



Universiteit
Leiden
The Netherlands

Childhood maltreatment and mental health problems in a 10-year follow-up study of adolescents in youth residential care: a latent transition analysis

Bürgin, D.; Witt, A.; Seker, S.; d'Huart, D.; Meier, M.; Jenkel, N.; ... ; Schmid, M.

Citation

Bürgin, D., Witt, A., Seker, S., D'Huart, D., Meier, M., Jenkel, N., ... Schmid, M. (2023). Childhood maltreatment and mental health problems in a 10-year follow-up study of adolescents in youth residential care: a latent transition analysis. *Development And Psychopathology*. doi:10.1017/S0954579423001426

Version: Publisher's Version
License: [Creative Commons CC BY 4.0 license](#)
Downloaded from: <https://hdl.handle.net/1887/3748618>

Note: To cite this publication please use the final published version (if applicable).

Regular Article

Childhood maltreatment and mental health problems in a 10-year follow-up study of adolescents in youth residential care: A latent transition analysis

David Bürgin^{1,2} , Andreas Witt³ , Süheyla Seker¹ , Delfine d'Huart¹ , Maria Meier^{1,4} , Nils Jenkel¹ ,
Cyril Boonmann^{1,5} , Klaus Schmeck¹ , Jörg M. Fegert⁶  and Marc Schmid¹ 

¹Child and Adolescent Psychiatric Research Department (UPKKJ), University Psychiatric Hospitals, University of Basel, Basel, Switzerland, ²Jacobs Center for Productive Youth Development, University of Zurich, Zurich, Switzerland, ³Department of Child and Adolescent Psychiatry, University Psychiatric Services Berne, Berne, Switzerland, ⁴Department of Psychology, Division of Neuropsychology, University of Konstanz, Constance, Germany, ⁵Department of Child and Adolescent Psychiatry – LUMC Curium, Leiden University Medical Center, Leiden, The Netherlands and ⁶Department of Child and Adolescent Psychiatry/Psychotherapy, University Ulm, Ulm, Germany

Abstract

Childhood maltreatment and mental health problems are common among young people placed out-of-home. However, evidence on the impact of maltreatment on the course of mental health problems in at-risk populations is sparse. The aim of this longitudinal study is twofold: (a) describe the course of mental health problems and the shift in symptom patterns among adolescents in youth residential care into young adulthood and (b) assess how childhood maltreatment is related to the course of mental health problems. One hundred and sixty-six adolescents in Swiss youth residential care were followed up into young adulthood (36.1% women; $M_{\text{Age-Baseline}} = 16.1$ years; $M_{\text{Age-Follow-Up}} = 26.4$ years). Latent transition analysis was employed to analyze transitions of symptom patterns and their association with maltreatment exposure. We found three latent classes of mental health problems: a “multiproblem”-class (51.8% baseline; 33.7% follow-up), a “low symptom”-class (39.2% baseline; 60.2% follow-up), and an “externalizing”-class (9.0% baseline; 6.0% follow-up). Individuals in the “multiproblem”-class were likely to transition towards less-complex symptom patterns. Higher severity of self-reported childhood maltreatment was associated with more complex and persistent mental health problems. Our study underlines the need for collaboration between residential and psychiatric care systems within and after care placements, with a specialized focus on trauma-informed interventions and care.

Keywords: childhood trauma; early life adversity; psychopathology; out-of-home care; person-oriented modeling

(Received 17 July 2023; revised 28 September 2023; accepted 28 October 2023)

Introduction

Children and adolescents in out-of-home care often experience cumulative stressors and adversities, including high rates of childhood maltreatment, influencing their long-term health and functioning (Esser & Schmidt, 2017; Fischer et al., 2016; Garcia et al., 2017; Schmid et al., 2008). Considering the cumulation of adversities, it is not surprising that higher levels of mental health problems and psychopathology are more common among young people placed out-of-home compared to those in the general population; a pattern often persisting into young adulthood (Beaudry et al., 2021; Bronsard et al., 2016; Seker, Boonmann, Gerger, et al., 2022). Both, childhood maltreatment and mental health problems can lead to the indication of a placement in the

child welfare or juvenile justice systems or might co-occur with them (Jäggi et al., 2021). Still, few longitudinal studies have investigated the course of psychopathology in such at-risk groups (Seker, Boonmann, Gerger, et al., 2022) and none, to our knowledge, used a longitudinal person-oriented modeling approach. Although previous research has shown that psychopathology in out-of-home placed individuals often persist into young adulthood (Seker, Boonmann, d'Huart, et al., 2022; Seker, Boonmann, Gerger, et al., 2022), research investigating shifts in patterns of psychopathological symptoms and factors influencing symptom persistency is needed. Therefore, the aim of the current study is to describe the course of mental health problems among adolescents in youth residential care into adulthood using latent transition analyses.

Childhood maltreatment (e.g., interpersonal trauma, abuse, and neglect) is unfortunately a too common experience children are exposed to, often resulting in long lasting consequences, in particular a heightened risk for psychopathology (Bellis et al., 2019; Copeland et al., 2018; Hughes et al., 2017; McCrory et al., 2017; McLaughlin et al., 2020; McLaughlin, 2016). Such forms of adversity have been found to be highly prevalent in samples and

Corresponding author: David Bürgin; Email: david.buergin@upk.ch
David Bürgin and Andreas Witt shared first authorship.

Cite this article: Bürgin, D., Witt, A., Seker, S., d'Huart, D., Meier, M., Jenkel, N., Boonmann, C., Schmeck, K., Fegert, J. M., & Schmid, M. (2023). Childhood maltreatment and mental health problems in a 10-year follow-up study of adolescents in youth residential care: A latent transition analysis. *Development and Psychopathology*, 1–16, <https://doi.org/10.1017/S0954579423001426>

societies (Bürgin et al., 2020; Bellis et al., 2019; Copeland et al., 2007; Felitti et al., 1998; Green et al., 2010; Kessler et al., 2017; Witt et al., 2017). This is a major public health concern, as higher risks for various mental disorders, especially internalizing disorders (e.g., affective disorders, anxiety disorders, and post-traumatic stress disorder [PTSD], complex PTSD, and adjustment disorder) are more common among maltreated individuals (Green et al., 2010; Heim & Binder, 2012; Heim et al., 2008; Kessler et al., 2010; Lewis et al., 2021; Moffitt & Klaus-Grawe Think, 2013). Maltreated individuals with internalizing disorders show an earlier age of onset of symptoms, greater symptom severity, more comorbidity across disorders, increased risk for suicide, and poorer treatment response than non-maltreated individuals (Cloitre et al., 2009; Heim & Binder, 2012; Heim et al., 2008; Teicher & Samson, 2013; Widom et al., 2007). Recent developments in the field highlight the broad risks following childhood maltreatment for transdiagnostic psychopathology (Dalgleish et al., 2020; McCrory et al., 2017; McLaughlin et al., 2020). Taken together, childhood maltreatment is related to adverse functional outcomes, especially psychopathology across descriptive diagnostic categories and, thus, is considered one of the most important transdiagnostic risk factors for the emergence of psychopathology.

Out-of-home placed children and adolescents in particular report high rates of childhood maltreatment and mental health problems (Garcia et al., 2017; Gonzalez-Garcia et al., 2023; Jaritz et al., 2008; Jozefiak et al., 2016), which both have been associated with increased risks for poor functioning and lower quality of life in adolescence that might persist into adulthood (Dorsey et al., 2012; Fischer et al., 2016; Greger et al., 2016; Jozefiak & Sonnichsen Kaye, 2015; Woods et al., 2013). Many young people in the child welfare and juvenile justice systems show complex and co-occurring patterns of adversity and maltreatment (Armour et al., 2013; Charak et al., 2019; Havlicek, 2014; Rebbe et al., 2017; Yampolskaya et al., 2014). Next to adversity and maltreatment, out-of-home placed young people often face various additional challenges (e.g., housing instability, homelessness, financial difficulties, or unemployment) along the transition from in-care to out-of-care, which further increase the risks of developing new or perpetuate extant mental health problems (Ahrens et al., 2014; Courtney et al., 2018; Havlicek et al., 2013; Jozefiak et al., 2016; Vinnerljung & Sallnäs, 2008). On top, many care systems, due to structural difficulties resulting from their legal bases and funding structures, are perceived as inflexible and create system inherent pressure to leave the care setting at the age of 18, with often limited preparation and challenges in accessing appropriate aftercare (Atkinson & Hyde, 2019; Haggman-Laitila et al., 2020; Schmid, Fegert, Schmeck, et al., 2022). As such it is not surprising, that previous studies showed that prevalence rates of mental health problems are still higher among adults who were previously placed in out-of-home care when compared with the general adult population (McKenna et al., 2021; Seker, Boonmann, Gerger, et al., 2022). Taken together, out-of-home placed children and adolescents are at risk for the emergence and persistence of psychopathology, especially at the critical period of transition from residential care settings to out-of-care and independent living.

Developmental psychopathology, as an interdisciplinary field of study, attempts to better understand the developmental interplay of bio-psycho-social factors through examining normal functioning and (psycho-)pathology, adaption and maladaptation, continuity and persistence, or change in patterns over time (Cicchetti & Toth, 2005, 2009; Rutter & Sroufe, 2000). Person-oriented statistical

modeling is increasingly used to describe the complex patterning of types of maltreatment, the co-occurrence of psychopathological symptoms, but also the shifts in symptom patterns over time (Achterhof et al., 2019; Lacey & Minnis, 2020; Petersen et al., 2019; Rivera et al., 2018; Witt et al., 2016). Person-oriented models are able to describe heterogeneous populations, multidimensional outcomes, non-linear pathways, and changing relations between processes (Hickendorff et al., 2018). Such approaches might help to statistically model developmental psychopathological transitions as they convey a “more person-oriented level of analysis of a differential pathways approach which is vital for achieving a primary mission of developmental psychopathology, implied in its definition as the study of the origins and course of individual patterns of behavioral maladaptation” (Cicchetti & Rogosch, 1996, p. 598). Taken together, combining both a developmental psychopathological perspective with recent trends to model co-occurring exposures and outcomes with person-oriented-modeling approaches over time is needed.

To date, few longitudinal studies have investigated the association of childhood maltreatment with the course of psychopathology among youths in residential care into young adulthood. Studying such an at-risk population longitudinally is inherently challenging and time consuming due to the cumulation of psychosocial burdens (Kind et al., 2023). To our knowledge, no study exists employing longitudinal person-oriented modeling among out-of-home placed individuals across the lifespan. As previous research has shown that psychopathology in such samples often persist into young adulthood (d’Huart, Steppan, et al., 2022; Seker, Boonmann, Gerger, et al., 2022), research investigating shifts in patterns of mental health problems and the factors influencing persistence and shifts of symptom patterns is needed.

In this longitudinal study, we aimed to describe the course of mental health problems among adolescents in youth residential care into young adulthood after they left care, using latent transition analysis. Furthermore, we aimed to investigate how the severity and latent profiles of self-reported childhood maltreatment are associated with the stability of psychopathology over time from a baseline assessment in adolescence to a 10-year follow-up in young adulthood.

Methods

Study design and procedures

In this study, we employed a longitudinal design. The baseline assessment was conducted between 2008 and 2011 throughout Switzerland as part of the epidemiological “Swiss study for clarification and goal-attainment in youth welfare and juvenile justice institutions” study (German: *Modellversuch Abklärung und Zielerreichung in stationären Massnahmen [MAZ.]*) (Schmid et al., 2013; Habersaat et al., 2018). Its follow-up study “Youth Welfare Trajectories: Learning from Experiences” (German: *Jugendhilfeverläufe: Aus Erfahrung lernen [JAEL]*) reassessed these individuals between 2017 and 2020 (d’Huart, Bürgin, et al., 2022; Kind et al., 2023; Schmid, Fegert, Clemens, et al., 2022; Seker, Bürgin, et al., 2022; Urben et al., 2022).

The baseline MAZ. study aimed to assess the psychosocial health of young people placed within youth residential care in Switzerland. Computerized assessments were conducted by adolescents together with a professional caregiver within the partaking institution. These assessments included a collaborative part in which adolescents and their primary caregiver defined goals and competencies. Furthermore, adolescents and caregivers

answered psychometric questionnaires on their own, caregivers were in the room when adolescents conducted the assessments, but were instructed to only interfere when adolescents had questions. The 64 included youth residential care institutions (35% of eligible institutions) were all accredited by the Swiss Federal Office of Justice and represent the various types of Swiss residential youth care institutions regarding their size, educational opportunities, intervention possibilities, and residing of children, adolescents, and young adults. These institutions include both educational institutions for children and adolescents and work-education institutions for young adults (Jäggi et al., 2021). At baseline, participants with non-sufficient language skills (of either German, French, or Italian) and / or intelligence impairments were excluded from participation in the MAZ. study (see Jäggi et al., 2021; Schmid et al., 2013). Within the MAZ. study, 592 young people took part in the study, representing around one third of all adolescents in these respective institutions (Jäggi et al., 2021). Representativeness of the MAZ.-study participants against not participating juveniles in the same institutions, was checked by asking institutional caregivers to report on mental health problems of adolescents not participating in the assessments ($N = 46$) on the Child or Young Adult Behavior Checklist (CBCL/YABCL) (Schmid et al., 2013). Age and gender matched comparisons showed no significant differences in the frequency of scoring in the clinical range on the internalizing-, externalizing- and total problems scales suggesting the participants to be representative of all residing in the partaking institutions (Jäggi et al., 2021). Of these 592 participants, 511 participants provided consent to be recontacted for a future follow-up. Further details on the MAZ. study design can be found in the final report and selected publications of the study team (Dölitzsch et al., 2014; Fischer et al., 2016; Jäggi et al., 2021; Schmid et al., 2013).

Within the JAEL study and with an extensive recruitment effort, we were able to reassess a total of 231 care leavers within our follow-up study (for an overview see the flow chart in Supplement Figure 1). Between November 2017 and July 2020, participants were reassessed, amongst others, using web-based psychometric questionnaires, as well as clinical interviews about psychopathology, substance use problems, delinquency, quality of life, and own experiences in the youth residential care institutions (d'Huart, Bürgin, et al., 2022; Schmid, Fegert, Clemens, et al., 2022; Schmid, Fegert, Schmeck, et al., 2022; Bürgin et al., 2022). Participants' inclusion or exclusion through the longitudinal cohort study leading to the final analytical sample is displayed in the Supplement (see Supplement Figure 1). In total 419 participants between 12 and 21 years of age filled out mental health screenings at baseline and provided consent for later follow-up; we were able to reassess 166 participants of these 419 eligible participants, thus our specific retention rate was 39.6%. Patterns of longitudinal dropouts were explored in detail, these attrition analyses revealed neither significant differences between included and non-included participants at the baseline assessments regarding socio-demographic characteristics and psychosocial burdens (Supplement Table 1), nor regarding their criminal records over time (up until Dec. 2017; Supplement Table 2). Thus, our final sample for the present study comprised a total of 166 adolescents in youth residential care (106 men, 63.9%; 60 women, 36.1%). At baseline, participants were on average 16.1 years old ($SD = 1.9$, Range [12–21 years]); at follow-up, they were on average 26.4 years old ($SD = 2.3$, Range [21–33 years]). Participants at baseline were placed into the youth residential care institution due to either civil law ($N = 82$; 49.7%) or criminal law jurisdiction ($N = 43$; 26.1%), or due to various other reasons ($N = 40$; 24.2%). A mean duration

of 10.2 years ($SD = 1$, Range [7.9–12.5 years]) lay between baseline and follow-up assessments.

Ethical approval

Written informed consent for participation in the study was obtained from children and adolescents and their legal representatives at baseline (MAZ. study) and from young adults at follow-up (JAEL study). We only recontacted participants who provided written consent at baseline to be recontacted in case of a follow-up study. The MAZ. study was reviewed and approved by the Ethics Committees for Research on Human in the cantons (states) of Basel and Vaud (Switzerland), and by the Institutional Review Board at Ulm University (Germany). The responsible ethics committee (Ethics Commission Northwestern Switzerland) approved the JAEL study (Ref.-No.: 2017-00718).

Measurement

Mental health problems were assessed using the “Massachusetts Youth Screening Instrument – second version” (MAYSI-2) at both baseline and follow-up. The MAYSI-2 is a screening questionnaire for specific clinical symptoms to be identified early and be given special attention during a juvenile justice placement (Grisso & Barnum, 2000). The questionnaire is used nationwide in many US states to guide decisions for treatment needs and was initially developed for juvenile justice and forensic settings (Grisso et al., 2012), but is also used in the broader child welfare field and participants over the age of 18 years (Dölitzsch et al., 2017; Reilly et al., 2019). Previous research on the psychometric properties of the MAYSI-2 has shown its reliability and validity to be equally well supported in participants over the age of 18 (Colins et al., 2015). The self-reported MAYSI-2 was previously shown to match clinical diagnoses using data from baseline assessments of the overall study (Leenarts et al., 2016). The MAYSI-2 consists of 52 items that assess symptoms during the last month and includes seven scales: Alcohol/Drug Use (ADU, eight items), Angry/Irritable (AI, nine items), Depressed-Anxious (DA, nine items), Somatic Complaints (SC, six items), Suicidal Ideation (SI, five items), Thought Disturbance (TS, five items), and Traumatic Experiences (TE, five items). All questions are answered on a binary scale (no/yes). The responses to the items yield scores on the seven scales listed above. For each scale, a scale-specific cutoff exists to categorize individuals into three groups: “clinically unsuspicious”, “caution range” or “warning range”. We did not analyze the TS scale as it is only available in boys/men, nor did we use the TE scale as items differ between genders (Leenarts et al., 2016). The cutoff for the caution range indicating problematic behaviors was used to dichotomize participants into low versus high mental health problems on the respective scale. These five binary items indicating highly problematic behavior at baseline and follow-up were used to derive latent mental health problem classes as described below.

Childhood maltreatment was assessed retrospectively by self-report at follow-up using the “Childhood Trauma Questionnaire-Short Form” (CTQ-SF) (Bader et al., 2009; Häuser et al., 2011). The CTQ-SF consists of 25 retrospective items assessing childhood maltreatment histories scored on a 5-point Likert scale (i.e., “never true” to “very often true”). The CTQ-SF includes the following five subscales: emotional abuse, physical abuse, sexual abuse, physical neglect, and emotional neglect. Individual items are summed to give subscale scores from 5 to 25 for all five dimensions. We summed up all five subscales to create a total score of the CTQ to

assess the overall severity of maltreatment. The CTQ-SF was found to show high reliability and validity, with intraclass correlation coefficients ranging from $r = 0.76$ to 0.86 (Bernstein et al., 2003). The CTQ and its short version CTQ-SF are internationally the most widely used questionnaires to assess childhood maltreatment. Based on the German norm data, severity classifications can be formed, commonly used for descriptive purposes (“none-minimal”, “slight-moderate”, “moderate-severe” to “severe-extreme”) (Häuser et al., 2011; Klinitzke et al., 2012; Witt et al., 2017). For descriptive purposes we report categorical rates of maltreatment based on scoring above the moderate cutoff per subscale. Furthermore, in our models, we used both the CTQ-SF total score as an overall index of the severity of maltreatment exposure before the age of 18, and the five distinct dimensional subscale scores of the CTQ-SF to derive latent exposure profiles.

Sociodemographic characteristics were assessed using self-developed items. Migration background was categorized dichotomously as absent or present in case the participant or one of their parents was born outside of Switzerland.

Data analyses

The analyses followed the proposed procedure for conducting a Latent Transition Analysis (LTA) by Nylund et al. (2007). A multistep procedure was used. First, a Latent Class Analysis (LCA) at each time point (baseline, follow-up) was modeled. Using LCA, models with 1–5 classes were considered at baseline and follow-up separately. To avoid local maxima, we used 2,000 random sets of starting values and 200 final stage optimizations. For LCAs, we used five binary items indicating highly problematic behavior on the respective subscale. In a second step, we examined the levels of measurement invariance between classes at baseline and follow-up. Then longitudinal changes over time were analyzed using LTA.

Latent transition analysis (LTA) is a methodological tool for modeling transitions in co-occurring behavior (Collins & Lanza, 2009; Lanza & Bray, 2010). This method has been used to understand how individuals move in and out of symptom profiles, e.g., in profiles of substance abuse (e.g., Bray et al., 2021). The method is discussed in detail elsewhere (Collins & Lanza, 2009; Lanza et al., 2013). LTA is a longitudinal extension of LCA/LPA where latent class membership is dynamic and individuals may transition between different time points (Bray et al., 2021).

Finally, covariates and/or distal outcomes were added to determine (1) whether class membership at baseline was associated with gender, age, profiles of childhood maltreatment, and overall severity of childhood maltreatment and (2) whether these variables were associated with transitions in class membership over time. As some types of child maltreatment were present in all participants of the present study and different types of childhood maltreatment usually co-occur (Herrenkohl & Herrenkohl, 2009; Manly et al., 2001), we conducted a Latent Profile Analysis (LPA) to identify distinct patterns of childhood maltreatment to more accurately describe individual experiences (Witt et al., 2016), and to use them in subsequent analyses. For LPA, we used the dimensional scores on the five subscales of the CTQ. To determine the optimal model, four specific fit indices were used: Akaike Information Criteria (AIC), Bayesian Information Criteria (BIC), sample size adjusted Bayesian Information Criteria (SSaBIC), and Entropy. The bootstrap-likelihood ratio test (BLRT), and the Vuong-Lo-Mendell-Rubin test (VLMR-LRT) were used to decide on the best fitting model (Nylund et al., 2007). These indicators are used to compare models with K and $K + 1$ latent classes. A significant

result indicates that a model with $K + 1$ classes or profiles shows a better fit. Parsimony and interpretability were also considered. All 166 included participants had complete data; therefore, complete case analyses were conducted assuming missingness at random (MAR). Analyses were conducted using MPlus Version 8.1 (Muthén & Muthén, 2012) and SPSS, Version 21. Figures were written in R (Version 4.2.2) via RStudio (Version 2022.12.0, Boston, MA, USA). Respective p -values and confidence intervals for significance tests are indicated.

Results

Descriptive data on sociodemographic characteristics, mental health problems, and childhood maltreatment are presented in Table 1. The study is overall characterized by high rates of mental health problems and childhood maltreatment, with many participants experiencing different types of mental health problems and having been exposed to diverse forms of maltreatment (see Table 1).

Latent class analyses (LCAs) of mental health problems at baseline and follow-up

First, we performed LCAs at baseline and follow-up. Model fit information and model selection criteria are displayed in Table 2. Models with 1–5 classes were considered for the LCAs. Based on these results, models with 2–4 classes should be considered for final model selection employing longitudinal LTA as fit indices are reasonably close together. In the LCAs, the AIC and aBIC were minimized for the 3-class model at follow-up, whereas the BIC was minimized for the 2-class model at baseline. However, at baseline, and follow-up AIC, BIC, and aBIC showed only little differences between 2-class, 3-class, and 4-class solution. We selected the 3-class model as optimal for interpretation and additional analysis, based on aBIC, VLMR-LRT and interpretability.

The plausibility of measurement invariance across the two follow-ups was examined using a likelihood ratio test, consideration of model selection criteria, and physical inspection of the LCAs. The likelihood ratio test was significant ($-2DLL = 36.77$, $Df = 15$, $p < .001$); the AIC and aBIC favored invariance and the BIC favored variance. For interpretation measurement invariance was deemed plausible and was assumed for all models.

Latent transition analyses (LTA)

Second, we performed LTA across both measurement timepoints. Parameter estimates for the selected 3-class LTA are shown in Table 3. Class 1 (51.8% prevalence at baseline, 33.7% at follow-up) was defined to be the “multiproblem”-class, as these young people reported problems across all scales of the MAYSI-2. Class 2 (39.2% at baseline and 60.2% at follow-up) was characterized by low symptoms and was therefore defined as “low symptoms” class. Class 3 (9.0% at baseline and 6.0% at follow-up) was characterized by high externalizing symptoms and was therefore labeled as “externalizing.” Item response probabilities across the five domains of mental health problems at baseline and follow-up are displayed in Figure 1.

Transition rates for movement between classes across the observational period are presented in Table 3. Transition probabilities represent transitions between classes from baseline to follow-up. The diagonals in Table 3 (section latent transition probabilities, parameters in bold) represent stability parameters (Bray et al., 2021). These stability parameters indicate the

Table 1. Sociodemographic information, psychopathology, and childhood maltreatment

	Baseline (<i>N</i> = 166)	Follow-up (<i>N</i> = 166)
Age (<i>M</i> , <i>SD</i>)	16.1 (1.9)	26.4 (2.3)
Range	12–21	21–33
Gender (% female)		36.1
Migration background (% yes)		53.0
Number of out-of-home placements (<i>M</i> , <i>SD</i>)		3.7 (3.3)
Range		1–20
Age at first out-of-home placement (<i>M</i> , <i>SD</i>)		11.7 (4.5)
Range		0–21
Mental health problems (MAYSI-2, above caution cutoff)	%	%
≥1 scale above cutoff	79.5	71.7
≥3 scales above cutoff	50.0	36.8
Alcohol/drug use	32.5	25.3
Angry-irritable	57.2	36.7
Depressed-anxious	53.0	51.2
Somatic complaints	44.0	41.6
Suicidal ideation	46.4	31.9
Categorical childhood maltreatment (CTQ)*		%
≥1 form of maltreatment		76.5
≥3 forms of maltreatment		34.3
Emotional abuse		27.7
Physical abuse		34.3
Sexual abuse		18.7
Emotional neglect		61.5
Physical neglect		50.0
Dimensional childhood maltreatment (CTQ)		<i>M</i> (<i>SD</i>)
CTQ-total score		52.0 (16.2)
Emotional abuse		10.5 (5.1)
Physical abuse		8.8 (4.8)
Sexual abuse		6.9 (4.2)
Emotional neglect		15.8 (5.2)
Physical neglect		10.0 (3.7)

Notes. MAYSI-2: Massachusetts Youth Screening Instrument – second version; *categorical prevalence was defined using the above moderate cutoff per scale.

proportion of participants that stay in the same class at both time points. For example, 72.3% of those in the “low symptoms” class at baseline were also in the “low symptoms” class at follow-up, whereas 18.5% of them transitioned to the “multiproblem” class, while only 9.0% transitioned to the “externalizing” class. The “multiproblem” and “externalizing” class showed more group transitions over time and thus a more dynamic pattern. Those with externalizing symptoms at baseline were more likely to transition to the “low symptoms,” but 20% transitioned to the

“multiproblem” class. Individuals in the “multiproblem” class at baseline were also likely to transition to the “low symptom” class at follow-up and only few transitioned to the “externalizing” class (see Table 3: latent transition probabilities; and Figure 2).

Latent profile analysis (LPA) of childhood maltreatment

Model fit information and model selection criteria for LPA for patterns of childhood maltreatment are shown in Table 4. Models with 1–5 classes were considered for the LPA. The results favored a 3-class solution, indicated by a significant VLMR-LRT and interpretability of the results, that was used for the following analyses. Class 1 (10.2% prevalence) was defined as “sexual abuse,” as these individuals reported high levels of sexual abuse in addition to other types of childhood maltreatment. Class 2 (73.3%) was characterized by multiple maltreatment but overall lower severity and was therefore defined as “low multiple.” Class 3 (16.5%) was characterized by high levels of multiple maltreatment (with less extent of sexual abuse as compared with Class 1) and was therefore defined as “high multiple” (see Figure 3).

Association between childhood maltreatment and latent classes and transitions of mental health problem

To address whether experiences of childhood maltreatment were associated with class membership at baseline, we included covariates in these models. Parameter estimates for the baseline-category, multinomial, logistic regression predicting latent class membership are shown in Tables 5 and 6. The “low symptoms” class was the reference latent class (see Table 5), all predictors were entered into the model simultaneously. Only gender, but not maltreatment profile membership was significantly associated with the “multiproblem” class at baseline (see Table 5), with women showing higher odds of being in the “multiproblem class” than men. A higher overall maltreatment severity indexed by the CTQ-total score was significantly associated with being in the “multiproblem” class at baseline (see Table 6). Due to the small number of participants in the “externalizing” class, multinomial logistic regression did not provide interpretable information regarding maltreatment profiles. However, age was significantly associated with “externalizing” class at baseline, with older age increasing the odds of being in the “externalizing” class (see Table 5).

To further investigate the associations of childhood maltreatment and gender with transitions between classes over time, we examined odds ratios for “movers” between- versus “stayers” within-classes. These analyses were only conducted for all classes in which more than $n = 10$ participants transitioned to another class, as predicting transition probabilities is only reasonable to perform when these occur. Due to the small number of participants in the externalizing class, this class was omitted from these analyses. Generally, the results showed that the “low symptom” class was the most stable and transitions from “multiproblem” and “externalizing” to “low symptoms” were the most likely classes (see Table 3). The results showed that a lower CTQ-total score and a higher age were associated with a transition from “multiproblem” to the “low symptoms” class (see Tables 7 and 8). Both CTQ-total score and maltreatment profiles were not significantly related to transitions between “low symptom” stayers versus movers to “externalizing” and “multiproblem” (see Supplement Tables 3.1 & 3.2).

Table 2. Model fit information and model selection criteria for latent class analyses (LCAs). Each LCA included five domains of mental health problems at baseline and follow-up assessment both testing two- to five-class solutions

	LL	AIC	BIC	aBIC	Entropy ^a	DF	VLMR-LRT	BLRT
<i>Baseline</i>								
2-class	474.966	971.932	1006.164	971.337	0.92	20	561.278***	561.278***
3-class	468.998	971.996	1024.900	971.076	0.89	17	474.966*	474.966
4-class	466.335	978.669	1050.245	977.425	0.78	8	468.998	468.998
5-class	464.617	987.234	1077.481	985.665	0.79	2	466.335	466.335
<i>Follow-up</i>								
2-class	448.210	918.420	952.652	917.825	0.87	20	534.727***	534.727***
3-class	439.483	912.966	965.870	912.047	0.92	17	448.210**	448.210***
4-class	435.543	917.087	988.663	915.843	0.91	8	439.483	439.483
5-class	434.066	926.132	1,016.380	924.564	0.92	2	435.543	435.543

^a0.70 is used as cutoff (Fonseca & Cardoso, 2007), values closer to 1 indicate better fit. Lower AIC, BIC and sample size adjusted BIC (SSaBIC) values indicate better fit. Significant VLLMR-LRT and BLRT indicate better fit of the model. * $p < .05$, ** $p < .01$, *** $p < .001$.

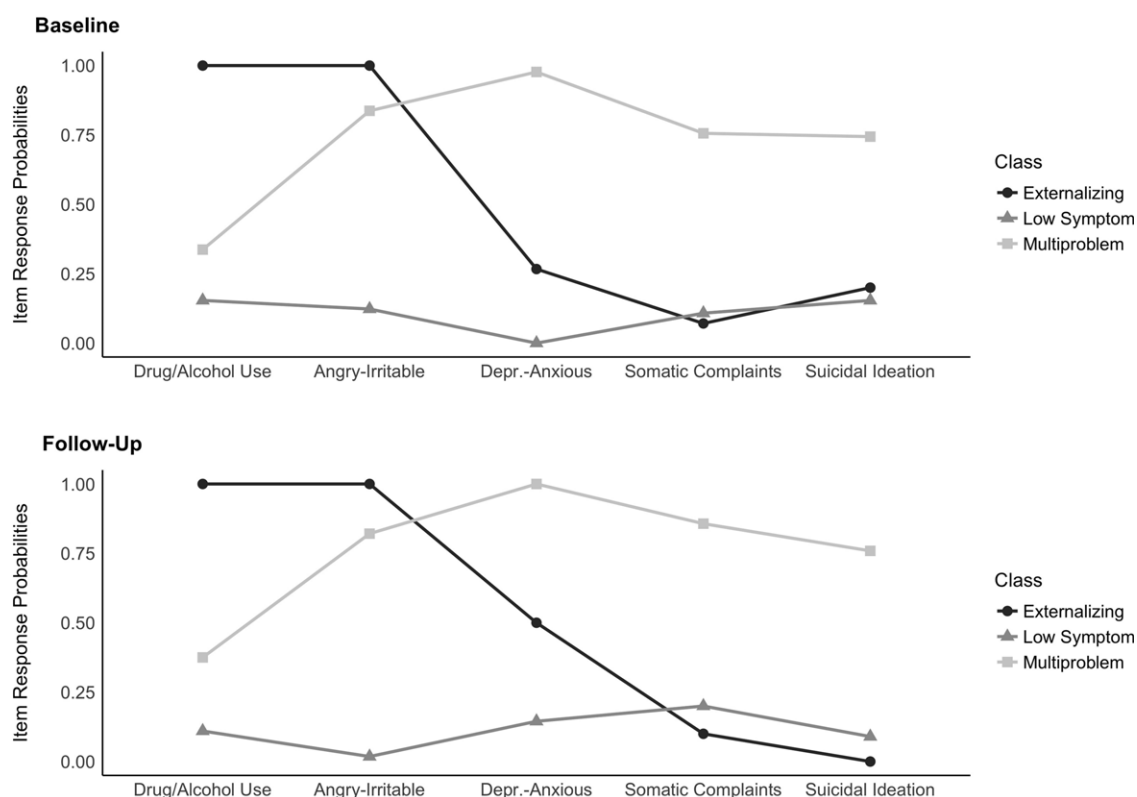


Figure 1. Latent classes of mental health problems at baseline and follow-up. Exact values of item response probabilities are reported in Table 3. Item response probabilities are displayed on the binary scale of the MAYSI-2 ranging between zero and one.

Discussion

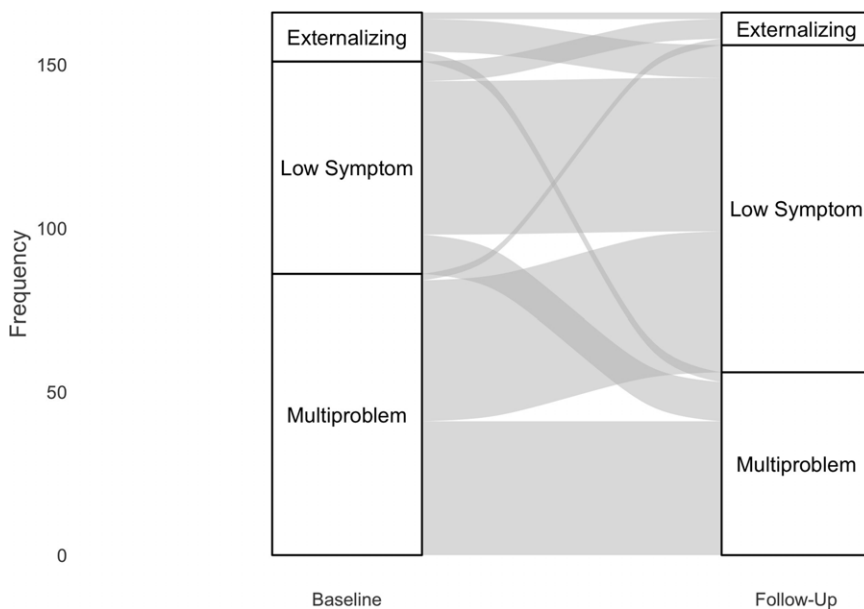
To the best of our knowledge, this is the first study to employ latent transition analysis to model shifts in mental health problem patterns over time in out-of-home placed adolescents. In this 10-year follow-up study of youth in residential care, we found three latent classes of psychopathology over time: a “multiproblem” class (51.8% at baseline, 33.7% at follow-up), a “low symptom” class (39.2% at baseline and 60.2% at follow-up), and an “externalizing” class (9% at baseline and 6% at follow-up). Overall, we found high stability for the “low symptom” class (72.3% of the “low symptom”

class), with only 18.5% of participants transitioning from the “low symptom” class to the “multiproblem” class over the course of 10 years. Results for the “multiproblem” and “externalizing” class showed less stable and more dynamic patterns of symptom shifts. Individuals in the “multiproblem” class were likely to transition to the “low symptom” class (50.0% of the “multiproblem” class), showing less-complex patterns of psychopathology at follow-up, whereas only few transitioned to the “externalizing” class (2.3% of the “multiproblem” class). Individuals with externalizing symptoms at baseline were also more likely to transition to the “low

Table 3. Parameter estimates for the selected 3-class model

	Multiproblem	Low symptom	Externalizing
<i>Latent class membership probabilities</i>			
Baseline (adolescence)	0.518	0.392	0.090
Follow-up (young adulthood)	0.337	0.602	0.060
<i>Item response probabilities (baseline)</i>			
Drug/alcohol use	0.337	0.154	1.000
Angry-irritable	0.837	0.123	1.000
Depressed-anxious	0.977	0.000	0.267
Somatic complaints	0.756	0.108	0.071
Suicide ideation	0.744	0.154	0.200
<i>Item response probabilities (follow-up)</i>			
Drug/alcohol use	0.375	0.110	1.000
Angry-irritable	0.821	0.018	1.000
Depressed-anxious	1.000	0.145	0.500
Somatic complaints	0.857	0.200	0.100
Suicide ideation	0.759	0.090	0.000
<i>Latent transition probabilities</i>			
	<i>Follow-up</i>		
Baseline	“Multiproblem”	“Low symptom”	“Externalizing”
“Multiproblem” (N = 86)	0.477 (N = 41)	0.500 (N = 43)	0.023 (N = 2)
“Low symptom” (N = 65)	0.185 (N = 12)	0.723 (N = 47)	0.092 (N = 6)
“Externalizing” (N = 15)	0.200 (N = 3)	0.667 (N = 10)	0.133 (N = 2)

Note. Bold numbers highlight the proportion of participants staying in the same class over time, and thus stability parameters per class.

**Figure 2.** Latent transition frequencies displayed as an alluvial plot. Frequencies and latent transition probabilities are reported in Table 3.

symptom” class (66.7% of the “externalizing” class) and fewer transitioned to the “multiproblem” class (20.0% of the “externalizing” class). Taken together, our study shows transitions from more complex, co-occurring, and externalizing symptom patterns towards less complex and less severe mental health problems from adolescence into young adulthood. Additionally, cumulative

childhood maltreatment among individuals in residential out-of-home placement was associated with persistence of more complex mental health problem patterns.

Previous research using person-oriented modeling in particular LTA to model shifts in classes of psychopathology over time is sparse and rather heterogeneous regarding the investigated



Figure 3. Latent profiles of childhood maltreatment. Item response probabilities are displayed on the dimensional CTQ subscales ranging between a minimum severity score of 5 and a maximum of 25.

Table 4. Model fit information and model selection criteria for latent profile analysis (LPA). LPA included five domains of childhood maltreatment tested for two- to five-class solutions

	LL	AIC	BIC	ABIC	Entropy ^a	VLMR-LRT	BLRT
2-class	3,419.258	6,876.517	6,935.644	6,875.489	0.95	3,528.980***	3,528.980***
3-class	3,345.191	6,742.381	6,823.293	6,740.975	0.972	3,419.258*	3,419.258***
4-class	3,312.676	6,691.351	6,794.047	6,689.566	0.967	3,345.191	3,345.191***
5-class	3,274.611	6,629.222	6,753.701	6,753.701	0.978	3,312.676	3,312.676***

^a0.70 is often used as cutoff (Fonseca & Cardoso, 2007), values closer to 1 indicate better fit. Lower AIC, BIC, and sample size adjusted BIC (SSaBIC) values indicate better fit. Significant VLLMR-LRT and BLRT indicate better fit of the model. **p* < .05, ***p* < .01, ****p* < .001.

Table 5. Multinomial logistic regression effects of predictors on latent class membership at baseline including the latent profiles of maltreatment

	Multiproblem ^a					Externalizing ^a				
	Coeff	SE	OR	Wald	<i>p</i>	Coeff	SE	OR	Wald	<i>p</i>
Gender (ref. women)	−2.11	0.44	0.12	22.72	<.001	0.69	1.15	2.01	0.37	0.54
Age	−0.04	0.10	1.00	0.002	0.96	0.02	0.15	1.40	5.15	0.02
LPA (ref. LM)										
SA	0.12	0.70	1.13	0.03	0.86	0.31	1.22	1.37	0.07	0.79
HM	0.66	0.51	1.93	1.68	0.19	–				

Note. HM = high maltreatment, SA = sexual abuse & other maltreatment, LM = low multiple. ^aReference category is the “low internalizing class.”

Table 6. Multinomial logistic regression effects of predictors on latent class membership at baseline including severity of overall childhood maltreatment

	Multiproblem ^a					Externalizing ^a				
	Coeff	SE	OR	Wald	<i>p</i>	Coeff	SE	OR	Wald	<i>p</i>
Gender (ref. women)	−1.18	0.44	0.16	17.09	<0.01	0.76	1.12	2.14	0.46	0.50
Age	0.02	0.10	1.02	0.04	0.85	0.33	0.15	1.39	5.05	0.03
CTQ-total score	0.05	0.14	1.05	11.00	<.001	0.02	0.02	1.02	0.54	0.46

Note. ^aReference category for mental health problems classes is the “low internalizing” class.

populations (mostly community- or population-based studies), time intervals between measurement points, the numbers of follow-ups, and their measure of psychopathology (Blok et al., 2022; Göbel & Cohrdes, 2021; Healy et al., 2022; Isdahl-Troye et al., 2022; McElroy et al., 2017; Moore et al., 2019; Petersen et al., 2022). None of these studies investigated out-of-home placed individuals,

Table 7. Binary logistic regression effects of predictors on transitions between “Multiproblem” stayers versus movers to “low symptom” including the latent profiles of maltreatment

	Coeff	SE	OR	Wald	<i>p</i>
Gender (ref. women)	−0.48	0.51	0.62	0.88	0.35
Age	0.233	1.38	1.26	2.86	0.09
<i>LPA (ref. LM)</i>					
SA	1.15	0.72	3.16	2.59	0.11
HM	−0.67	0.84	0.51	0.65	0.42

Note. HM = high maltreatment, SA = sexual abuse & other maltreatment, LM = low multiple.

Table 8. Binary logistic regression effects of predictors on transitions between “Multiproblem” stayers versus movers to “low symptom” including severity of overall childhood maltreatment

	Coeff	SE	OR	Wald	<i>p</i>
Gender (ref. women)	−0.25	0.52	0.78	0.24	0.62
Age	0.26	0.14	1.29	3.25	0.07
CTQ-total score	−0.07	0.02	0.93	13.63	<.001

nor used the same well-validated measures for mental health problems as we did. Despite these heterogeneous study designs of other previous studies, most of the studies (those merely focusing on mental health symptoms) found a four-class model as best fitting solution with a normative, a primarily internalizing, a primary externalizing, and a comorbid/multiproblem/co-occurring group (Blok et al., 2022; Healy et al., 2022; Isdahl-Troye et al., 2022; McElroy et al., 2017). Only one study found a three-class solution as best fit with a normative class, an emotional problem class, and a multiple problem class (Göbel et al., 2022). Both studies investigating dual-factor mental health concepts, which explore psychopathology next to life-satisfaction or well-being simultaneously (Antaramian et al., 2010; Suldo & Shaffer, 2008), found a higher number of classes (Moore et al., 2019; Petersen et al., 2022). Within our sample, we did not find a clearly identifiable purely “internalizing” or “emotional problem” class, which is often found within community- and population-based samples (Blok et al., 2022; Healy et al., 2022; Isdahl-Troye et al., 2022; McElroy et al., 2017). Instead, we found a “low symptom” class with low levels of internalizing and externalizing symptoms, a small merely externalizing class, and a large class showing both mental health problems across the internalizing and externalizing spectra. In summary, our findings revealed that at-risk samples might present with different patterns of mental health problems compared to the general population, with a larger proportion exhibiting co-occurring internalizing and externalizing mental health problems. Replication in larger out-of-home placed samples using different measures of mental health problems and psychopathology is needed.

Focusing on the stability of symptom classes over time, findings in the literature are heterogeneous, with some studies reporting high stability of latent class membership (Göbel et al., 2022; Isdahl-Troye et al., 2022; McElroy et al., 2017), but shifts being more common among those in the multiproblem or externalizing groups (Isdahl-Troye et al., 2022; McElroy et al., 2017). While some previous studies suggest more dynamic shifts and transient phases

of psychopathology along different developmental periods across childhood, these studies also highlight a subgroup of individuals with persisting complex psychopathological symptoms (Blok et al., 2022; Healy et al., 2022). Studies investigating dual-factor mental health concepts showed more dynamic patterns with more than half of the sample shifting between class membership (Moore et al., 2019; Petersen et al., 2022). In our study, we found relatively high numbers of transitions from the “multiproblem” and “externalizing” classes towards other classes similar to what was observed in previous studies (Blok et al., 2022; Healy et al., 2022; Isdahl-Troye et al., 2022; McElroy et al., 2017). This might be due to the overall higher proportions in the “multiproblem” class, which leads to comparably high proportions of transitions when looking at the entire sample. As such, findings from LTA studies show that mental health problems are mostly stable for all those in the less burdened classes, however, there are more transitions within burdened classes. Understanding factors contributing to transitions towards less troubled classes over time is of high interest. Our findings, in particular, underline that more longitudinal studies examining out-of-home placed samples are needed to better understand the persistence and stability of mental health problems over time and to guide intervention and social policy efforts.

Next to other community- and population-based studies employing LTA, meta-analyses of young adults with a residential care history have shown that the prevalence of mental disorders in young adults is still higher compared to the general population (Seker, Boonmann, Gerger, et al., 2022), but lower compared to estimates from meta-analyses within out-of-home care (Beaudry et al., 2021; Bronsard et al., 2016). Within our previous work in our cohort study, we have found that general, internalizing, and externalizing mental health problems (assessed dimensionally with the Achenbach Scales) decreased from adolescence to adulthood, with larger decreases in externalizing compared to internalizing symptoms (Seker, Bürgin, et al., 2022), whereas latent general psychopathology resulting from hierarchical-clustered psychologist-rated mental disorders seemed to be stable (Seker, Boonmann, d’Huart, et al., 2022). Together, our findings show that self-reported mental health overall improved in our cohort of adolescents placed in youth residential care into young adulthood, which is in line with the meta-analytic evidence within the field. Nevertheless, a subgroup of participants of our study still shows persistently high levels of mental health problems.

Our study further indicated that cumulative childhood maltreatment is associated with mental health problems in adolescence and is associated with persisting complex symptom patterns from adolescence to young adulthood in young people placed out-of-home. A large body of previous research has well established that childhood maltreatment and other forms of early adversity are associated with higher levels of psychopathology and mental disorders (Green et al., 2010; Hughes et al., 2017; Kessler et al., 2010; Lewis et al., 2021; McCrory et al., 2017; McLaughlin et al., 2020; McLaughlin, 2016; Moffitt & Klaus-Grawe Think, 2013). Next to these associations, childhood maltreatment exposure has repeatedly been shown to be associated to different characteristics of specific mental disorders, for example an earlier age of onset, higher severity of symptoms, comorbidity, increased risk for suicide, and poorer treatment response (Cloitre et al., 2009; Heim & Binder, 2012; Teicher & Samson, 2013; Widom et al., 2007). Interestingly, we did not find a significant association between latent maltreatment profiles on baseline mental health classes, nor on transitions between classes over time. This might be

explained by the overall high burden of maltreatment in the studied sample and the small sample size, as such the reference group (“low multiple”) also displays a considerable amount of neglect and comprised over 70% of the total sample, with the two other profiles being rather small and thus corresponding errors of estimates being rather large. Moreover, using a broader assessment of maltreatment with newer and more comprehensive measures might have resulted in different and more specific maltreatment patterns (Jarczok et al., 2023; Teicher & Parigger, 2015), which is important to consider in future research having large sample sizes. In sum, by using a person-oriented longitudinal modeling approach, we were able to show that maltreatment severity, but not latent profiles, is associated to more complex mental health problems in adolescence and to more perpetuating multiproblem psychopathology in a 10-year follow-up across the transition from within residential care to after residential care.

Our findings, along previous research, inform current debates on transdiagnostic approaches to conceptualize mental disorders and underscore the need to investigate childhood maltreatment as a transdiagnostic risk factor. The descriptive classification of mental disorders has been challenged since its introduction by the question of how to best conceptualize the impact of childhood maltreatment on mental disorders (Schmid et al., 2013; Teicher & Samson, 2013; van der Kolk et al., 2009). Continuing debate revolves around how the latent vulnerability due to maltreatment can be related to distinct subtypes of specific mental disorders, debate also continues on how such complex psychopathology is developmentally appropriately assessed within the disorder category of PTSD and the newly introduced complex PTSD diagnoses (Ford et al., 2022; Maercker et al., 2022; Spinazzola et al., 2021; Teicher et al., 2022). More recently transdiagnostic approaches to mental health, as the general *p*-factor theories, the hierarchical taxonomy of psychopathology (HiToP), or the Research Domain Criteria (RDoC), have gained prominence mainly in research (Caspi et al., 2014; Cuthbert & Insel, 2013; Dalgleish et al., 2020; Kotov et al., 2017). Such approaches highlight important core dimensions of functioning and conceptualize mental disorder under higher-order dimensions or along core domains of functioning (Caspi et al., 2014; Cuthbert & Insel, 2013; Dalgleish et al., 2020; Kotov et al., 2017). Following such an approach, childhood maltreatment (or adversity and trauma) can and should be conceptualized as transdiagnostic risk factors for the emergence of general psychopathology (McLaughlin et al., 2020; Nolen-Hoeksema & Watkins, 2011). Recent research also is increasingly invested in filling the gap between childhood risks and (psycho-)pathology by investigating mediators and mechanistic pathways transferring these risks (McLaughlin, 2016; Moffitt et al., 2017). Important mechanisms include emotion regulation, social information processing, and accelerated aging processes, which shape latent liabilities and vulnerability (Keyes et al., 2012; McCrory et al., 2017; McLaughlin et al., 2020). Next to transdiagnostic outcomes and mechanisms conveying risks, recent debates further foster an understanding of different core dimensions of adverse environments in childhood (Ellis & Del Giudice, 2019; Humphreys & Zeanah, 2015; Lange et al., 2019; Lewis et al., 2021; McLaughlin, 2016). From a developmental perspective, such early deviations from “expectable” environments interfere with different important developmental tasks including the development of emotion regulation, of close attachment bonds and peer relationships, with the development of an autonomous self, and different dimensions of personality functioning (Cicchetti & Doyle, 2016; d’Huart, Hutsebaut, et al., 2022; Humphreys &

Zeanah, 2015). All these intra- and interpersonal abilities are important protective factors for the emergence of psychopathology and underline core features of resilience.

Along these debates, our findings highlight that many individuals in at-risk populations – specifically young people placed out-of-home – present with comorbid mental health problems and psychopathological symptoms across the internalizing and externalizing spectra. As such, a transdiagnostic understanding of mental disorders and mental health problems is essential within out-of-home placed populations, who seldomly present with diagnostically well-fitting symptom presentations. Our findings also highlight, that almost half of participants in the multiproblem group shifted to a less troubling pattern of psychopathology over a 10-year follow-up and as such intervention by child welfare system might pay-off (at least for some). At the same time a quarter of all participants, almost half of all those in the multiproblem group at baseline show a stable pattern of co-occurring psychopathology over time. This subgroup might specifically benefit from trauma-focused interventions, including both evidence-based and trauma-focused psychotherapy, but also from concepts of trauma-informed care (Bath, 2008; Forkey et al., 2021; Hopper et al., 2010). The implementation of trauma-informed pedagogical concepts in different youth welfare contexts hold promise as they also aim to build capacity and to foster resilience by not merely treating the individual but shaping the socio-ecological context for young people to be able to develop and thrive (Bunting et al., 2019; Lang et al., 2021; Schmid et al., 2020; Zhang et al., 2021). These trauma-informed approaches not only account for trauma-related threat-responses of young people during daily life but are intended to enable young people from deprived environments to cope with their different developmental tasks at hand, to regulate their emotions with the help of a caregiver, to form close attachment and relationships, and to develop an autonomous self.

Strengths and limitations

Our findings within the present study need to be interpreted considering some important limitations. First, we used a retrospective self-report measure of childhood maltreatment which are debated considering certain biases (e.g., recall biases) with new studies reporting only poor overlap between maltreatment exposure assessed in prospective versus retrospective research designs (Baldwin et al., 2019; Bürgin et al., 2020; Danese & Widom, 2020; Danese, 2020; Hardt & Rutter, 2004). Still, the CTQ(-SF) is one of the most used measures of childhood maltreatment and childhood “trauma” worldwide, but also within the German-speaking spheres (Bader et al., 2009; Häuser et al., 2011; Klinitzke et al., 2012; Witt et al., 2017). Importantly, the CTQ does not differentiate when or in which specific context maltreatment occurred, however, around half of the items target the specific family context, whereas other items are broader-framed and might also have assessed peer- or caregiver-conducted maltreatment during the time or in between placements, within or outside of the institutions. Second, a control group of young people without residential care placements is lacking, thus our findings are not suited to address efficacy of youth residential care placement in general. Furthermore, the individual residential care trajectories and received specific pedagogical and therapeutic interventions vary greatly, and there is only sparse quantitative self-report data available about early childhood years and different forms of interventions. All of these are intertwined with specific behavioral

and emotional problems, as such we did not test any placement related characteristics as predictors of mental health trajectories, nor do we believe that our study design is suited to test the efficacy or non-efficacy of out-of-home care or of specific psychotherapeutic interventions. Third, even though the analyses provided stable solutions, the LTA approach generally favors larger sample sizes (Muthén, 2021). Fourth, generalizability needs to be made regarding the Swiss residential care setting and the broad age range (12–21) at baseline. As outlined, our sample draws from adolescents that resided in various kinds of youth residential care institutions, both the population of study and the youth residential care background are highly heterogeneous. Participating institutions, and participants in these institutions seem to be representative for the overall Swiss youth residential care population. Moreover, our attrition analyses have shown no systematic drop-out. Still, generalizability and inference should be made with caution and inference needs to consider the Swiss-specific and diverse population of study. Fifth, we used the same mental health measure at baseline and follow-up, which comes at the tradeoff of using the measure in an age range and setting for which it was not initially developed for. Despite these shortcomings this study has important strengths. We have investigated a rare and well-characterized high-risk sample of young adults with previous residential care placements over a follow-up period of 10 years, such data is rather rare and Swiss-unique. Moreover, our study incorporated psychometric assessment on child maltreatment and two measurement time-points on mental health within residential youth care and afterwards, combining such data from a rare sample with person-oriented longitudinal modeling approach is a great asset of our work.

Implications

Our findings have important implications for (child-)welfare systems and social policy. First, we need to continue to invest into the prevention of transdiagnostic risk factors for the emergence and perpetuation of psychopathology – foremost childhood maltreatment. Second, we need to promote accessible and suitable interventions and trauma-informed care concepts in different at-risk settings (Bunting et al., 2019; Forkey et al., 2021; Lang et al., 2021; Schmid et al., 2020; Zhang et al., 2021). Third, next to treating maltreatment-related psychopathology, welfare systems should foremost aim to build capacity within young people and help them to cope with their developmental tasks at hand to regulate their emotions, to form close attachments and supportive relationships, and to develop an autonomous self to be able and enabled to be well and partake within society (Bürgin et al., 2023; Schmid, Fegert, Clemens, et al., 2022). Last, transitioning from within residential or psychiatric care to after care and an independent life is a critical phase of vulnerability for which well-fitting and accessible help is needed as development is far more dynamic than a linear increase in age (Banaschewski et al., 2019; Danese, 2022; Haggman-Laitila et al., 2020).

Future research should aim to study populations with high levels of adversities over time within developmentally informed designs implementing person-oriented modeling approaches. Such research is time and cost consuming, but longitudinal studies following such populations are needed to elucidate risk and protective factors and mechanisms transferring these effects (Kind et al., 2023; Panter-Brick & Leckman, Kind et al., 2013; Schmid, Fegert, Clemens, et al., 2022; Schmid, Fegert, Schmeck, et al., 2022). Moreover, future research should incorporate new measures of childhood maltreatment and lifetime stressors (e.g. the MACE, the

ICAST-R, or the STRAIN), which are more inclusive of different forms of adversity and stressors and allow the assessment and the statistical modeling of frequency, timing, and duration of different exposures (Isele et al., 2014; Jarczok et al., 2023; Schalinski et al., 2016; Sturmabauer et al., 2019; Teicher & Parigger, 2015). Future research might also focus on latent profiles of adjustment regarding broader outcomes beyond merely studying mental health problems. For instance, “dual-factor mental health” perspectives enable to investigate psychopathology together with functioning, in order to better understand which young people still report a high quality of life despite presenting with psychopathology (Antaramian et al., 2010; Moore et al., 2019; Petersen et al., 2022). Such perspectives might help to build capacity, foster well-being and quality of life and help young people coming from deprived and maltreating backgrounds to partake in society and to be well (Bürgin et al., 2023; Schmid, Fegert, Clemens, et al., 2022).

Conclusion

The findings of this study shed light on the stability and shifts in classes of mental health problems over the course of 10 years from adolescence into young adulthood in adolescents placed within youth residential care in Switzerland. Our findings underscore the importance to understand childhood maltreatment as transdiagnostic risk factor for the emergence, but also for the perpetuation of psychopathology across the internalizing and externalizing spectra. Findings also show that half of young adults within the multiproblem class shifted to less troubling patterns of psychopathology, while the other half showed persisting internalizing and externalizing symptoms, highlighting the need for trauma-informed and -focused interventions within youth residential care, as well as interdisciplinary collaboration among residential care institutions, child welfare, youth mental health services, and child- and adolescent psychiatric care centers. More longitudinal research in at-risk populations is needed to better understand trajectories of mental health problems and risk and protective factors for adjustment over time.

Supplementary material. The supplementary material for this article can be found at <https://doi.org/10.1017/S0954579423001426>

Acknowledgements. This work was supported by the Swiss Federal Office of Justice with two grants for the MAZ and JAEL study awarded to MS, JMF, & KS. DB was supported by the Research Fund for Excellent Junior Researcher of the University of Basel for the study “CT-Quest.”

Competing interests. None.

References

- Achterhof, R., Huntjens, R. J. C., Meewisse, M. L., & Kiers, H. A. L. (2019). Assessing the application of latent class and latent profile analysis for evaluating the construct validity of complex posttraumatic stress disorder: Cautions and limitations. *European Journal of Psychotraumatology*, 10(1), 1698223. <https://doi.org/10.1080/20008198.2019.1698223>
- Ahrens, K. R., Garrison, M. M., & Courtney, M. E. (2014). Health outcomes in young adults from foster care and economically diverse backgrounds. *Pediatrics*, 134(6), 1067–1074. <https://doi.org/10.1542/peds.2014.1150>
- Antaramian, S. P., Scott Huebner, E., Hills, K. J., & Valois, R. F. (2010). A dual-factor model of mental health: Toward a more comprehensive understanding of youth functioning. *American Journal of Orthopsychiatry*, 80(4), 462–472. <https://doi.org/10.1111/j.1939-0025.2010.01049.x>
- Armour, C., Elklit, A., & Christoffersen, M. N. (2013). A latent class analysis of childhood maltreatment: Identifying abuse typologies. *Journal of Loss and Trauma*, 19(1), 23–39. <https://doi.org/10.1080/15325024.2012.734205>

- Atkinson, C., & Hyde, R. (2019). Care leavers' views about transition: A literature review. *Journal of Children's Services*, 14(1), 42–58. <https://doi.org/10.1108/JCS-05-2018-0013>
- Bader, K., Hännny, C., Schäfer, V., Neuckel, A., & Kuhl, C. (2009). Childhood trauma questionnaire-psychometrische Eigenschaften einer deutschsprachigen Version. *Zeitschrift für Klinische Psychologie und Psychotherapie*, 38(4), 223–230. <https://doi.org/10.1026/1616-3443.38.4.223>
- Baldwin, J. R., Reuben, A., Newbury, J. B., & Danese, A. (2019). Agreement between prospective and retrospective measures of childhood maltreatment: A systematic review and meta-analysis. *JAMA Psychiatry*, 76(6), 584–593. <https://doi.org/10.1001/jamapsychiatry.2019.0097>
- Banaschewski, T., Fegert, J. M., Freyberger, H., Karow, A., Reif, A., Schaff, C., Voderholzer, U., & Driessen, M. (2019). Transition psychiatry-challenges and solutions. *Fortschritte der Neurologie-Psychiatrie*, 87(11), 608–615. <https://doi.org/10.1055/a-1016-3288>
- Bath, H. (2008). The three pillars of trauma-informed care. *Reclaiming Children and Youth*, 17(3), 17–21.
- Beaudry, G., Yu, R., Langstrom, N., & Fazel, S. (2021). An updated systematic review and meta-regression analysis: Mental disorders among adolescents in juvenile detention and correctional facilities. *Journal of the American Academy of Child & Adolescent Psychiatry*, 60(1), 46–60. <https://doi.org/10.1016/j.jaac.2020.01.015>
- Bellis, M. A., Hughes, K., Ford, K., Ramos Rodriguez, G., Sethi, D., & Passmore, J. (2019). Life course health consequences and associated annual costs of adverse childhood experiences across Europe and North America: A systematic review and meta-analysis. *Lancet Public Health*, 4(10), e517–e528. [https://doi.org/10.1016/S2468-2667\(19\)30145-8](https://doi.org/10.1016/S2468-2667(19)30145-8)
- Bernstein, D. P., Stein, J. A., Newcomb, M. D., Walker, E., Pogge, D., Ahluvalia, T., Stokes, J., Handelsman, L., Medrano, M., Desmond, D., & Zule, W. (2003). Development and validation of a brief screening version of the Childhood Trauma Questionnaire. *Child Abuse & Neglect*, 27(2), 169–190.
- Blok, E., de Mol, C. L., van der Ende, J., Hillegers, M. H. J., Althoff, R. R., Shaw, P., & White, T. (2022). Stability and change of psychopathology symptoms throughout childhood and adolescence. *Child Psychiatry & Human Development*, 53(6), 1330–1339. <https://doi.org/10.1007/s10578-021-01212-8>
- Bray, B. C., Berglund, P. A., Evans-Polce, R. J., & Patrick, M. E. (2021). A latent transition analysis of self-reported reasons for marijuana use during young adulthood. *Evaluation & the Health Professions*, 44(1), 9–24.
- Bronsard, G., Alessandrini, M., Fond, G., Loundou, A., Auquier, P., Tordjman, S., & Boyer, L. (2016). The prevalence of mental disorders among children and adolescents in the child welfare system: A systematic review and meta-analysis. *Medicine (Baltimore)*, 95(7), e2622. <https://doi.org/10.1097/MD.0000000000002622>
- Bunting, L., Montgomery, L., Mooney, S., MacDonald, M., Coulter, S., Hayes, D., & Davidson, G. (2019). Trauma informed child welfare systems-A rapid evidence review. *International Journal of Environmental Research and Public Health*, 16(13), 2365. <https://doi.org/10.3390/ijerph16132365>
- Bürgin, D., Boonmann, C., Schmid, M., Tripp, P., & O'Donovan, A. (2020). Fact or artefact? Childhood adversity and adulthood trauma in the U.S. population-based Health and Retirement Study. *European Journal of Psychotraumatology*, 11(1), 1721146. <https://doi.org/10.1080/20008198.2020.1721146>
- Bürgin, D., Clemens, V., Varghese, N., Eckert, A., Huber, M., Bruttin, E., Boonmann, C., Unternährer, E., O'Donovan, A., & Schmid, M. (2022). Adverse and traumatic exposures, posttraumatic stress disorder, telomere length, and hair cortisol – Exploring associations in a high-risk sample of young adult residential care leavers. *Brain, Behavior, & Immunity - Health*, 26, 100524. <https://doi.org/10.1016/j.bbih.2022.100524>
- Bürgin, D., Clemens, V., Witt, A., Sachser, C., Jud, A., Brähler, E., Strauß, B., Petrowski, K., Schmid, M., & Fegert, J. M. (2023). Adverse childhood experiences increase the risk for low perceived social participation and health-related quality of life in a large-scale population-based study in Germany. *Child Abuse & Neglect*, 144, 106382. <https://doi.org/10.1016/j.chiabu.2023.106382>
- Caspi, A., Houts, R. M., Belsky, D. W., Goldman-Mellor, S. J., Harrington, H. L., Israel, S., Meier, M. H., Ramrakha, S., Shalev, I., Poulton, R., & Moffitt, T. E. (2014). The p factor: One general psychopathology factor in the structure of psychiatric disorders? *Clinical Psychological Science*, 2(2), 119–137. <https://doi.org/10.1177/2167702613497473>
- Charak, R., Ford, J. D., Modrowski, C. A., & Kerig, P. K. (2019). Polyvictimization, emotion dysregulation, symptoms of posttraumatic stress disorder, and behavioral health problems among justice-involved youth: A latent class analysis. *Journal of Abnormal Child Psychology*, 47(2), 287–298. <https://doi.org/10.1007/s10802-018-0431-9>
- Cicchetti, D., & Doyle, C. (2016). Child maltreatment, attachment and psychopathology: Mediating relations. *World Psychiatry*, 15(2), 89–90. <https://doi.org/10.1002/wps.20337>
- Cicchetti, D., & Rogosch, F. A. (1996). Equifinality and multifinality in developmental psychopathology. *Development and Psychopathology*, 8(4), 597–600. <https://doi.org/10.1017/S0954579400007318>
- Cicchetti, D., & Toth, S. L. (2005). Child maltreatment. *Annual Review of Clinical Psychology*, 1(1), 409–438. <https://doi.org/10.1146/annurev.clinpsy.1.102803.144029>
- Cicchetti, D., & Toth, S. L. (2009). The past achievements and future promises of developmental psychopathology: The coming of age of a discipline. *Journal of Child Psychology and Psychiatry*, 50(1–2), 16–25. <https://doi.org/10.1111/j.1469-7610.2008.01979.x>
- Cloitre, M., Stolbach, B. C., Herman, J. L., Kolk, B., Pynoos, R., Wang, J., & Petkova, E. (2009). A developmental approach to complex PTSD: Childhood and adult cumulative trauma as predictors of symptom complexity. *Journal of Traumatic Stress*, 22(5), 399–408. <https://doi.org/10.1002/jts.20444>
- Colins, O. F., Grisso, T., Vahl, P., Guy, L., Mulder, E., Hornby, N., Pronk, C., Markus, M., Doreleijers, T., & Vermeiren, R. (2015). Standardized screening for mental health needs of detained youths from various ethnic origins: The Dutch Massachusetts Youth Screening Instrument-Second Version (MAYSI-2). *Journal of Psychopathology and Behavioral Assessment*, 37(3), 481–492.
- Collins, L. M., & Lanza, S. T. (2009). *Latent class and latent transition analysis: With applications in the social, behavioral, and health sciences* (Vol. 718). John Wiley & Sons.
- Copeland, W. E., Keeler, G., Angold, A., & Costello, E. J. (2007). Traumatic events and posttraumatic stress in childhood. *Archives of general psychiatry*, 64(5), 577–584. <https://doi.org/10.1001/archpsyc.64.5.577>
- Copeland, W. E., Shanahan, L., Hinesley, J., Chan, R. F., Aberg, K. A., Fairbank, J. A., van den Oord, E. J. C. G., & Costello, E. J. (2018). Association of childhood trauma exposure with adult psychiatric disorders and functional outcomes. *JAMA Network Open*, 1(7), e184493. <https://doi.org/10.1001/jamanetworkopen.2018.4493>
- Courtney, M. E., Okpych, N. J., & Park, S. (2018). *Report from CalYOUTH: Findings on the relationship between extended foster care and youth's outcomes at age 21*. Chapin Hall at the University of Chicago.
- Cuthbert, B. N., & Insel, T. R. (2013). Toward the future of psychiatric diagnosis: The seven pillars of RDoC. *BMC Medicine*, 11(1), 126. <https://doi.org/10.1186/1741-7015-11-126>
- d'Huart, D., Bürgin, D., Seker, S., Birkhölzer, M., Jenkel, N., Boonmann, C., Fegert, J. M., Schmid, M., & Schmeck, K. (2022). Risikofaktoren für und Stabilität einer Persönlichkeitsstörung vom Jugendalter bis ins junge Erwachsenenalter in einer Hochrisikopopulation. *Kindheit und Entwicklung*, 31(1), 40–51. <https://doi.org/10.1026/0942-5403/a000367>
- d'Huart, D., Hutsebaut, J., Seker, S., Schmid, M., Schmeck, K., Bürgin, D., & Boonmann, C. (2022). Personality functioning and the pathogenic effect of childhood maltreatment in a high-risk sample. *Child and Adolescent Psychiatry and Mental Health*, 16(1), 95. <https://doi.org/10.1186/s13034-022-00527-1>
- d'Huart, D., Steppan, M., Seker, S., Bürgin, D., Boonmann, C., Birkhölzer, M., Jenkel, N., Fegert, J. M., Schmid, M., & Schmeck, K. (2022). Prevalence and 10-year stability of personality disorders from adolescence to young adulthood in a high-risk sample. *Frontiers in Psychiatry*, 13, 840678. <https://doi.org/10.3389/fpsy.2022.840678>
- Dalgleish, T., Black, M., Johnston, D., & Bevan, A. (2020). Transdiagnostic approaches to mental health problems: Current status and future directions. *Journal of Consulting and Clinical Psychology*, 88(3), 179–195. <https://doi.org/10.1037/ccp0000482>

- Danese, A. (2020). Annual Research Review: Rethinking childhood trauma—new research directions for measurement, study design and analytical strategies. *Journal of Child Psychology and Psychiatry*, 61(3), 236–250. <https://doi.org/10.1111/jcpp.13160>
- Danese, A. (2022). Bridging between youth psychiatry and child and adolescent psychiatry. *World Psychiatry*, 21(1), 83–85. <https://doi.org/10.1002/wps.20931>
- Danese, A., & Widom, C. S. (2020). Objective and subjective experiences of child maltreatment and their relationships with psychopathology. *Nature Human Behaviour*, 4(8), 811–818. <https://doi.org/10.1038/s41562-020-0880-3>
- Dölitzsch, C., Fegert, J. M., Künster, A., Kölch, M., Schmeck, K., & Schmid, M. (2014). Mehrfachdiagnosen bei Schweizer Heimjugendlichen. *Kindheit und Entwicklung*. <https://doi.org/10.1002/9780470939406.ch4>
- Dölitzsch, C., Leenarts, L. E., Schmeck, K., Fegert, J. M., Grisso, T., & Schmid, M. (2017). Diagnostic performance and optimal cut-off scores of the Massachusetts youth screening instrument-second version in a sample of Swiss youths in welfare and juvenile justice institutions. *BMC Psychiatry*, 17(1), 61. <https://doi.org/10.1186/s12888-017-1197-2>
- Dorsey, S., Kerns, S. E. U., Trupin, E. W., Conover, K. L., & Berliner, L. (2012). Child welfare caseworkers as service brokers for youth in foster care: Findings from project focus. *Child Maltreatment*, 17(1), 22–31. <https://doi.org/10.1177/1077559511429593>
- Ellis, B. J., & Del Giudice, M. (2019). Developmental adaptation to stress: An evolutionary perspective. *Annual Review of Psychology*, 70(1), 111–139. <https://doi.org/10.1146/annurev-psych-122216-011732>
- Esser, G., & Schmidt, M. H. (2017). Die Mannheimer Risikokinderstudie. *Kindheit und Entwicklung*, 26(4), 198–202. <https://doi.org/10.1026/0942-5403/a000232>
- Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., Koss, M. P., & Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults. The Adverse Childhood Experiences (ACE) Study. *American Journal of Preventive Medicine*, 14(4), 245–258. [https://doi.org/10.1016/s0749-3797\(98\)00017-8](https://doi.org/10.1016/s0749-3797(98)00017-8)
- Fischer, S., Dölitzsch, C., Schmeck, K., Fegert, J. M., & Schmid, M. (2016). Interpersonal trauma and associated psychopathology in girls and boys living in residential care. *Children and Youth Services Review*, 67, 203–211. <https://doi.org/10.1016/j.childyouth.2016.06.013>
- Fonseca, J. R., & Cardoso, M. G. (2007). Mixture-Model cluster analysis using information theoretical criteria. *Intelligent Data Analysis*, 11(2), 155–173. <https://doi.org/10.3233/IDA-2007-11204>
- Ford, J. D., Charak, R., Karatzias, T., Shevlin, M., & Spinazzola, J. (2022). Can developmental trauma disorder be distinguished from posttraumatic stress disorder? A symptom-level person-centred empirical approach. *European Journal of Psychotraumatology*, 13(2), 2133488. <https://doi.org/10.1080/2008066.2022.2133488>
- Forkey, H., Szilagyi, M., Kelly, E. T., J., Duffee, & Council on Community Pediatrics, Council on Foster Care, Adoption, and Kinship Care, Council on Child Abuse and Neglect, Committee on Psychosocial Aspects of Child and Family Health (2021). Trauma-informed care. *Pediatrics*, 148(2). <https://doi.org/10.1542/peds.2021-052580>
- Garcia, A. R., Gupta, M., Greeson, J. K. P., Thompson, A., & DeNard, C. (2017). Adverse childhood experiences among youth reported to child welfare: Results from the national survey of child & adolescent wellbeing. *Child Abuse & Neglect*, 70, 292–302. <https://doi.org/10.1016/j.chiabu.2017.06.019>
- Göbel, K., & Cohrdes, C. (2021). The whole is greater than the sum of its parts: Profiles of multiple mental health risk factors using Latent class analysis. *Child and Adolescent Psychiatry and Mental Health*, 15(1), 27. <https://doi.org/10.1186/s13034-021-00380-8>
- Göbel, K., Ortelbach, N., Cohrdes, C., Baumgarten, F., Meyrose, A. K., Ravens-Sieberer, U., & Scheithauer, H. (2022). Co-occurrence, stability and manifestation of child and adolescent mental health problems: A latent transition analysis. *BMC Psychology*, 10(1), 267. <https://doi.org/10.1186/s40359-022-00969-4>
- Gonzalez-Garcia, C., Vassiliadis, E., Moreno-Manso, J. M., Alcantara, M., Del Valle, J. F., & Bravo, A. (2023). Changes in mental health of children and young people in residential care: Outcomes and associated factors. *Psychosocial Intervention*, 32(1), 11–19. <https://doi.org/10.5093/pi2022a16>
- Green, J. G., McLaughlin, K. A., Berglund, P. A., Gruber, M. J., Sampson, N. A., Zaslavsky, A. M., & Kessler, R. C. (2010). Childhood adversities and adult psychiatric disorders in the national comorbidity survey replication I: Associations with first onset of DSM-IV disorders. *Archives of General Psychiatry*, 67(2), 113–123. <https://doi.org/10.1001/archgenpsychiatry.2009.186>
- Greger, H. K., Myhre, A. K., Lydersen, S., & Jozefiak, T. (2016). Child maltreatment and quality of life: A study of adolescents in residential care. *Health and Quality of Life Outcomes*, 14(1), 74. <https://doi.org/10.1186/s12955-016-0479-6>
- Grisso, T., & Barnum, R. (2000). *Massachusetts Youth Screening Instrument-2 (MAYSI-2)*. University of Massachusetts Medical School.
- Grisso, T., Fusco, S., Paiva-Salisbury, M., Perraut, R., Williams, V., & Barnum, R. (2012). *The Massachusetts youth screening instrument-version 2 (MAYSI-2): Comprehensive research review*. University of Massachusetts Medical School.
- Habersaat, S., Ragain, J., Mantzouranis, G., Palix, J., Boonmann, C., Fegert, J. M., Schmeck, K., Perler, C., Schmid, M., & Urban, S. (2018). Substance-use disorders, personality traits, and sex differences in institutionalized adolescents. *The American Journal of Drug and Alcohol Abuse*, 44(6), 686–694. <https://doi.org/10.1080/00952990.2018.1491587>
- Haggman-Laitila, A., Salokkila, P., & Karki, S. (2020). Integrative review of the evaluation of additional support programs for care leavers making the transition to adulthood. *Journal of Pediatric Nursing*, 54, 63–77. <https://doi.org/10.1016/j.pedn.2020.05.009>
- Hardt, J., & Rutter, M. (2004). Validity of adult retrospective reports of adverse childhood experiences: Review of the evidence. *Journal of Child Psychology and Psychiatry*, 45(2), 260–273. <https://doi.org/10.1111/j.1469-7610.2004.00218.x>
- Häuser, W., Schmutzter, G., Brahler, E., & Glaesmer, H. (2011). Maltreatment in childhood and adolescence: Results from a survey of a representative sample of the German population. *Deutsches Arzteblatt International*, 108(17), 287–294. <https://doi.org/10.3238/arztebl.2011.0287>
- Havlicek, J. (2014). Maltreatment histories of foster youth exiting out-of-home care through emancipation: A latent class analysis. *Child Maltreatment*, 19(3–4), 199–208. <https://doi.org/10.1177/1077559514539754>
- Havlicek, J., Garcia, A., & Smith, D. C. (2013). Mental health and substance use disorders among foster youth transitioning to adulthood: Past research and future directions. *Children and Youth Services Review*, 35(1), 194–203. <https://doi.org/10.1016/j.childyouth.2012.10.003>
- Healy, C., Brannigan, R., Dooley, N., Staines, L., Keeley, H., Whelan, R., Clarke, M., Zammit, S., Kelleher, I., & Cannon, M. (2022). Person-centered trajectories of psychopathology from early childhood to late adolescence. *JAMA Network Open*, 5(5), e229601. <https://doi.org/10.1001/jamanetworkopen.2022.9601>
- Heim, C., & Binder, E. B. (2012). Current research trends in early life stress and depression: Review of human studies on sensitive periods, gene-environment interactions, and epigenetics. *Experimental Neurology*, 233(1), 102–111. <https://doi.org/10.1016/j.expneurol.2011.10.032>
- Heim, C., Newport, D. J., Mletzko, T., Miller, A. H., & Nemeroff, C. B. (2008). The link between childhood trauma and depression: Insights from HPA axis studies in humans. *Psychoneuroendocrinology*, 33(6), 693–710. <https://doi.org/10.1016/j.psyneuen.2008.03.008>
- Herrenkohl, R. C., & Herrenkohl, T. I. (2009). Assessing a child's experience of multiple maltreatment types: Some unfinished business. *Journal of Family Violence*, 24(7), 485–496. <https://doi.org/10.1007/s10896-009-9247-2>
- Hickendorff, M., Edelsbrunner, P. A., McMullen, J., Schneider, M., & Trezise, K. (2018). Informative tools for characterizing individual differences in learning: Latent class, latent profile, and latent transition analysis. *Learning and Individual Differences*, 66, 4–15. <https://doi.org/10.1016/j.lindif.2017.11.001>
- Hopper, E. K., Bassuk, E. L., & Olivet, J. (2010). Shelter from the storm: Trauma-informed care in homelessness services settings. *The Open Health Services and Policy Journal*, 3(1), 80–100. <https://doi.org/10.2174/1874924001003010080>

- Hughes, K., Bellis, M. A., Hardcastle, K. A., Sethi, D., Butchart, A., Mikton, C., Jones, L., & Dunne, M. P. (2017). The effect of multiple adverse childhood experiences on health: A systematic review and meta-analysis. *Lancet Public Health*, 2(8), e356–e366. [https://doi.org/10.1016/S2468-2667\(17\)30118-4](https://doi.org/10.1016/S2468-2667(17)30118-4)
- Humphreys, K. L., & Zeanah, C. H. (2015). Deviations from the expectable environment in early childhood and emerging psychopathology. *Neuropsychopharmacology*, 40(1), 154–170. <https://doi.org/10.1038/npp.2014.165>
- Isdahl-Troye, A., Villar, P., Dominguez-Alvarez, B., Romero, E., & Deater-Deckard, K. (2022). The development of co-occurrent anxiety and externalizing problems from early childhood: A latent transition analysis approach. *Research on Child and Adolescent Psychopathology*, 50(4), 505–519. <https://doi.org/10.1007/s10802-021-00865-2>
- Isele, D., Teicher, M. H., Ruf-Leuschner, M., Elbert, T., Kolassa, I.-T., Schury, K., & Schauer, M. (2014). KERF–ein Instrument zur umfassenden Ermittlung belastender Kindheitserfahrungen. *Zeitschrift für Klinische Psychologie und Psychotherapie*, 43(2), 121–130.
- Jaggi, L., Schmid, M., Bürgin, D., Saladin, N., Grob, A., & Boonmann, C. (2021). Shared residential placement for child welfare and juvenile justice youth: Current treatment needs and risk of adult criminal conviction. *Child and Adolescent Psychiatry and Mental Health*, 15(1), 2. <https://doi.org/10.1186/s13034-020-00355-1>
- Jarczok, M., Lange, S., Meinck, F., Witt, A., Clemens, V., Fegert, J. M., & Jud, A. (2023). Widening epidemiological data on the prevalence of child maltreatment: Validation of the German ICAST-R in a student sample and national household survey. *Child Abuse & Neglect*, 137, 106038. <https://doi.org/10.1016/j.chiabu.2023.106038>
- Jaritz, C., Wiesinger, D., & Schmid, M. (2008). Traumatische Lebensereignisse bei Kindern und Jugendlichen in der stationären Jugendhilfe. *Trauma & Gewalt*, 2(4), 266–277.
- Jozefiak, T., Kaye, N. S., Rimehaug, T., Wormdal, A. K., Brubakk, A. M., & Wichstrøm, L. (2016). Prevalence and comorbidity of mental disorders among adolescents living in residential youth care. *European Child & Adolescent Psychiatry*, 25(1), 33–47.
- Jozefiak, T., & Sonnichsen Kaye, N. (2015). Self- and proxy reports of quality of life among adolescents living in residential youth care compared to adolescents in the general population and mental health services. *Health and Quality of Life Outcomes*, 13(1), 104. <https://doi.org/10.1186/s12955-015-0280-y>
- Kessler, R. C., Aguilar-Gaxiola, S., Alonso, J., Benjet, C., Bromet, E. J., Cardoso, G., Degenhardt, L., de Girolamo, G., Dinolova, R. V., Ferry, F., Florescu, S., Gureje, O., Haro, J. M., Huang, Y., Karam, E. G., Kawakami, N., Lee, S., Lepine, J. P., Levinson, D., Navarro-Mateu, F., Pennell, B. E., Piazza, M., Posada-Villa, J., Scott, K. M., Stein, D. J., Ten Have, M., Torres, Y., Viana, M. C., Petukhova, M. V., Sampson, N. A., Zaslavsky, A. M., & Koenen, K. C. (2017). Trauma and PTSD in the WHO World Mental Health Surveys. *European Journal of Psychotraumatology*, 8(sup5), 1353383. <https://doi.org/10.1080/2008198.2017.1353383>
- Kessler, R. C., McLaughlin, K. A., Green, J. G., Gruber, M. J., Sampson, N. A., Zaslavsky, A. M., Aguilar-Gaxiola, S., Alhamzawi, A. O., Alonso, J., Angermeyer, M., Benjet, C., Bromet, E., Chatterji, S., de Girolamo, G., Demyttenaere, K., Fayyad, J., Florescu, S., Gal, G., Gureje, O., . . . Williams, D. R. (2010). Childhood adversities and adult psychopathology in the WHO World Mental Health Surveys. *British Journal of Psychiatry*, 197(5), 378–385. <https://doi.org/10.1192/bjp.bp.110.080499>
- Keyes, K. M., Eaton, N. R., Krueger, R. F., McLaughlin, K. A., Wall, M. M., Grant, B. F., & Hasin, D. S. (2012). Childhood maltreatment and the structure of common psychiatric disorders. *British Journal of Psychiatry*, 200(2), 107–115. <https://doi.org/10.1192/bjp.bp.111.093062>
- Kind, N., Seker, S., d'Huart, D., Bürgin, D., Jenkel, N., Boonmann, C., Habersaat, S., Urban, S., Fegert, J. M., Clemens, V., Bürgin, D., & Schmid, M. (2023). High-risk substance use and psychosocial functioning in young adult care leavers: Findings from a 10-year follow-up study. *Children and Youth Services Review*, 155. <https://doi.org/10.1016/j.childyouth.2023.107290>
- Klinitzke, G., Romppel, M., Hauser, W., Brahler, E., & Glaesmer, H. (2012). [The German version of the Childhood Trauma Questionnaire (CTQ): Psychometric characteristics in a representative sample of the general population]. *Psychotherapie Psychosomatik Medizinische Psychologie*, 62(2), 47–51. <https://doi.org/10.1055/s-0031-1295495>
- Kotov, R., Krueger, R. F., Watson, D., Achenbach, T. M., Althoff, R. R., Bagby, R. M., Brown, T. A., Carpenter, W. T., Caspi, A., Clark, L. A., Eaton, N. R., Forbes, M. K., Forbush, K. T., Goldberg, D., Hasin, D., Hyman, S. E., Ivanova, M. Y., Lynam, D. R., Markon, K., . . . Zimmerman, M. (2017). The Hierarchical Taxonomy of Psychopathology (HiTOP): A dimensional alternative to traditional nosologies. *Journal of Abnormal Psychology*, 126(4), 454–477. <https://doi.org/10.1037/abn0000258>
- Lacey, R. E., & Minnis, H. (2020). Practitioner Review: Twenty years of research with adverse childhood experience scores - Advantages, disadvantages and applications to practice. *Journal of Child Psychology and Psychiatry*, 61(2), 116–130. <https://doi.org/10.1111/jcpp.13135>
- Lang, B., Schröder, M., & Schmid, M. (2021). Der traumapädagogische Implementierungsprozess im Schlupfhuus Zürich. *Trauma & Gewalt*, 15(1), 18–33.
- Lange, I., Goossens, L., Bakker, J., Michiels, S., van Winkel, R., Lissek, S., Leibold, N., Marcelis, M., Wichers, M., van Os, J., van Amelsvoort, T., & Schruers, K. (2019). Neurobehavioural mechanisms of threat generalization moderate the link between childhood maltreatment and psychopathology in emerging adulthood. *Journal of Psychiatry and Neuroscience*, 44(3), 185–194. <https://doi.org/10.1503/jpn.180053>
- Lanza, S. T., & Bray, B. C. (2010). Transitions in drug use among high-risk women: An application of latent class and latent transition analysis. *Advances and Applications in Statistical Sciences*, 3(2), 203–235.
- Lanza, S. T., Bray, B. C., & Collins, L. M. (2013). An introduction to latent class and latent transition analysis. *Handbook of Psychology*, 2, 691–716.
- Leenarts, L. E., Dolitzsch, C., Schmeck, K., Fegert, J. M., Grisso, T., & Schmid, M. (2016). Relationship between Massachusetts Youth Screening Instrument-second version and psychiatric disorders in youths in welfare and juvenile justice institutions in Switzerland. *BMC Psychiatry*, 16(1), 340. <https://doi.org/10.1186/s12888-016-1032-1>
- Lewis, S. J., Koenen, K. C., Ambler, A., Arseneault, L., Caspi, A., Fisher, H. L., Moffitt, T. E., & Danese, A. (2021). Unravelling the contribution of complex trauma to psychopathology and cognitive deficits: A cohort study. *The British Journal of Psychiatry*, 219(2), 448–455. <https://doi.org/10.1192/bjp.2021.57>
- Maercker, A., Cloitre, M., Bachem, R., Schlumpf, Y. R., Khoury, B., Hitchcock, C., & Bohus, M. (2022). Complex post-traumatic stress disorder. *Lancet*, 400(10345), 60–72. [https://doi.org/10.1016/S0140-6736\(22\)00821-2](https://doi.org/10.1016/S0140-6736(22)00821-2)
- Manly, J. T., Kim, J. E., Rogosch, F. A., & Cicchetti, D. (2001). Dimensions of child maltreatment and children's adjustment: Contributions of developmental timing and subtype. *Development and Psychopathology*, 13(4), 759–782. <https://doi.org/10.1017/S0954579401004023>
- McCorry, E. J., Gerin, M. I., & Viding, E. (2017). Annual Research Review: Childhood maltreatment, latent vulnerability and the shift to preventative psychiatry - the contribution of functional brain imaging. *Journal of Child Psychology and Psychiatry*, 58(4), 338–357. <https://doi.org/10.1111/jcpp.12713>
- McElroy, E., Shevlin, M., & Murphy, J. (2017). Internalizing and externalizing disorders in childhood and adolescence: A latent transition analysis using ALSPAC data. *Comprehensive Psychiatry*, 75, 75–84. <https://doi.org/10.1016/j.comppsy.2017.03.003>
- McKenna, S., Donnelly, M., Onyeka, I. N., O'Reilly, D., & Maguire, A. (2021). Experience of child welfare services and long-term adult mental health outcomes: A scoping review. *Social Psychiatry and Psychiatric Epidemiology*, 56(7), 1115–1145. <https://doi.org/10.1007/s00127-021-02069-x>
- McLaughlin, K. A. (2016). Future directions in childhood adversity and youth psychopathology. *Journal of Clinical Child & Adolescent Psychology*, 45(3), 361–382. <https://doi.org/10.1080/15374416.2015.1110823>
- McLaughlin, K. A., Colich, N. L., Rodman, A. M., & Weissman, D. G. (2020). Mechanisms linking childhood trauma exposure and psychopathology: A transdiagnostic model of risk and resilience. *BMC Medicine*, 18(1), 96. <https://doi.org/10.1186/s12916-020-01561-6>
- Moffitt, T. E., Belsky, D. W., Danese, A., Poulton, R., & Caspi, A. (2017). The longitudinal study of aging in human young adults: Knowledge gaps and research agenda. *The Journals of Gerontology Series A: Biological Sciences and Medical Sciences*, 72(2), 210–215. <https://doi.org/10.1093/geron/awlw191>

- Moffitt, T. E., & Klaus-Grawe Think, T. (2013). Childhood exposure to violence and lifelong health: Clinical intervention science and stress-biology research join forces. *Development and Psychopathology*, 25(4 Pt 2), 1619–1634. <https://doi.org/10.1017/S0954579413000801>
- Moore, S. A., Dowdy, E., Nylund-Gibson, K., & Furlong, M. J. (2019). A latent transition analysis of the longitudinal stability of dual-factor mental health in adolescence. *Journal of School Psychology*, 73, 56–73. <https://doi.org/10.1016/j.jsp.2019.03.003>
- Muthén, B. O. (2021). Using Mplus to do latent transition analysis and random intercept latent transition analysis [Video file]. <https://www.youtube.com/c/MplusVideos>
- Muthén, L. K., & Muthén, B. O. (2012). Mplus: Statistical analysis with latent variables; user's guide; [version 7]. Muthén et Muthén.
- Nolen-Hoeksema, S., & Watkins, E. R. (2011). A heuristic for developing transdiagnostic models of psychopathology: Explaining multifinality and divergent trajectories. *Perspectives on Psychological Science*, 6(6), 589–609. <https://doi.org/10.1177/1745691611419672>
- Nylund, K. L., Asparouhov, T., & Muthén, B. O. (2007). Deciding on the number of classes in latent class analysis and growth mixture modeling: A Monte Carlo Simulation Study. *Structural Equation Modeling: A Multidisciplinary Journal*, 14(4), 535–569. <https://doi.org/10.1080/10705510701575396>
- Panther-Brick, C., & Leckman, J. F. (2013). Editorial Commentary: Resilience in child development – interconnected pathways to wellbeing. *Journal of Child Psychology and Psychiatry*, 54(4), 333–336. <https://doi.org/10.1111/jcpp.12057>
- Petersen, K. J., Humphrey, N., & Qualter, P. (2022). Dual-factor mental health from childhood to early adolescence and associated factors: A latent transition analysis. *Journal of Youth and Adolescence*, 51(6), 1118–1133. <https://doi.org/10.1007/s10964-021-01550-9>
- Petersen, K. J., Qualter, P., & Humphrey, N. (2019). The application of latent class analysis for investigating population child mental health: A systematic review. *Frontiers in Psychology*, 10, 1214. <https://doi.org/10.3389/fpsyg.2019.01214>
- Rebbe, R., Nurius, P. S., Ahrens, K. R., & Courtney, M. E. (2017). Adverse childhood experiences among youth aging out of foster care: A latent class analysis. *Children and Youth Services Review*, 74, 108–116. <https://doi.org/10.1016/j.childyouth.2017.02.004>
- Reilly, C., Johnson, D. R., & Ferguson, K. (2019). Validation of the Massachusetts Youth Screening Instrument with a looked after population. *Clinical Child Psychology and Psychiatry*, 24(3), 593–607.
- Rivera, P. M., Fincham, F. D., & Bray, B. C. (2018). Latent classes of maltreatment: A systematic review and critique. *Child Maltreatment*, 23(1), 3–24. <https://doi.org/10.1177/1077559517728125>
- Rutter, M., & Sroufe, L. A. (2000). Developmental psychopathology: Concepts and challenges. *Development and Psychopathology*, 12(3), 265–296. <https://doi.org/10.1017/S0954579400003023>
- Schalinski, I., Teicher, M. H., Nischk, D., Hinderer, E., Müller, O., & Rockstroh, B. (2016). Type and timing of adverse childhood experiences differentially affect severity of PTSD, dissociative and depressive symptoms in adult inpatients. *BMC Psychiatry*, 16(1), 1–15.
- Schmid, M., Fegert, J. M., Clemens, V., Seker, S., d'Huart, D., Binder, M., Schröder, M., Friden, L., Boonmann, C., Jenkel, N., Schmeck, K., & Bürgin, D. (2022). Misshandlungs- und Vernachlässigungserfahrungen in der Kindheit: Ein Risikofaktor für die soziale Teilhabe ehemals außerfamiliär platzierter junger Erwachsener. *Kindheit und Entwicklung*, 31(1), 22–39. <https://doi.org/10.1026/0942-5403/a000366>
- Schmid, M., Fegert, J. M., Schmeck, K., & Boonmann, C. (2022). Was wird aus Care Leavern? *Kindheit und Entwicklung*, 31(1), 1–8. <https://doi.org/10.1026/0942-5403/a000364>
- Schmid, M., Goldbeck, L., Nuetzel, J., & Fegert, J. M. (2008). Prevalence of mental disorders among adolescents in German youth welfare institutions. *Child and Adolescent Psychiatry and Mental Health*, 2(1), 1–8. <https://doi.org/10.1186/1753-2000-2-2>
- Schmid, M., Kölsch, M., Fegert, J., & Schmeck, K. (2013). Abschlussbericht für den Fachausschuss für die Modellversuche und das Bundesamt für Justiz Zusammenfassung der wichtigsten Ergebnisse und Erkenntnisse des Modellversuchs Abklärung und Zielerreichung in stationären Maßnahmen (MAZ).
- Schmid, M., Lüdtke, J., Dolitzsch, C., Fischer, S., Eckert, A., & Fegert, J. M. (2020). Effect of trauma-informed care on hair cortisol concentration in youth welfare staff and client physical aggression towards staff: Results of a longitudinal study. *BMC Public Health*, 20(1), 21. <https://doi.org/10.1186/s12889-019-8077-2>
- Schmid, M., Petermann, F., & Fegert, J. M. (2013). Developmental trauma disorder: Pros and cons of including formal criteria in the psychiatric diagnostic systems. *BMC Psychiatry*, 13(1), 3. <https://doi.org/10.1186/1471-244X-13-3>
- Seker, S., Boonmann, C., d'Huart, D., Bürgin, D., Schmeck, K., Jenkel, N., Steppan, M., Grob, A., Forsman, H., Fegert, J. M., & Schmid, M. (2022). Mental disorders into adulthood among adolescents placed in residential care: A prospective 10-year follow-up study. *European Psychiatry*, 65(1), e40. <https://doi.org/10.1192/j.eurpsy.2022.30>
- Seker, S., Boonmann, C., Gerger, H., Jaggi, L., d'Huart, D., Schmeck, K., & Schmid, M. (2022). Mental disorders among adults formerly in out-of-home care: A systematic review and meta-analysis of longitudinal studies. *European Child & Adolescent Psychiatry*, 31(12), 1963–1982. <https://doi.org/10.1007/s00787-021-01828-0>
- Seker, S., Bürgin, D., d'Huart, D., Schmid, M., Schmeck, K., Jenkel, N., Fegert, J. M., Steppan, M., & Boonmann, C. (2022). Der Verlauf von psychischen Problemen bei fremdplatzierten Kindern und Jugendlichen bis in deren Erwachsenenalter. *Kindheit und Entwicklung*, 31(1), 9–21. <https://doi.org/10.1026/0942-5403/a000365>
- Spinazzola, J., van der Kolk, B., & Ford, J. D. (2021). Developmental trauma disorder: A legacy of attachment trauma in victimized children. *Journal of Traumatic Stress*, 34(4), 711–720. <https://doi.org/10.1002/jts.22697>
- Sturmbauer, S. C., Shields, G. S., Hetzel, E. L., Rohleder, N., & Slavich, G. M. (2019). The stress and adversity inventory for adults (Adult STRAIN) in German: An overview and initial validation. *PLoS One*, 14(5), e0216419. <https://doi.org/10.1371/journal.pone.0216419>
- Suldo, S. M., & Shaffer, E. J. (2008). Looking beyond psychopathology: The dual-factor model of mental health in youth. *School Psychology Review*, 37(1), 52–68.
- Teicher, M. H., Gordon, J. B., & Nemeroff, C. B. (2022). Recognizing the importance of childhood maltreatment as a critical factor in psychiatric diagnoses, treatment, research, prevention, and education. *Molecular Psychiatry*, 27(3), 1331–1338. <https://doi.org/10.1038/s41380-021-01367-9>
- Teicher, M. H., & Parigger, A. (2015). The 'Maltreatment and Abuse Chronology of Exposure' (MACE) scale for the retrospective assessment of abuse and neglect during development. *PLoS One*, 10(2), e0117423. <https://doi.org/10.1371/journal.pone.0117423>
- Teicher, M. H., & Samson, J. A. (2013). Childhood maltreatment and psychopathology: A case for ecophenotypic variants as clinically and neurobiologically distinct subtypes. *American Journal of Psychiatry*, 170(10), 1114–1133. <https://doi.org/10.1176/appi.ajp.2013.12070957>
- Urban, S., Habersaat, S., Palix, J., Fegert, J. M., Schmeck, K., Bürgin, D., Seker, S., Boonmann, C., & Schmid, M. (2022). Examination of the importance of anger/irritability and limited prosocial emotion/callous-unemotional traits to understand externalizing symptoms and adjustment problems in adolescence: A 10-year longitudinal study. *Frontiers in Psychiatry*, 13, 939603. <https://doi.org/10.3389/fpsy.2022.939603>
- van der Kolk, B. A., Pynoos, R. S., Cicchetti, D., Cloitre, M., D'Andrea, W., Ford, J. D., Lieberman, A. F., Putnam, F. W., Saxe, G., & Spinazzola, J. (2009). Proposal to include a developmental trauma disorder diagnosis for children and adolescents in DSM-V. *Unpublished manuscript*. http://cismail.it/wp-content/uploads/2013/11/DTD_papers_Oct_095eb2.pdf
- Vinnerljung, B., & Sallnäs, M. (2008). Into adulthood: A follow-up study of 718 young people who were placed in out-of-home care during their teens. *Child & Family Social Work*, 13(2), 144–155. <https://doi.org/10.1111/j.1365-2206.2007.00527.x>
- Widom, C. S., DuMont, K., & Czaja, S. J. (2007). A prospective investigation of major depressive disorder and comorbidity in abused and neglected children grown up. *Archives of General Psychiatry*, 64(1), 49–56.
- Witt, A., Brown, R. C., Plener, P. L., Brahler, E., & Fegert, J. M. (2017). Child maltreatment in Germany: Prevalence rates in the general population. *Child*

- and Adolescent Psychiatry and Mental Health, 11(1), 47. <https://doi.org/10.1186/s13034-017-0185-0>
- Witt, A., Munzer, A., Ganser, H. G., Fegert, J. M., Goldbeck, L., & Plener, P. L. (2016). Experience by children and adolescents of more than one type of maltreatment: Association of different classes of maltreatment profiles with clinical outcome variables. *Child Abuse & Neglect*, 57, 1–11. <https://doi.org/10.1016/j.chiabu.2016.05.001>
- Woods, S. B., Farineau, H. M., & McWey, L. M. (2013). Physical health, mental health, and behaviour problems among early adolescents in foster care. *Child: Care, Health and Development*, 39(2), 220–227. <https://doi.org/10.1111/j.1365-2214.2011.01357.x>
- Yampolskaya, S., Sharrock, P., Armstrong, M. I., Strozier, A., & Swanke, J. (2014). Profile of children placed in out-of-home care: Association with permanency outcomes. *Children and Youth Services Review*, 36, 195–200. <https://doi.org/10.1016/j.childyouth.2013.11.018>
- Zhang, S., Conner, A., Lim, Y., & Lefmann, T. (2021). Trauma-informed care for children involved with the child welfare system: A meta-analysis. *Child Abuse & Neglect*, 122, 105296. <https://doi.org/10.1016/j.chiabu.2021.105296>