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**Title: Trauma and mental health in young adults who arrived in France as unaccompanied and separated migrant children**

**Titre : Traumatisme et santé mentale chez les jeunes majeurs isolés étrangers arrivés en France en tant que Mineurs Non-Accompagnés**

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J.N. contributed to the study protocol and the choice of the research instruments, managed the data, performed the statistical analysis and wrote the manuscript.

C.G. contributed to the study protocol and the choice of the research instruments, was responsible for setting up the study in Montpellier and La Rochelle, recruited the participants and collected the data. C.G. also participated in data management.

I.C. contributed to the choice of the research instruments, particularly concerning stressful life-events, trauma and resilience, and provided expertise on these topics for the interpretation of the results.

S.P. contributed to the design of the study, and brought expertise in the neurobiology of stress for the interpretation of the data.

S.G. initiated and designed the study, wrote the protocol and was in charge of overall direction and planning. SG coordinated recruitment and data collection in Chambéry.

All co-authors contributed to interpreting the study results, structuring and revising the successive drafts of the manuscript. All co-authors have seen and approved the final version.

## **Abstract**

**Objectives:** The mental health of unaccompanied and separated minors (UASC) has been widely studied but not their first years of adulthood, often characterised by uncertainty after leaving child protection. The aim was to estimate the prevalence of psychiatric disorders using standardised and validated research instruments, and examine the effect of exposure to trauma.

**Methods:** 110 youth (92.7% male, median age 19.7 [18.1-22.8]) from Chambéry, Montpellier and La Rochelle were recruited to a cross-sectional exploratory study. During a face-to-face interview, somatoform disorder, anxiety and depression were assessed using the Patient Health Questionnaire (score $\geq$ 10) and post-traumatic stress disorder (PTSD) with the PTSD Checklist for DSM-5 (score $\geq$ 33). Traumatic life events were assessed using the Life Events Checklist.

**Results:** Of the youth, 19.3% had a probable somatoform disorder, 17.6% anxiety, 28.7% depression and 20% PTSD. The number of traumatic life events increased the risk of depression (multi-adjusted OR (95%CI): 1.56 (1.25-1.96)), PTSD (1.60 (1.23-2.08)), somatoform disorder (1.41 (1.10-1.82)), and anxiety (1.33 (1.02-1.72)). Physical assault was the type of event positively associated with the most disorders ( $p\leq$ 0.01, except for anxiety), followed by witnessing sudden and violent death ( $p\leq$ 0.01 for depression and PTSD) and sexual assault ( $p=$ 0.002 for PTSD).

**Conclusion:** Our study highlights the high prevalence of psychiatric disorders in young adults who arrived as UASC and the impact on their mental health of cumulative trauma and exposure to interpersonal and violent traumatic life events. A greater focus on their mental health with regular assessments is needed in order to provide rapid and adapted care.

249 words

**Keywords:** psychiatric disorders; trauma; migration; unaccompanied and separated minors; transition to adulthood

## Résumé

**Objectifs :** La santé mentale des mineurs non accompagnés a été largement étudiée mais peu d'études se sont intéressées à leur devenir au sortir de la protection de l'enfance, souvent caractérisé par l'incertitude et l'angoisse quant à leur statut et droit de rester dans le pays d'accueil. Notre objectif était d'étudier auprès de cette population de jeunes majeurs isolés étrangers (JMIE) la prévalence des troubles psychiatriques courants à l'aide d'instruments de recherche standardisés et validés, et d'examiner les associations entre la présence de ces troubles et leur histoire traumatique.

**Méthodes :** 110 JMIE (92,7% hommes, âge médian 19,7 ans [18,1-22,8]) de Chambéry, Montpellier et La Rochelle, ont participé à une étude transversale exploratoire. Le recrutement a été effectué par l'intermédiaire d'intervenants travaillant dans les centres d'accueil de l'Aide Sociale à l'Enfance où ils avaient séjourné. Au cours d'un entretien en face à face, les troubles probables somatoformes, anxieux et dépressifs ont été évalués avec le Patient Health Questionnaire (PHQ ; score $\geq$ 10) et le trouble de stress post-traumatique (TSPT) avec le PTSD Checklist for DSM-5 (PCL-5 ; score $\geq$ 33). Les associations entre ces quatre troubles et le nombre et type d'évènements de vie traumatiques mesurés avec le Life Events Checklist (LEC-5) ont été analysées à l'aide de modèles de régression logistique, avec un seuil de significativité fixé à  $p\leq 0,0125$  pour prendre en compte les comparaisons multiples.

**Résultats :** 19,3% des JMIE présentaient des troubles somatoformes, 17,6% une anxiété, 28,7% une dépression et 20% un TSPT. Le nombre médian d'évènements traumatiques vécus personnellement sur les 15 types investigués était de 5 [min-max : 0-10]. Les plus fréquents étaient : exposition à la mort accidentelle d'un proche (67,8%), agression physique (66,1%), attaque à main armée (47,7%) et captivité (45,9%).

Le nombre d'évènements de vie traumatiques augmentait le risque de dépression (OR (95%CI) ajusté : 1,56 (1,25-1,96)), de TSPT (1,60 (1,23-2,08)), de troubles somatoformes (1,41 (1,10-1,82)),

avec, après correction pour comparaisons multiples, une tendance pour l'anxiété (1,33 (1,02-1,72)). L'agression physique était le type d'évènement associé positivement au plus grand nombre de troubles psychiatriques ( $p \leq 0,01$ , pour tous les troubles sauf l'anxiété), suivi par l'exposition comme témoin à mort violente ( $p \leq 0,01$  pour la dépression et le TSPT) et par l'agression sexuelle ( $p = 0,002$  pour le TSPT).

Conclusion : les JMIE présentaient une prévalence élevée de troubles psychiatriques, comparée à des valeurs normatives pour les catégories d'âge les plus proches. Malgré les difficultés à établir des comparaisons, les prévalences par catégorie diagnostique étaient proches de celles trouvées dans d'autres études de migrants, mineurs non accompagnés ou adultes. Nous avons mis en évidence un effet cumulatif du nombre d'évènements de vie traumatiques sur ces troubles, qui était robuste aux ajustements pour les facteurs de confusion potentiels. Nous avons aussi constaté une augmentation des troubles, en particulier le TSPT, avec des évènements de type interpersonnels (agressions) et violents. Une évaluation régulière des symptômes psychiatriques avec une prise en charge rapide et adaptée est préconisée, en vue des troubles potentiellement traumatiques vécus dans les pays d'accueil qui viendraient s'ajouter aux évènements subis avant et pendant le parcours migratoire.

506 mots

Mots clés (3 à 5) : troubles psychiatriques; trauma; migration; mineurs non accompagnés; transition à l'âge adulte

## Introduction

Psychiatric disorders, in particular depression, and post-traumatic stress disorder (PTSD) are known to be particularly common in migrant populations [1, 2]. In Europe, almost a third of all first time asylum seekers are children and in many countries nearly half arrive as unaccompanied or separated migrant children (UASC) [3]. The protection of UASC is mandatory under the International Convention on the Rights of the Child [4]. Under this convention host countries agree to provide accommodation, health care, access to education and help with legal procedures. However, the end of this protection as they approach the age of majority is often characterised by uncertainty and anxiousness as to their right to stay in the host country [5, 6]. Yet this age group is one of the least studied in the life course of migrant populations [5, 7, 8, 9].

Evidence suggests migrant minors have high rates of psychiatric disorders [1, 10-12], especially as they approach adulthood [13]. A systematic review reported prevalence rates for depression ranging from 10.3% to 32.8%, for anxiety from 8.7% to 31.6% and for PTSD from 19% to 52.7%. These rates were particularly high in minors who arrived unaccompanied [10]. Research suggests that these high rates stay relatively unchanged over the short-term (2 years) [13-17], but not the long-term (5 years) with a reduction in symptoms for depression but not anxiety or PTSD [18]. Whereas many studies have been performed on UASC, research rarely focuses on the 'transiting to adulthood' 18 to 22 year olds. Moreover, studies of adult migrants seldom report rates for this age group and when performed, findings are often limited by small numbers. For newly arrived migrants in Germany, a meta-analysis found a 30.4% (20.4-40.8) prevalence rate for depression in adults, and 28.1% (12.4-45.4) in children and adolescents combined; rates for PTSD were 40.1% (29.3-51.1) and 35.2% (30.6-39.8), respectively [2]. For somatoform disorder, a study of Syrian refugees with residence permission in Germany reported a 24.1% prevalence rate, and a 3.6% rate in the subsample of 16 participants aged 18 to 24 years [19].

Post-traumatic stress symptoms (PTSS) and disorder [16, 20-22], anxiety [16] and somatoform disorder [19] have been shown to increase with the number of traumatic life events.

The association is less clear for depression [16, 18, 21]. Some studies distinguish between events experienced before, during and after the migration journey, as migrants can face additional stressful 'hassles' in the host country such as discrimination, distance from family, administrative procedures such as age assessment, insecurity and violence [16, 20, 22]. In a study of illegal adult migrants, 14% reported experience of a traumatic event since their arrival in France [22]. To the best of our knowledge, whereas the types of traumatic events and their relative frequency are sometimes described [16, 21], the different types of events as risk factors for mental health problems have seldom been studied [20]. Other factors that can negatively affect the mental health of migrants are being female [21], an older age on arrival [18] and impact of age assessment for UASC [16], low social support and difficult living conditions [14], legal status [23] and the rejection of asylum [14, 23].

In France, UASC are under the responsibility of the departmental Child Protection Services (CPSs) that organise and provide institutional care for all young minors with a placement decision through a network of reception centres [24, 25]. At the time of the study in 2019, 16760 new UASC were registered, bringing the total number of UASC under the care of the CPSs to 31009 [26]. Over the years, age at registration has increased considerably with, in 2019, approximately 40% aged 15 years and under, 45% aged 16 years and nearly 15% aged 17 years [26]. For this same year, up to two-thirds of those evaluated for the first time by the CPSs were not recognised as minors [6]. For registered minors, protection by the CPSs ends at age 18, at which point these young adults who arrived as UASC (YA-UASC) can find themselves in a variety of situations, ranging from full social integration with accommodation, work and residence permission, to an uncertain administrative situation that can lead to irregularity, an obligation to leave French territory and precarious living conditions [27]. The protection conferred by their status as minors can be extended with a Young Adult Work Contract (YAWC), a transitional measure allowing young people to complete their training or enter the labour market. It seems that there are no clearly defined criteria for obtaining these contracts, which often depend on academic success or the employer's appreciation [5, 6]. These YAWC [28] as well as the arrangements for care by the CPSs [29, 30] are funded at the



departmental level, and there are significant disparities between the departments [31]. As minors, the youth are helped by the CPSs to apply for a residence permit. Application for asylum is increasing but still remains exceptional which is not the case in many other European countries [28, 32, 33].

In sum, whilst in most European countries transition to adulthood is shaped by major changes for UASC [5], the specificities of this transition vary considerably from one country to another. Furthermore, there are differences between countries regarding the country of origin of UASC [34] and France stands out with a significant number of migrants from French-speaking West African countries who travelled the notoriously dangerous Central Mediterranean migration route [35]. To date, research in France on the health of UASC especially in their first years of adulthood is scarce [11, 27]. In a cross-sectional exploratory study of 110 YA-UASC aged 18 to 22 years, the aim was to describe their migratory background and living conditions as UASC under child protection and as YA-UASC, and provide prevalence rates for the main psychiatric disorders using standardised and validated research instruments. We further aimed to explore the associations between exposure to trauma and mental health.

## **Methods**

### *Study setting and participants*

The study was conducted in three French cities: Chambéry, Montpellier and La Rochelle. Participants were recruited between January 2019 and September 2020, through the carers working at the child protection reception centres (psychologists, social workers, etc.). We included youth aged between 18 and 22 years old, who arrived in France as UASC, were recognised as UASC and placed in the care of the CPSs, who no longer had a YAWC and spoke sufficiently good French to participate. Youth meeting these criteria were contacted by their previous referent and on agreement an appointment was arranged with the study coordinator. Prior to the interview, participants received the study information sheet and signed an informed consent form. The study was approved by the ethics committee of the University of Savoie-Mont Blanc (ref. CEREUS 20118-

22). Fewer than five youth refused to participate after being informed about the study and 15 could not be included (change of address, unreachable or did not attend the appointment). The sample included 110 participants.

### *Research instruments*

The questionnaire was administered during an interview lasting up to 1.5 hours. After a first section on their migration background and socio-demographic characteristics, the following research instruments were administered:

1- The Patient Health Questionnaire (PHQ) 15-item somatoform module (PHQ-15), 7-item anxiety module (GAD-7), and 9-item depression module (PHQ-9) [36]. In addition to continuous symptom scores, we constructed categorical variables by applying the 10+ threshold used to identify probable cases of somatoform disorder (SOMAT-10+), anxiety (ANX-10+), and depression (DEP-10+) [37-39].

2- The Life Events Checklist for DSM-5 (LEC-5) which screens for 17 lifetime traumatic events, experienced personally, as a witness or by close family or friend [40]. For brevity purposes, item 'other unwarranted or uncomfortable sexual experience' was grouped with 'sexual assault' and 'severe human suffering' with 'any other stressful event'. The LEC-5 had been translated into French by a bilingual expert on trauma stress [41]. The number of different types of events experienced personally (or witnessed for sudden violent or accidental death) was summed and was referred to as the number of traumatic life events.

3- The 20-item PTSD Checklist for DSM-5 (PCL-5) which assesses symptoms experienced in the past month, for the main traumatic event previously identified with the LEC-5 [42]. The global score was dichotomised using the validated 33+ score threshold (PTSD-33+) [43].

### *Statistical analysis*

The sample was described using percentages for categorical variables. The continuous variables were all asymmetrical according to the Shapiro-Wilk's test. They were thus described using

the median (min-max) or interquartile range (IQR), except for the mental health variables where the mean (standard deviation (SD), min-max) were given for comparative purposes with other studies. For the comparative analysis, we firstly analysed the associations between the number and type of traumatic events and the four mental health outcomes (SOMAT-10+, ANX-10+, DEP-10+, PTSD-33+) using univariate logistic regression models. Secondly, we examined migration background, socio-demographic and current situation variables as potential confounders and selected the variables associated with at least one of the four outcomes. Statistical significance was set at  $p \leq 0.0125$  to correct for multiple comparisons (Bonferroni correction). Thirdly, the significant associations between trauma and the four outcomes in the univariate models were further adjusted for covariates in multi-adjusted models, with findings expressed as odds ratios with 95% confidence intervals (CI). The linearity of the continuous variables with the outcomes was verified. Analyses were performed using SAS EG 7.15 (SAS Institute, Inc. Cary, North Carolina).

## **Results**

### *Socio-demographic characteristics of the sample*

The participants were mainly male (92.7%) (Table 1). The median age at the time of the study was 19.7 years (range: 18.1-22.8), and 16.3 years (range: 13.4-17.8) on arrival in the host country. Most of the participants (80%) were from Africa, mainly from Guinea (36.4%), Ivory Coast (19.3%), Mali (15.9%), Congo (13.6%) and Cameroon (9.1%). Regarding the study sites, 40% of the participants were recruited in Chambéry, 33.6% in Montpellier and 26.4% in La Rochelle. Age, sex and continent of origin did not differ significantly between the study sites.

### *Migration background and protection as UASC*

Most participants (81.8%) had decided to leave their country of origin alone, of which 36.7% had not informed their family. For the remaining 18.2%, their family had decided for them. The main reasons for leaving were: family conflict or abuse (43.6%), personal choice (36.4%), persecution or

war (16.4%), economic problems (14.5%), parental abandon (13.6%), and death of parent(s) (7.3%). One third (32.7%) sometimes regretted leaving. Whereas 24.6% of the participants had occasional contacts with their family and 45.6% regular contacts, 15.6% were seldom in touch and 15.4% had lost all contact. Most youth had remained throughout child protection in the care centre where placed on arrival. Only five youth had been placed in a foster home. During their stay in the child protection centre, 57.3% had seen a psychologist and 79% had been offered follow-up visits.

### *Traumatic life events and mental health*

The median number of traumatic life events was 5 (IQR: 4, range: 0-10). The most frequent events were: witnessing the sudden accidental death of close family or friend (67.8%), physical assault (66.1%), assault with weapon (47.7%) and captivity (45.9%) (Figure 1). When asked to single-out the most traumatic event, in 37.8% of cases this was an interpersonal event, such as aggression, assault, captivity and war. In 41% of cases this event had taken place before the migration journey, 40% during and 19% after arrival in the host country.

Of the sample, 19.3% reached criteria for a probable somatoform disorder (Table 2). The five most frequently reported symptoms were: tiredness (66.1%), headaches (57.8%), trouble sleeping (52.3%), back pain (48.6%) and pain in arms, legs or joints (45.9%). In addition, 17.6% had a probable anxiety disorder, 28.7% a depressive disorder and 20% PTSD applying the 33+ cut-off.

### *Associations between traumatic life events, socio-demographic and migration characteristics and mental health*

The number of traumatic life events was significantly higher in youth presenting with depression ( $p=0.0002$ ), anxiety ( $p=0.01$ ) and PTSD ( $p=0.0008$ ) (Figures 2a-d). Regarding the type of event, physical assault was associated with the most disorders, with a higher frequency of somatoform disorder ( $p=0.01$ ), depression ( $p=0.003$ ) and PTSD ( $p=0.01$ ); witnessing sudden violent death was associated with depression ( $p=0.01$ ) and PTSD ( $p=0.008$ ), and sexual assault with PTSD

( $p=0.002$ ). Youth who singled-out their main traumatic event as being of the interpersonal type were more likely to present with PTSD, but this was borderline significant ( $p=0.02$ ) (Table 3). Age at the main traumatic event did not differ according to any of the four disorders. Due to small numbers, only the number of traumatic events was examined adjusted for the significant covariates ( $p\leq 0.0125$ ), namely age, persecution or war as reason for leaving, leaving decided by family, and satisfaction with care at child protection centre (Appendix Table). For depression and PTSD, findings remained unchanged (OR (95%CI) per unit increase: 1.56 (1.25-1.96),  $p=0.0001$  and 1.60 (1.23-2.08),  $p=0.0005$ , respectively). For somatoform disorder, the association increased in significance (1.41 (1.10-1.82),  $p=0.008$ ) whereas for anxiety, it became borderline significant (1.33 (1.02-1.72),  $p=0.03$ ).

## **Discussion**

This study is one of the few to focus on YA-UASC, who are particularly difficult to locate and reach given the diversity of their life situations in their first years after leaving child protection. Our findings from a sample of 110 YA-UASC in three cities suggest these youth have a high prevalence of psychiatric disorders, considerably higher than that observed in similar age groups in the general population. Furthermore, we highlight the cumulative effect of traumatic life events on psychiatric disorders, in particular violent events such as assault and witnessing sudden and violent death.

### *Prevalence of psychiatric disorders*

Our findings are in keeping with studies from elsewhere regarding the high frequency of psychiatric disorders in young migrant populations [2, 19]. However, comparing studies requires caution due to significant variations in the choice of measurement scales and the selection of the study population. For instance, studies focus either specifically on UASC, or on all adult migrants with results not always stratified by age group. In our study, nearly 20% of the participants reached criteria for a somatoform disorder. In a general population study in Germany, only 9.7% of men aged 18 to 39 years, the closest comparable group, reached the same criteria with a considerably lower

mean PHQ-15 symptom score (3.71 (SD 2.80) compared to 5.6 (SD 4.2) in our study) [44]. Conversely, in a study of 116 adult Syrian refugees resettled in Germany (69% male, mean age 36.7 years (SD 10.9, range: 19-64)), 24.1% had a probable somatoform disorder with a mean PHQ-15 symptom score of 6.35 (SD 5.49) [19]. A more precise comparison restricted to the youngest age group (18 to 24 years) was not possible given the low number of participants in this group (n=16). Our findings are in keeping with both these studies regarding the types of somatic symptoms the most frequently reported, namely tiredness, trouble sleeping and back pain.

Similarly, using the PHQ and the same cut-offs, anxiety disorder was four times higher in our study than in the sub-group of men aged 18 to 39 years from the German general population [45], and depression was four times higher than in the 14 to 24 year old male sub-sample of a survey providing normative data for the PHQ-9 (score $\geq$ 10: 6.7%, compared to 28.7% in our study) [46]. However, our rates are similar to those reported in the Syrian refugee study, namely 30.2% and 15.5% for depression and anxiety, respectively [19]. Given that this study was restricted to refugees who had obtained residency permission, the rates could be expected to be even higher if the sample were extended to all asylum seekers. A meta-analysis of 20 studies on newly arrived refugees and asylum-seekers in Germany reported a PHQ-9 depression prevalence of 30.7% using the 10+ cut-off [2]. Regarding post-traumatic stress, mean PCL-5 scores of 44.2 (range 0-80) [47] and 39.5 (range 7-71) [48] were reported in two studies of adults migrants, who were mainly (>70%) unemployed [47, 48] and with no residence permit [47]. Our prevalence rate was closer to that found in students ranging from 15.4 (SD 14.7) [42] to 20.9 (SD 17.7) [41].

#### *Association between trauma and mental health*

Our findings highlight the increased risk of psychiatric disorders with exposure to traumatic events and are robust both to adjustment for confounder variables and correction for multiple comparisons. The strongest associations were found for depression and PTSD. Weaker associations were found for anxiety and somatoform disorder. Regarding somatoform disorder, the algorithm

provided by the authors for establishing DSM-IV sub-threshold caseness required ruling out 'an adequate biological explanation' [38]. With no clinical assessment, it was not possible to rule this out in our study and reclassify participants with regard to the 10+ cut-off accordingly for a more accurate estimation of somatoform disorder.

Our findings are broadly consistent with the few studies, mostly restricted to UASC, that show an association between the amount of exposure to traumatic life events and mental health in young migrants, although not always for the same diagnostic categories [16, 19, 21, 22]. Caution is nonetheless required given the different study populations, measurement scales and approaches (continuous versus categorical) used to assess mental health. In a cross-sectional survey of 78 UASC aged 13 to 18, the number of war-related trauma events was a significant predictor of PTSS assessed using the Impact of Event Scale; contrary to our findings, this was not the case for depressive symptoms measured using the Birmleson Depression Self-Rating Scale. The most frequent war-related traumas reported on the Harvard Trauma Questionnaire were: forced separation from family members and unnatural death of family or friend. The predictive effect of the different types of trauma was not studied [21]. Similarly, our results are inconsistent with Vervliet et al. (2014) who reported an increase in anxiety and PTSD but not depressive symptoms with the number of traumatic events experienced by UASC [16]. However, the number of daily stressors in the host country was associated with all mental health dimensions, including depression. Finally, in Jensen et al.'s UASC study (2019), anxiety, depression and PTSS levels were all higher in those exposed to severe unspecified trauma prior to arrival in Norway [18]. There are less studies on the effect of trauma on somatoform disorder. We found a borderline significant increase in somatoform disorder with the number of traumatic events, which reached significance in the multi-adjusted model and a significant association with experiencing physical assault. In the Syrian refugee study, somatic symptoms increased significantly and independently with exposure to trauma assessed using the Essen Trauma Inventory [19]. Given that traumatic events can be experienced in the post-migration period, adding to the trauma load [22], the deleterious effect of trauma exposure on mental health can be expected

to increase over time as YA-UASC grow older. In our study for instance, 19% of events singled-out as the most traumatic occurred after arrival in the host country.

### *Limitations*

Our sample may not be representative of all YA-UASC in France. Firstly, although the legislation ensures that all French departments participate equally in the reception of UASC [49], some are reported to be under more pressure than others. Furthermore, the reception and care arrangements provided as well as the offer of YAWC is known to differ substantially between departments [31]. In addition, YA-UASC could only be reached by the research team if they had maintained contact with their former carers. It is difficult to estimate the direction and strength of the bias introduced. On the one hand, YA-UASC in a stable situation may have been easier to reach leading to an underestimation of psychiatric disorder prevalence rates. On the other hand, social workers felt that those that kept in touch were often more vulnerable and in need of support and guidance. Also, YA-UASC not recognised as minors and protected by the CPSs were not included; yet they have been shown to be particularly vulnerable [50]. Other limitations were the cross-sectional design of the study, the absence of in-depth psychiatric interviews to establish diagnoses and, for many participants, the language barrier.

### *Strengths*

For an exploratory study of a population by definition difficult to reach, our sample can be considered relatively large. Furthermore, we used standardised and validated research instruments to estimate the prevalence of psychiatric disorders. The choice of the widely used PHQ allowed us to compare our prevalence rates with those established for similar age groups in normative populations. Given the limited knowledge of written French by some of the participants, the self-report questionnaires were administered by trained interviewers, which contributed to the good



quality of our data with very few missing values for a relatively large sample of youth difficult to reach.

## **Conclusion**

This exploratory study is one of the first to provide prevalence rates for different types of psychiatric disorders in YA-UASC in France, using standardised and validated research instruments. Our findings confirm the high level of psychiatric symptoms and disorders in this vulnerable population and highlight the need for regular assessments, in order to provide timely and adapted psychological interventions [51]. Moreover, we found a cumulative effect of traumatic life events, specifically on depression and PTSD, with assault and witnessing sudden and violent death as the most strongly associated types of events. Further large-scale prospective studies are warranted to study change in symptoms over time, following migrant minors from their arrival in the host country through their transition to adulthood and onwards.

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## **Conflicts of interest**

The authors declare that they have no competing interests

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None



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Table 1. Socio-demographic characteristics of the sample (N=110)

		Median [min-max] or %
Age (yrs)		19.7 [18.1-22.8]
Sex	Male	92.7
Country of origin	Africa	80.0
Learnt French prior to arrival	Yes	64.6
Living situation	Rented accommodation	51.8
	Young workers home	17.3
	Institutional (boarding school, student housing...)	10.9
	Living with friends	11.8
	Other (charity organisation, homeless...)	8.2
Monthly income	Charity, unemployment benefit, <500€	36.1
	600€ - 1100€	28.7
	≥1200€	35.2
Qualification or diploma	Yes	70.0
Professional training	Yes	30.0
Young Adult Work Contract	Yes	75.5
Current occupation	School	15.5
	Apprenticeship	30.0
	Salaried work	10.9
	Officially unemployed	34.5
	Other	9.1
Current administrative situation	Residence permit	68.2
	Residence permit application	10.9
	Asylum application	6.4
	Illegal stay	13.6
	Obligation to leave the territory	0.9

Table 2. Description of mental health and post-traumatic stress symptoms and disorder

		Total	
		N	Mean (SD) [min-max]
PHQ	Probable somatoform disorder (SOMAT-10+) (%)	109	19.3
	Probable anxiety disorder (ANX-10+) (%)	108	17.6
	Probable depressive disorder (DEP-10+) (%)	108	28.7
	Major depression (DSM-5 criteria) (%)	108	14.8
	Somatic symptom score	109	5.6 (4.2) [0-20]
	Anxiety symptom score	108	4.9 (4.0) [0-15]
	Depression symptom score	108	7.0 (5.4) [0-24]
PCL-5	Post-traumatic stress disorder (score≥33) (%)	110	20.0
	Post-traumatic stress disorder (DSM-5 criteria) (%)	110	26.4
	Total score	98 <sup>1</sup>	23.0 (12.4) [0-60]
	Re-experiencing score (items 1 to 5)	98 <sup>1</sup>	6.7 (4.2) [0-18]
	Avoidance score (items 6 to 7)	98 <sup>1</sup>	3.4 (2.3) [0-8]
	Cognitive score (items 8 to 14)	98 <sup>1</sup>	7.0 (5.4) [0-27]
	Hyper-reactivity score (items 15 to 20)	98 <sup>1</sup>	5.8 (4.5) [0-16]

<sup>1</sup>participants declaring at least one stressful life-event considered to be traumatic (LEC-5)



Table 3. Mental health disorders according to traumatic life events: univariate analysis

			Somatoform disorder	Anxiety disorder	Depressive disorder	Post-traumatic stress disorder
Types of traumatic life events: <sup>1</sup>		N <sup>6</sup>	Score ≥ 10 % (p)	Score ≥ 10 % (p)	Score ≥ 10 % (p)	Score ≥ 33 % (p)
Natural disaster <sup>2</sup>	No	78	19.0	19.2	29.5	17.5
	Yes	29	20.7 (0.84)	13.8 (0.51)	27.6 (0.85)	27.6 (0.25)
Fire or explosion <sup>2</sup>	No	78	19.2	16.7	25.6	16.5
	Yes	28	20.7 (0.87)	21.4 (0.57)	39.9 (0.18)	31.0 (0.10)
Transportation accident <sup>3</sup>	No	69	15.7	17.4	23.2	19.7
	Yes	39	25.6 (0.21)	18.0 (0.94)	38.5 (0.09)	20.5 (0.92)
Serious accident at work, home or during recreational activity <sup>2</sup>	No	82	18.1	18.3	24.4	19.1
	Yes	24	25.0 (0.45)	16.7 (0.86)	45.8 (0.05)	25.0 (0.52)
Physical assault <sup>3</sup>	No	36	2.7	8.3	8.3	2.7
	Yes	71	28.2 <b>(0.01)</b>	22.5 (0.08)	39.4 <b>(0.003)</b>	29.2 <b>(0.01)</b>
Assault with a weapon <sup>3</sup>	No	56	19.3	12.5	23.2	15.8
	Yes	51	19.6 (0.97)	23.5 (0.14)	35.3 (0.17)	25.0 (0.23)
Sexual assault <sup>2</sup>	No	90	15.4	14.4	25.6	16.3
	Yes	16	37.5 (0.04)	37.5 (0.03)	43.8 (0.14)	50.0 <b>(0.002)</b>
Combat or exposure to war zone <sup>2</sup>	No	73	20.3	12.3	23.3	17.3
	Yes	33	18.2 (0.80)	30.3 (0.03)	42.2 (0.05)	27.3 (0.24)
Captivity <sup>3</sup>	No	57	19.0	12.3	26.3	20.4
	Yes	50	20.0 (0.89)	24.0 (0.12)	32.0 (0.52)	25.0 (0.36)

Life-threatening illness or injury <sup>2</sup>	No	70	15.5	17.1	25.7	15.3
	Yes	37	27.0 (0.15)	18.9 (0.82)	35.1 (0.31)	29.7 (0.08)
Sudden violent death of other (homicide, suicide...) <sup>2</sup>	No	48	14.3	10.4	16.7	8.2
	Yes	59	23.7 (0.22)	23.7 (0.08)	39.0 <b>(0.01)</b>	30.0 <b>(0.008)</b>
Sudden accidental death of friend or family <sup>2</sup>	No	35	22.9	20.0	22.6	25.7
	Yes	72	17.8 (0.53)	16.7 (0.67)	33.3 (0.16)	17.6 (0.32)
Main traumatic event <sup>4</sup> : Interpersonal <sup>5</sup>	Yes	37	29.7	21.6	24.3	35.1
	No	61	16.4 (0.12)	16.4 (0.52)	34.4 (0.29)	14.8 (0.02)
Main event took place	Before leaving	40	22.0	17.5	30.0	19.5
	During migration	40	20.0	22.5	35.0	30.0
	Since arrival	19	21.0 (0.98)	10.5 (0.54)	21.1 (0.56)	10.5 (0.23)

<sup>1</sup>exclusion of events experienced personally or witnessed concerning less than 20 participants (exposure to toxic substance N=15; serious injury, harm or death you caused to someone else N=3)

<sup>2</sup>event experienced personally or witnessed (for events experienced personally by less than 30% of sample)

<sup>3</sup>event experienced personally

<sup>4</sup>event singled-out and explored by the PCL-5 (N=98)

<sup>5</sup>interpersonal events: assault, captivity, war

<sup>6</sup>numbers are for the mental health disorders with the most missing values, namely anxiety disorder and depression (N=108) and therefore differ slightly from those used to calculate the percentages in Figure 1

Table 3. Socio-demographic characteristics of the sample (N=110)

		Median [min-max] or %
Age (yrs)		19.7 [18.1-22.8]
Sex	Male	92.7
Country of origin	Africa	80.0
Learnt French prior to arrival	Yes	64.6
Living situation	Rented accommodation	51.8
	Young workers home	17.3
	Institutional (boarding school, student housing...)	10.9
	Living with friends	11.8
	Other (charity organisation, homeless...)	8.2
Monthly income	Charity, unemployment benefit, <500€	36.1
	600€ - 1100€	28.7
	≥1200€	35.2
Qualification or diploma	Yes	70.0
Professional training	Yes	30.0
Young Adult Work Contract	Yes	75.5
Current occupation	School	15.5
	Apprenticeship	30.0
	Salaried work	10.9
	Officially unemployed	34.5
	Other	9.1
Current administrative situation	Residence permit	68.2
	Residence permit application	10.9
	Asylum application	6.4
	Illegal stay	13.6
	Obligation to leave the territory	0.9

Table 4. Description of mental health and post-traumatic stress symptoms and disorder

		Total	
		N	Mean (SD) [min-max]
PHQ	Probable somatoform disorder (SOMAT-10+) (%)	109	19.3
	Probable anxiety disorder (ANX-10+) (%)	108	17.6
	Probable depressive disorder (DEP-10+) (%)	108	28.7
	Major depression (DSM-5 criteria) (%)	108	14.8
	Somatic symptom score	109	5.6 (4.2) [0-20]
	Anxiety symptom score	108	4.9 (4.0) [0-15]
	Depression symptom score	108	7.0 (5.4) [0-24]
PCL-5	Post-traumatic stress disorder (score≥33) (%)	110	20.0
	Post-traumatic stress disorder (DSM-5 criteria) (%)	110	26.4
	Total score	98 <sup>1</sup>	23.0 (12.4) [0-60]
	Re-experiencing score (items 1 to 5)	98 <sup>1</sup>	6.7 (4.2) [0-18]
	Avoidance score (items 6 to 7)	98 <sup>1</sup>	3.4 (2.3) [0-8]
	Cognitive score (items 8 to 14)	98 <sup>1</sup>	7.0 (5.4) [0-27]
	Hyper-reactivity score (items 15 to 20)	98 <sup>1</sup>	5.8 (4.5) [0-16]

<sup>1</sup>participants declaring at least one stressful life-event considered to be traumatic (LEC-5)

Table 3. Mental health disorders according to traumatic life events: univariate analysis

			Somatoform disorder	Anxiety disorder	Depressive disorder	Post-traumatic stress disorder
Types of traumatic life events: <sup>1</sup>		N <sup>6</sup>	Score ≥ 10 % (p)	Score ≥ 10 % (p)	Score ≥ 10 % (p)	Score ≥ 33 % (p)
Natural disaster <sup>2</sup>	No	78	19.0	19.2	29.5	17.5
	Yes	29	20.7 (0.84)	13.8 (0.51)	27.6 (0.85)	27.6 (0.25)
Fire or explosion <sup>2</sup>	No	78	19.2	16.7	25.6	16.5
	Yes	28	20.7 (0.87)	21.4 (0.57)	39.9 (0.18)	31.0 (0.10)
Transportation accident <sup>3</sup>	No	69	15.7	17.4	23.2	19.7
	Yes	39	25.6 (0.21)	18.0 (0.94)	38.5 (0.09)	20.5 (0.92)
Serious accident at work, home or during recreational activity <sup>2</sup>	No	82	18.1	18.3	24.4	19.1
	Yes	24	25.0 (0.45)	16.7 (0.86)	45.8 (0.05)	25.0 (0.52)
Physical assault <sup>3</sup>	No	36	2.7	8.3	8.3	2.7
	Yes	71	28.2 <b>(0.01)</b>	22.5 (0.08)	39.4 <b>(0.003)</b>	29.2 <b>(0.01)</b>
Assault with a weapon <sup>3</sup>	No	56	19.3	12.5	23.2	15.8
	Yes	51	19.6 (0.97)	23.5 (0.14)	35.3 (0.17)	25.0 (0.23)
Sexual assault <sup>2</sup>	No	90	15.4	14.4	25.6	16.3
	Yes	16	37.5 (0.04)	37.5 (0.03)	43.8 (0.14)	50.0 <b>(0.002)</b>
Combat or exposure to war zone <sup>2</sup>	No	73	20.3	12.3	23.3	17.3
	Yes	33	18.2 (0.80)	30.3 (0.03)	42.2 (0.05)	27.3 (0.24)
Captivity <sup>3</sup>	No	57	19.0	12.3	26.3	20.4
	Yes	50	20.0 (0.89)	24.0 (0.12)	32.0 (0.52)	25.0 (0.36)

Life-threatening illness or injury <sup>2</sup>	No	70	15.5	17.1	25.7	15.3
	Yes	37	27.0 (0.15)	18.9 (0.82)	35.1 (0.31)	29.7 (0.08)
Sudden violent death of other (homicide, suicide...) <sup>2</sup>	No	48	14.3	10.4	16.7	8.2
	Yes	59	23.7 (0.22)	23.7 (0.08)	39.0 <b>(0.01)</b>	30.0 <b>(0.008)</b>
Sudden accidental death of friend or family <sup>2</sup>	No	35	22.9	20.0	22.6	25.7
	Yes	72	17.8 (0.53)	16.7 (0.67)	33.3 (0.16)	17.6 (0.32)
Main traumatic event <sup>4</sup> : Interpersonal <sup>5</sup>	Yes	37	29.7	21.6	24.3	35.1
	No	61	16.4 (0.12)	16.4 (0.52)	34.4 (0.29)	14.8 (0.02)
Main event took place	Before leaving	40	22.0	17.5	30.0	19.5
	During migration	40	20.0	22.5	35.0	30.0
	Since arrival	19	21.0 (0.98)	10.5 (0.54)	21.1 (0.56)	10.5 (0.23)

<sup>1</sup>exclusion of events experienced personally or witnessed concerning less than 20 participants (exposure to toxic substance N=15; serious injury, harm or death you caused to someone else N=3)

<sup>2</sup>event experienced personally or witnessed (for events experienced personally by less than 30% of sample)

<sup>3</sup>event experienced personally

<sup>4</sup>event singled-out and explored by the PCL-5 (N=98)

<sup>5</sup>interpersonal events: assault, captivity, war

<sup>6</sup>numbers are for the mental health disorders with the most missing values, namely anxiety disorder and depression (N=108) and therefore differ slightly from those used to calculate the percentages in Figure 1

Figure 1. Level of exposure to traumatic life events (%) by type of event (LEC-5)

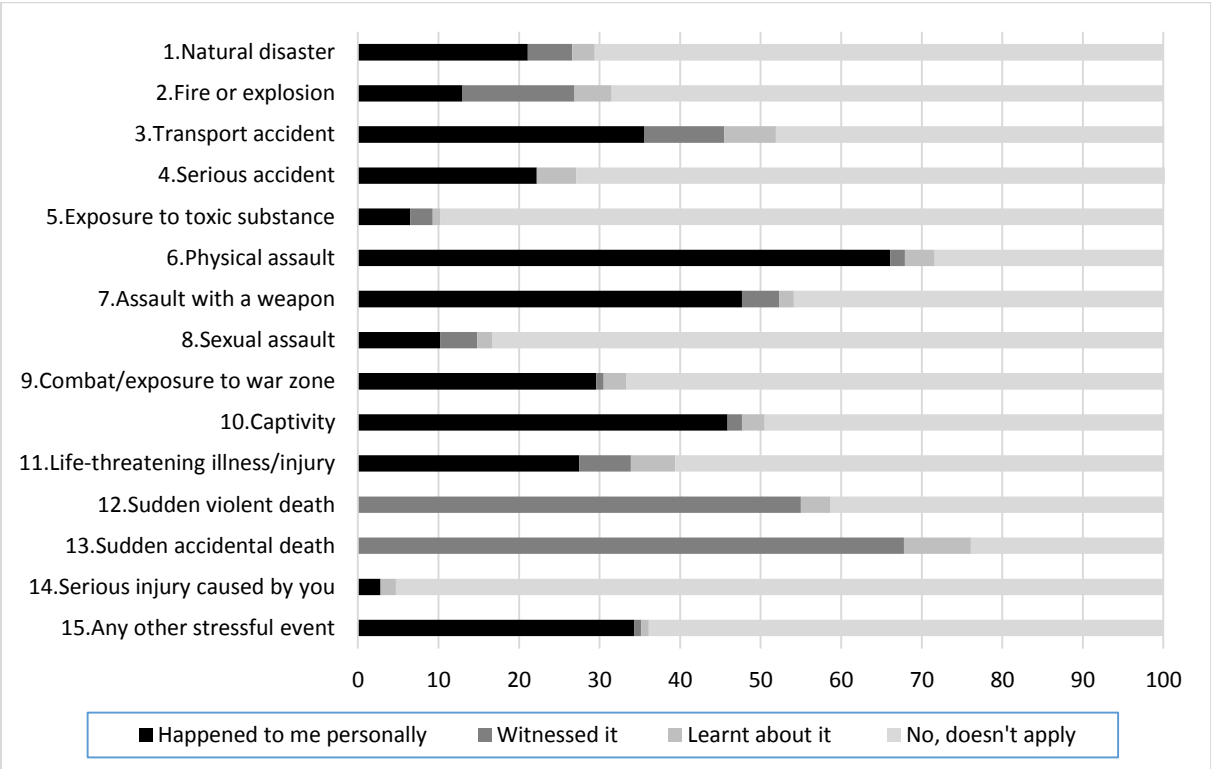


Figure 2a. Boxplot of the number of traumatic life events according to somatoform disorder

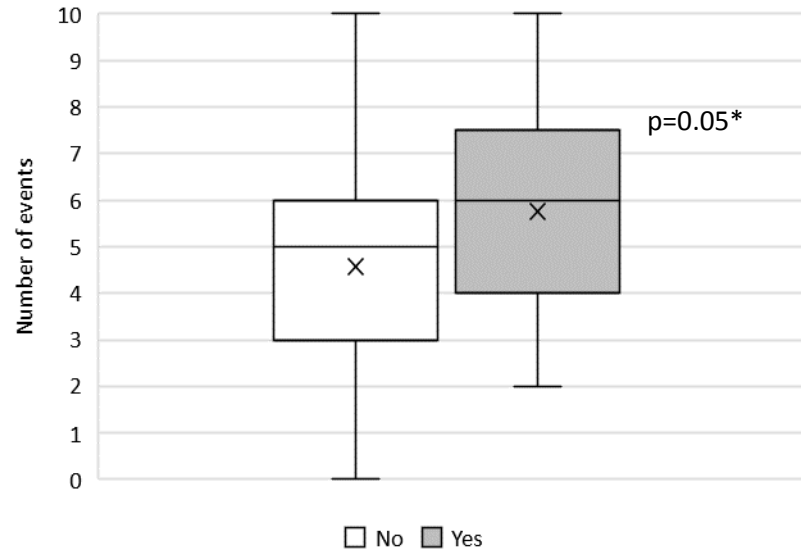


Figure 2b. Boxplot of the number of traumatic life events according to anxiety disorder

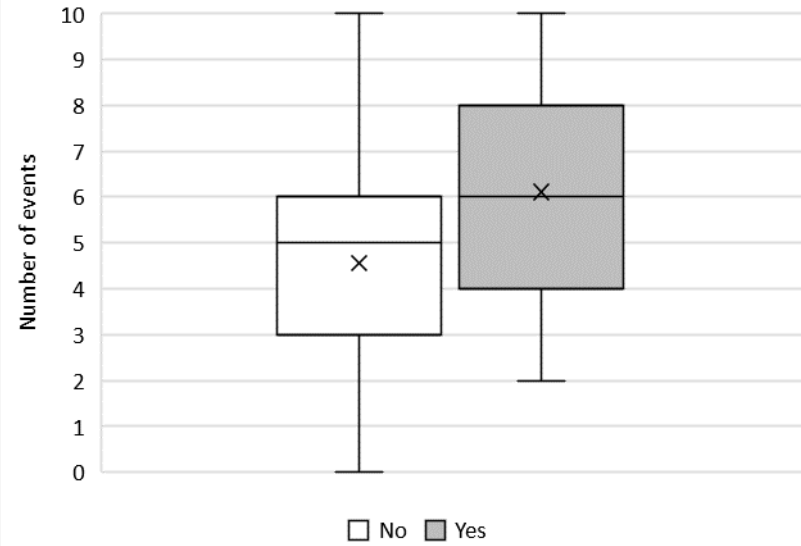


Figure 2c. Boxplot of the number of traumatic life events according to depressive disorder

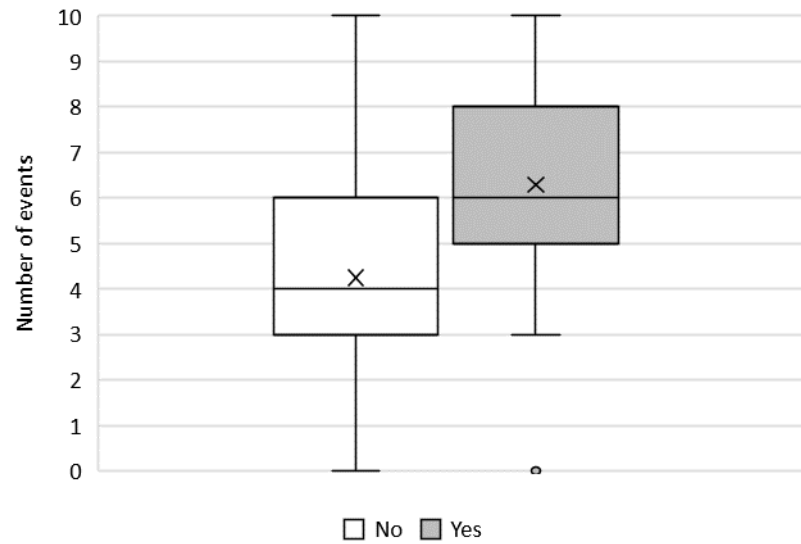
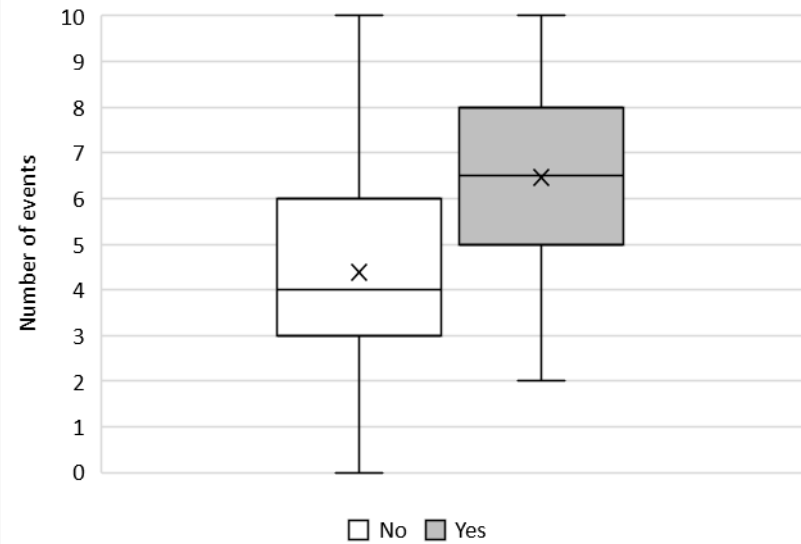


Figure 2d. Boxplot of the number of traumatic life events according to post-traumatic stress disorder





Appendix Table. Mental health disorders according to migration background and socio-demographic characteristics of participants

			Somatoform Disorder	Anxiety Disorder	Depressive Disorder	Post-traumatic stress disorder
Continuous variables (median [IQR]):		Cut-off scores: <sup>1</sup>				
Age		score<10	19 [2]	19 [3]	19 [2]	19 [2]
		score≥10	20 [2] *	19 [2]	19 [3]	20 [2]
Age at arrival in France		score<10	16.2 [0.9]	16.2 [1.0]	16.2 [0.9]	16.2 [0.8]
		score≥10	16.5 [0.8]	16.3 [0.7]	16.5 [0.9]	16.5 [0.8]
Time since end of child protection		score<10	0.9 [1.4]	1.0 [1.6]	0.9 [1.5]	0.9 [1.4]
		score≥10	1.6 [2.1] †	0.7 [1.2]	1.3 [1.3]	1.3 [1.8]
Categorical variables (%):		N	score≥10 (%)	score≥10 (%)	score≥10 (%)	score≥33 (%)
Country of origin	Europe/Asia	22	31.8	21.1	23.8	27.3
	Africa	87	16.1	17.2	29.9	19.8
Arrived before age 16	No	74	23.0	20.3	33.8	24.0
	Yes	35	11.4	11.8	17.7	11.4
<u>Reason for leaving:</u>						
Family conflict, abuse	No	61	24.6	16.7	30.0	22.6
	Yes	48	12.5	18.8	27.1	16.7
Persecution or war	No	91	16.3	14.3	27.5	15.2
	Yes	17	35.3	35.3 †	35.3	44.4 *
Economic problems	No	93	20.1	19.4	31.2	21.3
	Yes	15	13.3	6.7	13.3	12.5
Personal choice	No	69	23.2	20.3	31.9	24.3

	Yes	39	12.5	12.8	23.1	12.5
Parental abandon, homeless	No	93	21.3	17.2	29.0	20.0
	Yes	15	6.83	20.0	33.3	20.0
Decided to leave	Alone, family informed	33	9.1	9.4	18.8	18.2
	Alone, family not informed	56	16.1	16.1	32.1	15.8
	Family decided	20	45.0 *	35.0	35.0	35.0
Regrets leaving	No	73	15.1	15.3	23.6	15.6
	Yes, sometimes or often	36	27.8	22.2	38.9	25.0
Received financial help from family	No	68	20.6	17.7	35.3	20.3
	Yes	40	17.1	17.5	17.5 †	19.5
Contact with family	None or rarely	32	28.1	21.9	37.5	24.2
	Sometimes, often	76	15.6	15.8	25.0	18.2
Satisfied with care at CP centre	No or mildly	26	19.2	42.3	30.8	25.9
	Yes	82	19.3	9.8 *	28.1	18.1
Contact with carers at CP centre	None or rarely	50	24.0	16.0	26.0	17.8
	Sometimes, often	58	15.3	19.0	31.0	22.1
Insecure accommodation	No	74	20.0	13.5	25.7	19.7
	Yes	34	17.7	26.5	35.3	20.6
Monthly income	<500€	39	20.5	20.5	38.5	25.6
	600€ - 1100€	30	16.7	23.3	30.0	12.9
	≥1200€	37	21.1	8.1	18.9	21.1
Qualification or diploma	No	33	24.4	27.3	30.3	18.2
	Yes	75	17.1	13.3	28.0	20.8

Professional training	No	75	21.1	17.3	30.7	23.4
	Yes	33	15.2	18.2	24.2	12.1
Current occupation	School	17	11.8	17.7	29.4	11.8
	Apprenticeship	32	12.5	25.0	25.0	15.1
	Salaried work	37	23.7	8.1	21.6	23.7
	Other	22	27.3	22.7	45.5	27.3
Has a residence permit	No	36	30.6	19.4	36.1	28.8
	Yes	72	13.7 †	16.7	25.0	16.2

†  $p \leq 0.05$  \*  $p \leq 0.0125$  (taking into account multiple comparisons)

<sup>1</sup>except for PTSD where the cut-off is  $<33/\geq 33$

