



The contribution of childhood adversities to the persistence of severe role impairment among college students: a follow-up study

Mathieu Revranche¹ · Margot Biscond¹ · Fernando Navarro-Mateu^{2,3,4} · Viviane Kovess-Masfety⁵ · Mathilde M. Husky^{1,6}

Received: 20 June 2022 / Accepted: 2 February 2023
© The Author(s), under exclusive licence to Springer-Verlag GmbH Germany 2023

Abstract

Purpose While the association between childhood adversities (CAs) and negative mental health outcomes is robustly supported throughout the epidemiological literature, little is known about their contribution to the persistence of role impairment. The present study aims to investigate the association of three facets of CAs with the persistence of severe role impairment among college students using a follow-up design.

Methods Data were drawn from the French portion of the World Mental Health International College Student Initiative. Students who completed both the baseline and 1-year follow-up surveys were included ($n = 1,188$). Exposure to 12 types of CAs before the age of 18 was assessed at baseline, and 12-month role impairment and 12-month mental disorders were assessed at baseline and follow-up. Logistic regressions estimated associations by jointly using types, number of types, and cumulative frequency of exposure to CAs as predictors.

Results At baseline, 27.6% of students reported any severe role impairment. Among them, 47.5% reported the persistence of any impairment at one year. In models adjusted for 12-month mental disorders, only the frequency of CAs was associated with the persistence of impairment, namely college-related and other work impairment ($aOR = 1.17$, 95% CI [1.01, 1.35]).

Conclusion Role impairment is prevalent among college students, and studies are needed to better understand its persistence. Beyond the primary prevention of early stressors, screening for and treating mental health problems during college may help reduce the impact of CAs on the persistence of role impairment.

Keywords Childhood adversity · Role impairment · Mental disorder · College students · Follow-up study

Introduction

Available evidence from the World Mental Health International College Student Survey Initiative (WMH-ICS) suggests that one out of five first-year students experience severe 12-month role impairment in at least one area of functioning (i.e., home management/chores; work roles; close personal relationship; or social life) [1]. Role impairment among college students has typically been assessed regarding specific psychiatric disorders [2–4] or to reflect the interference of overall physical or emotional problems in daily activities [1, 5–7]. Functional impairment related to poor mental health is also known to be associated with reduced academic achievement [8] and increased odds of attrition [9]. It is therefore important to identify factors associated not only with the presence of impairment but also its persistence over time. Beyond the contribution of mental disorders [1, 5], additional factors have been shown to be associated with

✉ Mathilde M. Husky
mathilde.husky@u-bordeaux.fr

¹ Laboratoire de Psychologie EA4139, Université de Bordeaux, Bordeaux, France

² Departamento de Psicología Básica y Metodología, Unidad de Docencia, Investigación y Formación en Salud Mental (UDIF-SM), Servicio Murciano de Salud, Universidad de Murcia, Murcia, Spain

³ IMIB-Arrixaca, Murcia, Spain

⁴ CIBER de Epidemiología y Salud Pública (CIBERESP), Murcia, Spain

⁵ Institut de Psychologie, EA 4057, Université Paris Cité, Paris, France

⁶ Active Team, Bordeaux Population Health Research Center, Inserm, U1219, Bordeaux, France

increased role impairment, including childhood adversities (CAs) [3, 10].

CAs typically include exposure to child maltreatment (i.e., physical abuse, sexual abuse, emotional abuse, and neglect), but also encompass impaired home environments due to parental maladjustment (i.e., mental illness, substance use disorders, criminal behavior, and domestic violence) [11–17], as well as interpersonal loss (i.e., parental death, parental divorce, or other separation from parents) [18]. Importantly, CAs have been linked either independently or cumulatively to numerous negative outcomes including severe role impairment. For instance, data from the National Comorbidity Survey Replication revealed that when individual types of CAs and number of CAs were jointly examined, parental mental illness, criminal activities, domestic violence, physical abuse, sexual abuse, and neglect were associated with severe impairment related to 12-month mental disorders [3]. Another study using data from the WMH-ICS demonstrated that when CA type, number of types, and cumulative frequency of CAs were tested simultaneously, only the latter was significantly associated with severe impairment among first-year students with at least one 12-month disorder [10]. Prospectively, an increased number of types of CAs have been shown to predict poorer level of functioning over time among adolescents [19] and participants aged 15–30 years at ultra-high risk for psychosis [20].

Importantly, although longitudinal studies [19, 20] assessed role impairment at both baseline and follow-up, the effect of CAs on its persistence was not estimated per se. In addition, CAs have typically been operationalized to reflect the presence vs. absence of exposure to any given type of CA and to reflect the number of types [11–13, 15, 16]. A few studies have taken into account the cumulative frequency of exposure to CAs [10, 21] as a recommended alternate approach for the operationalization of adversities [22].

The current study thus seeks to address these gaps in prior CA research by (1) investigating the effect of CAs on the persistence of severe role impairment at 1 year among college students, and (2) relying on three facets of CAs: types, number of types, and cumulative frequency to examine this association.

Materials and methods

Participants and procedure

Data were drawn from an online survey designed to characterize mental health needs among first-year college students and conducted in two universities as part of the French portion of the WMH-ICS (https://www.hcp.med.harvard.edu/wmh/college_student_survey.php). Together, the two

participating universities enroll about 12,000 first-year college students each year. All incoming college students received an e-mail inviting them to take part in the survey from the 2017–2018 to the 2019–2020 academic years. The survey included questions regarding sociodemographic characteristics, mental health, and exposure to early stressors. Participants were provided with a description of the study and informed consent was obtained prior to starting the survey. Those who were minors at the time they completed the consent form were not eligible. Respondents at baseline were invited to take part in the follow-up survey 12 months later. All procedures were approved by an ethics committee (CCTIRS#15–527) and by the National Data Protection Authority (CNIL, Authorization#DR-2016–502).

The association between CAs and 12-month role impairment was tested beforehand at baseline ($N=2,661$, response rate = 7.58%), and these results are reported as supplemental material (Supplemental Table 3). The sub-sample of respondents who completed the follow-up survey ($n=1,221$, response rate = 45.89%) was used to predict the persistence of role impairment. After removing cases with any missing data on adjustment and outcomes variables ($n=33$), the final sample available for analysis included 1,188 respondents.

Measures

Childhood adversities

Twelve CAs occurring prior to age 18 were assessed with questions adapted from the childhood section of the World Mental Health Composite International Diagnostic Interview [23], the Army STARRs study [24], and the Adverse Childhood Experiences Scale [16]. CAs were operationalized in three ways to distinguish their type, number, and frequency. First, the 12 adversities were gathered into five types of CAs: parental psychopathology (four items: serious parental mental health problems; parental suicidal behaviors; parental alcohol or drug problems; domestic violence), physical abuse (two items: harm associated with bruises; physical abuse), sexual abuse (two items: inappropriate touching; sexual abuse), emotional abuse (two items: repeated hurtful comments and insults; emotional abuse), and serious neglect (two items: doing chores which were dangerous or age-inappropriate; serious neglect at home). For each item, respondents were invited to indicate how often they experienced each of the events on a five-point scale ranging from *never* (0) to *very often* (4). Participants were considered to have experienced a CA type whenever at least one item in the CA domain was reported to have occurred at least *rarely*. The five dichotomous types (i.e., exposure vs. no exposure) were created to examine and adjust for their individual contribution. Second, the five types of CA were summed to create a six-level variable reflecting the exact number of types

experienced (from exactly zero to exactly five). Given that CA often co-occur [18], the latter variable was computed to not overestimate their individual contribution in statistical analyses. Third, the frequency of occurrence of each of the five types of CA was added to reflect the overall sum of the frequency of CA types ranging from 0 to 15. For each CA type, the individual CA item with the highest frequency was identified and coded as follows: *never* and *rarely* were coded 0, *sometimes* was coded 1, *often* was coded 2, and *very often* was coded 3. The sum of these five highest frequency items was then computed to reflect cumulative frequency [10].

Role impairment

Twelve-month role impairment was assessed regardless of the presence of any mental disorder at both baseline and 1-year follow-up using an adapted version of the Sheehan Disability Scale [25, 26]. Two domains of functioning were considered in the current study, namely college-related and other work (i.e., ability to work or study as well as most of other people; academic performance) and personal or social life (cleaning, shopping, and working around the house, apartment or yard; the ability to initiate and maintain close personal relationships; overall social life) [1, 10]. A score of 7 or above on a scale ranging from 0 to 10 was considered as reflecting severe role impairment [23]. Persistence was defined as follows: reporting severe role impairment at follow-up for any given domain of impairment if severe role impairment was reported at baseline. Any impairment was defined as having reported college-related and other work impairment or personal or social life impairment. Thus, the persistence of any impairment was defined as having reported the persistence of college-related and other work impairment or the persistence of personal or social life impairment.

Mental disorders

Twelve-month Diagnostic and Statistical Manual of Mental Disorders (DSM-5) mental disorders were estimated at baseline and at follow-up. The Composite International Diagnostic Interview Screening Scales [27] was used to assess major depressive disorder, bipolar disorder, generalized anxiety disorder, panic disorder, and drug use disorder. A variable reflecting the number of 12-month mental disorders was computed at both baseline and follow-up by summing the five mental disorders listed above.

Covariates

Sociodemographics considered in the present study included sex (male vs. female) and age. In addition, because data collection overlapped with the beginning of

the COVID-19 pandemic, the timing of inclusion at baseline was categorized using the start of the first significant national public health measure implemented to limit the spread of SARS-CoV-2 (prior to vs. after March 17, 2020 or the first national lockdown) as a cutoff. The timing of inclusion at baseline variable is hereafter referred to as “COVID-19 pandemic period”.

Data analysis

First, as the study aimed to investigate the persistence of severe role impairment at 1 year, comparisons were made between those who completed the follow-up survey and those who did not (Supplemental Table 1). Importantly, no significant differences were found regarding age ($p = 0.669$), number of 12-month mental disorders ($p = 0.811$), any severe role impairment ($p = 0.547$) and exposure to CAs in terms of types (from $p = 0.313$ to $p = 0.920$), number of types ($p = 0.682$), and cumulative frequency ($p = 0.603$). Significant differences were found regarding sex (61.7% of females among those who completed the follow-up and 56.1% among those who did not) ($p = 0.005$) and drug use disorder (7.4% of those who completed the follow-up and 11.7% of those who did not) ($p = 0.017$). Furthermore, the proportion of respondents who took part in the follow-up survey was lower if the inclusion at baseline occurred during the pandemic ($p < 0.0001$).

Second, sociodemographic characteristics, 12-month mental disorders, and exposure to CAs were examined among respondents with or without severe role impairment persistence at 1 year. Chi-square and t tests were used to identify significant differences within role impairment domains.

Third, univariate and multivariate logistic regressions were performed to investigate the associations of the type, number of types, and frequency of CAs with severe role impairment persistence at follow-up. Multivariate analyses included all of the three facets of CAs and were adjusted on sex, COVID-19 pandemic period, and the number of 12-month mental disorders at follow-up. Given the assumptions that must be met in logistic regressions including the absence of perfect multicollinearity [28], the reference used to examine the number of types was zero or one in multivariate analyses, as the type of CA already reflected the presence of zero or one adversity.

Fourth, multinomial logistic regressions were performed using a three-category dependent variable (e.g., for the any severe impairment analysis: no impairment at baseline vs no persistence at follow-up vs persistence at follow-up), to investigate differences between the groups with and without severe impairment persistence at 1-year follow-up.

Coefficients and standard errors of logistic regressions were exponentiated and reported as odds ratios (*OR*) with their 95% confidence intervals (95% CI).

All analyses were performed on SPSS v.21.0.

Results

Characteristics of students with or without severe role impairment persistence at 1 year

Among college students with any severe role impairment at baseline (27.6%; $n = 337$), 47.5% ($n = 160$) reported the persistence of any impairment at 1 year (online

Supplementary Table S1). No statistical differences were found between the proportion of college students with or without persistent impairment depending on their inclusion pre vs. during COVID-19 pandemic ($p = 0.232$) (Table 1).

Students reporting the persistence of any role impairment had a higher number of 12-month mental disorders at follow-up ($p < 0.0001$), were exposed in greater proportion to each type of CA ($p < 0.0001$), with the exception of sexual abuse ($p = 0.407$), reported a higher number of types ($p < 0.0001$), and were more frequently exposed to CAs ($p < 0.0001$) (Table 1). Similar differences were obtained regarding the persistence of the college-related and other work impairment and the personal or social life impairment.

Table 1 Characteristics and 12-month mental disorders by persistence of severe role impairment at 1-year follow-up ($n = 1,188$)

	Severe role impairment persistence at follow-up														
	Any impairment					College-related and other work					Personal or social life				
	No		Yes		Test	No		Yes		Test	No	Yes	Test		
	$n = 1,028$	$n = 160$				$n = 1,085$	$n = 103$	$n = 1,067$	$n = 121$						
n	%	n	%	p	n	%	n	%	p	n	%	n	%	p	
<i>Sociodemographic characteristics</i>															
Sex													0.228	0.071	0.677
Male	216	39.3	27	31.2		229	39.3	14	24.7		220	38.7	23	33.6	
Female	812	60.7	133	68.8		856	60.7	89	75.3		847	61.3	98	66.4	
Age ^a	18.8	1.68	19.0	1.66	0.440	18.8	1.68	19.0	1.64	0.505	18.8	1.66	19.0	1.80	0.179
Timing of inclusion at baseline													0.232	0.111	0.325
Prior to COVID-19 pandemic	953	92.2	144	89.4		1006	92.2	91	87.1		988	92.0	109	90.0	
During COVID-19 pandemic	75	7.8	16	10.6		79	7.8	12	12.9		79	8.0	12	10.0	
Number of 12 M mental disorders ^a	0.44	0.72	1.47	1.03	<0.0001	0.48	0.76	1.56	1.06	<0.0001	0.47	0.75	1.52	1.02	<0.0001
<i>Childhood adversities type</i>															
Parental psychopathology	475	43.7	106	63.1	<0.0001	512	44.5	69	65.9	<0.0001	500	44.5	81	61.8	<0.0001
Physical abuse	156	14.5	47	29.3	<0.0001	170	14.9	33	35.3	<0.0001	168	15.2	35	27.9	<0.0001
Sexual abuse	43	3.2	9	3.5	0.407	48	3.3	4	2.4	0.798	44	3.2	8	3.6	0.205
Emotional abuse	326	29.8	96	60.3	<0.0001	366	31.9	56	55.3	<0.0001	346	30.6	76	61.3	<0.0001
Neglect	148	15.5	46	29.1	<0.0001	165	16.3	29	29.4	0.001	154	15.7	40	31.8	<0.0001
Number													<0.0001	<0.0001	<0.0001
0	418	42.6	33	19.9		427	41.2	24	22.6		428	41.9	23	20.7	
1	301	28.5	36	23.4		313	28.3	24	22.6		311	28.3	26	22.5	
2	150	14.3	30	21.3		166	15.2	14	15.5		156	14.4	24	22.5	
3	100	8.9	38	22.0		112	9.5	26	23.8		110	9.6	28	19.8	
4	48	4.9	21	12.8		55	5.1	14	15.5		51	5.0	18	13.5	
5	11	0.7	2	0.7		12	0.7	1	0.01		11	0.7	2	0.9	
Frequency ^a	1.06	1.93	2.45	2.78	<0.0001	1.12	1.97	2.58	2.98	<0.0001	1.10	1.96	2.59	2.84	<0.0001

Percentages are weighted. Persistence is defined by having reported severe role impairment at baseline and at follow-up for a given domain. The number of mental disorders was assessed at 1-year follow-up and includes 12-month major depressive disorder, any bipolar disorder, generalized anxiety disorder, panic disorder, and drug use disorder

^aMean and standard deviation are displayed

Association between childhood adversities and severe role impairment persistence at 1 year

In univariate analyses, the type, number of types, and frequency of CAs were associated with all role impairment persistence outcomes (Table 2). Regarding the number of types, the pattern of unadjusted associations with all role impairment persistence outcomes followed a dose–response pattern (e.g., from $aOR = 2.08$ for two adversities to $aOR = 4.06$ for four or more adversities in any impairment).

When entering all facets of CAs in multivariate models alongside with sex, COVID-19 pandemic period, and number of 12-month mental disorders at follow-up, the only remaining significant association was found between the frequency of CAs and persistence of college-related and other work impairment ($aOR = 1.17$, 95% CI [1.01, 1.35]).

Multinomial logistic regressions testing childhood adversities as predictor of any severe role impairment

In univariate models, using those with no impairment at baseline as reference, physical abuse ($OR = 2.44$, 95% CI [1.65, 3.60]) and neglect ($OR = 2.53$, 95% CI [1.71, 3.75]) were associated with persistent role impairment only (Table 3). Parental psychopathology and emotional abuse were associated with increased risk of both non-persistent and persistent impairment. The association involving the number of CAs followed a dose–response pattern among those with persistent impairment but not among those without persistent impairment. In multivariate models, none of the three operationalizations of CA was associated with role impairment outcomes.

Multinomial logistic regressions testing childhood adversities as predictor of severe role impairment in college-related and other work

In univariate models, using those with no impairment in college-related and other work at baseline as reference, physical abuse ($OR = 2.60$, 95% CI [1.66, 4.08]) and neglect ($OR = 2.23$, 95% CI [1.40, 3.55]) were associated with persistent impairment only (Table 4). Parental psychopathology and emotional abuse were associated with increased risk of both non-persistent and persistent impairment. Three and four or more CAs types were associated with persistent impairment. In multivariate models, the only significant association was found between the cumulative frequency of exposure to CAs and persistent impairment ($aOR = 1.17$, 95% CI [1.02, 1.35]).

Multinomial logistic regressions testing childhood adversities as predictor of severe role impairment in personal or social life

In univariate models, using those with no impairment in personal or social life at baseline as reference, physical abuse ($OR = 2.27$, 95% CI [1.47, 3.50]) and neglect ($OR = 3.09$, 95% CI [2.02, 4.71]) were associated with persistent role impairment only (Table 5). Parental psychopathology and emotional abuse were associated with increased risk of both non-persistent and persistent impairment. The association involving the number of CAs followed a dose–response pattern among those with persistent impairment but not among those without persistent impairment. In multivariate models, none of the three operationalizations of CA was associated with role impairment outcomes.

Discussion

The study sought to extend current knowledge on CAs and associated deleterious outcomes by jointly examining the contribution of their type, number, and cumulative frequency to the persistence of severe role impairment at 1 year among incoming college students. Results indicated that 12-month role impairment was common among first-year students, and that about half of those with impairment at baseline continued to report significant impairment 1 year later. Although CAs predicted the persistence of all role impairment outcomes in univariate analyses, the only remaining significant association in multivariate models was found regarding the persistence of college-related and other work impairment. When jointly examining the contribution of the type, number of types, and frequency of CAs, only frequency remained associated with impairment persistence.

Overall, more than one in four students in the current study reported any severe role impairment at baseline. Among them, 47.5% reported persistent impairment at 1 year. These findings are consistent with a WMH-ICS study based on a similar assessment of role impairment (i.e., home management/chores, work roles, close personal relationship, or social life impairment), showing that 20.4% of first-year students suffered from any severe role impairment regardless of any 12-month mental disorder [1]. The persistence of impairment observed at 1-year follow-up is also consistent with the existing literature. For instance, combined data collected in Wave 1 and Wave 2 (mean interval of 36.6 months) of the National Epidemiologic Survey on Alcohol and Related Conditions point to a similar prevalence of persistence among adults with mental health problems, in social functioning (47.9%), emotional role (49.2%), and mental health (56.6%) domains [29].

Table 2 Type, number, and frequency of childhood adversities as predictors of the persistence of severe role impairment at 1-year follow-up ($n = 1,188$)

Type	Severe role impairment persistence at follow-up											
	Any impairment			College-related and other work			Personal or social life					
	OR	95%CI	aOR	95%CI	aOR	95%CI	OR	95%CI	aOR	95%CI		
	$n = 160$			$n = 103$			$n = 121$					
Parental psychopathology	2.28***	1.61–3.24	1.09	0.62–1.92	2.27***	1.48–3.48	1.12	0.58–2.16	2.30***	1.54–3.42	1.09	0.57–2.08
Physical abuse	2.32***	1.59–3.40	0.95	0.41–2.16	2.54***	1.63–3.96	1.28	0.47–3.47	2.18***	1.42–3.33	0.83	0.33–2.07
Sexual abuse	1.36	0.65–2.86	0.49	0.16–1.47	0.87	0.31–2.47	0.24	0.05–1.06	1.65	0.76–3.58	0.68	0.22–2.11
Emotional abuse	3.23***	2.29–4.55	1.67	0.81–3.42	2.34***	1.56–3.52	0.85	0.33–2.21	3.52***	2.38–5.20	1.91	0.86–4.22
Neglect	2.40***	1.63–3.52	0.86	0.38–1.99	2.18**	1.38–3.46	0.77	0.28–2.16	2.93***	1.93–4.44	1.26	0.52–3.06
Number												
0–1	Ref		Ref		Ref		Ref		Ref		Ref	
2	2.08**	1.31–3.31	0.96	0.37–2.47	1.30	0.70–2.41	0.74	0.22–2.46	2.32**	1.38–3.89	0.94	0.33–2.70
3	3.96***	2.53–6.20	1.17	0.27–5.07	3.58***	2.13–6.00	1.38	0.22–8.67	3.84***	2.31–6.36	0.88	0.17–4.49
4+	4.06***	2.36–6.98	0.77	0.08–7.19	3.45***	1.84–6.49	0.77	0.05–11.91	4.86***	2.72–8.70	0.69	0.06–8.05
Frequency	1.26***	1.18–1.34	1.12	0.99–1.26	1.25***	1.17–1.34	1.17*	1.01–1.35	1.26***	1.18–1.35	1.10	0.97–1.25

Persistence is defined by having reported severe role impairment at baseline and at follow-up for a given domain. In univariate models, the three dimensions of childhood adversities (i.e., type, number, and frequency) were entered separately to predict each outcome. In multivariate models, the three dimensions of childhood adversities (i.e., type, number, and frequency) were entered simultaneously to predict each outcome, adjusting for sex, COVID-19 pandemic period, and number of 12-month mental disorders (i.e., major depressive disorder, any bipolar disorder, generalized anxiety disorder, panic disorder, and drug use disorder) at 1-year follow-up. To avoid perfect multicollinearity, the reference used to examine the number of childhood adversities was 0 or 1, as the type of childhood adversity already reflected the presence of 0 or 1 adversity. To avoid non-interpretable odds ratios for a large number of adversities, four and five adversities were merged into a single category reflecting four or more adversities. OR = odds ratio. aOR = adjusted odds ratio

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table 3 Results from multinomial logistic regressions using type, number, and frequency of childhood adversities as predictors of any severe role impairment ($n = 1,188$)

	Any severe role impairment							
	No persistence at follow-up				Persistence at follow-up			
	$n = 177$				$n = 160$			
	OR	95%CI	aOR	95%CI	OR	95%CI	aOR	95%CI
Childhood adversities								
Type								
Parental psychopathology	1.65**	1.19–2.28	1.21	0.76–1.95	2.49***	1.75–3.55	1.14	0.65–1.99
Physical abuse	1.29	0.84–1.98	0.79	0.37–1.71	2.44***	1.65–3.60	0.90	0.39–2.06
Sexual abuse	1.10	0.50–2.42	0.69	0.25–1.85	1.39	0.65–2.95	0.45	0.15–1.32
Emotional abuse	2.09***	1.50–2.90	1.74	0.94–3.22	3.71***	2.62–5.26	1.88	0.91–3.89
Neglect	1.33	0.86–2.06	0.74	0.34–1.61	2.53***	1.71–3.75	0.72	0.31–1.67
Number								
0–1	Ref		Ref		Ref		Ref	
2	2.12***	1.39–3.24	1.32	0.58–3.00	2.42***	1.50–3.88	1.18	0.46–3.06
3	1.71*	1.02–2.86	0.89	0.24–3.31	4.36***	2.75–6.91	1.42	0.33–6.18
4+	1.88	0.997–3.55	1.34	0.18–10.01	4.57***	2.61–8.01	1.54	0.17–14.12
Frequency	1.13**	1.05–1.22	1.02	0.90–1.15	1.30***	1.21–1.39	1.12	0.99–1.26

Multinomial logistic regressions were performed using the group with no severe role impairment at baseline as reference ($n = 851$). No persistence at follow-up is defined by having reported any severe role impairment at baseline but not at follow-up. Persistence at follow-up is defined by having reported any severe role impairment at baseline and at follow-up. In univariate models, the three dimensions of childhood adversities (i.e., type, number, and frequency) were entered separately to predict each outcome. In multivariate models, the three dimensions of childhood adversities (i.e., type, number, and frequency) were entered simultaneously to predict each outcome, adjusting for sex, COVID-19 pandemic period, and number of 12-month mental disorders (i.e., major depressive disorder, any bipolar disorder, generalized anxiety disorder, panic disorder, and drug use disorder) at baseline. To avoid perfect multicollinearity, the reference used to examine the number of childhood adversities was 0 or 1, as the type of childhood adversity already reflected the presence of 0 or 1 adversity. To avoid non-interpretable odds ratios for a large number of adversities, four and five adversities were merged into a single category reflecting four or more adversities. *OR* odds ratio *aOR* = adjusted odds ratio

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

In multivariate models, CAs were moderately yet significantly associated with only the persistence of impairment in college-related and other work. These results extend previous cross-sectional findings supporting the association between CAs and 12-month severe role impairment (including work role) among first-year students [10], by showing that this association may persist at 1 year, particularly in the work/study domain. Academic achievement may thus be particularly challenging for students with a history of exposure to CAs in terms of difficulty to meet academic needs. Interestingly, adjusting for covariates including 12-month mental disorders weakened the strength of associations between CAs and all impairment outcomes. In additional analyses (see Supplemental Tables 4, 5 and 6), three multivariate models were tested for each role impairment

outcome, namely by testing each CA operationalization separately while adjusting for covariates. The number of 12-month mental disorders was the only covariate associated with the persistence of all role impairment outcomes. Also, while each CA variable was associated with persistent role impairment outcomes in univariate models, adjusting for the number of 12-month mental disorders greatly weakened these associations. In addition, the strength of the association between mental disorders and role impairment outcomes remained similar in each tested multivariate model. Such findings may suggest that mental disorders likely play an important role in the relationship between CAs and the persistence of role impairment. There is robust evidence that CAs are linked with increased risk of mental disorders, including major depressive disorder, bipolar disorder,

Table 4 Results from multinomial logistic regressions using type, number, and frequency of childhood adversities as predictors of severe role impairment in college-related and other work ($n = 1,188$)

	Severe role impairment in college-related and other work							
	No persistence at follow-up				Persistence at follow-up			
	$n = 120$				$n = 103$			
	<i>OR</i>	95%CI	<i>aOR</i>	95%CI	<i>OR</i>	95%CI	<i>aOR</i>	95%CI
Childhood adversities								
Type								
Parental psychopathology	1.59*	1.09–2.34	1.10	0.63–1.94	2.39***	1.56–3.67	1.09	0.57–2.10
Physical abuse	1.24	0.76–2.03	0.67	0.26–1.69	2.60***	1.66–4.08	1.11	0.41–3.03
Sexual abuse	0.72	0.25–2.04	0.30	0.08–1.12	0.85	0.30–2.40	0.16*	0.03–0.72
Emotional abuse	1.92**	1.31–2.82	1.40	0.67–2.93	2.53***	1.68–3.81	0.86	0.32–2.32
Neglect	1.21	0.73–2.00	0.52	0.20–1.34	2.23**	1.40–3.55	0.55	0.20–1.57
Number								
0–1	Ref		Ref		Ref		Ref	
2	1.83*	1.13–2.99	1.43	0.54–3.78	1.40	0.75–2.61	1.03	0.30–3.53
3	1.65	0.92–2.96	1.43	0.29–6.99	3.79***	2.25–6.40	2.06	0.32–13.25
4+	1.73	0.85–3.55	3.16	0.28–35.68	3.68***	1.94–6.98	2.11	0.13–33.28
Frequency	1.11*	1.02–1.21	1.01	0.88–1.16	1.27***	1.18–1.37	1.17*	1.02–1.35

Multinomial logistic regressions were performed using the group with no severe impairment in college-related and other work at baseline as reference ($n = 965$). No persistence at follow-up is defined by having reported severe impairment in college-related and other work at baseline but not at follow-up. Persistence at follow-up is defined by having reported severe impairment in college-related and other work at baseline and at follow-up. In univariate models, the three dimensions of childhood adversities (i.e., type, number, and frequency) were entered separately to predict each outcome. In multivariate models, the three dimensions of childhood adversities (i.e., type, number, and frequency) were entered simultaneously to predict each outcome, adjusting for sex, COVID-19 pandemic period, and number of 12-month mental disorders (i.e., major depressive disorder, any bipolar disorder, generalized anxiety disorder, panic disorder, and drug use disorder) at baseline. To avoid perfect multicollinearity, the reference used to examine the number of childhood adversities was 0 or 1, as the type of childhood adversity already reflected the presence of 0 or 1 adversity. To avoid non-interpretable odds ratios for a large number of adversities, four and five adversities were merged into a single category reflecting four or more adversities. *OR* odds ratio. *aOR* adjusted odds ratio

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

generalized anxiety disorder, panic disorder, and alcohol and drug use disorders among college students [10]. Population-attributable risk proportions (PARPs) analyses have estimated that either eliminating or blocking the effects of CAs could potentially avoid 18.7% of alcohol use disorder, 39.3% of major depressive disorder, 43.0% of generalized anxiety disorder, 48.7% of panic disorder, 49.8% of drug use disorder, and 57.5% of bipolar disorder found in college students [10]. In addition, it has been estimated through PARPs analyses that eliminating mood, anxiety, and substance use disorders might reduce any severe role impairment by 64.6% [5]. Current results thus add to the literature to support the need to prevent mental health problems among incoming college students to lower the risk of poor functioning. These findings further underline the importance of early identification of mental disorders through appropriate screening procedures within college campus, and facilitated access to mental health services [30]. In this regard, a recent WMH-ICS study demonstrated that an easy-to-implement acceptance-facilitating intervention could increase intention to use mental health services (e.g., Internet-based intervention,

psychological counseling, general practitioner, and psychotherapy) [31], and therefore lower the high proportion of students that do not seek treatment [32, 33]. Furthermore, cost-effective online interventions have been shown to reduce college-related stress [34], anxiety [35, 36], and depressive symptoms [35].

Regarding the operationalization of adversities, the type, number of types, and frequency of CAs were all associated with the persistence of each severe impairment outcome in univariate analyses, particularly the number of types following a dose–response pattern, consistent with prior studies [3, 10]. Although the multivariate associations of type and number of CAs types with impairment persistence were greatly attenuated, the effect of their frequency remained similar yet moderate. Results from multinomial logistic regressions do not support the association between the frequency of CAs and non-persistent impairment; rather, the frequency of CAs may consist of a risk factor for the continuation of impairment in college-related and other work impairment beyond the first year of college. One possible explanation to the unique

Table 5 Results from multinomial logistic regressions using type, number, and frequency of childhood adversities as predictors of severe role impairment in personal or social life ($n = 1,188$)

	Severe role impairment in personal or social life							
	No persistence at follow-up				Persistence at follow-up			
	$n = 146$				$n = 121$			
	OR	95%CI	aOR	95%CI	OR	95%CI	aOR	95%CI
Childhood adversities								
Type								
Parental Psychopathology	1.94***	1.36–2.77	1.58	0.96–2.62	2.51***	1.68–3.75	1.18	0.62–2.24
Physical abuse	1.32	0.84–2.07	0.85	0.37–1.96	2.27***	1.47–3.50	0.81	0.32–2.02
Sexual abuse	1.00	0.41–2.40	0.66	0.22–1.97	1.64	0.75–3.61	0.59	0.19–1.81
Emotional abuse	2.02***	1.41–2.87	1.78	0.90–3.52	3.91***	2.63–5.80	2.07	0.93–4.65
Neglect	1.42	0.90–2.24	0.87	0.37–2.00	3.09***	2.02–4.71	1.06	0.43–2.60
Number								
0–1	Ref		Ref		Ref		Ref	
2	1.80*	1.13–2.87	0.93	0.39–2.24	2.53**	1.50–4.27	1.08	0.38–3.08
3	1.98*	1.17–3.32	0.79	0.19–3.25	4.26***	2.55–7.13	1.12	0.22–5.72
4+	1.90	0.97–3.71	0.92	0.10–8.16	5.35***	2.96–9.70	1.27	0.11–14.52
Frequency								
	1.14**	1.06–1.23	1.03	0.90–1.16	1.30***	1.21–1.39	1.11	0.98–1.25

Multinomial logistic regressions were performed using the group with no severe impairment in personal or social life at baseline as reference ($n = 921$). No persistence at follow-up is defined by having reported severe impairment in personal or social life at baseline but not at follow-up. Persistence at follow-up is defined by having reported severe impairment in personal or social life at baseline and at follow-up. In univariate models, the three dimensions of childhood adversities (i.e., type, number, and frequency) were entered separately to predict each outcome. In multivariate models, the three dimensions of childhood adversities (i.e., type, number, and frequency) were entered simultaneously to predict each outcome, adjusting for sex, COVID-19 pandemic period, and number of 12-month mental disorders (i.e., major depressive disorder, any bipolar disorder, generalized anxiety disorder, panic disorder, and drug use disorder) at baseline. To avoid perfect multicollinearity, the reference used to examine the number of childhood adversities was 0 or 1, as the type of childhood adversity already reflected the presence of 0 or 1 adversity. To avoid non-interpretable odds ratios for a large number of adversities, four and five adversities were merged into a single category reflecting four or more adversities. OR odds ratio. aOR adjusted odds ratio

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

contribution of the cumulative frequency could be that the chronic exposure to early adverse experiences may have long-lasting damaging effects on both physical and mental health [37, 38], but also on global cognition and executive function in adulthood [39, 40]. Taken together, results from the current study showed that investigating the type and number of types without taking into account the frequency of exposure may lead to an overestimation of obtained associations. While relying on typical measures of CA, whether reflecting a dichotomous exposure or a quantity of various CA types, have led to meaningful results in terms of public health implications, there is a need for future research to further investigate and take into account the chronic dimension of CAs. In addition, there is a need to improve current efforts in limiting exposure to CAs through primary prevention, which has proven challenging [41]. Beyond primary prevention, screening for CA exposure remains, however, crucial as it has been recognized to meaningfully identify individuals at increased risk for physical or psychological problems [42].

Limitations

The interpretation of the present findings should be considered in light of several limitations. First, there is likely to be downward biases in reports of CAs due to recall errors that stem from retrospective assessment [43]. Second, the current study was limited to CAs reflecting family dysfunction, and did not extend to additional adversities included in other studies such as bullying victimization and dating violence [10], or suggested as relevant measures of CAs like food insecurity, inadequate housing, societal marginalization and stigma, or neighborhood violence [44]. Third, the response rate at baseline for WMH-ICS in France was low (7.58%). The follow-up response rate was, however, more acceptable (45.89%) and similar to the follow-up rate obtained in other WMH-ICS studies conducted in other countries [45–47]. Furthermore, there were no differences regarding variables of interest between those who completed the follow-up and those who did not.

Conclusion

Severe role impairment was found to be prevalent and to persist at 1 year for a substantial proportion of students. Current evidence of childhood adversities contributing to the persistence of role impairment in university life support the importance to promote primary and secondary prevention of adversities. In addition, as the strength of the associations in analyses weakened after adjusting for mental disorders, interventions to bolster resilience, facilitate access to care, and treat mental health problems are also crucial. Finally, the current findings suggest that relying on a more complex operationalization of adversities, such as a cumulative frequency of exposure, should improve our understanding of their effect on individuals throughout the lifespan.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s00127-023-02434-y>.

Acknowledgements The authors declare that they have no conflict of interest.

Author contributions MR wrote the first draft of the manuscript and performed analyses. MMH and MR designed the study. All authors reviewed and contributed to the final manuscript.

Funding Support from the Institut Universitaire de France (M. Husky) was used to fund the study. Mathieu Revranche and Margot Biscond are supported by grant (ANR-17-CE36-0013, 2019) from the Agence Nationale de la Recherche (M. Husky).

Data availability Data privacy protection prohibits the public availability of the data. For questions regarding the data, contact the corresponding author (MH).

Declarations

Conflict of interest The authors declare that they have no conflict of interest.

Ethical approval All procedures were approved by an ethics committee (CCTIRS#15–527) and by the National Data Protection Authority (CNIL, Authorization#DR-2016–502).

Code availability The code can be available upon request to the first author (MR).

References

- Alonso J, Mortier P, Auerbach RP et al (2018) Severe role impairment associated with mental disorders: results of the who world mental health surveys international college student project. *Depress Anxiety* 35:802–814. <https://doi.org/10.1002/da.22778>
- Kovess-Masfety V, Leray E, Denis L et al (2016) Mental health of college students and their non-college-attending peers: results from a large French cross-sectional survey. *BMC Psychol* 4:20. <https://doi.org/10.1186/s40359-016-0124-5>
- McLaughlin KA, Green JG, Gruber MJ et al (2010) Childhood adversities and adult psychopathology in the national comorbidity survey replication (NCS-R) III: associations with functional impairment related to DSM-IV disorders. *Psychol Med* 40:847–859. <https://doi.org/10.1017/S0033291709991115>
- Verger P, Guagliardo V, Gilbert F et al (2010) Psychiatric disorders in students in six French universities: 12-month prevalence, comorbidity, impairment and help-seeking. *Soc Psychiatry Psychiatr Epidemiol* 45:189–199. <https://doi.org/10.1007/s00127-009-0055-z>
- Alonso J, Vilagut G, Mortier P et al (2019) The role impairment associated with mental disorder risk profiles in the WHO World Mental Health International College Student Initiative. *Int J Methods Psychiatr Res*. <https://doi.org/10.1002/mpr.1750>
- Ballester L, Alayo I, Vilagut G et al (2020) Mental disorders in Spanish university students: prevalence, age-of-onset, severe role impairment and mental health treatment. *J Affect Disord* 273:604–613. <https://doi.org/10.1016/j.jad.2020.04.050>
- Schüssler-Fiorenza Rose SM, Xie D, Stineman M (2014) Adverse childhood experiences and disability in U.S. Adults. *PM&R* 6:670–680. <https://doi.org/10.1016/j.pmrj.2014.01.013>
- Bruffaerts R, Mortier P, Kiekens G et al (2018) Mental health problems in college freshmen: prevalence and academic functioning. *J Affect Disord* 225:97–103. <https://doi.org/10.1016/j.jad.2017.07.044>
- Auerbach RP, Alonso J, Axinn WG et al (2016) Mental disorders among college students in the world health organization world mental health surveys. *Psychol Med* 46:2955–2970. <https://doi.org/10.1017/S0033291716001665>
- Husky MM, Sadikova E, Lee S et al (2022) Childhood adversities and mental disorders in first-year college students: results from the world mental health international college student initiative. *Psychol Med*. <https://doi.org/10.1017/S0033291721004980>
- Anda RF, Croft JB, Felitti VJ et al (1999) Adverse childhood experiences and smoking during adolescence and adulthood. *JAMA* 282:1652–1658. <https://doi.org/10.1001/jama.282.17.1652>
- Brown DW, Anda RF, Tiemeier H et al (2009) Adverse childhood experiences and the risk of premature mortality. *Am J Prev Med* 37:389–396. <https://doi.org/10.1016/j.amepre.2009.06.021>
- Chapman DP, Whitfield CL, Felitti VJ et al (2004) Adverse childhood experiences and the risk of depressive disorders in adulthood. *J Affect Disord* 82:217–225. <https://doi.org/10.1016/j.jad.2003.12.013>
- Dong M, Anda RF, Felitti VJ et al (2005) Childhood residential mobility and multiple health risks during adolescence and adulthood: the hidden role of adverse childhood experiences. *Arch Pediatr Adolesc Med* 159:1104–1110. <https://doi.org/10.1001/archpedi.159.12.1104>
- Dube SR, Felitti VJ, Dong M et al (2003) Childhood abuse, neglect, and household dysfunction and the risk of illicit drug use: the adverse childhood experiences study. *Pediatrics* 111:564–572. <https://doi.org/10.1542/peds.111.3.564>
- Felitti VJ, Anda RF, Nordenberg D et al (1998) Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: the adverse childhood experiences (ACE) study. *Am J Prev Med* 14:245–258
- Hillis SD, Anda RF, Felitti VJ, Marchbanks PA (2001) Adverse childhood experiences and sexual risk behaviors in women: a retrospective cohort study. *Fam Plann Perspect* 33:206–211. <https://doi.org/10.2307/2673783>
- Kessler RC, McLaughlin KA, Green JG et al (2010) Childhood adversities and adult psychopathology in the WHO world mental health surveys. *Br J Psychiatry* 197:378–385. <https://doi.org/10.1192/bjp.bp.110.080499>
- Duron JF, Williams-Butler A, Liu F-YY et al (2021) The Influence of adverse childhood experiences (ACEs) on the functional

- impairment of justice-involved adolescents: a comparison of baseline to follow-up reports of adversity. *Youth Violence Juv Justice* 19:384–401. <https://doi.org/10.1177/15412040211016035>
20. Yung AR, Cotter J, Wood SJ et al (2015) Childhood maltreatment and transition to psychotic disorder independently predict long-term functioning in young people at ultra-high risk for psychosis. *Psychol Med* 45:3453–3465. <https://doi.org/10.1017/S003329171500135X>
 21. Mortier P, Alonso J, Auerbach RP et al (2021) Childhood adversities and suicidal thoughts and behaviors among first-year college students: results from the WMH-ICS initiative. *Soc Psychiatry Psychiatr Epidemiol*. <https://doi.org/10.1007/s00127-021-02151-4>
 22. Lacey RE, Minnis H (2020) Practitioner review: twenty years of research with adverse childhood experience scores – advantages, disadvantages and applications to practice. *J Child Psychol Psychiatry* 61:116–130. <https://doi.org/10.1111/jcpp.13135>
 23. Kessler RC, Üstün TB (2004) The world mental health (WMH) survey initiative version of the world health organization (WHO) composite international diagnostic interview (CIDI). *Int J Methods Psychiatr Res* 13:93–121
 24. Ursano RJ, Colpe LJ, Heeringa SG et al (2014) The army study to assess risk and resilience in servicemembers (Army STARRS). *Psychiatry Interpers Biol Process* 77:107–119
 25. Leon AC, Olfson M, Portera L et al (1997) Assessing psychiatric impairment in primary care with the sheehan disability scale. *Int J Psychiatry Med* 27:93–105
 26. Ormel J, Petukhova M, Chatterji S et al (2008) Disability and treatment of specific mental and physical disorders across the world. *Br J Psychiatry J Ment Sci* 192:368–375. <https://doi.org/10.1192/bjp.bp.107.039107>
 27. Kessler RC, Calabrese JR, Farley PA et al (2013) Composite international diagnostic interview screening scales for DSM-IV anxiety and mood disorders. *Psychol Med* 43:1625–1637
 28. Vatcheva KP, Lee M, McCormick JB, Rahbar MH (2016) Multicollinearity in regression analyses conducted in epidemiologic studies. *Epidemiol Sunnyvale Calif*. <https://doi.org/10.4172/2161-1165.1000227>
 29. Cabello M, Caballero FF, Chatterji S et al (2014) Risk factors for incidence and persistence of disability in chronic major depression and alcohol use disorders: longitudinal analyses of a population-based study. *Health Qual Life Outcomes* 12:186. <https://doi.org/10.1186/s12955-014-0186-0>
 30. Eisenberg D, Hunt J, Speer N (2012) Help seeking for mental health on college campuses: review of evidence and next steps for research and practice. *Harv Rev Psychiatry* 20:222–232. <https://doi.org/10.3109/10673229.2012.712839>
 31. Ebert DD, Franke M, Kählke F et al (2019) Increasing intentions to use mental health services among university students results of a pilot randomized controlled trial within the world health organization's world mental health international college student initiative. *Int J Methods Psychiatr Res*. <https://doi.org/10.1002/mpr.1754>
 32. Ebert DD, Mortier P, Kählke F et al (2019) Barriers of mental health treatment utilization among first-year college students: First cross-national results from the WHO world mental health international college student initiative. *Int J Methods Psychiatr Res*. <https://doi.org/10.1002/mpr.1782>
 33. Janota M, Kovess-Masfety V, Gobin-Bourdet C, Husky MM (2022) Use of mental health services and perceived barriers to access services among college students with suicidal ideation. *J Behav Cogn Ther*. <https://doi.org/10.1016/j.jbct.2022.02.003>
 34. Harrer M, Adam SH, Fleischmann RJ et al (2018) Effectiveness of an internet- and app-based intervention for college students with elevated stress: randomized controlled trial. *J Med Internet Res*. <https://doi.org/10.2196/jmir.9293>
 35. Bantjes J, Kazdin AE, Cuijpers P et al (2021) A web-based group cognitive behavioral therapy intervention for symptoms of anxiety and depression among university students open-label pragmatic trial. *JMIR Ment Health*. <https://doi.org/10.2196/27400>
 36. Kählke F, Berger T, Schulz A et al (2019) Efficacy of an unguided internet-based self-help intervention for social anxiety disorder in university students: a randomized controlled trial. *Int J Methods Psychiatr Res*. <https://doi.org/10.1002/mpr.1766>
 37. Lupien SJ, Juster R-P, Raymond C, Marin M-F (2018) The effects of chronic stress on the human brain: From neurotoxicity, to vulnerability, to opportunity. *Front Neuroendocrinol* 49:91–105. <https://doi.org/10.1016/j.yfrne.2018.02.001>
 38. McEwen BS (2002) Protective and damaging effects of stress mediators: the good and bad sides of the response to stress. *Metabolism* 6:2–4
 39. D'Amico D, Amestoy ME, Fiocco AJ (2020) The association between allostatic load and cognitive function: a systematic and meta-analytic review. *Psychoneuroendocrinology*. <https://doi.org/10.1016/j.psyneuen.2020.104849>
 40. Danese A, McEwen BS (2012) Adverse childhood experiences, allostasis, allostatic load, and age-related disease. *Physiol Behav* 106:29–39
 41. Biglan A, Van Ryzin MJ, Hawkins JD (2017) Evolving a more nurturing society to prevent adverse childhood experiences. *Acad Pediatr* 17:S150–S157
 42. Drake RE, Cimpean D, Torrey WC (2022) Shared decision making in mental health: prospects for personalized medicine. *Dialogues Clin Neurosci*
 43. Wilsnack SC, Wonderlich SA, Kristjanson AF et al (2002) Self-reports of forgetting and remembering childhood sexual abuse in a nationally representative sample of US women. *Child Abuse Negl* 26:139–147. [https://doi.org/10.1016/S0145-2134\(01\)00313-1](https://doi.org/10.1016/S0145-2134(01)00313-1)
 44. Hartas D (2019) Assessing the foundational studies on adverse childhood experiences. *Soc Policy Soc* 18:435–443. <https://doi.org/10.1017/S1474746419000034>
 45. Blasco MJ, Vilagut G, Alayo I et al (2019) First-onset and persistence of suicidal ideation in university students: a one-year follow-up study. *J Affect Disord* 256:192–204. <https://doi.org/10.1016/j.jad.2019.05.035>
 46. McLafferty M, Brown N, McHugh R et al (2021) Depression, anxiety and suicidal behaviour among college students: comparisons pre-COVID-19 and during the pandemic. *Psychiatry Res Commun*. <https://doi.org/10.1016/j.psycom.2021.100012>
 47. Mortier P, Demyttenaere K, Auerbach RP et al (2017) First onset of suicidal thoughts and behaviours in college. *J Affect Disord* 207:291–299. <https://doi.org/10.1016/j.jad.2016.09.033>

Springer Nature or its licensor (e.g. a society or other partner) holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.