

Post-traumatic stress trajectories of children and their parents over the year following intensive care discharge: A secondary analysis

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Abstract

Background: New research in the field of psychological trauma has emphasized (a) the heterogeneity of psychological reactions after traumatic events and (b) the existence of distinct symptom trajectories.

Aims: In this study, existing data on post-traumatic stress disorder (PTSD) symptoms in 66 parent-child dyads were re-examined in the light of this literature in order to establish whether a similar pattern of symptom trajectories also applies to this population.

Study Design: A prospective observational cohort study. Participants' PTSD symptoms were assessed 3 and 12 months after discharge from a paediatric intensive care unit (PICU), using a short form of the Davidson Trauma Scale with parents and the Child Revised Impact of Events Scale with children aged 7–17 years.

Results: Results confirmed that the majority of children (58%) and parents (46%) exhibited a 'Resilient' PTSD trajectory over the year, in the sense that their scores remained in the non-clinical range at both timepoints. Children displaying a 'Resilient' trajectory were more likely to have a parent who also displayed a 'Resilient' trajectory ($p = .018$). However, there was also evidence of a 'Recovery' trajectory in a significant minority in this sample and over 1 in 4 children and parents exhibited a 'Chronic' or 'Delayed' symptom trajectory.

Conclusions: Although average PTSD scores reduced over time in this sample and 'Resilient' trajectories were common, a significant proportion of children and parents exhibited 'Chronic' and 'Delayed' symptom trajectories.

Relevance to Clinical Practice: These results suggest that, although the majority do well, a significant number of children and family members may develop chronic or delayed symptoms of PTSD in the year following PICU discharge. The monitoring of individual family members' symptoms beyond 3 months post-discharge may help to determine those who might most benefit from further support.

KEYWORDS

outcomes, post-intensive care syndrome (PICS), post-traumatic stress disorder (PTSD), recovery, resilience

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1 | INTRODUCTION

Recent longitudinal research on psychological recovery after traumatic events has demonstrated considerable heterogeneity in responses over time. A number of distinct Post-traumatic stress disorder (PTSD) symptom trajectories have been identified, which appear to be common across different trauma types, in both adults¹ and children.² These include 'Resilient' (i.e., scores remaining in the normal range) which has generally been found to be the most common pattern, irrespective of the nature of the traumatic event; 'Chronic' (where symptoms remain high); 'Recovery' (where high initial symptoms reduce over time) and 'Delayed' (where the initial rate of symptoms is low but increases later on). More generally, in the field of paediatric psychology, the concept of the 'trajectory' is also receiving greater prominence³ in relation to the understanding of longer term adaptation in families after illness and injury.

In the field of paediatric intensive care, this 'trajectory' approach to examining psychological recovery has recently been adopted in studies examining psychological outcomes in children⁴ and parents.⁵ This has been in recognition that the more traditional analytic strategy of reporting group means and proportions scoring above clinical cut-offs, can be misleading as it fails to distinguish individual differences and can give rise to mistaken inferences about the course of psychological distress over time.

In this report, a re-analysis of data on the PTSD symptoms of 66 parent-child dyads reported previously⁶ is presented, examining membership of the four most common putative PTSD trajectories in the literature, as outlined above. It was hypothesised that there would be a significant level of heterogeneity with regard to responses in this group, but that the 'Resilient' profile would be the most common.

2 | METHODS

Ethical permission for the original follow-up study was provided by the Great Ormond Street Hospital/Institute of Child Health Research Ethics Committee (Ref 03AR12). Families of children aged 7–17 years, consecutively admitted to a PICU at a tertiary hospital between 1 January 2004 and 31 July 2005, were informed about the study during admission and approached again, 6 weeks after discharge, to ask if they would be prepared to be involved. Data collection was by face-to-face interview at 3 months in the hospital outpatient clinic or at home, depending on family preference. Follow-up data were collected by postal questionnaire or telephone interview, at 12 months. Demographic and medical information were extracted from the child's medical record. Further detail on procedure and on the sample is available in Colville and Pierce (2012).⁶

Child PTSD symptoms were assessed using self-report on the 8-item Child Revised Impact of Event Scale (CRIES-8),⁷ with scores of ≥ 17 on this scale found to distinguish those with probable PTSD. Health-related quality of life (HRQoL) was also assessed by child self-report at the same timepoints using the Paediatric Quality of Life

What is known about the topic

- Paediatric intensive care unit (PICU) admission is associated with elevated risk of developing symptoms of Post-traumatic stress disorder (PTSD) in a proportion of children and parents.
- The majority of people display resilient reactions in the aftermath of trauma.
- A number of common PTSD symptom trajectories have been empirically confirmed after a range of different traumatic events.

What this paper adds

- Resilient PTSD symptom trajectories were common in children and parents after PICU admission.
- Resilient trajectories in parents were significantly associated with resilient trajectories in children.
- A significant proportion of children and parents (more than 1 in 4) displayed a chronic or delayed trajectory of PTSD symptoms in the year following PICU discharge.

Inventory (PedsQL).⁸ This provides normed scores ranging from 0 to 100 for Physical, Emotional, Social and School-related quality of life.

Parents completed the short form of the Davidson Trauma Scale,⁹ on which a score of ≥ 5 denotes risk of probable PTSD. They also completed the Hospital Anxiety and Depression Scale (HADS)¹⁰ at the same timepoints. In addition, at 12 months, they completed an overprotection measure, scored 0–4,¹¹ which assessed the degree to which they continued to worry about their child and needed to know their whereabouts. Overprotectiveness is a feature of parenting that has been endorsed in qualitative work in this situation¹² and has been found to be associated with the persistence of PTSD.¹¹

For the purposes of this re-analysis, children and parents were categorized using the a priori clinical cut-off method,² whereby the trajectories of those with scores below the relevant clinical cut-off at 3 and 12 months were termed 'Resilient'; those with scores in the clinical range initially, which later moved into the normal range were termed 'Recovery'; those with initial low scores that had moved into the clinical range by 12 months were termed 'Delayed' and finally participants with high scores at both timepoints were described as displaying a 'Chronic' trajectory.

The sample size precluded investigation of factors associated separately with each of these four profiles but univariate associations with a dichotomous categorisation of 'Resilient', compared with the other trajectories, were conducted using Pearson's Chi Square or Fisher's Exact tests for categorical variables and the Mann-Whitney test for continuous variables, using IBM SPSS version 29.0 statistical software (IBM Corporation, Armonk, NY), with the level of significance set at $p < .05$.

3 | RESULTS

Of the 132 families approached to take part, 102 provided data at 3 months (77%) and 72 at 12 months. Of the 72 families with data at 12 months, 66 provided complete PTSD data for both child and parent. Analyses below are based on these 66 dyads.

The distribution of the four main trajectories described in the literature is illustrated diagrammatically in Figure 1. The most common trajectory found was 'Resilient', which applied to 38 (58%) children and 30 (46%) parents. Similar proportions of both groups were found to have a 'Chronic' profile (10 [15%] children and 10 [15%] parents) with a slightly higher proportion of parents, 18 (27%), exhibiting a 'Recovery' profile than children, 11 (17%). Finally, 7 (11%) children and 8 (12%) parents reported an increase in symptoms, from the non-clinical to the clinical level, by 1 year after discharge, suggestive of a 'Delayed' response.

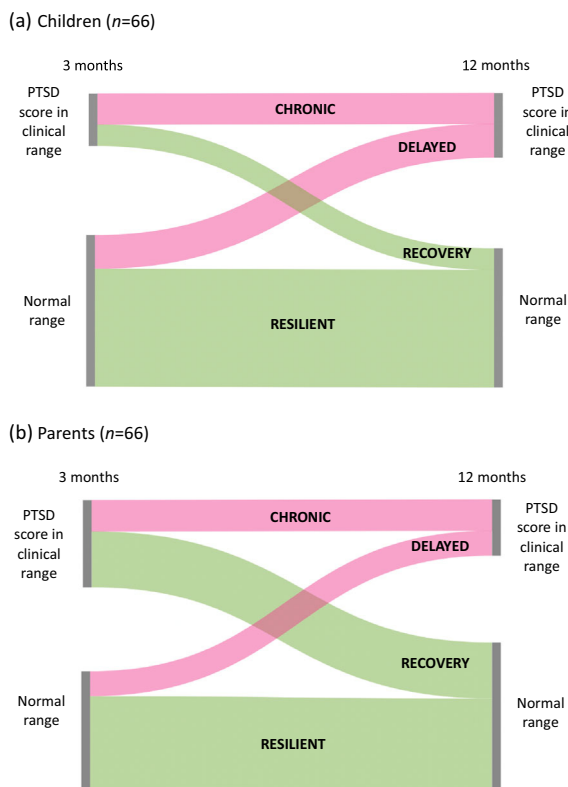


FIGURE 1 Post-traumatic stress disorder (PTSD) symptom trajectories in (a) children and (b) their parents in the year following PICU discharge. Trajectories: Chronic = PTSD score above cut-off at 3 and 12 months ($n = 10$ [15%] children and $n = 10$ [15%] parents); delayed = PTSD score in normal range initially but rising above clinical cut-off by 12 months ($n = 7$ [11%] children and $n = 8$ [12%] parents); recovery = PTSD score above clinical cut-off at 3 months but in normal range at 12 months ($n = 11$ [17%] children and $n = 18$ [27%] parents); and Resilient = PTSD scores below clinical cut-off at both timepoints ($n = 38$ [58%] children and $n = 30$ [46%] parents). Figures were produced using free software SankeyMATIC available from www.sankeymatic.com.

Comparisons between those whose symptoms followed a 'Resilient' trajectory with the rest are provided in Table 1. Where the child was admitted as an emergency, 'Non-Resilient' profiles (i.e., 'Chronic', 'Recovery' or 'Delayed') were more common, in both children ($p = .002$) and parents ($p < .001$). There was also an association with higher severity of illness score and 'Non-Resilient' trajectory for children over the year following discharge ($p = .029$). 'Resilient' parents reported lower anxiety and depression at 3 months ($p < .001$) and 12 months ($p = .003$, $p = .001$) and a lower overprotection score at 12 months ($p < .001$). 'Resilient' children reported better Emotional HRQoL at 3 months ($p < .001$) and better Emotional ($p < .001$), Social ($p < .012$), and School-related ($p < .001$) HRQoL at 12 months than their 'Non-Resilient' counterparts. Finally, children whose parents exhibited a 'Resilient' trajectory were more likely to report symptoms consistent with a 'Resilient' trajectory, and vice versa ($p = .018$).

4 | DISCUSSION

These analyses demonstrate the importance of examining individual trajectories of psychological distress in children and parents, in the year following PICU discharge. Although, as expected, the majority reported 'Resilient' PTSD symptom trajectories, there was considerable heterogeneity in the responses found over time, in this sample. The main clinical implication of these findings is that health professionals involved in following up and supporting this population should guard against extrapolating from group-level statistics and instead monitor individual symptom trajectories where possible.

The findings relating to parents are broadly consistent with trajectories of distress and family functioning in caregivers of children admitted to PICU after septic shock.⁵ However, the proportion of children found to display 'Non-Resilient' trajectories was significantly higher than that reported by Le Brocque et al. (2020),⁴ who did not find evidence supporting the existence of a 'Delayed' trajectory group in PICU survivors. These different findings may relate to sample differences in age and illness severity, or to the higher initial recruitment rate in the present study, but it is true that the evidence for 'Delayed' trajectories in children is more mixed than that in adults and the analytic strategy used in this study is regarded as more likely to classify those scoring around the cut-off as 'Delayed'.² Conversely, however, Le Brocque et al.⁴ used a significant degree of data imputation, which can be associated with a higher risk of misclassification of 'Delayed' and 'Chronic' trajectories where there is a significant level of attrition² and there are other studies which report that children's symptoms increase over time. One such study, conducted in the aftermath of Hurricane Katrina, found a trajectory of increasing PTSD symptoms in 18% of a sample of over 4000 children over 4 years.¹⁶

Strengths of this study include a high initial recruitment rate, the use of direct self-report measures with the children, and the length of follow up. However, the size of the sample was a limitation and, together with the fact that measures were only collected at two timepoints, precluded the use of more sophisticated, data-driven analysis of individual trajectories. Also, as the original data were collected

TABLE 1 Univariate associations with 'Resilient' PTSD trajectories in children ($n = 66$) and their parents in the year following PICU discharge.

Variable	Parents			Children		
	Resilient trajectory ^a ($n = 30$), mean (SD) or n (%)	Non-resilient trajectory ^b ($n = 36$), mean (SD) or n (%)	p^c	Resilient trajectory ^a ($n = 38$), mean (SD) or n (%)	Non-resilient trajectory ^b ($n = 28$), mean (SD) or n (%)	p^c
Demographic						
Age child (years)	11.4 (2.2)	11.5 (3.2)	.847	11.8 (2.7)	11.0 (2.9)	.254
Female child	15/30 (50%)	13/36 (36%)	.256	18/38 (47%)	10/28 (36%)	.344
Age parent	40.9 (5.7) ⁿ⁼²⁶	39.2 (7.4) ⁿ⁼³⁵	.233	40.2 (5.5) ⁿ⁼³⁶	39.5 (8.3) ⁿ⁼²⁵	.532
Lowest quintile social deprivation ^d	14/30 (47%)	17/35 (49%)	.878	17/37 (46%)	14/28 (50%)	.746
Child ethnicity white UK	19/30 (63%)	21/36 (58%)	.679	25/38 (66%)	15/28 (54%)	.315
Medical						
Emergency admission	20/30 (67%)	35/36 (97%)	<.001	27/38 (71%)	28/28 (100%)	.002
Length of stay (days)	4.9 (7.0)	3.9 (3.8)	.739	4.7 (6.4)	3.9 (3.8)	.698
PIM	7.0 (10.1)	9.2 (9.3) ⁿ⁼³⁵	.115	6.8 (9.9)	10.1 (9.3) ⁿ⁼²⁷	.029
Ventilated days	4.1 (5.8)	3.4 (3.2)	.807	4.0 (5.3)	3.4 (3.3)	.785
Child delusional memories ^e	10/30 (33%)	14/36 (39%)	.64	11/38 (29%)	13/28 (46%)	.145
Psychological						
Parent anxiety ^f 3 months (0–21)	3.8 (2.7)	10.2 (4.8)	<.001	6.3 (4.8)	8.6 (5.2)	.071
Parent depression ^f 3 months (0–21)	1.9 (2.3)	5.4 (4.8)	<.001	3.1 (3.5)	4.8 (5.0)	.113
Parent anxiety ^f 12 months (0–21)	5.2 (4.1)	9.4 (5.1) ⁿ⁼³⁴	.001	6.5 (5.0) ⁿ⁼³⁶	6.6 (5.0)	.069
Parent depression ^f 12 months (0–21)	2.1 (3.4)	4.8 (4.5) ⁿ⁼³⁴	.003	2.9 (4.1) ⁿ⁼³⁶	4.3 (4.3)	.079
Parent overprotection ^g 12 months (0–4)	1.7 (1.5)	3.0 (1.3) ⁿ⁼³²	.001	2.2 (1.7) ⁿ⁼³⁷	2.6 (1.4) ⁿ⁼²⁶	.321
Child physical HRQoL 3 months (0–100)	73.0 (19.8) ⁿ⁼²⁸	77.7 (20.5)	.266	76.7 (19.0) ⁿ⁼³⁶	74.2 (21.6)	.719
Child emotional HRQoL 3 months (0–100)	87.7 (15.6)	80.3 (19.1) ⁿ⁼³⁵	.052	90.8 (11.3) ⁿ⁼³⁷	74.3 (20.5)	<.001
Child social HRQoL 3 months (0–100)	88.5 (11.6)	89.0 (15.6) ⁿ⁼³⁵	.404	90.4 (11.0) ⁿ⁼³⁷	86.6 (16.7)	.579
Child school related HRQoL 3 months (0–100)	72.1 (15.1)	73.2 (19.1) ⁿ⁼²¹	.637	71.7 (16.4) ⁿ⁼²⁶	73.8 (18.7) ⁿ⁼²⁵	.589
Child physical HRQoL 12 months (0–100)	85.3 (17.0) ⁿ⁼²⁸	83.9 (20.2) ⁿ⁼³⁵	.972	88.4 (13.0) ⁿ⁼³⁶	79.4 (23.7) ⁿ⁼²⁷	.168
Child emotional HRQoL 12 months (0–100)	87.0 (17.7)	79.6 (22.3)	.266	90.9 (13.0)	72.1 (24.0)	<.001
Child social HRQoL 12 months (0–100)	92.0 (13.2)	87.3 (17.2) ⁿ⁼³⁵	.322	93.6 (12.3)	83.7 (17.8) ⁿ⁼²⁷	.012
Child school-related HRQoL 12 months (0–100) ^h	78.7 (17.8)	71.7 (17.8)	.105	81.4 (13.9)	65.9 (19.3)	<.001
Trajectory						
Parent resilient trajectory				22/38 (58%)	8/28 (29%)	.018
Child resilient trajectory	22/30 (73%)	16/36 (44%)	.018			

Abbreviations: HRQoL, Health-related quality of life (measured by PedsQL⁸); PIM, paediatric Index of Mortality¹³; PTSD, post-traumatic Stress Disorder (measured by SPAN⁹ in parents and CRIES-8⁷ in children).

^aResilient trajectory refers to PTSD score below clinical level at 3 and 12 months after discharge.

^bNon-Resilient trajectory refers to PTSD score in clinical range at 3 months only (Recovery trajectory), 12 months only (Delayed trajectory) or both (Chronic trajectory).

^cMann-Whitney test for continuous variables and Pearson's Chi Square/Fisher's Exact test for categorical variables.

^dMeasured by Townsend Deprivation Index.¹⁴

^eMeasured using Intensive Care Memory Tool (ICUM).¹⁵

^fMeasured with Hospital Anxiety and Depression Scale (HADS).¹⁰

^gMeasured using MacFarlane Overprotection Scale.¹¹

^hOnly available for those children who had returned to school by 3 months.

some time ago, there may be issues about the degree to which they are representative of families' current experience. Nevertheless, the fact remains that there are still very few longitudinal studies of psychological distress in children beyond the first 3 months after discharge and fewer still that also report on their parents' symptoms.⁴

Future longitudinal research with this population, based on larger samples and three or more data collection points, could usefully employ statistical techniques, such as latent class growth analysis,¹⁷ to confirm the presence or otherwise of the profiles suggested by these data. A larger sample would also facilitate a more nuanced

analysis of the risk factors associated with ultimate membership of the different trajectories.

Candidate risk factors for chronic distress in children include early childhood adversity, which is more common in the PICU population,¹⁸ and lower pre-morbid quality of life, which is associated with increased acute distress.¹⁹ Recent research has also shown that PTSD symptoms in parents are associated with previous traumatic experiences and mental health difficulties,²⁰ can persist well beyond the year following discharge,²¹ and are associated with decreased family functioning over time.²² These findings are consistent with the expansion of the concept of Post-Intensive Care Syndrome (PICS) to include family members (PICS-F)²³ and the particular emphasis in paediatrics (PICS-p)²⁴ on the dependence of children on parents for their emotional well-being.

In the spirit of Trauma-informed Care,²⁵ screening for past adversity in children and parents, as well as any other factors found in future research to predict 'Chronic' or 'Delayed' trajectories, may help identify those families most at risk of poorer long-term outcomes.

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CONFLICT OF INTEREST STATEMENT

The authors declare they have no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ETHICS STATEMENT

Ethics approval was obtained from the Great Ormond Street Hospital/Institute of Child Health Research Ethics Committee (ref 03AR12).

PATIENT CONSENT

Written informed consent was obtained for all participants.

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