

The Moral Injury, PTSD, and Suicidal Behaviors in Health Professionals 1 Year After the COVID-19 Pandemic Peak in China

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Abstract

Background

Moral injury among healthcare workers received considerable attention in China during the COVID-19 pandemic as a predictor of poor mental health outcomes. This study explored the relationship between moral injury, PTSD, and suicidal behaviors approximately 1 year after the pandemic peaked in this country.

Methods

An online survey was conducted from March 27 to April 26, 2021, across mainland China. A total of 3,465 health professionals completed the Chinese version of the Moral Injury Symptoms Scale-Health Professional (MISS-HP), Suicidal Behaviors Questionnaire-Revised (SBQ-R), and PTSD Checklist for DSM-5 (PCL-5). Unconditional logistic regression modeling was used to examine the association between these variables.

Results

The prevalence of PTSD and suicidal behavior among health professionals were 26.9% and 24.2%, respectively. The MISS-HP was positively correlated with PCL-5 ($r = 0.43$) and SBQ-R ($r = 0.24$) scores. Logistic regression revealed that MI was associated with a higher likelihood of PTSD (OR = 3.52, 95% CI: 3.01–4.13) and of suicidal behaviors (OR = 2.13, 95% CI: 1.81–2.50) after controlling for socio-demographical variables.

Conclusions

Moral injury symptoms were associated with a higher risk of PTSD and more suicidal behaviors among health professionals 1 year after the peak of the COVID-19 pandemic. The findings underscore the importance of identifying and treating the moral injury as one way to manage PTSD and suicidal behaviors among health professionals during the post-pandemic period.

Background

Moral injury (MI), the psychological consequences of transgressing moral values or witnessing such transgressions, has been increasingly recognized among a range of occupations (military personnel, health care workers, first responders, etc.) [1]. Anyone caught in a life-or-death or otherwise high-stakes situation with no good choices can suffer from MI. Other than in military personnel [2], MI among health professionals has attracted considerable attention in recent years [3]. Global health crises, such as the COVID-19 pandemic, have confronted healthcare professionals with increased exposure to potentially

morally injurious events (PMIEs) [4, 5]. Under difficult circumstances, frontline healthcare workers have been forced to make medical decisions that have moral significance, which in some cases has resulted in a loss of trust by patients and painful feelings about themselves and their jobs [6, 7]. In addition, health professionals have had to risk their own lives and that of their families due to exposure to sometimes fatal infectious diseases such as SARS and COVID-19. This has placed them under considerable fear and extreme stress, increasing the risk of developing posttraumatic stress disorder (PTSD) [8]. Studies have found that SARS was a traumatic experience for many healthcare providers and emergency room staff who developed PTSD as a result [9]. Such symptoms continued to be evident at least several years after the crisis [10]. A study of frontline UK health care workers reported a 22% prevalence of PTSD during the first wave of the pandemic [11], and another study found a 56% prevalence of PTSD among Spanish health workers during the early stage of the pandemic [12].

Physician suicide is another topic of growing professional and public health concern [13]. Public health crises may worsen suicide rates as one of the adverse mental health outcomes among the general population as well as in health professionals. A meta-analysis that pooled 54 studies found increased rates for suicidal ideation, attempts, and self-harm [14]. One study reported an increased suicide rate in Japan one month after the COVID-19 pandemic had peaked [15]. Increased suicide was also found in Wuhan city early in the pandemic [16]. However, only a few studies have examined suicidal behaviors among health professionals [17, 18], if any during the COVID-19 pandemic.

The association between MI and PTSD has been examined in many different subgroups over the past decade. For example, adolescent refugees with high levels of moral injury have reported significantly higher PTSD symptoms [19]. Likewise, studies in military/veterans have repeatedly found MI associated with adverse outcomes such as suicide and PTSD [20–22]. Combined PTSD and MI have also been associated with a significantly higher risk for suicidal behaviors [23]. Although a large number of studies have examined the effect of the public health crises on the mental health of health professionals [24], gaps still need to be addressed. The long-term adverse outcomes such as suicidal behaviors and potential triggers (moral injury) among health professionals have not received much attention. To our knowledge, no study has yet explored the relationship between MI, PTSD, and suicidal behaviors among health professionals in China nearly one year after the peak of the COVID-19 pandemic when the virus had largely become controlled (providing some indication of the sustained effects of MI on the mental health of health professionals caused by this public health crisis). The present study sought to do exactly that.

Methods

Participants and Procedure

Health professionals (physicians and nurses) who had at least two years of hospital work experience in mainland China were eligible to participate. The exclusion criteria were: (1) having a six month or longer break in work duties due to any reason in the past two years; (2) unable to access the internet or other

mobile device due to the vision or other disability that prevented completion of the online questionnaire; and (3) those without a current active license (in primary health care offices, some physicians may not have yet passed the medical qualifications exam for licensure).

Due to the risk of infection, traditional face-to-face interviews were not employed (even though the pandemic was largely under control). The questionnaire was administered via an online survey platform (WenJuanXing, <https://www.wjx.cn/app/survey.aspx>) from March 27th to April 26th, 2021. A draft version of the questionnaire was first administered to 11 physicians from two hospitals for pre-testing. These physicians were asked to send comments about the ease of access to the online questionnaire, clarity of wording, and time burden. Necessary changes in language and technical settings were then made based on the consensus of researchers to arrive at the final version of the electronic questionnaire.

A letter with a link to the online questionnaire was sent to potential participants through social media (includes WeChat, QQ, and email list) inviting them to complete the survey; those who responded to the invitation were encouraged to forward the invitation letter to their colleagues and post it on their social media networks. A small amount of money (approximately one US dollar) was offered for their time. The survey was available in both Smartphone and Windows applications and was developed following guidelines from the Checklist for Reporting Results of Internet E-Surveys (CHERRIES) [25].

As shown in Fig. 1, there were a total of 15,976 potential participants (documented based on an automated record from the survey platform) who were invited to participate. Of those individuals, 4,025 responded to the invitation (25.2%) and completed the online questionnaire; of those, 4,017 completed the questionnaire. Finally, 552 participants met the exclusion criteria resulting in a final sample of 3,465 participants.

Measures

Sociodemographic Characteristics

Information was collected on age, gender, marital status, educational attainment, ethnicity (Chinese Han vs. minority ethnicity), work area (general medical ward, ICU/emergency room), physician or nurse status, length in practice, and exposure to patients with COVID-19.

Moral Injury

MI was assessed using the 10-item Chinese version of the Moral Injury Symptoms Scale-Health Professional (MISS-HP)[26]. This measure assesses ten dimensions of MI: betrayal, guilt, shame, moral concerns, loss of trust, loss of meaning, difficulty forgiving, self-condemnation, faith struggle, and loss of faith[27]. Response options for each of the ten items range from 1 to 10, indicating agreement or disagreement, resulting in a total score ranging from 10 to 100, with higher scores indicating more severe

MI symptoms. The Chinese version of MISS-HP is a well-validated instrument applicable to health professionals with a Cronbach's alpha of 0.71; a test-retest coefficient of 0.77; and a cutoff value of 50 that is indicative of significant MI symptoms[26]. The Cronbach's alpha in the present sample was 0.72.

Suicidal Behaviors

The 4-item Suicidal Behaviors Questionnaire-Revised (SBQ-R) was used to assess four different aspects of suicidal behavior: lifetime suicide ideation and suicide attempts; frequency of suicide ideation over the past twelve months; threats of a suicide attempt; and the likelihood of suicidal behavior in the future. The total score ranges from 3 to 18, with a recommended cut-off score of ≥ 7 for high risk of suicide[28]. The Chinese version of the SBQ-R has been shown to have acceptable psychometric properties [29]. In this study, the Cronbach alpha for the SBQ-R was 0.80.

PTSD

A short-form PTSD Checklist for DSM-5 (PCL-5-SF) was used to assess the symptoms of PTSD[30]. The four-item version of the scale has acceptable convergent and discriminant validity compared with the full 20-item PCL-5. Each item is scored from 0 to 4 (not at all, a little bit, moderately, quite a bit, extremely) resulting in a total score ranging from 0 to 16; a cut-off score of 6 is indicative of clinically significant PTSD symptoms. The Chinese version of the PCL-5-SF has acceptable psychometric properties [31]. In this study, the Cronbach alpha of the PCL-5-SF was 0.90.

Statistical Analyses

Descriptive statistics were performed by calculating means, standard deviations (SD), and proportions. The correlation between moral injury, PTSD, and suicidal behaviors was examined using Pearson's correlation. The chi-square test was used to test the prevalence of clinically significant PTSD and suicidal behavior, and their association with the categorical variables of gender, final academical degree, etc. Unconditional logistic regression model was employed to test the association after controlling for covariates. Odds ratios (OR) with 95% confidence intervals (95% CIs) were calculated under the IBM SPSS 23.0. The alpha level for statistical significant was set at 0.05.

Results

Socio-demographical Characteristics

Participants' ages ranged from 20 to 67 years with an average age of 35.8 (SD = 8.3) years (Table 1). The average length in practice was 12.8 years (SD = 8.8), ranging from 2 to 49 years. About a quarter of the participants were male (24.6%), and most were married (75.4%). The final sample consisted of 1,549 (44.7%) nurses and 1,916 (55.3%) physicians. A small number of participants (10.1%) worked in the ICU

or emergency room. Most participants were from western China. Most participants indicated no religious affiliation (90.5%). Most participants were not involved in the care of COVID-19 patients (86.7%), although 13.3% were so involved. Slightly over a quarter of participants reported significant PTSD symptoms (26.9%) and 24.2% reported significant suicidal behaviors. Over one-third of participants suffered from moral injury.

Table 1
Socio-demographical characteristics of participants (n = 3,465)

Variable	n (%)	Mean ± SD
Gender, Male	853(24.6)	
Marital status		
unmarried	734(21.2)	
married	2,614(75.4)	
divorced/widow	117(3.4)	
Ethnicity (minorities)	648(18.7)	
Nurse/physician (nurse)	1,549(44.7)	
Work area		
ICU/emergency	351(10.1)	
Other	3,114(89.9)	
Area		
East	801(23.1)	
Middle	270(7.8)	
West	2,394(69.1)	
Final academic degree		
Bachelor	2,812(81.2)	
Master	541(15.6)	
Ph.D	112(3.2)	
Religion		
No	3,136(90.5)	
Christian/Catholic	24(0.7)	
Buddhist/Taoist	94(2.7)	
Islam	211(6.1)	
*Dir COVID care, yes	462(13.3)	
PTSD, yes	931(26.9)	
Suicidal behaviors, yes	840(24.2)	

Variable	n (%)	Mean ± SD
Moral injury, yes	1,270(36.7)	
Age, years		35.8 ± 8.3
Length of practice, years		12.8 ± 8.8
<i>Note.*Directly provided care to COVID-19 patients</i>		

Bivariate Correlations

Moral injury (MISS-HP score) positively correlated with PTSD ($r = 0.43$) and suicidal behaviors ($r = 0.24$), and PTSD was positively correlated with suicidal behaviors (0.42) (Table 2). Those who were male and those who worked in the ICU or emergency room had a higher prevalence of MI. Similarly, those who are male, middle-aged, and work in the ICU or emergency room had a higher prevalence of PTSD. Those who were middle-aged, divorced/widow, or whose occupation was nursing had a higher prevalence of suicidal behaviors. Participants with MI had a higher prevalence of PTSD (43.3%) and suicidal behaviors(33.1%) (Table 3).

Table 2
Bivariate correlations (n = 3,465)

	M (SD)	1	2	3	4	5
1.MISS-HP	45.9(11.3)	1				
2.PCL-5-SF	4.0 (3.6)	0.429*	1			
3.SBQ-R	5.0 (2.8)	0.239*	0.417*	1		
4. Age	35.8 (8.3)	0.006	-0.009	-0.022	1	
5. TIP	12.8 (8.8)	0.002	-0.025	-0.019	0.941*	1
M: mean; SD: standard deviation; *P < 0.05, **P < 0.01						
MISS-HP: moral injury symptoms scale-health professional; PCL-5-SF: 4-item PTSD Checklist for DSM-5; SBQ-R: Suicidal Behaviors Questionnaire-Revised; TIP: time in practice;						

Table 3
The bivariate associations between moral injury, PTSD, and suicidal behavior

Variable		N	Moral injury n(%)	PTSD n(%)	Suicidal behavior n(%)
Age group	≤ 30	1108	391(35.3)	278(25.1) *	266(24.0) *
	30–40	1501	581(38.7)	442(29.4)	400(26.6)
	40–50	623	221(35.5)	159(25.5)	129(20.7)
	≥ 50	233	77(33.0)	52(22.3)	45(19.3)
Gender	Male	853	366(42.9) *	281(32.9) *	190(22.3)
	Female	2612	904(34.6)	650(24.9)	650(24.9)
Marital status	unmarried	734	258(35.1)	188(25.6)	204(27.8) *
	married	2614	967(37.0)	701(26.8)	603(23.1)
	div/wid	117	45(38.5)	42(35.9)	33(28.2)
Ethnicity	Han	2817	1016(36.1)	742(26.3)	701(24.9)
	minorities	648	254(39.2)	189(29.2)	139(21.5)
Nurse/physician	nurse	1549	558(36.0)	406(26.2)	409(26.4) *
	physician	1916	712(37.2)	525(27.4)	431(22.5)
Work area	ICU/emerg	351	158(45.0) *	125(35.6) *	91(25.9)
	Other	3114	1112(35.7)	806(25.9)	749(24.1)
FAD	Bachelor	2812	1036(36.8)	736(26.2)	691(24.6)
	Master	541	191(35.3)	158(29.2)	116(21.4)
	Ph.D	112	43(38.4)	37(33.0)	33(29.5)
Area	East	801	249(31.1) *	176(22.0) *	190(23.7)
	Middle	270	105(38.9)	77(28.5)	69(25.6)
	West	2394	916(38.3)	678(28.3)	581(24.3)
Religion	No	3136	1139(36.3)	819(26.1) *	753(24.0)
	Chri/Cath	24	8(33.3)	5(20.8)	6(25.0)
	Budd/Tao	94	42(44.7)	33(35.1)	29(30.9)
	Islam	211	81(38.4)	74(35.1)	52(24.6)

Variable		N	Moral injury n(%)	PTSD n(%)	Suicidal behavior n(%)
TIP (years)	≤ 5	827	290(35.1)	215(26.0)	191(23.1)
	5–10	608	225(37.0)	162(26.6)	153(25.2)
	≥ 10	2030	755(37.2)	554(27.3)	496(24.4)
Dir COVID care	no	3003	1115(37.1)	813(27.1)	732(24.4)
	yes	462	155(33.5)	118(25.5)	108(23.4)
PTSD	no	2534	720(28.4) *	–	416(16.4) *
	yes	931	550(59.1)	–	424(45.5)
Moral injury	no	2195	–	381(17.4) *	419(19.9) *
	yes	1270	–	550(43.3)	421(33.1)
Suicidal behavior	no	2625	849(32.3) *	507(19.3) *	–
	yes	840	421(50.1)	424(50.5)	–
*chi-square test P < 0.05;					
Dir COVID care : Directly provided care to COVID-19 patients; FAD: final academic degree; Chri/Cath: Christian/Catholic; Budd/Tao:Buddhist/Taoist; div/wid: divorced/widow; TIP: time in practice;					

Table 4. Multivariate analyses of PTSD and suicidal behaviors

Variable	PTSD		Suicidal behavior	
	OR (95%CI)	<i>P</i>	OR (95%CI)	<i>P</i>
Age group				
≤ 30	1.00	--	1.00	--
30-40	1.19(0.90,1.57)	0.214	1.17(0.89,1.55)	0.259
40-50	0.98(0.68,1.40)	0.905	0.87(0.61,1.25)	0.443
≥50	0.83(0.53,1.29)	0.402	0.79(0.51,1.25)	0.326
Male	1.44(1.18,1.76)	<0.001	0.87(0.71,1.07)	0.201
Marital status				
Unmarried	1.00	--	1.00	--
Married	0.99(0.78,1.26)	0.953	0.68(0.54,0.85)	0.001
Div/wid	1.76(1.09,2.81)	0.020	0.92(0.57,1.48)	0.717
Minorities	0.89(0.77,1.25)	0.983	0.72(0.56,0.93)	0.011
Physician	0.87(0.71,1.06)	0.174	0.86(0.70,1.04)	0.123
ICU/Emer	1.42(1.11,1.83)	0.005	0.99(0.76,1.29)	0.955
Final academic degree				
Bachelor	1.00	--	1.00	--
Master	1.25(0.98,1.59)	0.062	0.93(0.72,1.19)	0.547
Ph.D	1.41(0.91,2.19)	0.126	1.45(0.93,2.24)	0.098
Religion				
No	1.00	--	1.00	--
Chri/Cath	0.77(0.27,2.16)	0.617	1.07(0.42,2.75)	0.889
Budd/Tao	1.50(0.95,2.37)	0.079	1.34(0.85,2.11)	0.211
Islam	1.59(1.09,2.31)	0.017	1.48(0.99,2.21)	0.058
Length on practice				
≤ 5 year	1.00	--	1.00	--
5-10 year	0.99(0.75,1.31)	0.956	1.16(0.88,1.54)	0.288
≥10 year	1.04(0.76,1.42)	0.812	1.27(0.93,1.73)	0.135
Dir COVID	1.01(0.84,1.35)	0.595	0.99(0.78,1.26)	0.931

Moral injury	3.52(3.01,4.13)	⊠0.001	2.13(1.81,2.50)	⊠0.001
Div/wid: divorced/widow; Dir COVID⊠Directly provided care to COVID-19 patients; FAD: final academic degree; Chri/Cath: Christian/Catholic; Budd/Tao:Buddhist/Taoist;				

Multivariate Logistic Regression

As shown in **Table 4**, males, who worked in ICU or emergency room, and indicate an Islamic religious affiliation had a higher risk of PTSD symptoms. MI was strongly associated with a higher risk of PTSD (OR = 3.52, 95% CI = 3.01–4.13) after controlling for socio-demographical variables. Those who were married and indicated a minority ethnicity were less likely to score high on suicidal behaviors, while MI was associated with a greater risk of suicidal behaviors (OR = 2.13 (95% CI = 1.81–2.50).

Discussion

Individuals who experience a life-or-death or otherwise high-stakes situation without good options can be at risk for MI. This study found that over one-third of the health professionals reported suffering significant MI symptoms. Studies have found that MI has been associated with several adverse mental health outcomes and lower quality of health care (including increased medical errors) [32]. The prevalence in the study post-pandemic is lower than in a study conducted during the early stage of the pandemic when healthcare resources were extremely limited and the number of positive cases increasing rapidly[33]. In addition, the present study found that one of four health professionals scored in the clinically significant range of the PCL-5 indicating PTSD, even after one year following the control of COVID-19 in China. These findings are consistent with previous studies indicating that the stress of the COVID-19 pandemic served as a traumatic event for health professionals directly involved in the pandemic in Wuhan, China where the overall prevalence of PTSD was 31.6% [34].

We also found that 24.2% of health professionals reported a high risk of suicidal behaviors (attempt, ideation, and the likelihood of suicidal behavior in the future). As mentioned, studies indicate an increased risk of suicide among nurses and physicians [17, 18]. However, to our knowledge, this is the first epidemiological study to report on the prevalence suicidal behaviors among Chinese health professionals after the year 2020 when most of the country was locked down as a public health intervention. The findings in the present study suggest that the impact of the pandemic on the mental health of health professionals may be long-term. Therefore, suicide prevention efforts should be considered in the rebuilding of the health system in the post-pandemic era.

While moral injury is not currently considered a mental disorder, previous studies have found that it co-exists with several mental health disorders in military personnel, such as PTSD, depression, substance use, and suicidal ideation [21, 23, 35]. This was also found in the present study where moral injury was

strongly associated with a higher risk of PTSD (OR = 3.52) and suicidal behaviors (OR = 2.13) after controlling for socio-demographical variables. These findings are also similar to a study in refugees residing in Switzerland, where MI accounted for 16% of the variance in PTSD symptoms [36]. Moral injury has been shown to be a separate syndrome from PTSD and other emotional disorders [37]. The core symptoms of moral injury are guilt, shame, moral concerns, feelings of betrayal, loss of meaning and trust, difficulty forgiving, and religious or spiritual struggles [38]. Both psychological and spiritual interventions are available that target moral injury and are shown to be also effective in reducing PTSD symptoms among current or former military personnel [39].

The present findings provide preliminary evidence supporting the call to screen for significant MI symptoms among health professionals, particularly those working in the ICU or emergency room, those with negative life experiences (divorced, widowed), and males in China. As noted above, interventions for MI have been shown to be quite successful in other occupations (specifically, the military).

Limitations

Several aspects of the present study limit the generalizability of the findings here. First, this was a cross-sectional study of health professionals that prevents making causal inferences. Prospective studies will be needed to determine whether MI symptoms increase the risk of PTSD and suicidal behaviors or vice-versa, or whether the effects are bi-directional in nature. Second, the non-random sampling design requires caution when generalizing to service members in other areas of China and health professionals outside of China. Finally, like all self-report measures, the accuracy of responses cannot be guaranteed since external factors may influence the report of symptoms (even though the survey was anonymous).

Conclusions

Moral injury, PTSD, and suicidal behaviors are prevalent among health professionals one year after the pandemic was contained in mainland China. Moral injury was associated with a higher risk of significant PTSD symptoms and suicidal behaviors among this group of health professionals. The findings provide preliminary evidence to support efforts to identify MI symptoms and develop interventions to address them in attempts to reduce the risk of PTSD and suicidal behaviors in health professionals during the period after control of the COVID-19 pandemic has been achieved.

Abbreviations

MI: moral injury; PTSD: post-traumatic stress disorder; MISS-HP: Moral Injury Symptoms Scale-health professional; OR: Odds ratio; 95%CI: 95% confidence intervals; PCL-5: PTSD Checklist for DSM-5; SD: standard deviation; SBQ-R: Suicidal Behaviors Questionnaire-Revised;

Declarations

Ethics approval and consent to participate

The survey was anonymous. The potential risks and benefits of the anonymous survey were described in the invitation letter. Online informed consent was obtained by asking participants to check a box on the device's screen with the response (I agree to participate in the study, or I do not agree to participate in the survey). If the answer was "I do not agree", the survey was immediately terminated automatically. The institutional review board of the Ningxia Medical University approved the study (approval #2020-112). We confirm that all methods were carried out in accordance with relevant guidelines and regulations.

Consent for publication

Not apply

Availability of Data and Materials

The datasets generated and/or analysed during the current study are not publicly available due to the institutional restriction but are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

Study concept and design: ZW, HK; acquisition of subjects and data collection: JW, JL, XS, and WM; analysis and interpretation of data: all authors; preparation of the manuscript: WM, HK, ZW; revision of the manuscript for critical intellectual content: ZW, HK. All authors have read and approved the manuscript.

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Figures

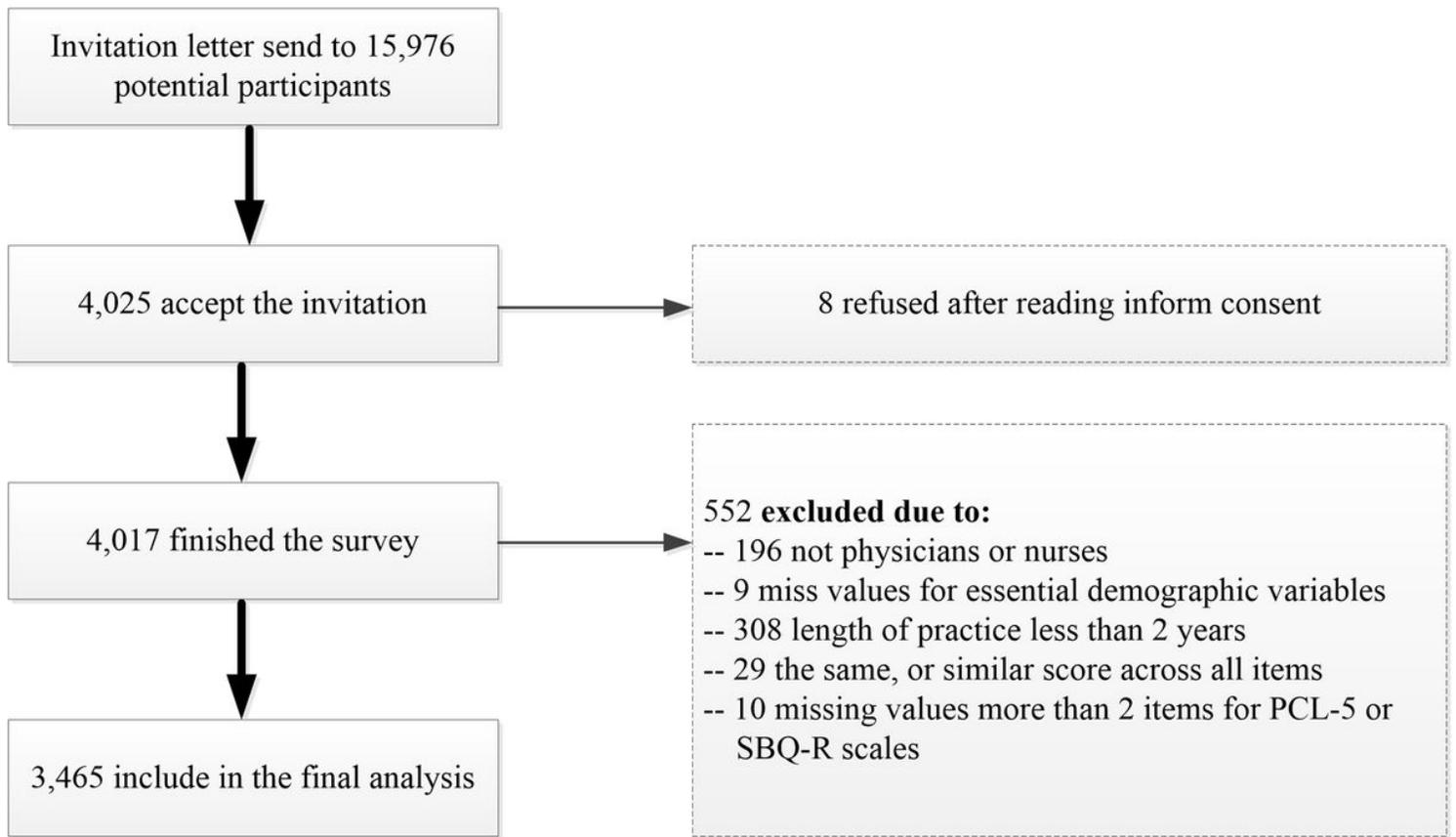


Figure 1

Flowchart of the participant enrollment(PCL-5-SF: 4-item PTSD Checklist for DSM-5; SBQ-R: Suicidal Behaviors Questionnaire-Revised)