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The impact of family violence incidents on personality changes: An examination of social media users' messages in China

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Abstract: Changes in personality tend to be intertwined with life events (e.g., family violence [FV]). This study aimed to examine the personality changes before and after an FV incident using Weibo data. Samples were selected from 1.16 million Weibo users in China who had posted their own FV experience as victims. We used Linguistic Inquiry and Word Count (LIWC) to extract the linguistic features of these unstructured texts as the scores of participants' personality. We built prediction models to measure and compare personality differences between the victim group and control group in Sample 1; and personality changes between the victim group and control group before and after an FV incident in Sample 2. Results showed that the victims' neuroticism increased and conscientiousness decreased after experiencing FV. At the same time, their agreeableness and openness levels were lower than those of the control group. Implications and limitations are also discussed.

Keywords: family violence; machine learning prediction model; online ecological recognition; personality change; Weibo

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The change of personality has been reported to be intertwined with life events (Leikas & Salmelaaro, 2014), such as divorce (Allemand, Hill, & Lehmann, 2015), romantic relationships (Finn, Mitte, & Neyer, 2015), birth (Kandler, Bleidorn, Riemann, Angleitner, & Spinath, 2012), death (Löckenhoff, Terracciano, Patriciu, Eaton, & Costa, 2010), and family violence (Neyer & Lehnart, 2007). These events may have lasting effects on individuals' personalities through modifying, interrupting, or redirecting life trajectories by altering their feelings, thoughts, and behaviors (Bleidorn, Hopwood, & Lucas, 2016b). It is worth noting that the first occurrence of life events may have a more obvious impact. Negative life events, such as facing the death of a spouse (Specht, Egloff, & Schmukle, 2011) and being fired for the first time (Boyce, Wood, Daly, & Sedikides, 2015), show significant impacts on personality compared with the same life events that occur later.

As a typical negative life event, "family violence (FV)" refers to physical, sexual, and psychological violence occurring in the family, which can be categorized explicitly into domestic violence, child abuse, and FV exposure, using physical approaches and non-physical approaches (Yousefabad & Alilou, 2013). It has a significant adverse impact on an individual's life quality, mental wellness (Golding, 1999), and personality changes (Neyer & Lehnart, 2007). Furthermore, the first experience of FV is a

landmark event of potential state changes, as mentioned above (Bleidorn, Hopwood, & Lucas, 2016b). Existing research (Allemand, Gomez, & Jackson, 2010; Lüdtke, Roberts, Trautwein, & Nagy, 2011) measures personality and life events through self-reports in relatively long, fixed time intervals, such as 1 year (Specht et al., 2011) or even longer (e.g., 2 years, Headey & Wearing, 1989; or 3 years, Costa, Herbst, McCrae, & Siegler, 2000), and may compare personality changes between groups with and without specific life events. However, the results are contradictory in explaining the relations between personality and FV. For example, compared with people without FV experiences, abused children scored higher in neuroticism and lower in extraversion (Allen & Lauterbach, 2007), and women who suffered from domestic violence scored higher in neuroticism and lower in both extraversion and conscientiousness (Yousefabad & Alilou, 2013). On the other hand, some studies indicate that neuroticism levels in the FV groups and non-FV groups were initially different before the occurrence of FV (Ogle, Rubin, & Siegler, 2013; Pietri & Bonnet, 2017).

These conflicting results may be due to limitations of existing measures for personality changes. First, some studies may include participants who have had multiple experiences of FV at a measurement interval (Tetzner, Becker, & Baumert, 2016). As research indicates that different changes may occur between a first event and a later event (van Scheppingen, Denissen, Chung, Tambs, & Bleidorn, 2017), changes in personality may be affected by the repetitive occurrence of FV rather than FV itself. Second, previous studies have basically studied the impact of FV by comparing FV groups and non-FV groups (Allen & Lauterbach, 2007; Ogle et al., 2013; Pietri & Bonnet, 2017; Yousefabad & Alilou, 2013). It is difficult to distinguish whether changes in personality are due to the occurrence of FV, or whether these two groups are inherently different. Finally, personality has been assessed with self-reports in most studies, which may be prone to biases that distort conclusions.

To exclude the possible limitations mentioned above, the ideal and direct method is to strictly match the times of personality measurement and first occurrence of FV (Bleidorn, Hopwood, & Lucas, 2016b; Löckenhoff et al., 2010). However, excluding a very few cases (such as a planned a year abroad; Greischel, Noack, & Neyer, 2016), most life events are unpredictable and infrequent, especially adverse life events (e.g., FV). It is almost impossible to conduct a questionnaire-based study that can perfectly match the times of personality measurement and target a life event (Orth & Luciano, 2015).

Weibo, a leading social network in China, provides a new opportunity for tracing back life events and personality changes (Young, Rivers, & Lewis, 2014). People record daily life and share personal feelings in real time on Weibo. As users' expressions reflect their personalities (Gosling, Augustine, Vazire, Holtzman, & Gaddis, 2011), researchers could recognize their personalities from these expressions using online ecological recognition (OER) technology (M. Liu et al., 2018). OER is a social-network-based data-collection method containing participant selection (Zhao, Jiao, Bai, & Zhu, 2016) and psychological feature recognition measured by built predictive models (Daniel et al., 2015; X. Liu, Nie, Bai, Hao, & Zhu, 2015; Youyou, Schwartz, Stillwell, & Kosinski, 2017). Combining the online detection of life events and the online recognition of personality, it is possible to match the timing of the event and the measurement of the personality, which overcomes the limitations of survey methods in fixed intervals.

In order to identify the pattern of personality development and the influences of an FV incident, our study aimed to predict personality changes using social network data related to FV on Weibo. Our findings contribute to understanding the impact of an FV incident on personality changes and have implications in developing programs to mitigate the effects of FV.

Methods

Samples

This study used data obtained from a public data pool containing more than 1.16 million active users' public data (more than 500 posts for each user in the dataset) from Weibo (a Twitter-similar platform in China), including profiles, network behaviors, and posts (Li, Li, Hao, Guan, & Zhu, 2014). Weibo is a leading Chinese social network with more than 550 million active daily users as of March 2020 (Weibo Corporation, 2020). These users share their daily life experiences and interact with each other through Weibo functions (e.g., publish, forward, reply, @function), providing rich data for researchers in human behaviors on social media. The study process followed the privacy and the ethical principles listed by Kosinski, Matz, Gosling, Popov, and Stillwell (2015). The project received ethical

approval from the Institutional Review Board of the Institute of Psychology, Chinese Academy of Sciences (Approval H16003). All data were anonymous.

Sample 1

We sampled the Sample 1_victim group as FV victims based on their self-report of FV victimization on Weibo, including two steps (Figure 1):

1. There were 265,981 FV-related posts from the data pool (Li et al., 2014) that were retrieved using 117 combinations of FV-related words (e.g., "beat me," "curse me," "abuse," and "domestic violence") and personal pronouns (e.g., "wife," "husband," "father," "mother," and "he/she"; see Appendix A for more details).
2. A total of 69 research assistants (RAs) screened the sampled posts and identified real FV posts. They manually checked whether each FV-related post reported a

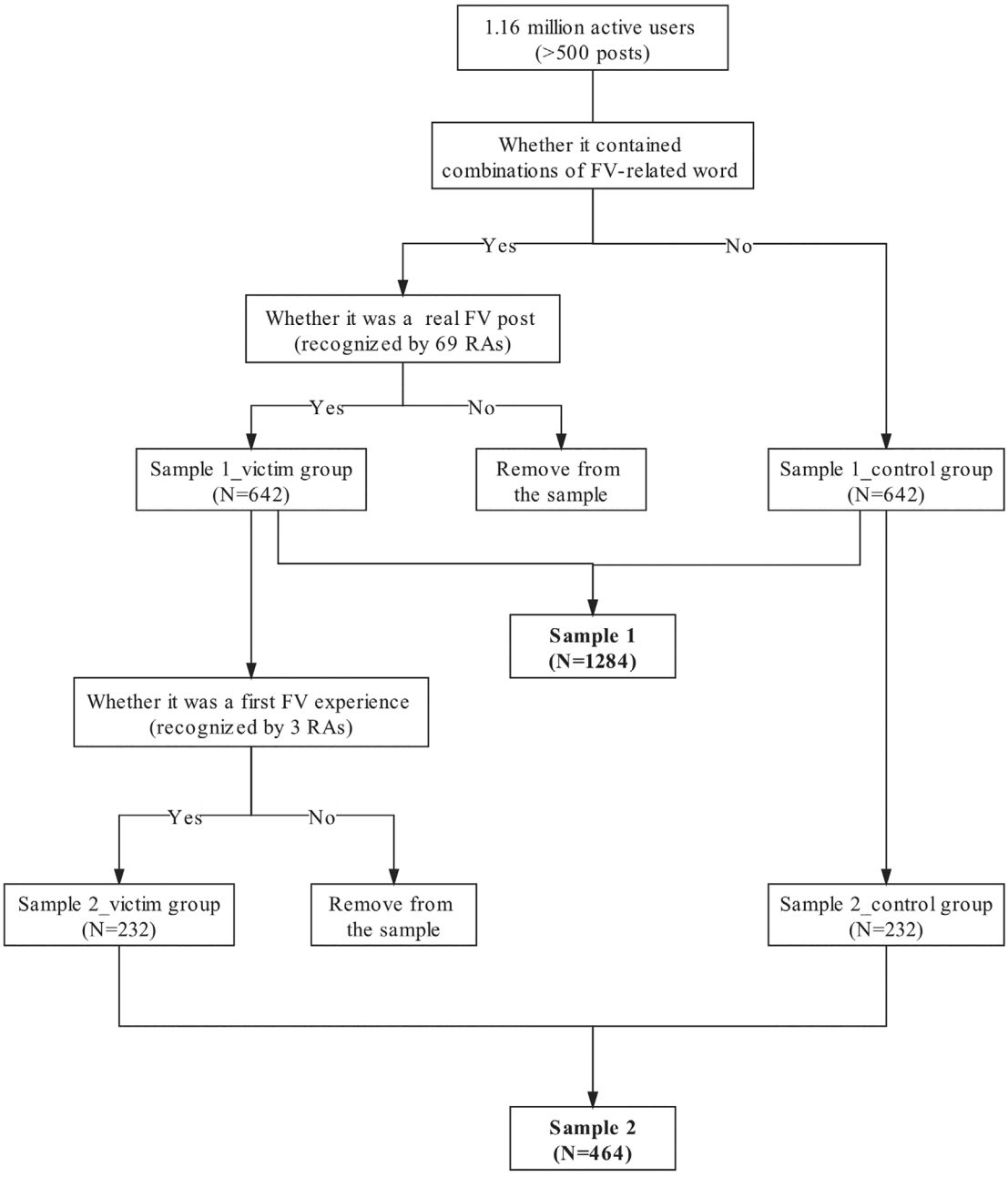

Figure 1. Screening process for Samples 1 and 2. FV = family violence; RAs = research assistants.

real FV case, which meant that it must be a self-revelation post instead of discussing any FV-related news or personal opinions. The RAs also labeled the identified FV cases into three types (domestic violence, child abuse, and FV exposure) and two forms of violence (physical approaches and non-physical approaches), as described in Appendix B. These 69 RAs had completed a training program, including manual coding, content analysis, and FV literature. Then, the RAs were divided into 23 groups (three RAs in each group) to complete the screening and coding work. A real FV post had to be agreed upon by all three RAs in the same group. Finally, a total of 642 victims composed the Sample 1_victim group.

We randomly selected 642 Weibo users who had not hit any FV-related keyword in their posts from the data pool to compose the Sample 1_control group. We matched the control group with the victim group in terms of age, gender, and place of residence.

Sample 2

We selected the FV victims from Sample 1 who had indicated the first FV incident in their lifetime (Figure 1). The inclusion criteria are shown in Appendix C. Three RAs completed the screening for Sample 2. Only victims who were unanimously judged by all three RAs as reporting their first experience of FV were included in the Sample 2_victim group (n = 232).

We selected 232 Weibo users as our Sample 2_control group from the Sample 1_control group following the same sampling method.

Sample comparisons

Sample 1 was used to examine the personality differences between the Sample 1_victim group and the Sample 1_control group. Sample 2 was used to measure the personality changes before and after an FV incident.

Measurement

The personality-assessment model (Gao et al., 2013) acquired the personality scores of the samples. The measurement was consistent with previous studies (Li et al., 2014; M. Liu et al., 2018).

First, we recruited 1766 active Weibo users (60.8% female, 23.66 ± 5.28 years old) from the public data pool from which our samples were taken. These users completed the Big-Five Inventory (John, Donahue, & Kentle, 1991) after providing informed consent, and the raw personality scores were transformed into scores ranging from 0 to 100 (M = 50, SD = 15).

Second, we extracted 99 language features from each user's posts using Linguistic Inquiry and Word Count (LIWC), a transparent text analysis program effectively identifying and analyzing word categories in text (Pennebaker, 2011). Step 2 also included (1) segmenting the posts into word pieces with Language Technology Platform, a Chinese natural language processing system (Gao et al., 2013); and (2) calculating the word frequencies in the 88 psychologically meaningful word categories (e.g., positive emotion words, family words) and 11 basic word-usage categories (e.g., counts of words, counts of words per sentence) via Simplified Chinese Language and Word Count (Zhao et al., 2016). Since some Weibo users might not update their Weibo every day based on the records of users' online behaviors, we built a prediction model according to the weekly feature extraction rather than that daily.

Third, we built linear regression models for each of the five personality traits by the pace regression method to predict the personality scores. Ten-fold cross-validation was conducted to avoid overfitting. The data set was divided into 10 parts at random when training the model; we then took turns to use nine parts to train the model and to predict the remaining one part. This procedure was processed through Weka 3.8.

Data analysis

To evaluate the predictive accuracy of the models, we correlated predicting and self-reported personality scores, which is the general method for testing criterion validity (Piedmont, 2014) and the precision of machine learning models (Gao et al., 2013; Youyou et al., 2017). The correlation coefficients between the predicted scores and self-report questionnaire scores are shown in Table 1. It achieved moderately strong in behavioral science (Cohen, 1988). Meanwhile, test–retest reliability ranked from .77 to .79. Compared to the study of Youyou et al. (2017), the accuracy of our models was a bit higher in the dimensions of agreeableness (r = .30), conscientiousness (r = .32), extraversion (r = .34), and neuroticism (r = .38), but not openness (r = .37).

The five predictive models were then applied to the victim groups and their matched control groups in Samples

Table 1
Criterion Validity of Five Dimensions

Dimensions	*r*	*r* (Youyou et al., 2017)
Agreeableness	.31	.30
Conscientiousness	.42	.32
Extraversion	.40	.34
Openness	.32	.38
Neuroticism	.38	.37

1 and 2 to generate personality scores. We extracted features for each week during the research period and aggregated weekly personality scores indicated from Weibo.

For Sample 1, we calculated each subject's personality scores using their Weibo posts data during the 6 months leading up to April 2, 2017 (sampling time), to compare the personality differences between the Sample 1_victim group and the Sample 1_contol group.

For Sample 2, we calculated the personality scores on the day before the FV had occurred (T-before) using the Weibo posts during the 6 months leading up to the FV, and the personality scores at 6 months after the FV (T-after) using the Weibo posts during the 6 months after the FV, to observe the users' personality changes before and after FV (Figure 2). The FV date was the day when the victim reported their first FV experience on Weibo, supposing that most Weibo users tend to record their life in a timely fashion.

The relationship between personality scores and FV was statistically analyzed through SPSS 22, which is published by IBM, New York, United States.

Results

Demographic details

Demographic details were obtained from self-report profiles on Weibo, which showed that the majority of the victims were female; the median age was 27 years in Sample 1 and 26 years in Sample 2 (Table 2).

Personality changes

Sample 1

In general, there were differences between the Sample 1_victim group and Sample 1_control group (Table 3), especially regarding agreeableness, $t(1,282) = 7.071$, $p < .001$, $d = 0.39$, 95% confidence interval (CI) = [1.80, 3.18], conscientiousness, $t(1,282) = 5.351$, $p < .001$, $d = 0.30$, 95% CI [1.52, 3.27], and neuroticism, $t(1,282) = -7.268$, $p < .001$, $d = 0.41$, 95% CI [−4.17, −2.40]. Compared with the control group, FV victims scored lower in agreeableness ($M = 56.65$, $SD = 6.37$) and conscientiousness ($M = 47.36$, $SD = 8.73$), but higher in neuroticism ($M = 55.95$, $SD = 7.67$).

Personality differences between the victim group and control group were similar among different FV types

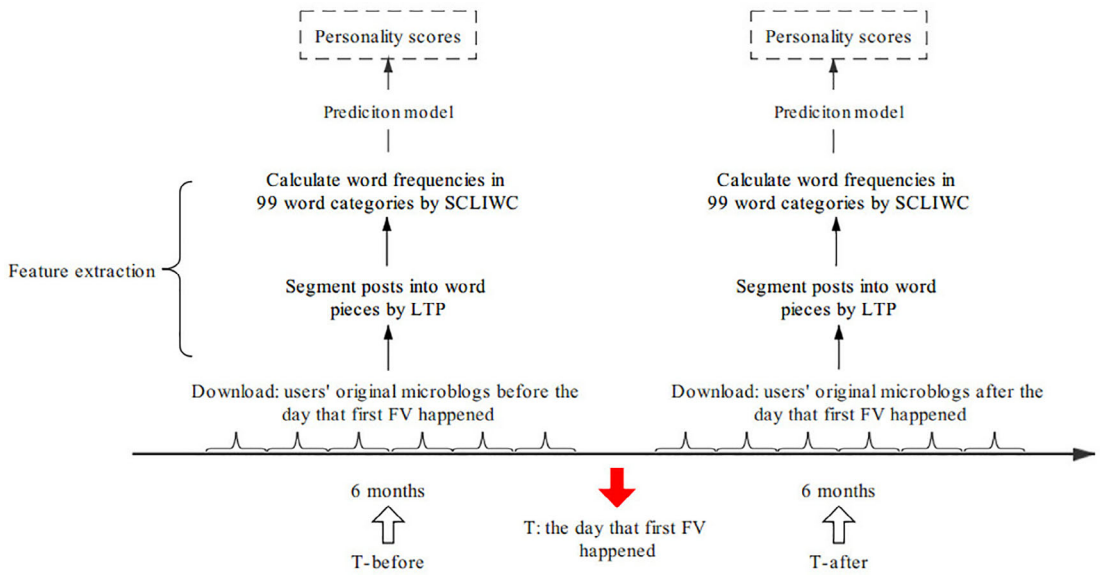

Figure 2. Procedures of personality predicted by dynamic features for Sample 2. *Note*. SCLIWC = Simplified Chinese Language and Word Count; LTP = Language Technology Platform; FV = family violence.

Table 2
Demographic Characteristics of the Sample of Family Violence Victims on Sina Weibo

		Sample 1 (n = 642) n (%)	Sample 2 (n = 232) n (%)
Gender	Male	250 (39)	54 (23)
	Female	392 (61)	179 (77)
Age (years)	<10	6 (1)	6 (3)
	10–20	99 (15)	69 (30)
	20–30	92 (14)	20 (9)
	30–40	103 (16)	11 (5)
	>40	6 (1)	2 (1)
	Missing data	336 (53)	124 (52)

Table 3
Personality Differences Between Victim Group and Control Group: Sample 1

	Victim group		Control group				
	M	*SD*	*M*	*SD*	*df*	*t*	*p*
Agreeableness	56.65	6.37	59.13	6.23	1,282	7.071	**.000*****
Conscientiousness	47.36	8.73	49.75	7.22	1,282	5.351	**.000*****
Extraversion	47.06	9.67	46.53	9.67	1,282	−0.979	.328
Openness	51.91	10.13	52.67	9.81	1,282	1.352	.177
Neuroticism	55.95	7.67	52.66	8.49	1,282	−7.268	**.000*****

*** $p < .001$.

(Table 4): domestic violence (n = 116, 89% female), child abuse (n = 411, 55% female), and FV exposure (n = 115, 55% female); and violence by physical approaches (n = 509, 64% female) and non-physical approaches (n = 133, 50% female).

Victims scored significantly lower on agreeableness when they had experienced domestic violence, $t(230) = -4.361$, $p < .001$, $d = 0.57$, 95% CI [−5.69, −2.15], and child abuse, $t(820) = -6.132$, $p < .001$, $d = 0.43$, 95% CI [−3.49, −1.80], and when abuse was conducted through both physical, $t(1015) = -6.088$, $p < .001$, $d = 0.38$, 95% CI [−3.20, −1.64], and non-physical approaches, $t(264) = -3.629$, $p < .001$, $d = 0.45$, 95% CI [−4.23, −1.25] (Figure 3A). Lower conscientiousness scores were found in victims who had experienced child abuse, $t(820) = -4.822$, $p < .001$, $d = 0.34$, 95% CI [−3.96, −1.67], FV exposure, $t(227) = -2.042$, $p = .042$, $d = 0.27$, 95% CI [−3.85, −0.07], and FV by both physical, $t(1015) = -4.670$, $p < .001$, $d = 0.29$, 95% CI [−3.43, −1.40], and non-physical approaches, $t(264) = -2.670$, $p = .008$, $d = 0.33$, 95% CI [−4.03, −0.61] (Figure 3B). Extraversion scores showed no significant differences in all five dimensions between different types of violence and the control group (Figure 3C). Significantly lower openness was found in domestic violence victims, $t(230) = -2.367$, $p = .019$, $d = 0.31$, 95% CI [−5.40, −0.49], and non-physical violence victims, $t(264) = -2.457$, $p = .015$, $d = 0.30$, 95% CI [−4.83, −0.53] (Figure 3D). In addition, victims scored higher in neuroticism in all five types of FV: domestic violence, $t(230) = 3.712$, $p < .001$, $d = 0.49$, 95% CI [2.17, 7.08]; child abuse, $t(820) = 5.515$, $p < .001$, $d = 0.33$, 95% CI [2.01, 4.23]; FV exposure, $t(227) = 3.011$, $p = .003$, $d = 0.40$, 95% CI [0.87, 4.16]; physical violence, $t(1015) = 6.108$, $p < .001$, $d = 0.38$, 95% CI [2.15, 4.18]; and non-physical violence, $t(264) = 4.118$, $p < .001$, $d = 0.50$, 95% CI [1.95, 5.51] (Figure 3E).

Sample 2

We further explored personality changes before and after FV in Sample 2. Repeated-measures analysis of variance was conducted with time (T-before vs. T-after) as the within-group variable and group (victim group vs. control group) as the between-group variable.

Personality was generally stable in our study period, as no main effect of time was found (Table 5). The main effects of group were observed for lower agreeableness, $F(1, 462) = 12.546$, $p < .001$, $\eta^2 = .026$, 95% CI [1.29, 4.50], and openness, $F(1, 462) = 7.625$, $p = .006$, $\eta^2 = .016$, 95% CI [0.93, 5.52], in the victims. The

Table 4
Personality Differences of Different Types Between Victim Group and Control Group: Sample 1

	Victim group		Control group				
	M	*SD*	*M*	*SD*	*df*	*t*	*p*
Agreeableness							
Domestic violence	55.42	7.93	59.34	5.54	230	−4.361	**.000*****
Child abuse	56.62	5.94	59.27	6.41	820	−6.132	**.000*****
FV exposure	57.97	5.87	58.45	6.24	227	−0.595	.552
Physical violence	56.73	6.34	59.15	6.35	1015	−6.088	**.000*****
Non-physical violence	56.34	6.50	59.08	5.79	264	−3.629	**.000*****
Conscientiousness							
Domestic violence	48.87	7.25	50.21	7.33	230	−1.395	.164
Child abuse	46.61	9.30	49.42	7.29	820	−4.822	**.000*****
FV exposure	48.49	7.66	50.45	6.83	227	−2.042	**.042***
Physical violence	47.24	9.23	49.66	7.11	1015	−4.670	**.000*****
Non-physical violence	47.78	6.49	50.10	7.64	264	−2.670	**.008****
Extraversion							
Domestic violence	45.86	9.24	47.08	7.57	230	−1.106	.270
Child abuse	47.60	10.13	46.35	10.41	820	1.751	.080
FV exposure	46.33	8.24	46.63	8.81	227	−0.266	.791
Physical violence	47.26	10.05	46.45	10.14	1015	1.282	.200
Non-physical violence	46.29	8.05	46.85	7.62	264	−0.574	.567
Openness							
Domestic violence	49.98	10.41	52.93	8.45	230	−2.367	**.019***
Child abuse	52.28	10.58	52.41	10.34	820	−0.175	.862
FV exposure	52.56	7.72	53.33	9.13	227	−0.685	.494
Physical violence	52.36	10.26	52.61	10.16	1015	−0.386	.700
Non-physical violence	50.22	9.44	52.90	8.33	264	−2.457	**.015***
Neuroticism							
Domestic violence	56.51	9.47	51.89	9.50	230	3.712	**.000*****
Child abuse	56.00	7.65	52.88	8.55	820	5.515	**.000*****
FV exposure	55.16	5.37	52.65	7.13	227	3.011	**.003****
Physical violence	56.01	7.71	52.84	8.79	1015	6.108	**.000*****
Non-physical violence	55.72	7.56	51.99	7.21	264	4.118	**.000*****

* $p < .05$, ** $p < .01$, *** $p < .001$.

Time × Group interaction was significant for conscientiousness, $F(1, 462) = 3.959$, $p = .047$, $\eta^2 = .008$, and neuroticism, $F(1, 462) = 17.272$, $p < .001$, $\eta^2 = .036$. A further simple effect analysis found that conscientiousness of FV victims significantly decreased after FV, $F(1, 462) = 16.260$, $p < .001$, $\eta^2 = .034$, 95% CI [1.78, 5.15], while neuroticism of FV victims significantly increased after FV, $F(1, 462) = 26.280$, $p < .001$, $\eta^2 = .054$, 95% CI [2.96, 6.65].

A further simple effect analysis found that conscientiousness of FV victims significantly decreased after FV, $F(1, 462) = 16.260$, $p < .001$, $\eta^2 = .034$, 95% CI [1.78, 5.15] (Figure 4B), while neuroticism of FV victims significantly increased after FV, $F(1, 462) = 26.280$, $p < .001$, $\eta^2 = .054$, 95% CI [2.96, 6.65] (Figure 4E). In contrast, the control group changed slightly in the opposite direction (Figure 4). The *p* values had been adjusted by Bonferroni correction.

We also examined personality changes among different FV types (Table 6). Considering that three-way interaction (Time × Group × FV types) is not significant in five dimensions and that the sample sizes of different FV types varied greatly, we conducted a two-way analysis. No significant main effect or interaction effect was observed among victims after they experienced domestic violence ($n = 41$, 89% female), FV exposure ($n = 41$, 61% female), or non-physical violence ($n = 40$, 50% female), except for a main effect of group on neuroticism among the FV exposure group, $F(1, 80) = 4.841$, $p = .031$, $\eta^2 = .057$, 95% CI [0.40, 8.00], and non-physical violence group, $F(1, 78) = 4.244$, $p = .043$, $\eta^2 = .052$, 95% CI [0.13, 7.53].

Victims who had suffered child abuse ($n = 150$, 66% female) showed an interaction effect of conscientiousness, $F(1, 298) = 5.382$, $p = .021$, $\eta^2 = .018$, and neuroticism, $F(1, 298) = 10.706$, $p = .001$, $\eta^2 = .035$. A further simple

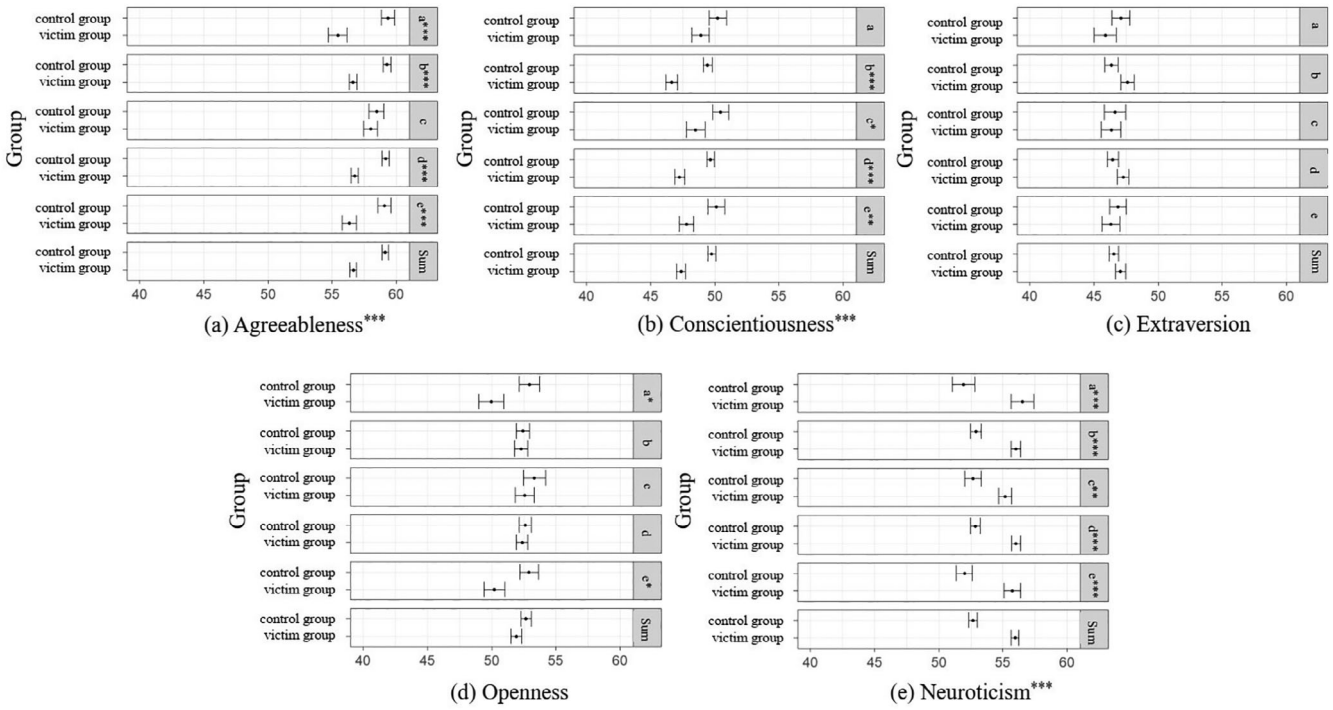

Figure 3. Average scores of each dimension of the Big-Five Personality. *Note*. Comparison of control group with victims from (A) domestic violence, (B) child abuse, (C) FV exposure; and of (D) physical violence, (E) non-physical violence. *$p < .05$, **$p < .01$, ***$p < .001$, with error bar represents standard error.

Table 5
Personality Traits of Victim Group and Control Group Before and After Family Violence: Sample 2

	Victim group				Control group						
	T-before		T-after		T-before		T-after				
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	F_{Time}	F_{Group}	$F_{Time \times Group}$
Agreeableness	55.33	11.25	55.23	9.09	57.59	12.89	58.76	9.07	0.915	**12.546*****	1.256
Conscientiousness	48.88	11.21	47.43	9.65	50.19	12.12	50.90	8.83	0.474	**8.581****	**3.959***
Extraversion	49.33	15.40	49.41	13.72	48.44	15.33	48.51	13.20	0.008	.000	0.723
Openness	50.54	16.17	49.68	14.21	53.41	16.30	53.26	12.52	0.478	**7.625****	0.230
Neuroticism	53.43	12.33	56.87	9.93	53.39	10.68	52.07	10.25	3.426	**8.585****	**17.272*****

Note. T-before represents the predicted personality of the day before family violence (FV) and T-after represents the predicted personality of 6 months after FV. *F* values of repeated-measures analysis of variance are represented by F_{Time}, F_{Group} and $F_{Time \times Group}$.
* $p < .05$, ** $p < .01$, *** $p < .001$.

effect analysis found that victims showed decreased conscientiousness, $F(1, 298) = 16.980$, $p < .001$, $\eta^2 = .054$, 95% CI [2.14, 6.04], and increased neuroticism, $F(1, 298) = 14.219$, $p < .001$, $\eta^2 = .046$, 95% CI [2.03, 6.45], after child abuse compared with the control group. Besides, there was a main effect of group on agreeableness, $F(1, 298) = 6.646$, $p = .01$, $\eta^2 = .022$, 95% CI [0.60, 4.46].

Significant interaction effects were found when assessing conscientiousness, $F(1, 382) = 3.986$, $p = .47$, $\eta^2 = .010$, and neuroticism, $F(1, 382) = 14.881$, $p < .001$, $\eta^2 = .037$, among the victim group of physical violence ($n = 192$, 73% female). A further simple effect analysis found that victims showed decreased conscientiousness, $F(1, 382) = 11.615$, $p = .001$, $\eta^2 = .030$, 95% CI [1.33, 5.00], and increased neuroticism, $F(1, 382) = 19.473$, $p < .001$, $\eta^2 = .049$, 95% CI [2.57, 6.69], after physical violence compared with the control group. In addition, there was a main effect of group on agreeableness, $F(1, 382) = 12.444$, $p < .001$, $\eta^2 = .032$, 95% CI [1.41, 5.00], and openness, $F(1, 382) = 6.043$, $p = .014$, $\eta^2 = .016$, 95% CI [0.63, 5.66].

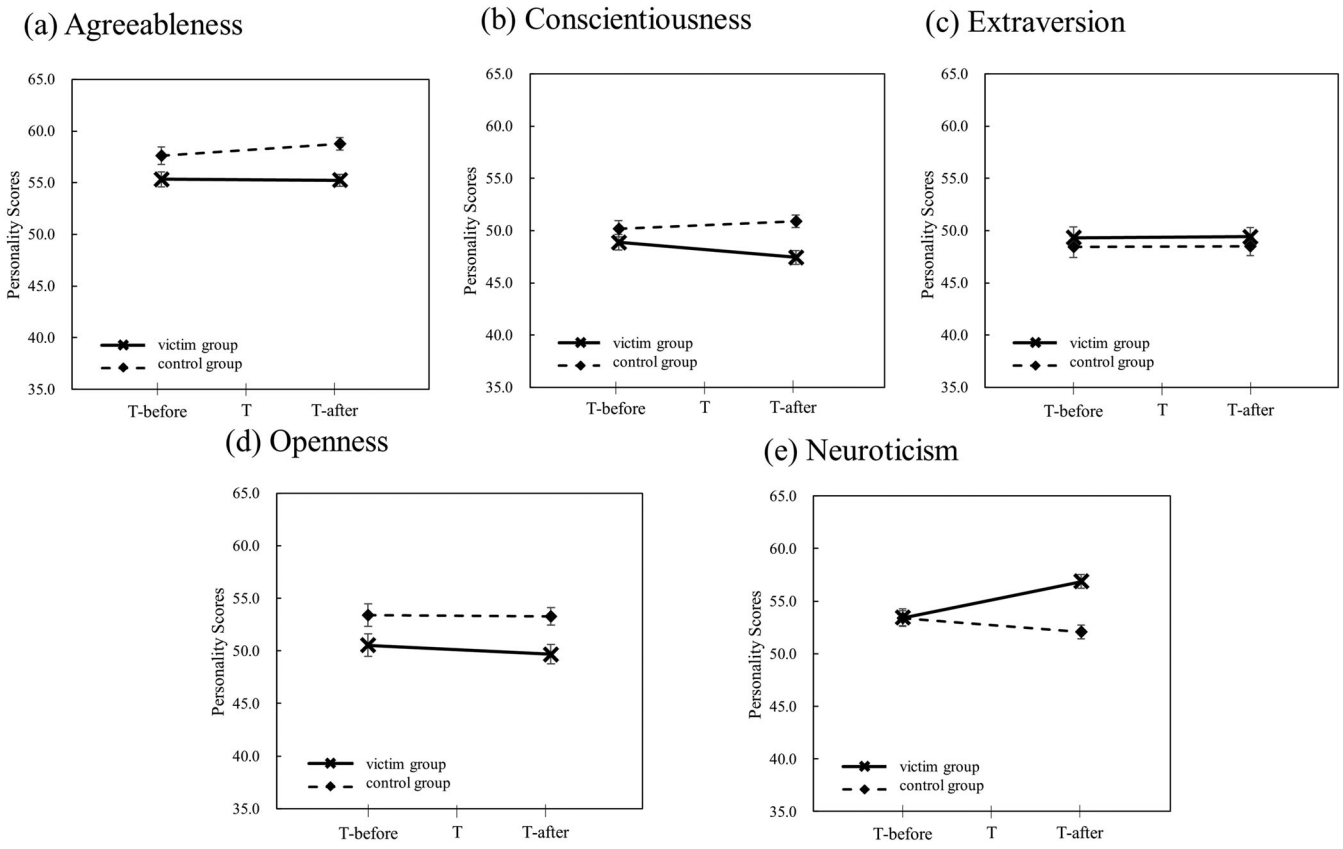

Figure 4. Mean-level change of personality scores after the family violence (FV) event. *Note.* (A) Agreeableness, (B) Conscientiousness, (C) Extraversion, (D) Openness, and (E) Neuroticism. The error bar represents standard error. T-before represents the period before first FV experience, T represents the time point when the first FV happened, T-after represents the period after first FV experience.

Discussion

In this study, we used online ecological recognition (OER) to measure personality differences between the victim group and the control group in Sample 1; and personality changes between the victim group and the control group before and after an FV incident in Sample 2. Results show that conscientiousness and neuroticism changed after FV, while agreeableness and openness might have been originally different before FV. It may help to learn the pattern of personality development and the influences of FV.

Sample 1 FV victims showed relatively lower agreeableness and conscientiousness and higher neuroticism. Similar personality differences were observed among the different types of violence. Results were consistent with previous results, indicating that after experiencing FV, victims were worse at dealing with interpersonal relationships (Graziano, Jensen-Campbell, & Hair, 1996); less organized, concentrated, and persevering (Hugh, 1988); and more nervous, fearful, and emotional (Goldberg, 1992).

Furthermore, we observed post-event differences in conscientiousness and neuroticism in Sample 2. The significant personality changes in conscientiousness and neuroticism among victims who suffered child abuse and physical aggression show similar patterns. Previous studies have found that people who experience adverse life events show an increase in neuroticism (Boals, Southard-Dobbs, & Blumenthal, 2015; Lüdtke et al., 2011). Similar bidirectional effects were found for conscientiousness regarding family-related life events (e.g., the birth of the first child, divorce; Bleidorn, Buyukcan-Tetik, et al., 2016a; Specht et al., 2011). This study measured personality changes and occurrence of FV using Weibo data instead of the fixed-interval measurement, and it indicates that these changes might result from impacts of FV on personality.

Agreeableness and openness were lower among victims before FV. They do not show significant change after FV in Sample 2, which might imply pre-existing differences. Previous studies have shown that low agreeableness significantly predicts being a target of bullying in the workplace

Table 6
Personality Traits of Different Types of Victim Group and Control Group Before and After Family Violence: Sample 2

	Victim group				Control group						
	T-before		T-after		T-before		T-after				
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	F_{Time}	F_{Group}	$F_{Time \times Group}$
Agreeableness											
Domestic violence	54.76	9.25	54.96	7.84	57.00	9.82	58.31	8.65	.533	2.764	.291
Child abuse	55.94	10.99	55.39	9.14	57.66	13.50	58.74	8.08	.131	**6.646***	1.234
FV exposure	53.64	13.81	54.93	10.22	57.91	13.35	59.40	8.79	.914	3.222	.000
Physical violence	55.58	11.41	55.35	9.24	57.91	13.35	59.40	8.79	.958	**12.444*****	1.778
Non-physical violence	54.11	10.49	54.66	8.41	56.03	10.42	55.72	9.87	.011	.624	.148
Conscientiousness											
Domestic violence	48.60	10.78	48.00	10.10	51.12	10.96	49.64	7.58	1.096	1.126	.199
Child abuse	48.74	11.64	47.22	9.37	49.89	12.17	51.31	7.74	.007	**6.617***	**5.382***
FV exposure	49.68	10.17	47.66	10.38	50.14	12.60	51.09	8.87	.252	.917	.432
Physical violence	49.47	9.98	47.95	9.18	50.14	12.60	51.09	8.87	.260	**5.077***	**3.986***
Non-physical violence	46.07	15.70	44.95	11.45	50.46	9.63	49.96	8.67	.636	3.817	.093
Extraversion											
Domestic violence	51.98	15.49	49.47	13.95	48.44	13.59	47.26	11.78	1.107	1.335	.143
Child abuse	49.69	14.52	50.25	13.54	47.85	16.34	48.67	13.18	.453	1.686	.016
FV exposure	45.36	17.87	46.29	14.05	48.50	16.18	48.65	13.28	.013	2.727	.280
Physical violence	49.28	15.95	49.72	13.74	48.50	16.18	48.65	13.28	.097	.608	.024
Non-physical violence	49.56	12.57	47.93	13.69	48.16	10.53	47.84	12.92	.328	.133	.147
Openness											
Domestic violence	51.28	13.43	50.98	11.36	53.92	10.89	51.93	9.53	.618	.761	.340
Child abuse	51.19	16.77	49.68	14.48	52.68	17.07	53.67	13.09	.075	3.284	1.747
FV exposure	47.43	16.45	48.35	15.91	53.51	16.80	53.78	12.80	.447	2.192	.024
Physical violence	50.93	15.79	50.08	14.05	53.51	16.80	53.78	12.80	.120	**6.043***	.454
Non-physical violence	48.69	18.01	47.74	15.00	52.93	13.83	50.72	10.91	.988	1.588	.157
Neuroticism											
Domestic violence	55.39	9.60	57.41	9.87	54.28	11.01	52.56	8.61	.019	2.534	2.943
Child abuse	52.54	13.49	56.66	9.88	53.20	11.38	52.43	9.58	**4.999***	2.881	**10.706****
FV exposure	54.74	9.95	57.09	10.39	53.39	10.76	51.69	10.40	1.516	**4.841***	3.786
Physical violence	53.02	12.59	56.32	10.16	53.39	10.76	51.69	10.40	.043	**5.375***	**14.881*****
Non-physical violence	55.41	10.91	59.53	8.32	53.38	10.41	53.90	9.44	3.937	**4.244***	2.387

Note. T-before represents the predicted personality of the day before FV and T-after represents the predicted personality 6 months after FV. *F* values of repeated-measures analysis of variance are represented by F_{Time}, F_{Group} and $F_{Time \times Group}$. FV = family violence.
* $p < .05$, ** $p < .01$, *** $p < .001$.

(Lind, Glasø, Pallesen, & Einarsen, 2009) and that openness contributes to intimate relationship satisfaction (McCrae & Sutin, 2009). The results for different types of FV also indicate pre-existing differences in agreeableness among victims who have suffered child abuse and in openness among victims who have experienced FV by physical approaches.

Our findings attempt to accurately match the first experience of FV and personality measurement for understanding the relationships between them. It may help us to understand the personality development caused by life events (Brandt, Mike, & Jackson, 2019). After learning which life events may bring personality changes, we can further study the characteristics of these events and the mechanisms of changes (Wrzus & Neyer, 2016). Furthermore, this research will make it possible to assess the true impacts of life events and manage to prevent or mitigate the adverse effects of life events (Jonkmann, Thoemmes, Lüdtke, & Trautwein, 2013).

The current study highlights the OER method's application value due to its ability to measure psychological status retrospectively. With the popularity of recording daily life on social media, OER may help researchers find individuals with rare, unpredictable experiences. More importantly, it provides the possibility to conduct "psychological measurements" on a past specific time point, which extends researchers' ability into the range where other methods have failed. The accuracies of the manually selected victim samples and the model-predicted personality scores may not equal some traditional methods (Kern et al., 2014), such as questionnaires; however, this approach may still provide additional insight when traditional methods are restricted.

Our study had several limitations. First, we did not analyze the impact of demographic characteristics on the transition of participants' personalities after FV incidences had occurred due to the limitation of Weibo source data. Second, the generalizability of our conclusion remains to be validated since we only analyzed posts from the Weibo users who posted their FV experience on Weibo. Third, the relatively small and unbalanced sample size of FV victims in this study may hinder further findings of significant differences among possible important personality types of FV victims. Future studies should investigate the effects of different FV types through using a larger sample size and balancing the sample size of each FV type. Fourth, since we measured personality changes through the mean of the personality score distribution for 6 months, it may reflect personality state changes in this study. Personality trait changes might be measured after a longer interval in further study. Finally, the study only measured personality twice over a 6-month interval, and it may miss some changes after FV incident. One study shows that personality changes are supposed to be non-linear (Lüdtke et al., 2011). Multiple, longer follow-ups would be helpful in future studies to portray the long-term picture of personality changes after multiple FV incidents.

Conclusion

Results show that FV incident is associated with personality changes using Weibo users' self-revelation posts about FV. The study finds that conscientiousness and neuroticism changed after the first FV incident in their lifetime. Pre-event differences in agreeableness and openness suggest pre-existing differences. We contribute to the literature for better understanding the relationship between FV as special life events and personality changes. The OER approach also shows potential in psychological research based on the accumulating social media data.

Disclosure of conflict of interest

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

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APPENDIX A: KEY WORDS FOR RETRIEVING FV-RELATED POSTS

No.	Keywords	No.	Keywords	No.	Keywords
1	FV + husband	40	neglect + husband	79	beat me + husband
2	FV + hubby	41	neglect + hubby	80	beat me + hubby
3	FV + wife	42	neglect + wife	81	beat me + wife
4	FV + wifey	43	neglect + wifey	82	beat me + wifey
5	FV + father	44	neglect + father	83	beat me + father
6	FV + mother	45	neglect + mother	84	beat me + mother
7	FV + mom	46	neglect + mom	85	beat me + mom
8	FV + dad	47	neglect + dad	86	beat me + dad
9	FV + he/she	48	neglect + he/she	87	beat me + he/she
10	FV + you	49	neglect + you	88	beat me + you
11	FV + child	50	neglect + child	89	beat me + child
12	FV + son	51	neglect + son	90	beat me + son
13	FV + daughter	52	neglect + daughter	91	beat me + daughter
14	Family violence + husband	53	quarrel + husband	92	abuse + husband
15	Family violence + hubby	54	quarrel + hubby	93	abuse + hubby
16	Family violence + wife	55	quarrel + wife	94	abuse + wife
17	Family violence + wifey	56	quarrel + wifey	95	abuse + wifey
18	Family violence + father	57	quarrel + father	96	abuse + father
19	Family violence + mother	58	quarrel + mother	97	abuse + mother
20	Family violence + mom	59	quarrel + mom	98	abuse + mom
21	Family violence + dad	60	quarrel + dad	99	abuse + dad
22	Family violence + he/she	61	quarrel + he/she	100	abuse + he/she
23	Family violence + you	62	quarrel + you	101	abuse + you
24	Family violence + child	63	quarrel + child	102	abuse + child
25	Family violence + son	64	quarrel + son	103	abuse + son
26	Family violence + daughter	65	quarrel + daughter	104	abuse + daughter
27	mental abuse + husband	66	scold + husband	105	bruise + husband
28	mental abuse + hubby	67	scold + hubby	106	bruise + hubby
29	mental abuse + wife	68	scold + wife	107	bruise + wife
30	mental abuse + wifey	69	scold + wifey	108	bruise + wifey
31	mental abuse + father	70	scold + father	109	bruise + father
32	mental abuse + mother	71	scold + mother	110	bruise + mother
33	mental abuse + mom	72	scold + mom	111	bruise + mom
34	mental abuse + dad	73	scold + dad	112	bruise + dad
35	mental abuse + he/she	74	scold + he/she	113	bruise + he/she
36	mental abuse + you	75	scold + you	114	bruise + you
37	mental abuse + child	76	scold + child	115	bruise + child
38	mental abuse + son	77	scold + son	116	bruise + son
39	mental abuse + daughter	78	scold + daughter	117	bruise + daughter

APPENDIX B: TYPES OF FV*

Types	Definition and examples
Sources of violence	
Domestic violence	"Domestic violence" refers to FV between a husband and wife or cohabiting couples.[a] We coded the posts as intimate partner violence when any types of violence occurred in all kinds of intimate partner relationships, such as current or former spouses, boyfriends and girlfriends, or dating partners. Example: "Domestic violence! [tears]. You abused me since I have just married you."
Child abuse	"Child abuse" refers to FV in which minors are abused by their parents, including beatings and insults.[b] We coded the posts as parent violence when the posts were posted by a child victim themself or the posters clearly declared their own child abuse experiences from their parents or other caretakers, such as kicking, cursing, burning, or biting. Example: "My father was drunk again, but this time he hit me."
FV exposure	"FV exposure" refers to witnessing domestic violence between family members, such as FV against one's mother by one's father, or FV against one's sibling(s) by one's parent(s). We coded posts as exposure to FV when they contained content about witnessing FV among family members, such as witnessing/hearing the fight, or identifying the effects of physical abuse. Example: "I was scared when I saw my father beating my mother."
Types of violence	
Physical approaches	"Physical approaches" refers to physically abusive FV. We coded the existence of physical abuse when the posts included, but were not limited to, words such as pushing, biting, choking, slapping, hitting, scratching, punching, or use of any weapon or things against the partner. Example: "I have got beaten up during the Spring Festival by a man I never thought I'd be hit by in my life."
Non-physical approaches	"Non-physical approaches" refers to non-physically abusive FV. We coded the existence of non-physical abuse when the posts described the occurrence of verbal abuse, emotional abuse, economic abuse, sexual abuse, and so on. Example: "I want to divorce! He is out with other women and I did not say anything. But I cannot stand that he abuses me!"

Note. FV = family violence

*Cited from M. Liu et al. (2018). Using social media to explore the consequences of domestic violence on mental health.

[a]Centers for Disease Control and Prevention (2017).

[b]Children's Bureau (2017).

APPENDIX C: CRITERIA OF THE FIRST FV*

	Criteria	Counts	%
1	Clearly state that it is the first FV experience in the post Example: "My father was drunk again, but this time he hit me. It was the first time he hit me. I do not understand why you did that. What are you angry about? … I'll be somebody someday!!!"	72	31
2	State FV as an unimaginable event and clearly express the feeling of shock, etc. Example: "I have got beaten up during the Spring Festival by a man I never thought I'd be hit by in my life. I will not call him dad anymore!!"	44	19
3	Clearly state that he/she has never experienced FV before this incident. Example: "I chose to speak out, but she forced me home for fear that the neighbors might know the truth. Yes, my biological father, who never hit me or even yelled at me, hit me on account of my stepmother."	36	15
4	Emphasize that FV really happened, even though the victim never thought that FV would happen to them. Example: "Yesterday, domestic violence happened indeed. I was depressed for a long time. Each family has its own problems. When my father got drunk, domestic violence did happen."	33	14
5	Clearly state that he/she has never suffered FV in the family of origin until married. Example: "Domestic violence! [tears]. You abused me since I have just married you. My father has not even beaten me during the past twenty years. I will always remember what you did to me today."	21	9
6	Clearly state strong hatred for the first FV experience and unforgiveness. Example: "My heart is frozen from the moment you hit me. I will never come into that house and call you mother again. I hate you. I'll never forget the harm that you gave me."	14	6
7	Clearly state that he/she will tolerate only for the first FV, but never allow it to happen again. Example: "This time, I endure… You hit me when you were drunk just because I was here? Next time, if there is a next time, I will not endure it, even if you seek help from my mother."	13	6

*Cited from M. Liu et al. (2018). Using social media to explore the consequences of domestic violence on mental health.