Original Research

The Impact of Relational Adverse Childhood Experiences on Suicide Outcomes During Early and Young Adulthood

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Abstract

This study aimed at investigating the degree to which relational adverse childhood experiences (ACEs) would affect suicide outcomes during early and young adulthood of Iranian female and male students. In all, 487 undergraduate students (59.2% females) with a mean age of 20.66 ± 1.42 were recruited using a multistage clustering sampling method from eight schools from the fields of humanities, engineering, and basic sciences. Suicide Behavior Questionnaire–Revised form (SBQ-R) was employed for assessing past year suicidal ideation (PYSI, once or more), the meaningful likelihood of future suicide (mLoFS, a score of 2 or more), and suicide risk (SR ≥7). Relational ACEs were assessed in the form of a yes/no question, including caregivers' maltreatment, household relational dysfunction, family loss events, school events, and sexual abuse. Analyses were conducted using Fisher's exact test, chi-square test, and univariate binary logistic regression. The rates of PYSI, LoFS, and SR were, respectively, 37.2%, 44.6%, and 30.8%.

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The most experienced event was witnessing verbal violence (68.8%) and the least was divorce/separation (6.2%). All the events and domains (except family loss events), the interaction of domains, and cumulative events significantly increased the odds of suicide outcomes, in which females were more affected by all types of relational ACEs. Students whose ethnicity was Azari & Turk and who were studying in humanities or basic sciences showed a higher suicide risk than their counterparts. The study showed that the rates of relational ACEs and suicide outcomes were remarkable, in Iran. Because of the detrimental effects of relational ACEs on suicidality, mostly for females, it is necessary to improve the initiatives promoting child protection and legal support for health professionals to address child abuse. There is also an urgent need for providing young students with supports and effective interventions.

Introduction

Suicide as a self-initiated behavior is one of the leading causes of death worldwide, which includes a continuum that begins with ideation, followed by communication, planning, committing, and, finally, the suicide (Silverman, Berman, Sanddal, O'Carroll, & Joiner, 2007). Among worldwide college students, the results of one meta-analysis revealed that while the lifetime prevalence rates of suicidal ideations, plans, and attempts were 22.3%, 6.1%, and 3.2%, respectively, these rates for a 12-month prevalence were about 10.6%, 3.0%, and 1.2%, respectively (Mortier, Cuijpers, et al., 2018). Another meta-analysis among Iranian students estimated a lifetime rate of 2.6% to 7.42% and a 1-year rate of 1.8% to 3.5% for suicide ideation and attempt, respectively (Bakhtar & Rezaeian, 2017). It is worth noting that the experience of lifelong suicide ideation and behavior can not only have a negative impact on students' academic performance (Mortier et al., 2015), but also it can increase the likelihood of suicide risk (SR) in the following years (Nock et al., 2008). Given that the goal of the World Health Organization (WHO, 2014) is to decrease the rate of suicide by 10% worldwide by the year 2020, investigating the factors that increase the possibility of suicide-related behaviors among the youth population becomes a necessity.

One of the major risk factors that have received considerable attention regarding suicide-related behaviors is adverse childhood experiences (ACEs)

which generally impose detrimental consequences on health and well-being (Boullier & Blair, 2018). The term ACEs was first coined by the Centers for Disease Control (CDC) in 1998 (Boullier & Blair, 2018), including adverse events of maltreatment, abuse, household dysfunction, community violence, poverty, and so on (World Health Organization, 2006). ACEs reportedly have been considered as major contributors to the many risk factors of disease, which may lead to an early death (Campbell, Walker, & Egede, 2016). In Iran, although some epidemiological studies have been carried out on the prevalence of child maltreatment (Mahram, Hosseinkhani, Nedjat, & Aflatouni, 2013; Pirdehghan, Vakili, Rajabzadeh, & Puyandehpour, 2015), only a few studies have addressed the impacts of such experiences among adolescents (Pirdehghan, Vakili, Rajabzadeh, Puyandehpour, & Aghakoochak, 2016) and adults (Pournaghash-Tehrani, 2011; Pournaghash-Tehrani & Feizabadi, 2009). Therefore, the expansion of research on the incidence and later consequences of ACEs may pave the way to improve the professional and legal condition about the issue in the country (Borimnejad & Khoshnavay Fomani, 2015).

Furthermore, ACEs have been reported to be among the major risk factors pertaining to future suicide-related behaviors (Bjorkenstam, Kosidou, & Bjorkenstam, 2017; Dias de Mattos Souza, Lopez Molina, Azevedo da Silva, & Jansen, 2016; Rhodes et al., 2011). Research in this area has suggested that various types of ACEs including peer victimization, maltreatment, legal problems, divorce, and drug abuse of family members can significantly increase the likelihood of the SR (Castellvi et al., 2017; Ziaei et al., 2017). Given that the interpersonal theory of suicide highlights the causal effect of thwarted interpersonal needs on suicide ideation and behavior (Van Orden et al., 2010), it can be suggested that those relational ACEs that involve parents/caregivers, authorities at school, peers, and so on could be seen as the major contexts leading to increased SR during early adulthood of young people.

Aims of the Study

The purpose of the present study was to evaluate the effects of different relational ACEs on suicide outcomes including the SR, the past year suicide ideation (PYSI), and the meaningful likelihood of future suicide behaviors (mLoFS) among Iranian students during their early and young adulthood. Specifically, the first aim of this study was to examine the degree to which experiencing caregivers' maltreatment, household relational dysfunction, loss events, school events, and sexual abuse would have an impact on the suicide

outcomes. The second aim was to determine the interactive effect of such domains and the effects of the cumulative events to grasp an understanding about the consequences of an elevation in the relational ACEs experienced. And, the third aim was to investigate any possible gender differences in the link between relational ACEs and suicide outcomes during early and young adulthood.

Method

Design and Sampling

This study was of cross-sectional retrospective design and carried out during the period of April to May 2018. A total of 524 undergraduate students of an Iranian University participated in the study. The inclusion criteria included being an undergraduate, aged between 18 and 29 years, and willingness to participate in the study. To achieve a better representative sample, the sampling was carried out based on a multistage method. First, eight schools from three educational fields of humanities (five schools), engineering (one school), and basic sciences (two schools) were selected as strata. Second, based on the proportionate quotas of individuals and genders, one to three available classes from each school were selected as clusters and the enrolled students were recruited.

From 524 sealed booklets distributed, 33 were returned incomplete, giving a response rate of 93.7%. In addition, one participant had graduated, and three participants were unwilling to respond to suicide-related questions. Thus, using listwise deletion, 487 data were included in the final analysis (92.9%). Data for eight participants were missing in gender; thus, in the analysis process, their data were included in the total sample but were excluded when the data were separated for female and male subsamples. Participants were aged 19 to 28 years with a mean age of 20.66 ± 1.42. Females composed the majority of the sample ($n = 288$, 59.2%). This rate was consistent with the gender distribution among undergraduate students consisting of 60% females and 40% males. In total, 52.2% were studying humanities ($n = 254$), 25.5% engineering ($n = 124$), and 22.4% basic sciences ($n = 109$). This rate again was relatively consistent with the distribution of student in Iran's academia. The majority of the sample were Fars ($n = 262$, 53.8%), followed by Turk ($n = 113$, 23.2%), Mazani/Gilak ($n = 40$, 8.2%), Lor ($n = 21$, 4.3%), Kurd ($n = 14$, 2.9%), and others ($n = 15$, 2.1% including Baluch, Arab, and Turkman). They were mostly residing with their families ($n = 326$, 66.9%) or in university dormitories (30.2%, $n = 147$). Most of the participants were single ($n = 466$, 95.7%; see Table 1)

Table 1. Sample Information (*N* = 487).

Characteristics	*n*	%
Age (*M* ± *SD*)		
19-28 years old	20.66 ± 1.42	
Gender		
Male	191	39.2
Female	288	59.2
Unspecified	8	1.6
Educational group		
Humanities	254	52.2
Engineering	124	25.5
Basic sciences	109	22.4
Ethnicity		
Fars	262	53.8
Turk	113	23.2
Mazani or Gilak	40	8.2
Lor	21	4.3
Kurd	14	2.9
Else[a]	15	3.1
Unspecified	22	4.5
Residence		
With Family	326	66.9
University dormitory	147	30.2
Else[b]	12	2.5
Unspecified	2	0.4
Marital status		
Single	466	95.7
Married	17	3.5
Unspecified	4	0.8

[a]Including Baluch, Arab, Turkman, and who responded to "other".
[b]Private dormitory or rented house.

Instruments

Demographic information was obtained using a questionnaire which included age, gender, academic field (humanities, engineering, basic sciences), ethnicity, residence, and marital status.

    Suicide Behavior Questionnaire–Revised form (*SBQ-R*) was used to assess suicide-related outcomes. This short instrument was designed by Osman et al. (2001) based on a lengthy original work of Linehan and Nielsen (1981). SBQ-R contains four questions about lifetime suicide behavior, previous 12-month

suicidal ideations, suicide communication, and self-reported likelihood of any future suicide behavior. The range of total scores would be from 3 to 18, with a higher score indicating a higher risk of suicide. In the study of Osman et al. (2001), the cutoff point of 8 for clinical samples showed a sensitivity of 0.80 and a specificity of 0.91, and the score of 7 for youth and young adults showed a sensitivity of 0.93 and a specificity of 0.95. This instrument has been previously used with Iranian population (Safa, Boroujerdi, Talischi, & Masjedi, 2014; Shakeri et al., 2015) and was translated and validated in an unpublished work of Safa and Boroujerdi (Safa et al., 2014) with a Cronbach's alpha of .85. For the purpose of this study, the second question as an indication of the PYSI, the last question pertaining to the mLoFS, and the total score providing SR with the cutoff point of 7 were employed.

Relational Adverse Childhood Experiences (*Relational ACEs*) were retrospectively assessed using a newly developed instrument consisting of 12 selected questions suggested by the Childhood Trauma Questionnaire (CTQ; Garrusi & Nakhaee, 2009), Trauma Experience Checklist (TEC; Nijenhuis, Van der Hart, & Kruger, 2002), and considering CDC and WHO classifications (Boullier & Blair, 2018; WHO, 2018). The questionnaire considers two settings of home and school, which includes five domains: *caregivers' maltreatment*, including physical abuse, emotional abuse, lack of love, and neglect; *household relational dysfunctions*, including witnessing verbal violence and physical violence, and divorce/separation; *loss events*, including loss of parents and/or siblings; *school events*, including peer victimization and authorities' maltreatment; and *sexual abuse*, including nonphysical and physical sexual abuse. The description of each area is presented in the supplemental appendix. The participants were asked to answer a Yes/No question of whether they had ever experienced such events prior to age 18.

Ethical Issues

The ethical issues were considered based on the tenets of the Helsinki Declaration, which was approved by the representative of the National Committee for Ethics in Biomedical Research (http://ethics.research.ac.ir/). Informed consent was obtained. Participants were informed about the aim of the study and confidentiality considerations including a sealed envelope for data collection, no need to put their own names or their schools on the questionnaires, and who, with which regulations, would access the data. To compensate the students for their participation, students were presented with a gift from the institution's Counseling Center. Participants were encouraged to contact the center if they would like to seek any help regarding their emotional problems.

Analysis Strategies

Descriptive statistics were used to report the demographic characteristics, relational ACEs, and incidence of suicide-related outcomes. Dependent variables were defined as dummy variables including PYSI with a score of 0 = *never* and 1 = else (including *rarely, sometimes, often, very often*), mLoFS with a score of 0 = *never* or *no chance at all* and 1 = else (including *rather unlikely, unlikely, likely, rather likely, very likely*), and SR with a score of 0 = *total risk of* <7 and 1 = *total score of* ≥7. Independent variables were included in the analysis in four types, including (a) singular events; (b) at least one event in domains of caregivers' maltreatment (any experience of physical abuse, emotional abuse, lack of love, and/or neglect), household relational dysfunction (any experience of domestic physical violence, domestic verbal violence, and/or divorce/separation), school events (any experience of peer victimization and/or authorities' maltreatment), and sexual abuse (any experience of physical and/or nonphysical sexual abuse); (c) interaction of the domains; and (d) cumulative events including no event, 1/2 events, 3/4 events, 5/6 events, and ≥7 events (see the supplemental appendix for the details of relational ACEs).

Therefore, for inferential statistics, Fisher's exact test and chi-square test were used to evaluate gender and group comparisons. In addition, to examine the odds of suicide-related outcomes, a series of univariate binary logistic regression was performed. Logistic regression test was also conducted to determine the effect of cumulative events using two deferent approaches: the cumulative effect in reference to the category of *no event* (Indicator method), and the effects in reference to *all the above categories* (Deference method). The constant was included in the analysis. The *p* value was set as <.05.

Results

Suicide Outcomes

Table 2 presents the rates of the PYSI, mLoFS, SR, and relational ACEs, presenting for the total sample, male students, and female students. In all, 37.2% (*n* = 181) of the total sample experienced PYSI, with 34% (*n* = 65 of 191) of male and 38.2% (*n* = 110 of 288) of female students, with no significant difference, whereas a more proportion of total sample including 44.6% (*n* = 217) reported mLoFS, with 41.9% (*n* = 80) of male and 45.5% (*n* = 131) of female, showing no significant differences. SR was seen in 30.8% (*n* = 150) of the total sample, showing a significant difference favoring females (34%, *n* = 98), compared with males (25.1%, *n* = 48), *p* < .05.

Table 2. Variable Information and Demographic Differences (N = 487).

Variables	Total[a] N (of 487)	%	Male n (of 191)	%	Female n (of 288)	%	Demographic Differences Gender p[b]	Ethnicity p[c]	Educational Group p[d]
PYSI	181	37.2	65	34.0	110	38.2	.384	.204	.119
LoFS	217	44.6	80	41.9	131	45.5	.453	.432	.246
SR	150	30.8	48	25.1	98	34.0	.043	.029	.025
Physical abuse	59	12.1	18	9.4	40	13.9	.155	.553	.905
Emotional abuse	152	31.2	53	27.7	97	33.7	.191	.590	.612
Lack of love	119	24.4	43	22.5	75	26.0	.389	.366	.040
Neglectfulness	125	25.7	53	27.7	69	24.0	.392	.517	.259
Witnessing verbal violence	335	68.8	125	65.4	204	70.8	.228	.944	.551
Witnessing physical violence	108	22.2	32	16.8	75	26.0	.019	.179	.459
Divorce/Separation	30	6.2	12	6.3	18	6.3	1.000	.154	.530
Peer victimization	96	19.7	53	27.7	41	14.2	.001	.534	.789
School authorities' maltreatments	85	17.5	29	15.2	54	18.8	.327	.293	.920
Nonphysical sexual abuse	81	16.6	26	13.6	53	18.4	.208	.763	.723
Physical sexual abuse	69	14.2	24	12.6	44	15.3	.208	.336	.736
Loss of mother	3	0.6	2	1.0	1	0.3	.02[e]	.917[e]	.056[e]
Loss of father	17	3.5	1	0.5	15	5.2			
Loss of siblings	4	0.8	0	0.0	3	1.0			

Note. PYSI = past year suicidal ideation; LoFS = likelihood of future suicide; SR = suicide risk.

[a]Eight data on gender were missing.

[b]Fisher's exact test, two-sided, including 479 cases with valid gender data.

[c]Pearson's chi-square including three ethnic categories of Fars, Azari & Turks, and other ethnics (including Baluch, Arab, Turkman, and who responded to "else"), two-sided, on 465 valid data.

[d]Pearson's chi-square including three educational groups of humanities, engineering, and basic sciences, two-sided, on 487 valid data.

[e]The loss of mother, father, and siblings was merged as loss events; doing so, Fisher's exact test, two-sided, was used for gender differences on 479 valid data, and Pearson's chi-square, two sided, was used for the differences based on ethnicity (465 valid data) and educational group (487 valid data). Significant *p* values (<.05) are provided in italics.

As Table 2 presents, there were some significant differences in terms of SR based on educational group and ethnicity (including three groups of Fars, Azari & Turk,[1] and other ethnics involving Baluch, Arab, Turkman, and who responded to "else"), $p < .05$. Additional analysis revealed that studying humanities and basic sciences could increase the odds of SR as 1.71 (95% confidence interval [CI] = [1.04, 2.83]) and 2.17 (95% CI = [1.22, 3.85]), respectively, in reference to engineering. Moreover, being Azari & Turk could increase the odds of SR as 2.17 (95% CI = [1.1, 4.03]) in reference to other ethnics and as 1.62 (95% CI = [1.02, 2.57]) in reference to Fars.

Relational ACEs

As Table 2 presents, witnessing verbal violence was the most reported event by 68.8% ($n = 335$) of the sample, followed by emotional abuse (31.2%, $n = 152$), neglect (25.7%, $n = 125$), lack of love (24.4%, $n = 119$), and witnessing physical violence (22.2%, $n = 108$). Among these, only witnessing physical violence was more highly reported by females (26%, $n = 75$) than males (16.8%, $n = 32$), $p < .05$. In school settings, 19.7% ($n = 96$) of the total sample reported peer victimization, with a higher rate among males (27.7%, $n = 53$) than females (14.2%, $n = 41$), $p < .01$. Authorities' maltreatment was reported by 17.5% ($n = 85$) of the total sample. In sexual abuse, nonphysical abuse was reported by 16.6% ($n = 81$) and physical sexual abuse was reported by 14.2% ($n = 69$) of the total sample, with no significant gender difference. Finally, loss events were experienced by 0.6% ($n = 3$) for mother, 3.8% ($n = 17$) for father, and 0.8% ($n = 4$) for siblings. In total, loss events were reported more frequently by females (6.7%, $n = 18$) than males (1.6%, $n = 3$), $p < .05$. Finally, there was also a significant difference in terms of lack of love between educational groups, in that studying humanities could increase the likelihood of lack of love 1.81 times (95% CI = [1.07, 3.06]) in reference to engineering.

The Impact of Singular Events and Domains

Table 3 shows the results of univariate logistic regression for predicting the odds of suicide outcomes based on experienced relational ACEs, for the total sample, male students, and female students.

SR

In the total sample, except loss events, all singular relational ACEs could significantly increase the odds of SR, from neglect, 4.27 (95% CI = [2.78, 6.58]), to witnessing verbal violence, 1.58 (95% CI = [1.03, 2.44]). In addition, all

Table 3. Univariate Logistic Regression of Relational ACEs Predicting Likelihood of Suicide Outcomes.

	Total Sample (N = 487)						Male (n = 191)						Female (n = 288)					
	SR (n = 150)		PYSI (n = 181)		LoFS (n = 217)		SR (n = 48)		PYSI (n = 65)		LoFS (n = 80)		SR (n = 98)		PYSI (n = 110)		LoFS (n = 131)	
IV	Odds	95% CI	Odds	95% CI	Odds	95% CI	Odds	95% CI	Odds	95% CI	Odds	95% CI	Odds	95% CI	Odds	95% CI	Odds	95% CI
Physical abuse	2.27	[1.30, 3.94]	2.22	[1.28, 3.84]	1.56	[0.90, 2.70]	2.05	[0.75, 5.63]	1.63	[0.61, 4.35]	1.84	[0.69, 4.89]	2.46	[1.25, 4.83]	2.50	[1.27, 4.94]	1.56	[0.80, 3.05]
Emotional abuse	2.48	[1.89, 4.27]	3.03	[2.04, 4.50]	2.03	[1.38, 2.99]	2.10	[1.05, 4.21]	1.96	[1.02, 3.76]	1.67	[0.88, 3.15]	3.64	[2.71, 6.12]	3.98	[2.37, 6.66]	2.57	[1.55, 4.24]
Lack of love	2.72	[1.77, 4.18]	3.01	[1.96, 4.60]	2.71	[1.77, 4.16]	1.87*	[0.89, 3.90]	1.99*	[0.99, 3.98]	2.66	[1.33, 5.35]	3.57	[2.06, 6.18]	4.00	[2.30, 6.95]	3.01	[1.74, 5.22]
Neglectfulness	4.27	[2.78, 6.58]	3.80	[2.48, 5.81]	3.06	[2.00, 4.68]	4.46	[2.22, 9.00]	3.06	[1.58, 5.90]	3.58	[1.84, 6.95]	4.53	[2.56, 8.01]	4.44	[2.50, 7.89]	2.90	[1.65, 5.10]
Witnessing verbal violence	1.58	[1.03, 2.44]	2.04	[1.34, 3.10]	1.59	[1.07, 2.35]	0.84	[0.43, 1.66]	1.16	[0.62, 2.20]	1.17	[0.64, 2.15]	2.37	[1.31, 4.28]	3.01	[1.67, 5.43]	2.04	[1.20, 3.47]
Witnessing physical violence	2.07	[1.33, 3.21]	1.71	[1.11, 2.64]	1.86	[1.21, 2.86]	1.20	[0.51, 2.82]	0.72	[0.31, 1.66]	1.48	[0.69, 3.18]	2.43	[1.41, 4.17]	2.52	[1.47, 4.31]	2.06	[1.20, 3.51]
Divorce/Separation	2.39	[1.13, 5.02]	2.02*	[0.96, 4.25]	2.64	[1.21, 5.77]	0.99	[0.26, 3.83]	0.63	[0.16, 2.41]	1.42	[0.44, 4.57]	4.28	[1.55, 11.78]	4.64	[1.61, 13.40]	4.58	[1.47, 14.27]
Peer victimization	2.28	[1.44, 3.60]	2.16	[1.37, 3.39]	1.90	[1.21, 2.98]	3.93	[1.96, 7.90]	2.44	[1.27, 4.7]	2.30	[1.21, 4.37]	2.06	[1.06, 4.03]	2.35	[1.20, 4.59]	1.84*	[0.95, 3.61]
School authorities' maltreatments	2.66	[1.65, 4.29]	2.08	[1.29, 3.33]	1.55	[1.58, 4.15]	2.95	[1.30, 6.71]	2.03*	[0.91, 4.52]	3.78	[1.62, 8.83]	2.52	[1.38, 4.61]	2.00	[1.10, 3.63]	2.20	[1.19, 4.00]
Nonphysical sexual abuse	2.47	[1.52, 4.02]	1.94	[1.20, 3.15]	2.04	[1.26, 3.31]	2.09*	[0.88, 4.98]	1.51	[0.65, 3.50]	1.75	[0.76, 4.02]	2.91	[1.58, 5.35]	2.30	[1.26, 4.20]	2.31	[1.25, 4.26]
Physical sexual abuse	2.71	[1.62, 4.56]	2.20	[1.32, 3.68]	2.89	[1.69, 4.94]	2.43*	[1.00, 5.89]	1.77	[0.75, 4.21]	3.22	[1.30, 7.95]	3.08	[1.60, 5.94]	2.46	[1.28, 4.72]	3.03	[1.53, 6.01]
Family loss events	1.21	[0.50, 2.92]	1.59	[0.69, 3.67]	0.96	[0.41, 2.22]	—	—	0.97	[0.09, 10.89]	—		1.60	[0.61, 4.19]	1.67	[0.64, 4.35]	1.21	[0.47, 3.15]
Caregivers' maltreatments	3.83	[2.54, 5.76]	3.52	[2.39, 5.17]	2.83	[1.95, 4.10]	3.29	[1.66, 6.52]	2.38	[1.29, 4.38]	2.82	[1.55, 5.11]	4.36	[2.58, 7.36]	4.43	[2.67, 7.38]	3.08	[1.90, 4.99]
Household relational dysfunction	1.64	[1.06, 2.54]	2.10	[1.38, 3.21]	1.63	[1.100, 2.41]	0.92	[0.46, 1.83]	1.25	[0.67, 2.37]	1.24	[0.67, 2.28]	2.37	[1.31, 4.28]	3.01	[1.67, 5.43]	2.04	[1.20, 3.47]
School events	2.68	[1.78, 4.04]	2.20	[1.48, 3.27]	2.25	[1.52, 3.35]	3.87	[1.95, 7.66]	2.37	[1.27, 4.42]	2.68	[1.45, 4.95]	2.53	[1.48, 4.35]	2.25	[1.32, 3.84]	2.13	[1.25, 3.63]
Sexual abuse	2.38	[1.53, 3.67]	2.05	[1.33, 3.14]	2.08	[1.35, 3.20]	2.04*	[0.94, 4.47]	1.59	[0.75, 3.36]	2.13	[1.02, 4.49]	2.71	[1.57, 4.67]	2.42	[1.41, 4.15]	2.14	[1.25, 3.67]
Interaction of domains	2.93	[1.43, 5.98]	2.80	[1.36, 5.78]	2.30	[1.11, 4.80]	2.08	[0.56, 7.69]	1.31	[0.36, 4.82]	3.45*	[0.86, 13.79]	3.79	[1.53, 9.39]	3.86	[1.52, 9.79]	2.23*	[0.90, 5.49]

Note. Dashed lines (—) indicate an invariant categorization. Bold odds with asterisks are marginally significant with *p* < .10. Bold odds are significant with *p* < .05. IV = independent variable; ACEs = Adverse childhood experiences; SR = suicide risk; PYSI = past year suicidal ideation; LoFS = likelihood of future suicide; 95% CI = 95% confidence interval.

domains showed significant increased odds, from caregivers' maltreatment, 3.83 (95% CI = [2.54, 5.75]), to household relational dysfunction, 1.64 (95% CI = [1.06, 2.54]). The interaction of domains showed a significant odds of 2.93 (95% CI = [1.43, 5.98]).

By separating results for males and females, some gender discrepancies became evident. For females, all relational ACEs, except loss events, 1.60 (95% CI = [0.61, 4.19]), were significantly impactful, from neglect, 4.53 (95% CI = 2.56, 8.01]), and divorce/separation, 4.28 (95% CI = [1.55, 11.78]), to peer victimization, 2.06 (95% CI = [1.06, 4.03]). For males, only neglect, 4.66 (95% CI = 2.22, 9.00]), peer victimization, 3.93 (95% CI = [1.96, 7.90]), emotional abuse, 2.10 (95% CI= [1.05, 4.21]), and authorities' maltreatment 2.95 (95% CI = [1.30, 6.71]) showed a significant increased odds. Females generally indicated higher odds magnitude.

However, caregivers' maltreatment showed a significant increased odds of 4.36 (95% CI = [2.58, 7.36]) for females and of 3.29 (95% CI = [1.66, 6.52]) for males. Most notably, only females received a significant increased odds from household relational dysfunction, 2.37 (95% CI = [1.31, 4.28]), whereas males received a higher increased odds from school events, 3.87 (95% CI = [1.95, 7.66]). Importantly, the interaction of domains was only significant for females, 3.79 (95% CI = [1.53, 9.39]). See Table 3 for the complete results of relational ACEs on increasing the odds of SR, in the total sample, male students, and female students.

PYSI

For PYSI in the total sample, neglect had the highest impact, 3.80 (95% CI = [2.48, 5.81]), whereas witnessing physical violence had the lowest, 1.71 (95% CI = [1.11, 2.64]). Among domains, caregivers' maltreatment, 3.52 (95% CI = [2.93, 517]), household relational dysfunction, 2.10 (95% CI = [1.38, 3.21]), school events, 2.20 (95% CI = [1.48, 3.27]), sexual abuse, 2.05 (95% CI = [1.33, 3.14]), and interaction of domains, 2.80 (95% CI = [1.36, 5.78]) could significantly increase the odds of PYSI.

Among females, except loss events, 1.67 (95% CI = [0.64, 4.35]), all the events could significantly increase the odds of PYSI, from neglect, 4.44 (95% CI = [2.50, 7.89]), to authorities' maltreatment, 2.00 (95% CI = [1.10, 3.63]). However, for males, neglect, 3.06 (95% CI = [1.58, 5.90]), remained the most notable event, followed only by peer victimization, 2.44 (95% CI = [1.27, 4.7]), and emotional abuse, 1.96 (95% CI = [1.02, 3.76]). The results of school authorities' maltreatment, 2.03 (95% CI = [0.91, 4.52]), and lack of love, 1.99 (95% CI = [0.99, 3.98]), were just marginally significant, $p < .10$.

Again, males only showed significant results in caregivers' maltreatment, 2.38 (95% CI = [1.29, 4.38]), and school events, 2.37 (95% CI = [1.27, 4.42]). In contrast, females showed a much higher increased odds for all domains, including caregivers' maltreatment, 4.43 (95% CI = [2.67, 7.38]), and the interaction of domains, 3.86 (95% CI = [1.52, 9.79]). See Table 3 for the complete results of relational ACEs on increasing the odds of PYSI.

mLoFS

Among the total sample, physical abuse, 1.56 (95% CI = [0.90, 2.70]), and loss events, 0.96 (95% CI = [0.41, 2.22]), did not show any significant impact on mLoFS. However, neglect showed the highest increased odds, 3.06 (95% CI = [2.00, 4.68]). Other singular events showed an increased odds from school authority events, 1.55 (95% CI = [1.58, 4.15]), to parental divorce/separation, 2.64 (95% CI = [1.21, 5.77]). Furthermore, domains indicated an increased odds from caregivers' maltreatment, 2.83 (95% CI = [1.95, 4.10]), to household relational dysfunction, 1.63 (95% CI = [1.10, 2.41]). These increased odds of mLoFS were as high as 2.30 (95% CI = [1.11, 4.80]) for the interaction of domains.

Among males, only authorities' maltreatment, 3.78 (95% CI = [1.62, 8.83]), neglect, 3.58 (95% CI = [1.84, 6.95]), lack of love, 2.66 (95% CI = [1.33, 5.35]), and peer victimization, 2.30 (95% CI = [1.21, 4.37]), showed significant increased odds. Although females did not show a significant increase of odds for physical abuse, 1.56 (95% CI = [0.80, 3.05]), and loss events, 1.21 (95% CI = [0.47, 3.15]), the other singular events showed a significant increased odds of mLoFS, the most notable of which was divorce/separation, 4.58 (95% CI = [1.47, 14.27]).

Similarly, there were some gender discrepancies in the impact of domains on mLoFS. in that females displayed a higher increased odds by caregivers' maltreatment, 3.08 (95% CI = [1.90, 4.49]), and household relational dysfunction, 2.04 (95% CI = [1.20. 3.47]). Again, males showed a higher impact from school events, 2.68 (95% CI = [1.45, 4.95]). Sexual abuse increased significantly the odds of mLoFS for both females, 2.14 (95% CI = [1.25, 3.67]), and males, 2.13 (95% CI = [1.02, 4.49]). Finally, contrary to SR and PYSI, the odds of mLoFS was more increased by the interaction of domains for males, 3.45 (95% CI = [0.86, 13.79]), than for their female counterparts, 2.23 (95% CI = [0.90, 5.49]), while both were marginally significant ($p < .10$). See Table 3 for the complete results of relational ACEs on increasing the odds of mLoFS.

The Impact of Cumulative Events

Table 4 presents the impact of cumulative events on increasing the odds of suicide outcomes.

Table 4. Univariate Logistic Regression of Cumulative Events Predicting Suicide Outcomes.

Cumulative events	Total (N = 487)						Male (n = 191)						Female (n = 228)					
	SR (n = 150)		PYSI (n = 181)		LoFS (n = 217)		SR (n = 48)		PYSI (n = 65)		LoFS (n = 80)		SR (n = 98)		PYSI (n = 110)		LoFS (n = 131)	
	Odds	95% CI	Odds	95% CI	Odds	95% CI	Odds	95% CI	Odds	95% CI	Odds	95% CI	Odds	95% CI	Odds	95% CI	Odds	95% CI
No event			Referent (Indicator)						Referent (Indicator)						Referent (Indicator)			
1 or 2	1.86	[0.69, 5.03]	1.87	[0.79, 4.45]	1.88	[0.88, 4.03]	4.75	[0.59, 38.36]	2.20	[0.59, 8.31]	2.25	[0.68, 7.42]	0.96	[0.30, 3.15]	1.39	[0.44, 4.43]	1.48	[0.55, 4.00]
3 or 4	4.92	[1.82, 13.31]	4.20	[1.75, 10.09]	4.08	[1.87, 8.92]	8.08*	[1.00, 65.25]	3.56*	[0.93, 13.58]	3.13*	[0.93, 19.52]	4.37	[1.36, 14.02]	4.91	[1.53, 15.71]	5.00	[1.79, 14.01]
5 or 6	6.75	[2.35, 19.39]	6.77	[2.62, 17.45]	4.10	[1.73, 9.68]	7.60	[0.82, 70.16]	5.15	[1.15, 23.01]	3.64*	[0.91, 14.61]	6.37	[1.86, 21.78]	7.77	[2.26, 26.65]	4.26	[1.42, 12.81]
≥7	11.77	[4.04, 34.01]	10.03	[3.79, 26.53]	8.26	[3.35, 20.37]	19.00	[2.08, 173.72]	5.67	[1.22, 26.33]	14.00	[2.94, 66.66]	10.15	[2.88, 35.84]	13.00	[3.62, 46.64]	6.94	[2.22, 21.78]
No event			Referent (Deference)						Referent (Deference)						Referent (Deference)			
1 or 2	1.86	[0.69, 5.03]	1.87	[0.79, 4.45]	1.88	[0.88, 4.03]	4.75	[0.59, 38.36]	2.20	[0.58, 8.31]	2.25	[0.68, 7.42]	0.96	[0.30, 3.15]	1.39	[0.44, 4.43]	1.48	[0.55, 4.00]
3 or 4	3.61	[1.96, 6.67]	3.07	[1.75, 5.36]	2.97	[1.78, 4.97]	3.71	[1.13, 12.16]	2.40	[1.02, 5.62]	2.08*	[0.94, 4.61]	4.45	[2.09, 9.49]	4.16	[1.97, 8.77]	4.11	[2.06, 8.20]
5 or 6	3.23	[1.75, 5.96]	3.40	[1.89, 6.14]	2.08	[1.17, 3.68]	2.25	[0.69, 7.41]	2.59*	[0.97, 6.91]	1.90	[0.73, 4.96]	3.94	[1.87, 8.32]	4.10	[1.94, 8.65]	2.19	[1.06, 4.49]
≥7	4.20	[2.29, 7.71]	3.72	[2.02, 6.82]	3.49	[1.88, 6.48]	4.60	[1.54, 13.77]	2.25	[0.82, 6.19]	6.23	[1.92, 20.21]	4.46	[2.08, 9.56]	4.82	[2.19, 10.58]	2.93	[1.38, 6.26]

Note. Bold, italic odds with asterisks are significant with $p < .05$. Bold odds are significant with $p < .10$. PYSI = past year suicidal Ideation; SR = suicide risk; LoFS = likelihood of future suicide; 95% CI = 95% confidence interval.

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SR

Compared with *no event*, experiencing three relational ACEs or more could significantly increase the odds of SR for the total sample from 4.92 (95% CI = [1.82, 13.31]) to 11.77 (95% CI = [4.04, 34.01]). Compared with all the above categories, this exacerbating pattern was significantly seen from 3.61 (95% CI = [1.96, 6.67]) to 4.20 (95% CI = [2.29, 7.71]). Splitting the genders, compared with *no event*, ≥7 events showed the most detrimental effect for both females, 10.15 (95% CI = [2.88, 35.84]), and males, 19.00 (95% CI = [2.08, 173.72]). Compared with the above categories, females showed a considerable impact for all categories, mostly for ≥7 events, 4.46 (95% CI = [2.08, 9.56]).

PYSI

In the total sample, compared with *no event*, the odds of PYSI was increased from 4.20 (95% CI = [1.75, 10.09]) to 10.03 (95% CI = [3.79, 26.53]). For females, these increased odds were from 4.91 (95% CI = [1.53, 15.71]) to 13.00 (95% CI = [3.62, 46.64]). For males, however, only two categories of 5/6, 5.15 (95% CI = [1.15, 23.01]), and ≥7 events, 5.67 (95% CI = [1.22, 26.33]), could show significant increased odds. Moreover, compared with the above categories, as the number of events increased, the odds of PYSI showed a significant increase for the total sample, mostly for ≥7 events, 3.72 (95% CI = [2.02, 6.82]). For females, compared with the above categories, the increased odds of mLoFS were also significant for all categories in which ≥7 events showed the highest increased odds, 4.82 (95% CI = [2.19, 10.58]). Males only showed a significant result for 3/4 events, 2.40 (95% CI = [1.02, 5.62]), and the result for 5/6 events was just marginally significant, 2.59 (95% CI = [0.97, 6.91]), *p* < .10.

mLoFS

For the total sample, the cumulative events showed an increase in odds, the highest of which was for ≥7 events, 8.26 (95% CI = [3.35, 20.37]). Compared with the above categories, this rate again was significant with the highest rate for ≥7 events, 3.49 (95% CI = [1.88, 6.48]). For females, such increased odds were also high, notably for ≥7 events, 6.94 (95% CI = [2.22, 21.78]). And, compared with the above categories, this rate remained significant for all categories, with the highest for 3/4 events, 4.11 (95% CI = [2.06, 8.20]). The odds of mLoFS among males were significantly increased only by ≥7 events, 14.0 (95% CI = [2.94, 66.66]), and were marginally significant for

3/4, 3.13 (95% CI = [0.93, 19.52]), and for 5/6 events, 3.64 (95% CI = [0.91, 14.61]), *p* < .10. Compared with the above categories, only ≥7 events showed significant results, 6.23 (95% CI = [1.92, 20.21]), and the impact of 3/4 events was marginally significant, 2.08 (95% CI = [0.94, 4.61]), *p* < .10.

Discussion

The aim of this study was to determine the degree to which the relational ACEs would affect suicide outcomes during early and young adulthood of Iranian university students. Results indicated that the rates of suicide outcomes were fairly considerable as 37.2% of the total sample reported having at least a one-time suicidal ideation during the PYSI, 44.6% reported an mLoFS, and 30.8% indicated an SR. The results replicated the other national findings of the high rate of suicidality among Iranian population (Hassanian-Moghaddam & Zamani, 2017; Kiadaliri, Saadat, Shahnavazi, & Haghparast-Bidgoli, 2014), particularly young people (Hajebi et al., 2017). These rates were markedly higher than the results of some recent meta-analysis studies on medical students with a PYSI of 11.1% (Rotenstein et al., 2016), as well as on worldwide college students with that of 10.6% (Mortier, Cuijpers, et al., 2018). Also, our findings were comparable with those of Pakistani (Khokher & Khan, 2005) and Colombian studies' findings (Zapata Roblyer & Betancourth Zambrano, 2017), with 31.4% and 31% of PYSI, respectively. Moreover, the results of a recent meta-analysis on suicide behavior and risk demonstrated that Asian college students had the highest rate of suicide outcomes than students from other regions (Mortier, Cuijpers, et al., 2018).

In addition, the rates of reported relational ACEs were significant. Emotional abuse affected one fifth to about one third of the sample. In addition, more than two thirds of the students witnessed parental verbal violence, and one fifth of them witnessed physical violence. Moreover, one seventh of them experienced one sort of school harassments (peer victimization and/or authorities' maltreatment), and one fifth of the sample experienced a type of sexual abuse. These results were consistent with other studies carried out on Iranian adolescents indicating high rates of child abuse and neglect (Pirdehghan et al., 2015). Indeed, because the evidence has emphasized the damaging impact of such experiences on health outcomes both during childhood (Ziaei et al., 2017) and later adulthood (Bjorkenstam et al., 2017; Pournaghash-Tehrani, 2011; Pournaghash-Tehrani & Feizabadi, 2009), these high rates of experiencing relational ACEs need to receive more attention from all authorities, policy makers, and stakeholders.

Overall, results indicated that relational ACEs could considerably increase the likelihood of suicide outcomes. Such findings were consistent with other

studies that reported incidents such as bullying (Brunstein Klomek, Sourander, & Gould, 2010), interpersonal violence, and child maltreatment (Castellvi et al., 2017), as well as different types of maltreatment including emotional abuse (Dias de Mattos Souza et al., 2016), could increase the risk of suicidality in later years. Furthermore, this study revealed that both outcomes of PYSI and mLoFS should become the focus of suicide assessments among student sample. In addition, our results indicated that about 4.4% of the sample who did not develop any PYSI reported an mLoFS, meaning that they might commit suicide from *rather unlikely* (scoring 2) to *very likely* (scoring 6) in the future rather than reporting a *never* (scoring 0) or *no chance at all* (scoring 1). To our knowledge, most of the research in the field has not considered this particular outcome. The findings of the present study pertaining to the effects of relational ACEs on the likelihood of future suicide suggest that such a possibility should be considered in future studies. Congruent with previous studies that underlined the effects of ACEs on future suicide (Campos, Besser, & Blatt, 2013; Castellvi et al., 2017; Enns et al., 2006; Mortier et al., 2017), our results show that ACEs do not necessarily predict a suicide-related behavior; rather, they can significantly increase the tendency of students to give a higher score while evaluating the possibility of committing suicide in the future.

The most notable result of the study was the obvious gender discrepancies in the negative impact of relational ACEs on suicide outcomes. Although both genders were subjected to the same degree of relational ACEs, the only difference between men and women was that women witnessed more domestic physical violence, whereas for men it was the school events that were higher. As such, ACEs in women had a stronger impact, both in terms of different types and magnitude on the consequences of suicide outcomes. In addition, males' suicide outcomes were mainly influenced by neglect and both types of school events, whereas females' suicide outcomes were affected by a wider range of events including neglect, divorce/separation, emotional abuse, and lack of love. There was also a significant gender discrepancy pertaining to sexual abuse, in which males showed only an effect of nonphysical events on SR and physical events on mLoFS, but females displayed vulnerability to sexual ACEs, both of which contributed to an increase in all suicide outcomes. Although the results of Rhodes et al. (2011) showed that, in boys, there is a strong link between sexual abuse and suicides, our results pointed out that females in their young adulthood became more influenced by childhood sexual adverse events.

More importantly, our results indicated that experiencing more than 3 events could considerably increase the risk of suicide outcomes. Specifically, this detrimental effect would substantially be escalated when it is increased

to ≥7 events. Consistent with this finding, other studies have also revealed that facing multiple ACEs can not only contribute to developing SR in later years (Bjorkenstam et al., 2017; Enns et al., 2006), but it can also result in the development of health problems in adulthood (Campbell et al., 2016). However, some discrepancies were seen; in females, the more relational ACEs they had, the more vulnerable they were to develop suicide-related behaviors. Specifically, in females, every two additional relational ACEs could significantly increase the likelihood of all suicide outcomes, whereas in males there was a higher threshold (i.e., seven or more relational ACEs) for developing suicide-related behaviors, mostly in terms of SR and mLoFS.

Overall, these different results underscore a clear distinction as to how the types and domains of relational ACEs would distinctly affect different genders. Other studies have also reported similar difference (Baldwin et al., 2018; Dhingra, Boduszek, & Sharratt, 2016; Rhodes et al., 2011), suggesting the need to obtain a gender-specific view to the link between childhood events and outcomes. In this regard, results of a study suggested that females may be more resilient to neurological effects of childhood maltreatment while displaying an increased vulnerability to psychiatric symptoms (Samplin, Ikuta, Malhotra, Szeszko, & Derosse, 2013), which might be due to the brain's circuits cooperating in internalizing disorders (Herringa et al., 2013). To account for our findings, these studies suggested that the way females and males become influenced by their toxic relational environments could be different than each other, partly because of some neurological predispositions. However, any competent explanation of such difference should take into account the social context in which such events were experienced. For example, Iranian female teenagers generally experienced a higher degree of distress symptoms (Javadi, Jourabchi, Shafikhani, & Tajik, 2017), which might become entangled with their higher vulnerability to experience self-degrading feelings of guilt and punishment during depressive moods (Khesht-Masjedi, Shokrgozar, Abdollahi, Golshahi, & Sharif-Ghaziani, 2017). This compromised situation might heighten their willingness to take their own lives, particularly when family relations and interpersonal experiences, instead of being a sanctuary during childhood, became a liability.

It should be noted that the observed consequences may continue to exert their impact from one generation to another. The results of neurological studies on empathy indicate that the emotional problems of the mother can have an epigenetic effect on the brain development of the infant and consequently increase the possibility of future problems for the child. In other words, if the psychological problems of Iranian female students destined to be tomorrow's mothers are not timely and properly addressed, their future offspring will become vulnerable to many problems. This is also applicable to male students

whose empathic bonding with their future children can bestow them with the feelings of happiness and joy as well as regulating negative emotions such as aggression (Schore & McIntosh, 2011). Therefore, the necessary step is the improvement in child legislations that enable the health professionals of the country to report the cases of child abuse and to have the professional skills and knowledge that help them to properly intervene in the situation (Borimnejad & Khoshnavay Fomani, 2015).

The important point is that ACEs are not necessarily correlates of suicide outcomes; rather, they can provide a fertile ground for the development of suicide-related behaviors in the future (Brunstein Klomek et al., 2010). A meta-analysis determined that childhood–adolescent onset of suicidal thought and behavior was more effective on college performance of the students than its postmatriculation onset (Mortier, Auerbach, et al., 2018). Consequently, the fact that relational ACEs lead to developing suicide outcomes could be mediated by the childhood–adolescent onset of suicide-related behaviors in response to such adverse experiences (Ziaei et al., 2017). It is worth mentioning that the efforts to enhance the social awareness about parenting and child-rearing during the past decade in Iranian research and practice (Arabgol, Hakim-Shooshtari, & Panaghi, 2014) could contribute to the subsided rates of relational ACEs and suicide outcomes. However, to eliminate the link between relational ACEs and suicide outcomes, more efforts are needed to promote a healthy relational environment and to encourage the survivors of ACEs to seek professional help. To that end, childhood educational settings should be included in effective interventional programs (Young, Sweeting, & Ellaway, 2011), and universities during later life must take on a more active role in assisting survivors to complete the recovery process.

Finally, our results showed some other discrepancies among ethnic and educational groups. Consistent with some national studies indicating the provincial disparities in suicidality (Nazari Kangavari, Shojaei, & Hashemi Nazari, 2017), our analyses revealed that there was a higher SR among Azari & Turk students (see Note 1). Moreover, students studying humanities and basic sciences also showed a higher risk of SR than those studying engineering. These results bring about a need for future studies to consider the ethnic backgrounds and educational contexts of the young population and to address an array of social and psychological factors affecting the SR of the students (Assari, 2018).

Limitations

The retrospective nature of the study might affect the amount of reported relational ACEs because of possible recall bias. Although the differences in rates of relational ACEs, suicide outcomes, and odds ratios were statistically

evaluated in both genders, the moderation effect of gender in the impact of relational ACEs on suicide outcomes was not statistically analyzed. In addition, some of our results showed a wide CI or a marginally significant result, which mainly could be attributed to sample size. For instance, loss events were only experienced by a relatively few students, resulting in a wide CI including 1, whereas the magnitudes of odds ratio indicated an increased likelihood of suicide outcomes (see Table 3). These results suggested that a higher sample size might yield more fruitful evidence as to the effects of such relational ACEs on suicidality, especially among male students. However, this study was the first investigation into the impact of ACEs on later suicidality among Iranian young adults; as well, employing a multistage sampling method helped to ensure a better representative sample. Regarding our study findings and limitations, further longitudinal studies are suggested to decrease recall bias and investigate later subsequent suicide outcomes. Other studies also are suggested to find how female and male students may become influenced by relational adversities during their childhood and how these ACEs can contribute to their risky behaviors such as nonsuicidal self-injury and suicide attempts (Martin, Dykxhoorn, Afifi, & Colman, 2016).

Conclusion

The study showed that there was a remarkable rate of suicide outcomes in terms of SR, PYSI, and the mLoFS and of experienced relational ACEs among Iranian students. It also indicated that there was a detrimental link between different types and domains, and accumulative risk of relational ACEs to suicide outcomes in early and young adulthood of students, with a more substantial relationship among females. There is a crucial need to implement preventive measures and health promotion programs during both childhood and early adulthood to mitigate the rates of relational ACEs and to avert the suicide-related behaviors.

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Note

1. Azari and Turk people in Iran (Iranian Azerbaijanis) are arguably shared in ethnicity, whose mother tongue is Turkish. To respect the preference of the participants as to whether they may identify themselves as either Azari or Turk, both notions were included in the questionnaire and were reported as such. For the purpose of analysis, however, we added them up together as the second major ethnicity in Iran to yield three comparable ethnic groupings.

Supplemental Material

Supplemental material for this article is available online.

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