profile were rated near to the sample mean with regard to externalizing problems (mean scores within +/–0.1 – 0.2 standard deviation from the sample mean), with scores decreasing over time (at t1 and t2, mean scores were higher than the sample mean, whereas at t3 and t4, mean scores were lower than the sample mean). Children in the *high and stable* profile had the highest level of externalizing problems prior to the pandemic (mean score 0.8 standard deviation higher than the sample mean). While their levels of externalizing problems remained relatively stable over time, the difference to the sample mean increased (t3 and t4: mean score 1.1 standard deviation higher than the sample mean).

3.1.1. Differences between profiles of internalizing and externalizing problems in demographic characteristics

Next, we tested whether children in the internalizing and externalizing problems clusters differed according to their demographic characteristics (Table **3**). No significant differences between profiles concerning demographic characteristics were found for internalizing problems profiles. For externalizing problems profiles, significant differences with regard to child sex were found (F [2,47] = 3.20, P = 0.050, η^2 = 0.12). Following up on this finding, the multinomial logistic regression model showed lower odds for boys' membership in the *high and stable* externalizing problems profile (OR = 0.08, 95% C.I. 0.01, 0.66, P = 0.021; reference group: *low and stable* profile). When comparing the *high and stable* profile with the *moderate and decreasing* profile, the odds ratio was not significant (OR = 0.29, 95% C.I. 0.05, 1.56, P = 0.14). No significant odds ratio was found for the *moderate and decreasing* versus *low and stable* profile comparison (OR = 0.31, 95% C.I. 0.06, 1.59, P = 0.20).

Table 3

Profile means and standard deviations for demographic characteristics (collected at t1).

	Child sex[a]		Child age[b]		Firstborn[c]		Nationality[d]		Mother education[e]		Mother employment[f]		Family income[g]	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
	Internalizing problems													
(1) Low and stable (n = 14)	0.50	–	52.9	3.32	0.21	–	1.00	–	0.71	–	0.42	–	2.00	0.78
(2) Moderate and stable (n = 20)	0.45	–	54.2	3.72	0.40	–	0.85	–	0.53	–	0.47	–	1.84	0.6
(3) High and increasing (n = 16)	0.31	–	52.9	3.40	0.44	–	0.75	–	0.38	–	0.33	–	1.50	0.8
	Externalizing problems													
(1) Low and stable (n = 12)	0.67	–	54.8	4.34	0.25	–	1.00	–	0.58	–	0.6	–	2.00	0.6
(2) Moderate and decreasing (n = 23)	0.43	–	53.0	3.17	0.43	–	0.91	–	0.52	–	0.32	–	1.86	0.73
(3) High and stable (n = 15)	0.20	–	53.0	3.16	0.33	–	0.67	–	0.54	–	0.42	–	1.50	0.8

Note. [a]Child sex: 1 = male, 0 = female; [b]Child age in months; [c]Firstborn child to the family: 1 = yes, 0 = no; [d]Nationality: 1 = Jordanian, 0 = otherwise; [e]Mother education: 1 = two-year college degree or higher, 0 = any other lower levels; [f]Mother employment status: 1 = working, 0 = otherwise; [g]Family income (monthly): 1 = poverty (<350 JOD), 2 = low income (350–850 JOD), and 3 = middle-high income (>850 JOD).

3.1.2. Differences in mothers' psychosocial functioning between profiles of children's mental health trajectories after 15 months of the COVID-19 pandemic

The ANOVAs indicated differences in signs of depressive symptoms between profiles (Table **4**). The results were significant for externalizing problem profiles (F [2,42] = 3.62, P = 0.04, η^2 = 0.15) and

marginally significant for internalizing problem profiles (F [2,42] = 2.86, P = 0.069, η^2 = 0.12). Pairwise t-tests using Bonferroni correction found that two externalizing problem profiles (*low and stable, moderate and decreasing*) differed significantly regarding signs of depressive symptoms. Mothers of children in the *moderate and decreasing* externalizing problems profile showed higher signs of depressive symptoms (M = 20.52, SD = 6.04) compared to mothers of children in the *low and stable* externalizing problems profile (M = 15.00, SD = 4.92). For internalizing problem profiles, pairwise t-tests were not significant. No additional significant differences between the internalizing problems profiles (the externalizing problems profiles, respectively) were found with regard to perceived parenting stress and self-reported parenting practices.

Table 4

Differences in mothers' psychological functioning between profiles at t4.

Mothers' psychological functioning	Children's mental health									
	Internalizing problems					Externalizing problems				
	Low and stable	Moderate and stable	High and increasing	F (2,42)	η^2	Low and stable	Moderate and decreasing	High and stable	F (2,42)	η^2
	M (*SD*)	*M* (*SD*)	*M* (*SD*)			*M* (*SD*)	*M* (*SD*)	*M* (*SD*)		
Depressive symptoms	15.54 (4.50)	19.95 (5.89)	20.46 (7.04)	2.86^{+}	0.12	15.00 (4.92)	20.52 (6.04)	19.67 (6.20)	3.62*	0.15
Parenting stress	2.45 (0.47)	2.86 (0.56)	2.67 (0.76)	1.98	0.08	2.60 (0.34)	2.76 (0.65)	2.63 (0.76)	0.31	0.01
Parenting practices										
Warmth	6.35 (0.47)	5.87 (1.47)	5.98 (1.10)	0.70	0.03	6.21 (0.50)	6.12 (1.44)	5.76 (1.03)	0.56	0.02
Control	4.96 (0.88)	5.05 (1.09)	4.87 (0.99)	0.13	0.01	5.36 (0.81)	4.74 (1.06)	5.01 (0.95)	1.60	0.07

Note. *P < 0.05; $^{+}$P < 0.10.

4. Discussion

Using data from a longitudinal study that was ongoing when the COVID-19 pandemic unfolded, we explored mental health trajectories of young children from low-income families in Jordan. Although the results suggested relatively stable internalizing and externalizing problem scores for the overall sample, we found that mental health responses to the pandemic were heterogeneous, which is consistent with studies with young children from low-income families in Canada (Jegatheeswaran et al., 2024; Saleem et al., 2022) and various studies with adult populations (Ellwardt & Präg, 2021; Shevlin et al., 2023). Like these studies, we found profiles representing stability, improvement, and deterioration in mental health. Furthermore, the majority of the tested demographic variables did not differ between profiles of children's mental health trajectories. Only limited variation between profiles was found regarding mothers'

psychosocial functioning. Minor effects were found for mothers' depressive symptoms but not for mothers' perceived parenting stress and self-reported parenting practices.

Most children in our sample had profiles suggesting good mental health (68% when considering internalizing problems and 70% when considering externalizing problems). Children with low or moderate internalizing problems or with low externalizing problems prior to the pandemic experienced no change in their mental health. Children with initially moderate externalizing problems showed improvements during the COVID-19 pandemic. These findings suggest that the most common response was that children could cope with pandemic-related stressors, which aligns with previous studies (Jegatheeswaran et al., 2024; Saleem et al., 2022). One possible explanation is that low levels of preexisting mental health problems serve as a buffer during crises, enabling children to navigate disruptions in daily life more effectively (Jegatheeswaran et al., 2024). In particular, resilience plays a crucial role in fostering positive adaptation despite the challenges of the COVID-19 pandemic. Children with greater resilience may be better equipped to engage in flexible coping strategies, adjusting their approaches to manage stress and maintain stability in the face of adversity. The strong and positive associations between resilience and mental health in children across heterogeneous study populations were confirmed in a literature review (Mesman et al., 2021).

Around one-third of the children in our sample belonged to the high problems profiles, with the highest scores in internalizing or externalizing problems than all other profiles at all four timepoints. The high level of problems either remained stable after the onset of the pandemic or increased even more. These results align with studies on low-income children in Canada (Jegatheeswaran et al., 2024; Saleem et al., 2022), which indicate that children with preexisting mental health problems were at greater risk for poor mental health outcomes during the pandemic. The disruption to daily routines and lifestyle changes may have worsened behavioral symptoms, as children struggled to cope with prolonged exposure to stressors. Additionally, the loss of school and social opportunities, key sources of positive experiences, has been suggested as a contributing factor to their increased risk for mental health problems (Jegatheeswaran et al., 2024).

Although demographic child and family characteristics were consistently reported as predictors of mental health in research from before the pandemic, we did not find evidence that such characteristics differentiated between profiles of good and profiles of poor mental health in our sample. However, most studies have used a variable-centered approach. Interestingly, when looking at studies using a person-centered approach and reporting longitudinal profiles of mental health trajectories during the COVID-19 pandemic (Saleem et al., 2022; Shevlin et al., 2023), results were similar to ours, and associations were less consistent. It is possible that during periods of crisis, other factors, such as family routines (Glynn et al., 2021), are more important for children's mental health trajectories.

In contrast to previous research showing child-driven effects of mental health problems on parents' functioning (Yan et al., 2021), we did not find consistent differences in mothers' psychological functioning

between profiles of children's mental health trajectories. Only one significant difference was found; mothers of children in the *moderate and decreasing* externalizing problems profile showed higher signs of depressive symptoms compared to mothers of children in the *low and stable* externalizing problems profile. Surprisingly, mothers in the high problem profiles did not indicate significantly higher signs of depressive symptoms. The finding could be due to cultural customs, such as strong extended family networks, which may have provided crucial social, emotional, and practical support. Such support systems may be critical when caring for a child with mental health problems, as they can help alleviate some of the caregiving burden, a key factor in depressive symptoms. While this remains speculative due to the lack of data, it aligns with research showing that communities emphasizing family support demonstrated resilience during the pandemic, even if community members were from low-income backgrounds (Jamison et al., 2023). However, all of the mothers in our sample reported scores ranging from 15–19, which would be classified as moderately severe depression, to 20–27, which would be classified as severe depression (Kroenke et al., 2001). These findings are concerning due to the lasting consequences for child well-being (Goodman et al., 2011). It will be important for future research to identify risk factors of maternal depression. Besides family factors, such as child mental health problems, factors such as prenatal mood disorders and hormonal influences, as suggested by risk prediction models (Qi et al., 2023), may also play a role in maternal depression, particularly in low-income contexts (Liu et al., 2021). A deeper understanding of these factors could inform targeted interventions to support maternal and child well-being.

The present study has several noteworthy strengths, particularly its repeated-measures longitudinal design with one pre-pandemic assessment and three assessments during the pandemic (which capture multiple lockdown periods). Additional strengths include the focus on young children from low-income families in Jordan, where research on children's mental health is scarce, and the use of a widely accepted measure of internalizing and externalizing problems.

Several study limitations need acknowledging. First, the small overall sample size resulted in even smaller sample sizes in each profile, further limiting the interpretation of results. For example, we may not have observed a difference in mothers' psychosocial functioning between the high and low problems profiles because of the relatively low number of children belonging to these profiles compared to the moderate problems profile. Furthermore, attrition was substantial between the pre-pandemic and pandemic waves, as we could only retain 65% of the original sample. Dropout was particularly high among urban Syrian refugee families. A common reason in this population was that contact numbers were permanently disconnected (often because families cannot access or afford longer-term mobile plans), preventing us from reaching these families for the follow-ups during the pandemic. Second, all data were collected from one informant only; mothers provided information on their child's mental health and their own psychosocial functioning. Although the study employed standard measures utilized in similar populations, mothers might not have accurately gauged both their child's mental health and their own psychosocial functioning. Third, mothers' psychosocial functioning was only assessed at t4, when

infection rates declined and restrictions were lifted. However, family processes, such as the responses of various family members to a pandemic, vary across time. Possibly, differences between profiles might have been more evident earlier in the pandemic. For future research, the ongoing responses of children and mothers should be tracked using a family-centered approach.

5. Conclusion

The COVID-19 pandemic brought unparalleled disruptions to children's daily routines with unknown consequences for their mental health. Although the stressors of the pandemic were similar for most children, not every child was affected in the same way. This study contributes to a growing body of research showing that mental health responses of children to the pandemic are nuanced, suggesting a complex picture of improvements, declines, and stability. While most children belonged to profiles suggesting good mental health, about one-third of children showed poor mental health trajectories. Children with preexisting mental health problems carried a greater risk of mental health harm. Although every child and their family benefit from mental health interventions, it will be crucial to target the children who are most in need and most susceptible to being harmed by current and future crisis periods.

Author contribution (using CRediT)

Antje von Suchodoletz: Conceptualization, Methodology, Investigation, Data Curation, Writing – Original Draft, Writing – Review & Editing, Project Administration, Supervision, Funding Acquisition

Aleksandrina Dimova: Data Curation, Writing – Original Draft, Writing – Review & Editing

Rahma Ali: Data Curation, Formal Analysis, Visualization

Lina Qtaishat: Methodology, Investigation

Rana Dajani: Conceptualization, Methodology, Writing – Review & Editing, Supervision, Funding Acquisition

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Competing Interests

Rana Dajani is the founder and director of WLR, an independent nonprofit, nongovernmental organization in Jordan. The NGO helped recruit participants for the original study in 2019. However, Rana Dajani was not involved in collecting and analyzing the presented data. All other authors declare no conflict of interest.

Author Biography

Antje von Suchodoletz is a developmental psychologist passionate about early childhood development. Her research explores caregiver–child interactions, recognizing their critical role in early childhood development. She is particularly fascinated by the dynamics of these interactions, how caregivers and children influence each other, and how context and culture shape the experiences of children and their caregivers. Using new technologies, Antje's research delves deeper into understanding the factors that make caregiver–child interactions successful and enriching for children's development and wellbeing. The findings can help enhance family and child well-being, enabling each child to achieve their full developmental potential. Antje is currently an Associate Professor of Psychology at New York University in Abu Dhabi.

Aleksandrina Dimova was a research assistant/lab manager in the Teaching, Learning and Development Lab from September 2021 until August 2024. She contributed to projects focusing on the quality of caregiver–child interactions in different cultural contexts, exploring the eye gaze of parent–child dyads during a book-sharing activity, caregiver–child emotional co-regulation, and the relationship between early childhood education quality and child outcomes in low- and middle-income countries. Further research interests include computational psychiatry and the neural basis of working memory. Currently, Aleksandrina is a research assistant in the Sreenivasan Lab at New York University Abu Dhabi.

Rahma Ali spent over six years as a quantitative researcher, focusing on impact evaluations and randomized control trials that contributed to policy decisions aimed at reducing global poverty. Now, as a Senior Product Researcher, she leverages her deep understanding of human behavior to help software companies improve their platforms through user-centered design. Drawing on her experience researching the behavior and resilience mechanisms of underprivileged populations, Rahma applies the same empathy and analytical rigor to understand how users interact with technology.

Lina Qtaishat is currently a researcher and research manager at We Love Reading, a program of the Taghyeer organization in Jordan. Her work focuses on implementing science and community

interventions and evaluating their effectiveness in child development, literacy, lifelong learning, well-being, and empowerment. Specializing in participatory methods like fuzzy cognitive mapping and mental modeling, Lina also manages research projects integrating biological and physiological measures to advance understanding of human flourishing and development.

Rana Dajani is currently a Yidan Global Fellow at the Harvard Graduate School of Education and a professor of molecular biology at the Hashemite University in Jordan. Her areas of expertise include epigenetics and the biomarkers of trauma among refugees. Through her leadership, she has introduced national and regional stem cell laws and presided over numerous scientific boards and United Nations councils, most recently as the President of the Society for the Advancement of Science and Technology in the Arab World. Visiting professor at Harvard, Yale, MIT, Jepson School of Leadership, and Cambridge. A tireless supporter of building indigenous research capabilities in the developing world and creating a mentoring program to support women scholars in STEM, which was recognized by the National Academy of Sciences. Rana is a social entrepreneur and global thought leader. She founded We Love Reading, a grassroots initiative to create changemakers in underserved communities by fostering a lifelong love of reading. A recipient of the UNESCO International Literacy Prize, We Love Reading has established over 8000 locally run libraries in more than 70 countries. Rana has also been recognized as a Fulbright, Eisenhower, Robert Bosch, Ashoka, and Yale Morse Fellow. She is on the list of the 100 most influential Arab women and has received the Jacobs Social Entrepreneur Award, the Nansen UNHCR Refugee Award, and the Schwab Social Entrepreneur Award.

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