



# Cumulative and independent effects of experiences of social adversity on support for violent radicalization during the COVID-19 pandemic: the mediating role of depression

Diana Miconi<sup>1</sup> · Anna Levinsson<sup>2</sup> · Rochelle L. Frounfelker<sup>2</sup> · Zhi Yin Li<sup>3</sup> · Youssef Oulhote<sup>4</sup> · Cécile Rousseau<sup>2</sup>

Received: 16 March 2021 / Accepted: 28 January 2022 / Published online: 11 February 2022  
© The Author(s), under exclusive licence to Springer-Verlag GmbH Germany 2022

## Abstract

**Purpose** Social adversity experiences have increased during the pandemic and are potential risk factors for both depression and support for violent radicalization (VR). However, the cumulative and independent effects of various social adversity experiences on support for VR have yet to be explored. This paper examines the cumulative and independent effects of COVID- and non-COVID-related discrimination, exposure to violence, traditional and cyberbullying victimization on support for VR. In addition, we investigate whether depression mediates the relationship between these forms of social adversity and support for VR.

**Methods** A total of 6003 young adults ( $M_{\text{age}} = 27$ ,  $SD_{\text{age}} = 4.40$ , range 18–35) living in metropolitan areas in Canada responded to an online survey. We used multivariable regression models, controlling for socio-demographic characteristics, to infer covariate adjusted associations between social adversity measures and support for VR. Additionally, we conducted a formal mediation analysis to estimate the proportion mediated by depression.

**Results** There was a cumulative relationship between experiences of social adversity and support for VR ( $\beta = 1.52$ ; 95% CI: 1.32, 1.72). COVID-related discrimination and cyberbullying victimization were independently associated with stronger support for VR. Depression partially mediated the effect of cumulative social adversity, COVID-related discrimination and cyberbullying on support for VR.

**Conclusion** Prevention programs during the present pandemic should prioritize decreasing discrimination and providing psychosocial support to depressed young adults who experience social adversity. Practitioners should prioritize developing programs that foster digital literacy skills and critical thinking among young adults to address the concerning impact of cyberbullying on support for VR.

**Keywords** Violent radicalization · Depression · Discrimination · COVID-19 · Bullying victimization · Young adults

## Introduction

The COVID-19 pandemic poses unprecedented challenges to the global population's physical and mental wellbeing, with long-lasting consequences on society. The level of uncertainty and risk involved in this health emergency has contributed to a steep increase in the overall polarization of the social and political environment [1], as demonstrated by the increase in reported violent radical acts, such as COVID-related hate incidents and crimes [2]. The social and political polarization of society is not a new phenomenon, and has been increasing over the decades prior to the COVID-19 pandemic [3, 4]. However, this pandemic has highlighted social inequalities and accelerated violent radicalization (VR) processes, resulting in the escalation of

---

✉ Diana Miconi  
diana.miconi@umontreal.ca

<sup>1</sup> Department of Educational Psychology and Andragogy, Université de Montréal, Montreal, QC, Canada

<sup>2</sup> Division of Social and Cultural Psychiatry, McGill University, Montreal, QC, Canada

<sup>3</sup> Department of Epidemiology, Biostatistics, and Occupational Health, McGill University, Montreal, QC, Canada

<sup>4</sup> School of Public Health and Health Sciences, University of Massachusetts Amherst, Boston, USA

societal conflicts and tensions [5]. The violent protests at the Capitol in the US and the rapid spread of conspiracy theories and movements promoting the use of violence (e.g., Qanon, Anti-Vax) are some timely examples that illustrate this increasing social polarization [6].

VR is a complex and multidimensional phenomenon [7] defined as a process whereby an individual or a group increases support for violence as a legitimate means to reach a specific (e.g., political, social, religious) goal [8]. Although the association between support for VR and violent action is not linear, population-wide attitudes toward legitimizing some forms of violence may contribute to increase social polarization and fuel the emergence of extremist groups and provide a narrative to channel despair and rage in vulnerable individuals [9]. Prior research has documented the impact that discrimination and violence can have on support for VR via depression [10]. However, the relationship between exposure to multiple experiences of social adversity as well as specific experiences of discrimination and bullying victimization and support for VR during the present pandemic has yet to be explored. Insights into risk factors for VR are critical to inform prevention and intervention programs during this pandemic, as the effectiveness of such programs is presently jeopardized by the lack of empirical knowledge on which risk factors to target and how [11].

### Social adversity and violent radicalization

In this study, social adversity is defined as experiences of discrimination and interpersonal violence and victimization occurring both in person and remotely via online forums. Specifically, in our study, conducted after the first wave of the COVID-19 pandemic, we looked at experiences of discrimination (COVID-related and not), exposure to violence (direct and indirect) as well as online and in-person victimization among young adults. The association between general discrimination and exposure to violence and support for VR is not new as it has been investigated in multiple studies. Although some studies conducted on minority samples found no or minimal evidence for such associations [12, 13], a recent meta-analysis reported an association between discrimination and support for VR among juveniles [14]. In other research, experiences of discrimination and violence contributed to feelings of injustice, which in turn were a risk factor for support for VR in both Canadian and Belgian youth [10, 15, 16]. Less is known about the associations between bullying victimization and support for VR, as bullying victimization has been primarily investigated in association with mental health and/or specific violent behaviors [17]. Bullying victimization is defined as repeated exposure to negative actions from one or more people, and involves a power imbalance between the perpetrator(s) and the victim [18]. The available literature indicates that bullied youth are

at increased risk of aggressive and illegal behaviors both during adolescence and as adults [19, 20]. Some evidence suggests that victims of bullying are more likely to bring weapons at school [21]. In recent years cyberbullying—a form of bullying victimization that occurs via electronic contact—has emerged as a significant public health problem [22]. Mounting evidence indicates overlap between traditional bullying victimization and cyberbullying victimization, with both experiences associated with mental health problems, violent behaviors and self-harm [23]. The anonymity and publicity within a large online community that are typical of cyberbullying may worsen the negative health consequences of cybervictimization compared to traditional bullying victimization [24, 25]. Although bullying victimization is a risk factor for violence in general and has emerged as part of the clinical picture of some recent lone-actor shooters (e.g., Alexandre Bissonnette) [26], it has yet to be explored as a potential risk factor in association with support for VR. Of note, all empirical evidence outlined above originates from studies that were conducted before the COVID-19 pandemic; more recent empirical studies are needed to shed light on the commonalities and specificities of these associations in the present pandemic context.

Experiences of social adversity do not occur in isolation. Rather, people who experience one such event are at increased risk of exposure to additional adverse events [27, 28]. Prior research has documented the cumulative effect of multiple social stressors on mental health, including symptoms of depression [27, 29, 30]. Hence, while it remains important to investigate the independent and specific impact of different types of social adversity on adverse outcomes, it is important to also consider their cumulative effect on psychosocial wellbeing. This is particularly true in the present context of COVID-19, characterized by rapid social changes, growing social inequalities and exposure of social and health injustices in public discourse.

### Social adversity during the COVID-19 pandemic

Since the outbreak of the pandemic, there are reports of COVID-related discrimination and xenophobic incidents directed at targeted and stigmatized groups (e.g., members of Asian communities, seniors and health care workers), including hate speech, vandalism and physical intimidation on streets and in stores [31–35]. Social distancing measures have contributed to an increase in bullying and victimization in the online space [36, 37]. In a recent study, young Canadian people were more likely to report of COVID-related discrimination (i.e., discrimination attributed to one's presumed or known COVID infection), especially online [35], than older adults. Mounting evidence indicates that such experiences of social adversity during this health emergency are associated with worse mental health outcomes [34],

especially among young people [38, 39]. As individuals who engage in violent radical movements are increasingly younger in both Europe [40] and North America [41], empirical knowledge on risk factors for VR is urgently needed to provide insights into potential prevention and intervention initiatives to support young adults in these uncertain and socially polarized times.

### The role of depression

Findings on the association between depression and support for VR are still mixed, with literature suggesting a complex relationship between mental health and VR [42]. Although depressive symptoms do not necessarily lead to greater risk of VR [42], multiple studies have highlighted a positive association between depression and support for VR [12, 43, 44]. A Canadian study found that depressive symptoms can mediate the association between specific experiences of social adversity (i.e., discrimination and violence) and support for VR among college students in Quebec [10]. Experiencing social adversity may challenge local contextual embeddedness and identity development and have a negative impact on mental health, occasionally leading to extremist attitudes and violence based on rigid ideological positions [15]. Recent studies indicate that psychological distress and depression are increasing, particularly among young people during the pandemic [45], and that experiences of discrimination and stigma related to COVID-19 are associated with higher psychological distress [34]. It is, therefore, important to investigate the potential mediating role of depression between different types of social adversity and support for VR in the present context.

### The present study

The present research investigates the cumulative and independent effects of multiple experiences of social adversity (i.e., experiences of COVID-related and non-COVID-related discrimination, exposure to violence, as well as traditional and cyberbullying victimization) on support for VR in a sample of young adults living in metropolitan areas in three of the Canadian provinces (i.e., Alberta, Quebec, Ontario) that have been hard-hit by the pandemic. Specifically, we investigate whether: (1) exposure to multiple experiences of social adversity has a cumulative effect on support for VR; (2) COVID-related discrimination, traditional and cyberbullying victimization are independently associated with higher support for VR above and beyond the expected impact of general experiences of discrimination and violence documented in the literature; (3) these associations are mediated by depression. In light of the present social scenario, we expected bullying victimization and COVID-related

discrimination to represent cumulative and independent risk factors for VR both directly and indirectly via depression.

## Method

### Participants

A total of 6003 residents of the province of Alberta, Quebec and Ontario aged 18 and over completed an online survey (see Table 1). Participants were randomly selected from the AskingCanadians panel (Delvinia), based on their age (18–35) and their place of residence (Calgary, Edmonton, Montreal, Toronto). The AskingCanadians panel is continuously monitored by the Delvinia panel management team and compared with Statistics Canada census data to ensure it reflects the Canadian population as a whole. To grow their panel and ensure that it maintains a true representation of the Canadian population and a high-quality standard, Delvinia constantly recruits new panelists from partnerships with some of Canada's biggest and most successful loyalty programs (e.g., A Hudson's Bay Rewards, Walmart, PETROPOINTS). Although the AskingCanadians Panel is regularly monitored to represent Statistics Canada census data, participation in this study was voluntary and confidential; as such, this study relies on a convenience sample that cannot be considered representative of the population of young adults in the three provinces. Participants completed the survey in either French or English between October 16, 2020 and November 17, 2020. All participants received CA\$2.50 in compensation and provided an electronic informed consent. The response rate was 19%. The study was approved by the Institutional Review Board of the Faculty of Medicine at McGill University (Canada).

## Measures

### Independent variables

**COVID-related discrimination** The questionnaire specified that discrimination refers to the feeling of being treated unfairly because of physical (skin color, disability, etc.) or personal characteristics (religion, ethnicity etc.) and that it can be explicit (insults, threats) or implicit (you feel it). Participants were asked if they experienced discrimination because of COVID-19 (i.e., because of their actual or presumed COVID-19 status) (Yes/No response option).

**Cyberbullying victimization** Participants responded to a single question that asked how frequently they had been electronically bullied or harassed. They responded on a four-point Likert scale (Never, Sometimes, Often, Very often). Higher scores indicate a higher frequency of being bullied online.

**Table 1** Descriptive statistics of participants ( $n = 6003$ )

Variable	<i>n</i> (%)
<b>Gender</b>	
Woman	3292 (54.8%)
Man	2646 (44.1%)
Gender diverse	30 (0.5%)
Missing	35 (0.6%)
<b>City</b>	
Montreal	2000 (33.3%)
Calgary	1002 (16.7%)
Edmonton	1000 (16.7%)
Toronto	2001 (33.3%)
<b>Financial problems</b>	
Not at all	1963 (32.70%)
A little	2184 (36.4%)
Moderate	896 (14.9%)
A lot	769 (12.8%)
Missing	191 (3.2%)
<b>Education</b>	
High school or less	1267 (21.1%)
Apprenticeship, technical institute, trade or vocational school, college, CEGEP or other non-university certificate or diploma,	1741 (29.0%)
University certificate, diploma or degree	2892 (48.2%)
Missing	103 (1.7%)
<b>Immigration status</b>	
First generation	1454 (24.2%)
Second generation	1577 (26.3%)
Third generation or more	2872 (47.8%)
Missing	100 (1.7%)
<b>Perceived discrimination</b>	
No	1443 (24.0%)
Yes	4437 (73.9%)
Missing	123 (2.0%)
<b>Exposure to violence</b>	
No	2519 (42.0%)
Yes	3244 (54.0%)
Missing	240 (4.0%)
<b>COVID-related discrimination</b>	
No	4697 (78.2)
Yes	1193 (19.9%)
Missing	113 (1.9%)
<b>Depression (clinical cut-off 1.75)</b>	
Below clinical cut-off	2367 (39.4%)
Above clinical cut-off	3153 (52.5%)
Missing	483 (8.0%)
	Mean (SD) min, max, % missing
Age	26.72 (4.53) 18.00, 35.00, 0.0%
Traditional bullying victimization	2.05 (0.85) 1.00, 4.00, 1.0%
Cyberbullying victimization	1.84 (0.91) 1.00, 4.00, 2.1%
Depression (HSCL-25)	2.07 (0.83) 1.00, 4.00, 8.0%
Community Social Adversity	2.86 (1.47) 0.00, 5.00, 7.5%
Radicalism Intention Scale (RIS)	13.87 (7.40) 4.00, 28.00, 9.3%

**Traditional bullying victimization** Participant responded to a single question that asked how frequently they had been bullied or harassed in person and responded on a four-point Likert scale (Never, Sometimes, Often, Very often). Higher scores indicate a higher frequency of being traditionally bullied.

**Exposure to violence** Participants' exposure to violence was investigated via three questions used in the Enquête Santé Québec on Cultural Communities [46]. Participants were asked (yes/no response format) whether: (1) they witnessed or experienced acts of violence in relation to a social and/or political context; (2) they had a personal experience of persecution and (3) they witnessed or experienced violent events involving someone close (e.g., family, friend). Participants who answered yes to at least one of the questions were categorized as exposed to violence.

**General perceived discrimination (non-related to COVID-19)** The Perceived Discrimination scale [47] is a self-report questionnaire that documents the experience of structural discrimination because of eight reasons (i.e., language, religion, political views, sexual orientation, gender, race/ethnicity, migration status, other) and eight contexts of life (i.e., looking for a job, the workplace, looking for an apartment or house, school, public spaces, health and/or social services, justice and/or the police, other). Participants are asked if they experienced discrimination in any of the selected contexts and for any of the selected reasons and are invited to answer in a dichotomous format (i.e., yes/no response). According to their answers, participants were assigned to one of two groups: (1) those who experienced discrimination in at least one of the domains (i.e., at least one yes response), and (2) those who did not report discrimination in any domain (i.e., all no responses).

**Cumulative social adversity** In addition to examining individual experiences of social adversity, we constructed a cumulative social adversity score. Exposure to any of the five experiences of social adversity counted as one point, and categories were summed for a total score ranging from 0 to 5. Scores of traditional and cyberbullying victimization were recoded prior to the calculation of this sum score, separately for each item, by assigning 0 to all participants who responded that they never experienced victimization, and 1 for participants who reported some experience of victimization (i.e., from “sometimes” to “all the time”). For the other experiences of social adversity (non-COVID-related discrimination, COVID-related discrimination and exposure to violence), participants who responded “yes” were given a score of 1 (all these measures had a binary—yes/no—response option).

### Mediating variable

**Depression** Depression was measured using the 15-item scale of the Hopkins Symptom Checklist-25 (HSCL-25)

[48]. Items are rated on a Likert scale from 1 (not at all) to 4 (extremely), and a total score is obtained by computing the mean of all items. The clinical cut-off is set at 1.75 (score range from 1 to 4). The HSCL-25's psychometric qualities have been well established [49]. In this study, Cronbach's alpha and McDonald's Omega for the depression score were both 0.95.

### Dependent variable

**Support for violent radicalization** The Radicalism Intention Scale (RIS) is a four-item subscale of the Activism and Radicalism Intention Scales (ARIS) [50]. It assesses an individual's readiness to participate in illegal and violent behavior in the name of one's group or organization. Respondents rate their agreement with four statements on a seven-point Likert scale, with higher scores indicating more support for VR (range 4–28). A sample item is: “I would continue to support an organization that fights for my group's political and legal rights even if the organization sometimes resorts to violence”. The scale has good psychometric properties among young adults [15]. Cronbach's Alpha and McDonald's Omega for the sample were both 0.91.

### Covariates

**Socio-cultural variables** Participants self-reported age, gender (male, female, gender-diverse), education (high school or less, technical degree or some college/university, university degree and above), immigrant generation (first-, second- and third-generation immigrant and above), present experiences of financial difficulties (Not at all, Some, A moderate amount, A lot), city of residence (Calgary, Edmonton, Montreal, Toronto) and exposure to COVID-19 (yes/no).

### Statistical analyses

We used ANOVA to examine univariable associations of students' socio-demographic characteristics and social adversity variables (i.e., discrimination, exposure to violence, COVID-related discrimination, cyberbullying victimization, traditional bullying victimization, cumulative social adversity) with depression and support for VR. Prior to multivariable analyses, cyberbullying victimization, traditional bullying victimization, cumulative social adversity and depression scores were standardized, therefore, allowing for inference of the effect of a one Standard Deviation (SD) increase in the exposure on support for VR scores. Missing values for both continuous and categorical variables were imputed with multiple imputations by chained equations ( $n = 10$ ) prior to multivariable analyses. Sensitivity analysis suggested that missing data and multiple imputations did not alter the observed patterns of associations.

First, we investigated the cumulative effect of social adversity on support for VR by including the cumulative social adversity score as an independent variable in a linear regression model while controlling for socio-demographic variables (i.e., gender, age, city of residence, education, financial difficulties, immigrant status and exposure to COVID-19). Second, we investigated whether COVID-related discrimination, cyberbullying victimization and traditional bullying victimization were associated with support for VR, by implementing three separate linear regression models, one for each type of experience and controlling for socio-demographic variables. In these models, we included experiences of discrimination and exposure to violence as covariates, based on available empirical findings that have supported their association with support for VR among young people [10, 15]. Third, we tested whether COVID-related discrimination, cyberbullying victimization and traditional bullying victimization were independently associated with support for VR by including all five social adverse experiences (i.e., general discrimination not related to COVID-19, exposure to violence, COVID-related discrimination, traditional and cyberbullying victimization) in the same regression model simultaneously. Last, we determined the extent to which depression mediated the effect of each experience of social adversity on support for VR. We ran separate mediation analyses for each of the predictors. The mediation analyses yielded estimates of the direct effect, or the effects not attributable to depression, as well as an indirect effect (i.e., the proportion of the total effects attributable to depression). The indirect effect divided by the total effect was used to calculate the proportion of the effect attributed to mediators. We used Monte Carlo approximation based on the asymptotic sampling distribution [51] to compute confidence intervals in mediation analyses. Since traditional approaches to mediation analyses proposed by Baron and Kenny [52] only apply in specific cases of linear regression for both the mediator and the outcome models with no exposure-mediator interaction, we choose to apply mediation analyses within the potential outcome framework to relax these assumptions [10, 53]. There was a statistically significant interaction between each of our exposures and the mediator (all  $p$  values  $< 0.001$ ). Hence, we included the interaction in all mediation analyses. The estimated average causal mediation effects (ACME) and average direct effects (ADE) were estimated by holding the mediator fixed at the level expected for individuals who were exposed or not to the exposure of interest [53]. For exposures based on a continuous score, the mediator was fixed at the value expected at the exposure scores of  $-1$  (one SD below the mean) and  $+1$  (one SD above the mean).

Based on a conservative Bonferroni adjustment, the threshold for statistical significance was set to 0.01 (two-sided tests). We used the mediation package [54] in R [55].

## Results

Table 1 shows that 75% of our sample reported having experienced at least one incident of discrimination in their lives, with 20% of them reporting at least one episode of discrimination related to their presumed COVID-19 status. More than half of our participants scored above the clinical cut-off for depression. Univariable associations of students' socio-demographic characteristics and social adversity variables with depression and support for VR are reported in Table 2 (see supplemental material for multivariable associations of socio-demographic variables with support for VR). Support for VR was higher among participants who self-identified as male or gender-diverse compared to participants who self-identified as female. Older participants, participants who did not report experiences of financial difficulties, and those with a high school degree endorsed lower support for VR compared to younger, more financially insecure, and participants with higher levels of education. First-generation immigrants had lower scores on support for VR compared to non-immigrants (i.e., third generations and more). Additionally, support for VR was higher among participants who experienced discrimination or violence, among those who were exposed to COVID-19 and among participants who resided in Montreal (Table 2).

The cumulative social adversity score was significantly and positively associated with support for VR [ $F(df) = 218.24 (1, 585.03)$ ;  $\eta_p^2 = 0.04$ ;  $\beta = 1.52$ ; 95% CI 1.32, 1.72,  $p < 0.001$ ]. Due to collinearity issues, it was not possible to simultaneously test the effects of all stressors and the cumulative social adversity score in the same model (see Supplemental material for detailed information on correlations among study variables). In a model including all social adversities, only COVID-related discrimination and cyberbullying victimization were independently associated with support for VR, with a small ( $\eta_p^2 = 0.01$ ) and a small to medium ( $\eta_p^2 = 0.04$ ) effect-size, respectively (see Table 3).

Depression was positively associated with support for VR, controlling for all five social adversities as well as for socio-demographic variables [ $F(df) = 316.71 (1, 739.56)$ ;  $\eta_p^2 = 0.06$ ;  $\beta = 2.09$ ; 95% CI 1.86, 2.32]. We tested the potential mediating role of depression in the association between exposures (i.e., COVID-related discrimination, cyberbullying victimization and cumulative social adversity score) and support for VR. Results are reported in Fig. 1. Depression mediated the association between each exposure variable and support for VR. This was true for both lower and higher levels of the mediator. However, the magnitudes of both direct and indirect effects were greater among participants at higher levels of depression than among participants at lower levels of depression (see Supplemental material). On average, depression scores

**Table 2** Descriptive statistics of study variables, stratified by socio-demographic and predictor variables ( $n = 6003$ )

	RIS total score			Depression (mean score)		
	<i>n</i>	Mean (SD)	<i>p</i> value	<i>n</i>	Mean (SD)	<i>p</i> value
<i>Gender</i>	5426		<0.001	5499		0.003
Female	2959	12.93 (7.04)		3016	2.09 (0.77)	
Male	2442	14.97 (7.66)		2455	2.05 (0.89)	
Gender diverse	25	18.48 (6.38)		28	2.53 (0.76)	
<i>City of residence</i>	5444		<0.001	5520		<0.001
Calgary	896	13.46 (7.05)		917	1.97 (0.78)	
Edmonton	908	14.24 (7.43)		909	2.13 (0.86)	
Montreal	1850	14.51 (8.01)		1870	2.22 (0.89)	
Toronto	1790	13.24 (6.81)		1824	1.94 (0.74)	
<i>Financial problems</i>	5434		<0.001	5414		<0.001
Not at all	1830	19.51 (11.14)		1839	1.66 (0.64)	
A little	2051	22.67 (12.56)		2036	2.03 (0.71)	
Moderate	830	28.33 (14.64)		816	2.44 (0.80)	
A lot	723	32.46 (17.20)		723	2.86 (0.86)	
<i>Education</i>	5400		<0.001	5468		<0.001
High school or less	1107	13.99 (6.99)		1125	2.17 (0.81)	
Apprenticeship, technical institute, trade or vocational school, college, CEGEP or other non-university certificate or diploma	1613	15.24 (7.88)		1605	2.29 (0.90)	
University certificate, diploma or degree	2680	12.99 (7.15)		2738	1.90 (0.75)	
<i>Immigrant status</i>	5394		<0.001	5456		<0.001
First generation	1315	12.94 (7.09)		1328	1.89 (0.72)	
Second generation	1408	13.80 (6.76)		1430	1.99 (0.78)	
Third generation or more	2671	14.39 (7.82)		2698	2.21 (0.87)	
<i>Perceived discrimination</i>	5372		<0.001	5449		<0.001
No	1297	11.48 (6.55)		1374	1.64 (0.63)	
Yes	4075	14.64 (7.51)		4075	2.22 (0.83)	
<i>Exposure to violence</i>	5305		<0.001	5372		<0.001
No	2276	12.33 (6.97)		2368	1.78 (0.71)	
Yes	3029	15.04 (7.55)		3004	2.30 (0.84)	
<i>COVID-related discrimination</i>	5375		<0.001	5467		<0.001
No	4255	12.78 (6.92)		4360	1.93 (0.74)	
Yes	1120	17.96 (7.77)		1107	2.62 (0.91)	
<i>Traditional bullying victimization</i>	5386		<0.001	5465		<0.001
Below median	4286	12.77 (6.80)		4390	1.88 (0.70)	
Above median	1100	18.15 (8.12)		1075	2.85 (0.84)	
<i>Cyberbullying victimization</i>	5377		<0.001	5453		<0.001
Below median	4431	12.69 (6.76)		4532	1.90 (0.71)	
Above median	946	19.51 (7.70)		921	2.93 (0.82)	
Total	5444	13.87 (7.40)		5520	2.07 (0.83)	

*p* values of the univariable associations between each socio-demographic and predictor variables are reported

accounted for 42% (between 23% at low levels of depression and 62% at high levels of depression), 28% (between 20% at low levels of depression and 38% at high levels of depression) and 32% (between 17% at low levels of

depression and 48% at high levels of depression) of the total effect of exposure to cumulative social adversity, COVID-related discrimination and cyberbullying victimization on support for VR, respectively (see Fig. 1).

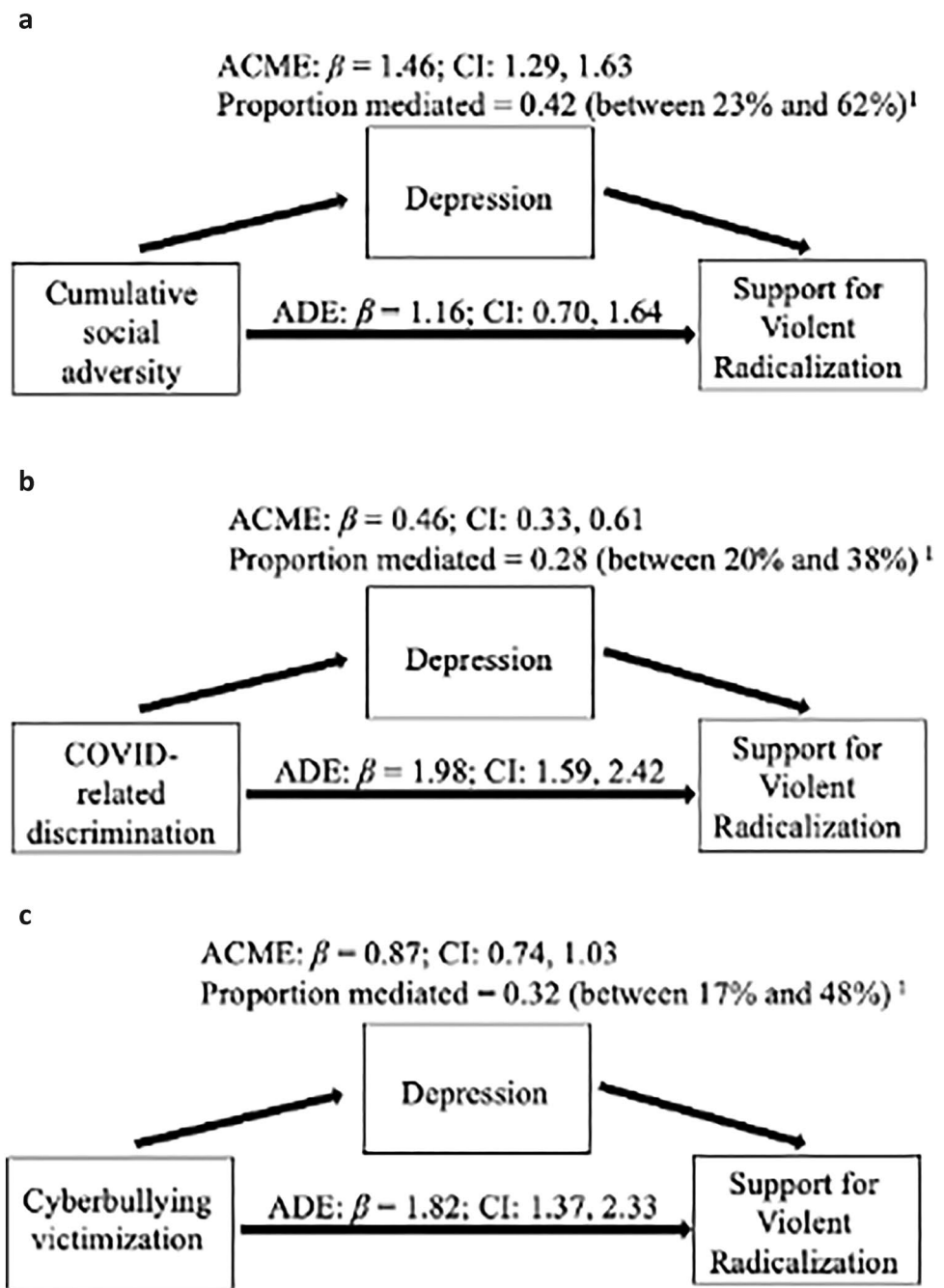
**Table 3** Results of multivariable linear regression models on RIS total scores (*n* = 6003)

Variables	Model 1			Model 2			Model 3			Model 4				
	<i>B</i>	95% CI	<i>F</i> ( <i>df</i> )	$\eta_p^2$	<i>B</i>	95% CI	<i>F</i> ( <i>df</i> )	$\eta_p^2$	<i>B</i>	95% CI	<i>F</i> ( <i>df</i> )	$\eta_p^2$		
Discrimination non-related to COVID-19			23.04** (950.17)	.004			17.81** (813.90)	.003			12.02** (559.34)	.002	4.05 (703.65)	
No	Ref				Ref				Ref					
Yes	1.11**	0.66, 1.57			1.00**	0.53–1.46			0.80**	0.35, 1.26			0.01, 0.93	
Exposure to violence			14.06** (695.27)	.003			11.77** (660.35)	.002			6.46 (611.46)	.001	3.30 (607.31)	
No	Ref				Ref				Ref					
Yes	0.76**	0.36, 1.16			0.70**	0.30–1.10			0.51*	0.12, 0.90			-0.03, 0.76	
COVID-related discrimination			157.57** (9555.64)	.026									75.95** (6760.62)	
No	Ref													
Yes	2.99**	2.53, 3.46											1.62, 2.55	
Traditional bullying victimization					1.24**	1.04–1.45	145.50** (5405.19)	.025						-0.04, 0.42
Cyberbullying victimization									2.06**	1.86, 2.26	391.12** (1632.11)	.066	1.77** 1.53, 2.01 205.89** (1467.58)	

Model 1: effects of discrimination non-related to COVID-19, exposure to violence and COVID-related discrimination on RIS total scores; model 2: effects of discrimination non-related to COVID-19, exposure to violence and traditional bullying victimization on RIS total scores; model 3: effects of discrimination non-related to COVID-19, exposure to violence and cyberbullying victimization on RIS total scores; model 4: effects of discrimination non-related to COVID-19, exposure to violence, COVID-related discrimination, traditional bullying victimization and cyberbullying victimization on RIS total scores. All models controlled for age, gender, education, financial problems, immigrant status, exposure to COVID-19 and city of residence  
 \**p* < 0.01; \*\**p* < 0.001



**Fig. 1** Mediation of the association between our exposure variables (i.e., COVID-related discrimination, cyberbullying victimization and cumulative social adversity) and RIS scores by depression, in separate models ( $n = 6003$ ). Average direct and indirect effects are reported. *ACME* average causal mediation effect, *ADE* average direct effect, *CI* confidence interval; all models controlled for age, gender, education, financial problems, immigrant status, exposure to COVID-19 and city of residence. All models but the one with cumulative social adversity as exposure included other social adverse experiences as covariates. All models included the exposure X mediator interaction. All terms were significant at  $p < .001$ . <sup>1</sup>Average proportion mediated calculated as the average between the proportion mediated at low and high levels of depression



**Discussion**

The present study investigated the cumulative and independent effects of experiences of discrimination (COVID-related and non-COVID-related), exposure to violence and traditional and cyberbullying victimization on support for VR in a sample of young Canadian adults during the COVID-19 pandemic. In addition, we tested whether these associations were mediated by depression. Our results

indicated a cumulative positive effect of social adversity on support for VR. COVID-related discrimination and cyberbullying victimization had an independent effect on support for VR, when controlling for the other experiences of social adversity. In line with prior findings [10], depression mediated the association between these stressors and support for VR.

Findings around the concerning levels of social adversity and depressive symptoms reported by young adults in our

sample are aligned with reports on the high levels of distress among young Canadian adults prior to the pandemic [10, 56] as well as with emerging evidence on prevalence of discrimination and mental distress in young people during the pandemic [34, 57]. This indicates the need for prompt and creative interventions to support young adults and promote inclusivity while preserving social distancing and safety as much as possible [38, 58, 59].

### Social adversity and VR

Aligned with prior studies, specific experiences of discrimination and victimization were associated with higher support for VR among young adults [10, 14, 15]. However, our findings add to prior research by providing evidence of a cumulative effect of social adversity on support for VR. This suggests that individuals who are marginalized and exposed to multiple types of victimization are at increased risk of supporting VR. This has important implications for prevention and clinical efforts, in that special attention should be devoted to understanding and supporting young adults who suffer from experiences of victimization or who are at increased risk of victimization.

Our results indicated that, during the COVID-19 pandemic, experiences of COVID-related discrimination and cyberbullying victimization had a statistically significant and independent positive effect on support for VR. The association between COVID-related discrimination and support for VR confirms prior findings on the negative impact of discrimination on youth both in Quebec [10] and Belgium [15] and indicates that some perceived reasons for discrimination may be more detrimental than others [15]. The association between cyberbullying and support for VR supports clinical observations on how bullying can trigger violent radical acts [26]. The fact that in our sample cyberbullying victimization was associated with support for VR may be because of the specificities of experiences during the pandemic. Indeed, social distancing guidelines have forced most people to largely rely on the internet for social interactions, and excessive internet use has become a concern during the COVID-19 pandemic especially among young adults [60]. Whereas internet use can improve one's quality of life by allowing to maintain positive connections on social media and online with friends and families [61], the excessive exposure to smartphones and internet can increase the chances of traditional offline victimization being experienced in the online space [62]. These findings also support preliminary evidence of the greater negative impact that cyberbullying victimization can have on mental health compared to traditional bullying victimization, because of the publicity and anonymity involved in this specific form of victimization [24, 25]. While we should not underplay the negative impact that traditional bullying victimization can

have on young adults' lives, our results point to the urgent need of promoting digital literacy skills among young adults as well as to interventions to protect and support youth's and young adults' activities in the online space.

### The mediating role of depression

In line with prior research [10, 56], depression represented an important risk factor for support for VR, indicating that social adversity was associated with higher depressive symptoms, which were in turn associated with higher support for VR. In clinical terms, our results indicate that if we were to reduce levels of depression in young adults from high to low we could significantly reduce the negative impact of cumulative social adversity on support for VR. Similar results were found for cyberbullying victimization and COVID-related experiences. This confirms prior findings and the importance for prevention programs to address social adversity and mental health simultaneously to find effective ways to support young adults and reduce the risk of VR [10].

### Limitations

This study has some limitations which need to be mentioned. First, we used a cross-sectional design which prevents us from drawing any conclusions about causality. Longitudinal studies are needed to shed light on the trajectories of experiences of social adversity, depression and support for VR during the present health emergency. In particular, pre- and post-pandemic data on the association between specific social stressors and support for VR are needed to investigate whether the stronger impact of COVID-related discrimination and cyberbullying is related specifically to the present COVID-19 context. Second, our study used an online method of recruitment which resulted in a response rate which was low, even if within the expected range for online surveys. Although the recruitment was based on a population-based sample, we relied on a convenience sample and voluntary participation; hence, a participant selection bias cannot be completely excluded. Third, we relied on a single-item measure of COVID-related discrimination, traditional and cyberbullying victimization. Future studies should include more fine-grained measures of these social stressors and more nuanced information on COVID-related and non-COVID-related bullying victimization. In light of the present polarization around vaccine intentions and intake, future investigations of experiences of discrimination and victimization related to COVID-vaccination would be extremely important. Fourth, our sample was collected in metropolitan areas in four Canadian cities, and results cannot be easily generalized to other countries, or to young adults living in rural areas. Last, effect-sizes in the study were modest. However, given the high prevalence of social

adversity and depression in our sample, even small effect sizes can have a considerable impact at the population level [63].

## Practical implications

In spite of these limitations, our results represent the first source of Canadian data on social adversity and support for VR among young adults during the COVID-19 pandemic and provide important indications to inform prevention programs at the individual and collective/societal level. The cumulative effect of social adverse experiences on support for VR indicates the need to support young adults who are at risk of multiple forms of social stress. The association of COVID-related discrimination and cyber-bullying victimization with support for VR on top of other experiences of discrimination and violence confirm the importance of targeting COVID-related discrimination and bullying victimization, in person as well as in the online space. Programs aimed at fostering digital literacy skills and critical thinking among young people are warranted.

Promoting social justice and inclusivity should become a crucial objective of prevention programs targeting young adults, especially during and in the aftermath of this pandemic. The high prevalence of discrimination and COVID-related discrimination in our sample requires integration strategies aimed at increasing the awareness of the “other” and reflecting on diversity via education and public health campaigns. In addition, the mediating effect of depression emphasizes the importance of promoting access to psychosocial support to address the distress and anger of young adults, especially those who have been exposed to discrimination and bullying during the pandemic. Improving accessibility to clinical services for trauma and for depression could contribute to decrease anger and despair in young adults, thus contributing to a decrease of social polarization and violence in our societies.

**Supplementary Information** The online version contains supplementary material available at <https://doi.org/10.1007/s00127-022-02244-8>.

**Acknowledgements** We would like to acknowledge the support of Delvinia in the collection of study data.

**Funding** Our work was supported by FRQSC (Fonds de Recherche du Québec Société et Culture) Grant # 2017-SE-196373 and RAPS (Équipe de Recherche et Action sur les Polarisation Sociales) Grant # 180645 to CR.

**Availability of data and material** Data and material are available upon request to the corresponding author.

**Code availability** R scripts are available upon request to the corresponding author.

## Declarations

**Conflict of interest** The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

**Ethics approval** The study was approved by the Institutional Review Board of the Faculty of Medicine at McGill University (#A09-B69-20A). The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008.

**Consent to participate** Electronic informed consent was obtained from all individual participants included in the study.

**Consent for publication** Not applicable.

## References

1. Shao W, Hao F (2020) Confidence in political leaders can slant risk perceptions of COVID-19 in a highly polarized environment. *Soc Sci Med* 261:113235. <https://doi.org/10.1016/2Fj.socscimed.2020.113235>
2. Bowen O (2020) These Asian Canadians are concerned as hate crimes spike in the coronavirus pandemic. *Global News*
3. Institute for Economics and Peace (2019) *Global Peace Index 2018: Measuring the impact of terrorism*
4. Lowe D (2019) Christchurch terrorist attack, the far-right and social media: what can we learn? *The New Jurist*
5. Venkatesh V, Rousseau C, Morin D, Hassan G (2021) Violence as collateral damage of the COVID-19 pandemic. *The Conversation*
6. Morabia A (2021) The fascist threat. *Am J Public Health*. <https://doi.org/10.2105/ajph.2021.306169>
7. McGilloway A, Ghosh P, Bhui K (2015) A systematic review of pathways to and processes associated with radicalization and extremism amongst Muslims in Western societies. *Int Rev Psychiatry* 27(1):39–50. <https://doi.org/10.3109/09540261.2014.992008>
8. Schmid AP (2013) Radicalisation, de-radicalisation, counter-radicalisation: a conceptual discussion and literature review. *International Centre for Counter-terrorism (ICCT) Research Paper* 97(1)
9. Eisenman DP, Flavahan L (2017) Canaries in the coal mine: Interpersonal violence, gang violence, and violent extremism through a public health prevention lens. *Int Rev Psychiatry* 29(4):341–349. <https://doi.org/10.1080/09540261.2017.1343527>
10. Rousseau C, Hassan G, Miconi D, Lecompte V, Mekki-Berrada A, El Hage H, Oulhote Y (2019) From social adversity to sympathy for violent radicalization: the role of depression, religiosity and social support. *Arch Public Health* 77(1):45. <https://doi.org/10.1186/s13690-019-0372-y>
11. Feddes AR, Gallucci M (2015) A literature review on methodology used in evaluating effects of preventive and de-radicalisation interventions. *J Deradicalization* 5:1–27
12. Bhui K, Everitt B, Jones E (2014) Might depression, psychosocial adversity, and limited social assets explain vulnerability to and resistance against violent radicalisation? *PLoS ONE* 9(9):1–10. <https://doi.org/10.1371/journal.pone.0105918>
13. Ellis BH, Abdi SM, Lazarevic V, White MT, Lincoln AK, Stern JE, Horgan JG (2016) Relation of psychosocial factors to diverse behaviors and attitudes among Somali refugees. *Am J Orthopsychiatry* 86(4):393–408. <https://doi.org/10.1037/ort0000121>

14. Emmelkamp J, Asscher JJ, Wissink IB, Stams GJ (2020) Risk factors for (violent) radicalization in juveniles: a multilevel meta-analysis. *Aggress Viol Behav*. <https://doi.org/10.1016/j.avb.2020.101489>
15. Frounfelker RL, Frissen T, Vanorio I, Rousseau C, d'Haenens L (2019) Exploring the discrimination-radicalization nexus: empirical evidence from youth and young adults in Belgium. *Int J Public Health*. [https://doi.org/10.1007/s00038-019-01226-z\(0123456789\)](https://doi.org/10.1007/s00038-019-01226-z(0123456789))
16. Ellis H, Miller E, Sideridis G, Frounfelker RL, Miconi D, Abdi S, Aw-Osman F, Rousseau C (2021) Risk and protective factors associated with attitudes in support of violent radicalization: variations by geographic location. *Int J Public Health* 66:617053
17. Holt MK, Gini G (2017) Complexities in the association between bullying victimization and weapon carrying. *Pediatrics* 140(6):e20173033
18. Olweus D (1994) Bullying at school: basic facts and effects of a school based intervention program. *J Child Psychol Psychiatry* 35(7):1171–1190. <https://doi.org/10.1111/j.1469-7610.1994.tb0129.x>
19. Gibb SJ, Horwood LJ, Fergusson DM (2011) Bullying victimization/perpetration in childhood and later adjustment: findings from a 30 year longitudinal study. *J Aggress Confl Peace Res* 3(2):82–88. <https://doi.org/10.1108/17596591111132891>
20. Nansel TR, Overpeck MD, Haynie DL, Ruan WJ, Scheidt PC (2003) Relationships between bullying and violence among US youth. *Arch Pediatr Adolesc Med* 157(4):348–353
21. Van Geel M, Vedder P, Tanilon J (2014) Bullying and weapon carrying: a meta-analysis. *JAMA Pediatr* 168(8):714–720
22. Smith PK, Mahdavi J, Carvalho M, Fisher S, Russell S, Tippett N (2008) Cyberbullying: Its nature and impact in secondary school pupils. *J Child Psychol Psychiatry* 49(4):376–385. <https://doi.org/10.1111/j.1469-7610.2007.01846.x>
23. Moore SE, Norman RE, Suetani S, Thomas HJ, Sly PD, Scott JG (2017) Consequences of bullying victimization in childhood and adolescence: a systematic review and meta-analysis. *World J Psychiatry* 7(1):60. <https://doi.org/10.5498/wjp.v7.i1.60>
24. Sticca F, Perren S (2013) Is cyberbullying worse than traditional bullying? Examining the differential roles of medium, publicity, and anonymity for the perceived severity of bullying. *J Youth Adolesc* 42(5):739–750
25. Wang J, Nansel TR, Iannotti RJ (2011) Cyber and traditional bullying: Differential association with depression. *J Adolesc Health* 48(4):415–417
26. Héту M-H (2020) How Alexandre Bissonnette—and other mass shooters—could be stopped before they kill. *CBC News*
27. Nurius PS, Green S, Logan-Greene P, Borja S (2015) Life course pathways of adverse childhood experiences toward adult psychological well-being: a stress process analysis. *Child Abuse Negl* 45:143–153. <https://doi.org/10.1016/j.chiabu.2015.03.008>
28. Seery MD, Holman EA, Silver RC (2010) Whatever does not kill us: cumulative lifetime adversity, vulnerability, and resilience. *J Pers Soc Psychol* 99(6):1025. <https://doi.org/10.1037/a0021344>
29. Green BL, Goodman LA, Krupnick JL, Corcoran CB, Petty RM, Stockton P, Stern NM (2000) Outcomes of single versus multiple trauma exposure in a screening sample. *J Trauma Stress* 13(2):271–286. <https://doi.org/10.1023/A:1007758711939>
30. Suliman S, Mkabile SG, Fincham DS, Ahmed R, Stein DJ, Seedat S (2009) Cumulative effect of multiple trauma on symptoms of posttraumatic stress disorder, anxiety, and depression in adolescents. *Compr Psychiatry* 50(2):121–127. <https://doi.org/10.1016/j.comppsy.2008.06.006>
31. Devakumar D, Shannon G, Bhopal SS, Abubakar I (2020) Racism and discrimination in COVID-19 responses. *Lancet* 395(10231):1194–1194. [https://doi.org/10.1016/s0140-6736\(20\)30792-3](https://doi.org/10.1016/s0140-6736(20)30792-3)
32. Ransing R, Ramalho R, de Filippis R, Ojeahere MI, Karaliuniene R, Orsolini L, da Costa MP, Ullah I, Grandinetti P, Bytyçi DG (2020) Infectious disease outbreak related stigma and discrimination during the COVID-19 pandemic: drivers, facilitators, manifestations, and outcomes across the world. *Brain Behav Immunity* 89:555–558. <https://doi.org/10.1016/2Fj.bbi.2020.07.033>
33. Kandil CY (2020) Asian Americans report over 650 racist acts over last week, new data says. *NBC News*
34. Miconi D, Li ZY, Frounfelker RL, Santavicca T, Cénat JM, Venkatesh V, Rousseau C (2021) Ethno-cultural disparities in mental health during the COVID-19 pandemic: a cross-sectional study on the impact of exposure to the virus and COVID-19-related discrimination and stigma on mental health across ethno-cultural groups in Quebec (Canada). *BJPsych Open*. <https://doi.org/10.1192/bjo.2020.146>
35. Miconi D, Li Z, Frounfelker RL, Venkatesh V, Rousseau C (2021) Socio-cultural correlates of self-reported experiences of discrimination related to COVID-19 in a culturally diverse sample of Canadian adults. *Int J Intercult Relat* 81:176–192
36. He J, He L, Zhou W, Nie X, He M (2020) Discrimination and social exclusion in the outbreak of COVID-19. *Int J Environ Res Public Health* 17(8):2933. <https://doi.org/10.3390/ijerph17082933>
37. Karmakar S, Das S (2020) Evaluating the impact of COVID-19 on cyberbullying through bayesian trend analysis. In: *Proceedings of the european interdisciplinary cybersecurity conference (EICC) co-located with European Cyber Week*
38. Nearchou F, Flinn C, Niland R, Subramaniam SS, Hennessy E (2020) Exploring the impact of COVID-19 on mental health outcomes in children and adolescents: a systematic review. *Int J Environ Res Public Health* 17(22):8479. <https://doi.org/10.3390/ijerph17228479>
39. Daly M, Sutin A, Robinson E (2020) Longitudinal changes in mental health and the COVID-19 pandemic: evidence from the UK Household longitudinal study. *Psychol Med*. <https://doi.org/10.1017/S0033291720004432>
40. Khosrokhavar F (2019) *Radicalisation*. Les Editions de la Maison de Science de l'Homme, Paris
41. Rousseau C, Miconi D, Frounfelker RL, Hassan G, Oulhote Y (2020) A repeated cross-sectional study of sympathy for violent radicalization in Canadian college students. *Am J Orthopsychiatry* 90(4):406–418. <https://doi.org/10.1037/ort0000444>
42. Misiak B, Samochowiec J, Bhui K, Schouler-Ocak M, Demunter H, Kuey L, Raballo A, Gorwood P, Frydecka D, Dom G (2019) A systematic review on the relationship between mental health, radicalization and mass violence. *Eur Psychiatry* 56:51–59. <https://doi.org/10.1016/j.eurpsy.2018.11.005>
43. Bhui K, Silva MJ, Topciu RA, Jones E (2016) Pathways to sympathies for violent protest and terrorism. *Br J Psychiatry J Ment Sci* 209(6):483–490. <https://doi.org/10.1192/bjp.bp.116.185173>
44. Bhui K, Otis M, Silva MJ, Halvorsrud K, Freestone M, Jones E (2020) Extremism and common mental illness: cross-sectional community survey of White British and Pakistani men and women living in England. *Br J Psychiatry* 217(4):547–554
45. Racine N, McArthur BA, Cooke JE, Eirich R, Zhu J, Madigan S (2021) Global prevalence of depressive and anxiety symptoms in children and adolescents during COVID-19: a meta-analysis. *JAMA Pediatr* 175(11):1142–1150
46. Rousseau C, Drapeau A (2004) Santé mentale—Chapitre 11 [Mental Health—Chapter 11]. In: *Insitut de la statistique Québec (ed) Santé et bien-etre, immigrants récents au Québec: une adaptation réciproque? Etude auprès des communautés culturelles 1998–1999 [Health and well being, recent immigrants in Quebec: a reciprocal adjustment? Studies within cultural communities 1998–1999]*. Les Publications du Québec, Montréal, pp 211–245
47. Noh S, Beiser M, Kaspar V, Hou F, Rummens J (1999) Perceived racial discrimination, depression, and coping: a study of Southeast

- Asian refugees in Canada. *J Health Soc Behav.* <https://doi.org/10.2307/2676348>
48. Derogatis LR, Lipman RS, Rickels K, Uhlenhuth EH, Covi L (1974) The Hopkins Symptom Checklist (HSCL): a self-report symptom inventory. *Syst Res Behav Sci* 19(1):1–15. <https://doi.org/10.1002/bs.3830190102>
  49. Mollica RF, Caspi-Yavin Y, Bollini P, Truong T, Tor S, Lavelle J (1992) The Harvard Trauma Questionnaire: validating a cross-cultural instrument for measuring torture, trauma, and post-traumatic stress disorder in Indochinese refugees. *J Nerv Ment Dis* 180(2):111–116. <https://doi.org/10.1097/00005053-199202000-00008>
  50. Moskalenko S, McCauley C (2009) Measuring political mobilization: The distinction between activism and radicalism. *Terror Political Violence* 21(2):239–260. <https://doi.org/10.1080/09546550902765508>
  51. King G, Tomz M, Wittenberg J (2000) Making the most of statistical analyses: improving interpretation and presentation. *Am J Political Sci* 44(2):347–361. <https://doi.org/10.2307/2669316>
  52. Baron RM, Kenny DA (1986) The moderator–mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. *J Pers Soc Psychol* 51(6):1173
  53. Imai K, Keele L, Tingley D (2010) A general approach to causal mediation analysis. *Psychol Methods* 15(4):309. <https://doi.org/10.1037/a0020761>
  54. Tingley D, Yamamoto T, Hirose K, Keele L, Imai K (2013) Mediation: R package for causal mediation analysis. R package version 4.2. 2
  55. R Core Team (2017) R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria
  56. Miconi D, Oulhote Y, Hassan G, Rousseau C (2020) Sympathy for violent radicalization among college students in Quebec (Canada): the protective role of a positive future orientation. *Psychol Violence* 10(3):344–354. <https://doi.org/10.1037/vio0000278>
  57. Hawes MT, Szenczy AK, Klein DN, Hajcak G, Nelson BD (2021) Increases in depression and anxiety symptoms in adolescents and young adults during the COVID-19 pandemic. *Psychol Med.* <https://doi.org/10.1017/S0033291720005358>
  58. Rousseau C, Miconi D (2020) Protecting youth mental health during the COVID-19 pandemic: a challenging engagement and learning process. *J Am Acad Child Adolesc Psychiatry* 59(11):1203–1207. <https://doi.org/10.1016/j.jaac.2020.08.007>
  59. Loades ME, Chatburn E, Higgs-Sweeney N, Reynolds S, Shafran R, Brigden A, Linney C, McManus MN, Borwick C, Crawley E (2020) Rapid systematic review: the impact of social isolation and loneliness on the mental health of children and adolescents in the context of COVID-19. *J Am Acad Child Adolesc Psychiatry* 60(1):6–7. <https://doi.org/10.1016/j.jaac.2020.05.009>
  60. Islam MS, Sujjan MSH, Tasnim R, Ferdous MZ, Masud JHB, Kundu S, Mosaddek ASM, Choudhuri MSK, Kircaburun K, Griffiths MD (2020) Problematic internet use among young and adult population in Bangladesh: correlates with lifestyle and online activities during the COVID-19 pandemic. *Addict Behav Rep* 12:100311. <https://doi.org/10.1016/j.abrep.2020.100311>
  61. Pontes HM, Szabo A, Griffiths MD (2015) The impact of Internet-based specific activities on the perceptions of Internet addiction, quality of life, and excessive usage: a cross-sectional study. *Addict Behav Rep* 1:19–25. <https://doi.org/10.1016/j.abrep.2015.03.002>
  62. Machimbarrena JM, González-Cabrera J, Ortega-Barón J, Beranuy-Fargues M, Álvarez-Bardón A, Tejero B (2019) Profiles of problematic internet use and its impact on adolescents' health-related quality of life. *Int J Environ Res Public Health* 16(20):3877. <https://doi.org/10.3390/ijerph16203877>
  63. Bellinger DC (2007) Interpretation of small effect sizes in occupational and environmental neurotoxicology: individual versus population risk. *Neurotoxicology* 28(2):245–251. <https://doi.org/10.1016/j.neuro.2006.05.009>