

表7 少年施設男性入所者における性行為の強要被害体験と現在の性嗜好の関係

	性行為の強要被害あり		df	X ²	
	n=25 (+)	n=245 (-)			
露出症	0.0%	0.9%	1	0.2	
フェティシズム	36.0%	16.7%	1	5.6*	
窃触症	8.0%	0.9%	1	7.6**	
小児性愛	0.0%	0.0%	1	-	
性的マゾヒズム	4.0%	0.0%	1	9.4**	
性的サディズム	16.0%	5.6%	1	4.0*	
服装倒錯	0.0%	0.9%	1	0.2	
窃視症	8.0%	0.9%	1	7.6**	
獣愛	0.0%	0.0%	1	-	
性体験	女性とのみ性体験あり	75.0%	82.3%	3	41.3***
	男性とのみ性体験あり	4.2%	0.0%		
	両性とも性体験あり	16.7%	0.4%		
	性体験なし	4.2%	17.3%		

* p<0.05, ** p<0.001, *** p<0.001

「性器を触られる」が最も多く、次いで「口腔性交を強要される」「相手の性器を触らされる」「性交（肛門性交を含む）」という順であった。

では、性被害体験を男女間で比較した場合、その重症度には何からの相違があるのでしょうか？

筆者らは、男性性被害者の臨床的特徴を明らかにするために、女性性被害者との比較も行っている。すなわち、少年施設入所者における性行為の強要被害体験のある男性25名を、同じく少年施設入所者における性行為の強要被害体験のある女性17名とのあいだで、自殺関連行動および抑うつ・解離に加えて、自身の性被害体験に関する日本語版 IES-R (Impact of Event Scale Revised) 2 得点の比較も試みた (表6)。すると、男女間で年齢に関して有意差が認められたものの、自己切傷、あるいは自殺念慮や自殺企図の経験率、および、IES-R, K10, ADES の各得点に関しては、全く差が認められず、IES-R 平均得点は、男女いずれの性被害体験者の場合も、PTSD のカットオフである 25 点²⁾ を超える高得点であった。

以上の結果は、男性の性被害体験が、その精神保健的問題の重篤さにおいて、女性のそれよりも軽症であるとはいえないことを意味している。

V. 男性性被害者の性的嗜好

性被害に遭遇した男性は、その後の性嗜好に何

らかの影響を受けるのであろうか？ 筆者らは、少年施設男子入所者全員に対する性的嗜好に関する質問の回答を、性被害体験の有無によって比較する、という分析も試みている (表7)。その結果、表から明らかなように、性行為の強要被害のある者では、自らがフェティシズム、窃触症、性的マゾヒズム、性的サディズム、窃視症などに該当すると回答した者が有意に多く認められた。また、性体験に関しては、性体験の経験者、ならびに、両性と性体験を持ったことがあると回答した者が多かった。

この結果をどのように解釈すればよいであろうか？ まず、男性性被害者に比較的多く見られた両性愛傾向については、そもそも性被害体験の加害者が男性であったために、結果的に両性愛ともとれる回答となったものも少なくないであろう。ただし、性被害を受けた男性は、自分なりに被害体験を合理化するために「自分は同性愛者なのだ」と思いこんでいたり、自身の性的同一性に混乱を来したりする者がまれではないという指摘もあり⁷⁾、結果の解釈には慎重を要する。

それでは、性的マゾヒズムや性的サディズム、あるいはフェティシズム、窃触症や窃視症といった性的嗜好に関しては、どう考えるべきであろうか？ もちろん、これらはあくまでも正常範囲内の「性的嗜好」であり、その結果に、しばしば重

篤な性犯罪に結びつく小児性愛が含まれていない以上、目くじらを立てる必要はないのかもしれない。しかし、窃触症や窃視症についていえば、十分に犯罪を構成する行動であり、藤岡⁵⁾が指摘する、強姦殺人や快樂殺人へと至る、進行性の性加害行為スペクトラムにおいては、窃触症や窃視症は最も軽症の極に位置する性加害行為であり、また、性的サディズムは強姦の心理的背景を準備する性的嗜好である。

このように考えると、我々の調査結果は、被害と加害の連鎖という観点からきわめて興味深い知見といえる。男性性被害の研究においては、「性的虐待を受けた男児は、他人に性的虐待をくりかえす」という神話——宮地²¹⁾によれば、「吸血鬼神話」と呼ぶそうである——は、一応否定されている。その根拠としてしばしば引用されるのが、Lisak¹⁵⁾による米国における調査結果——性的加害者の8割に被害歴があるが、被害者のうちで加害に回るのは2割にすぎない——である。けれども裏を返せば、Lisakの指摘は、少数とはいえ一部の被害者は確実に加害者となっていることを意味している。現に杉山と海野²⁷⁾も、性被害を受けた男児の加害行動を報告するなかで、「被虐待児が加害者となって虐待状況を反復することで自らが受けた衝撃を緩衝する」というマスターリーという現象に言及している。

ちなみに、性被害を受けながら性加害者になった者とならなかった者とは、一体何が異なるのであろうか？ 宮地²¹⁾は、被害者が加害者になるかどうかの分岐点は、「被害体験を誰に話すことができ、その話を相手に信じてもらい、支援を受けることができるかどうかにある」と述べている。

VI. 性被害体験は男性の反社会性を促進するのか？

ここまで、筆者自身が行った少年施設や高校での調査にもとづいて、男性における性被害体験と自殺関連行動や非行や性加害行為との関係について論じてきた。もちろん、これらの結果をもって、「性被害体験があらゆる反社会的行動の原因である」などと結論するつもりはない。事実、海外の

研究では、性被害体験と攻撃的行動との関連を肯定する研究⁴⁾もあれば、身体的虐待とネグレクトが暴力犯罪と関連することは認めても、性的虐待との関連については否定的な研究¹⁹⁾もある。また、そもそも、反社会的集団への所属自体が、様々な被害のリスクを高める可能性があり、トラウマは非行・犯罪の原因ではなく結果である、という反論もありえよう。

けれども、いくつかの先行研究^{15,21,27)}は「被害と加害の連鎖」という現象を支持しておける。たとえば、養育者からの身体的虐待を繰り返し受けた者は、ある段階から加害者の信念に同一化して他害的な暴力をくりかえすようになるという^{20,24)}。また、性的虐待を受けながらも、適切な情報や支援が与えられなかった子どものなかには、いつしか「弱音を吐いてはいけない。表出を許されるのは怒りの感情だけだ」と思いこむようになり、加害行為や暴力をくりかえし、他者との親密な関係の構築が困難となる者がいる、という指摘もある²¹⁾。そして、我々の調査結果もまた、性嗜好の偏奇という間接的なかたちではあるが、性被害者が性加害者へと発展しうる要因があることを示している。

そう考えてみると、少年施設における男性の性被害者に対する支援が持つ意義は大きいように思われる。すでに海野と杉山²⁹⁾は、将来の加害行為防止という観点から、児童養護施設における性的被害男児への治療的介入を実践し、そうした実践が社会安全維持に資する可能性を指摘している。実際、成人男性の場合でも、刑務所内で他の受刑者による男性受刑者の性的被害が少なくなく、こうした体験が出所後の地域における加害行動や逸脱行動に影響する、という報告がある³¹⁾。

筆者自身、少年鑑別所で出会った印象的な男子のことを思い出さずにはいられない。彼は、養護施設のなかで、年下の男子にフェラチオを強要したり、性器を擦って射精させたりする、という行為を繰り返して、少年鑑別所入所となった。後に明らかになったのは、彼自身がかつて両親による虐待から逃れた一時保護所で、同様の性被害に遭遇していたことであった。そして、その記憶が自生的かつ侵襲的に回想されるたびに、他の少年に

対する性加害衝動が突発的に高まるということであった。このような少年に対する矯正教育は、性被害体験を取り扱うことなしには、十分な再犯予防効果を上げないのではなからうか？

IV. おわりに～非行少年の被害と加害

少年施設に入所している少年たちは実に様々なトラウマ体験を抱えている。たとえば、筆者が少年院で出会ったある少年は、毎晩消灯後の暗闇のなかで様々な外傷体験のフラッシュバックに苦しめられていた。それは、幼少時、何時間にもわたって父親から殴られながら、一種の「無感覚状態」に陥っている自分の姿であったり、唯一の親友が目の前で大型トラックのタイヤの下敷きになって血まみれの肉片となる場面であったりした。彼はかつて地元の暴走族の「総長」を務め、少年院では模範的な集団寮のリーダー的存在であったが、少年院職員には決してそうしたフラッシュバックのことを相談しなかった。その理由について、彼は筆者に次のように語っていた。

「小学校2年生のとき、腫れ上がった顔で学校に行ったら、不審に感じた担任の先生から、『絶対に内緒にするから正直に言ってほしい』と懇願された。だから、先生を信用して、父親から毎日殴られていることを話した。すると、すぐに先生は自宅を訪れ、親に注意をした。その夜、父親から、『余計なことというな』とめっちゃくちゃに殴られた。そのとき、『絶対に話してはいけない。話すと裏切られる。かえって悪い結果になる』と思った。以来、誰も信じないようにしてきたし、正直な気持ちは話さないようにしてきた。気持ちがつらくなったときには、とにかく覚せい剤とマリファナで頭を麻痺させていた」。

精神分析家 Miller²⁰⁾ は、多くの犯罪者が、子ども時代に何らかの虐待を受けながらも、その怒りと痛みの記憶を抑圧・封印し、心に鎧を被せていると述べている。なかでも性的虐待は、様々な苦痛に満ちた記憶のなかで、最も語る事が困難な記憶である。そして、そのようにして自分の痛みが無感覚になった結果、他人の痛みも感じることもできなくなって、成人後に自傷行為や薬物乱用、あるいは暴力行為を繰り返すという。

こうした Miller の考えは、現在、米国アリゾナ州を本拠地とする犯罪加害者支援の民間団体 Amity²⁴⁾ ——スタッフ自身も受刑経験者であり、治療共同体にもとづく刑務所プログラムの再犯率は、通常の刑務所出所者の3分の1以下である³⁰⁾ ——に引き継がれ、現在、そのプログラムに生かされている。Amity では、犯罪加害者のトラウマ体験を積極的に扱っている。それは、他人の痛み気づけるようになるには、まずは自分自身の封印された痛みを感じる必要がある、という考えにもとづいたものである。ちなみに、Amity に取材したドキュメンタリー映画『ライファーズ』には、自らの性被害体験を語る、男性の終身刑受刑者が登場している。

わが国では、男性の性被害体験に関する研究はようやく端緒についたばかりである。筆者は、この領域の研究から、犯罪者の更生に資する何らかの知見が得られるのではないかと期待している。

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Trauma and Antisocial behavior: An association with sexual abuse in males

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The present paper addressed the close association between traumatic experiences and antisocial behaviors in juvenile delinquents based on the researches the author had conducted in juvenile institutes such as a juvenile classification home and reformatory. According to our studies, male and female adolescents incarcerated in juvenile institutes were more frequently victimized by various traumatic events than ordinary high-school students. Particularly, female inmates markedly showed severe suicidal tendencies including self-injury, suicidal ideation, and suicidal attempt, probably associated with such traumatic experiences. Male inmates victimized by sexual abuse also showed the same extent of suicidal tendencies and trauma-related psychiatric symptoms including PTSD symptoms, depression and dissociation as female victims. Many of them also showed deviations of sexual behavior. This appears to indicate the possible pathway which leads child victims to adult perpetrators. [130 words]

Key Word Antisocial behavior, delinquency, trauma, sexual abuse, self-injury

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Towards an Explanation of Inconsistent Rates of Posttraumatic Stress Disorder across Different Countries: Infant Mortality Rate as a Marker of Social Circumstances and Basic Population Health

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Not only has accidental injury been shown to account for a significant health burden on all populations, regardless of age, sex and geographic region [1], it is also an important risk factor for posttraumatic stress disorder (PTSD). Recent epidemiological studies using consecutive patients have reported inconsistent findings in the prevalence of accident-related PTSD in developed countries. For instance, PTSD prevalence at 4–12 months after accident was in the range of 17–32% in the UK [2], US [3] and Israel [4], but at considerably lower rates of 10.4% in Australia [5], 8.5% in Japan [6], and 1.9–3.1% in Switzerland [7, 8]. In a recent study by Schnyder et al. [8] published in *Psychotherapy and Psychosomatics*, the authors discussed that intercultural differences play an important role in the development of PTSD. We agree with their suggestion that local environmental factors, such as socioeconomic and cultural components, and health care systems are also important. In this context, Babones [9] showed an unambiguously positive correlation between income inequality and population health including infant mortality (an indicator of social circumstances and basic population health) at country level. The aim of the present study was to reveal the prevalence of PTSD at 6 months' follow-up in our prospective study [10] and to examine the relation between infant mortality rate and prevalence of PTSD in the reliable cross-country data available.

A total of 300 patients consecutively admitted to the intensive care unit (ICU) of a teaching hospital in Tokyo due to accident-related injury were enrolled in the study and were assessed shortly after admission and 6 months after their accident. The main outcome measure was the Clinician-Administered PTSD Scale [11, 12]. The method and sociodemographic and clinical information have been presented in an earlier publication [10]. Briefly, the majority of participants were men (77.7%), the average (\pm SD) age was 36.5 ± 15.0 years, the average (\pm SD) Injury Severity Score [13] was 9.1 ± 7.9 , and the median Glasgow Coma Scale score [14] was 15.0 (range 3–15).

One hundred and six (35.3%) of the 300 patients completed a face-to-face follow-up interview at 6 months. All patients met the stressor criterion A1. Six patients (5.7%, 95% confidence interval = 1.3–10.1) met all other criteria for accident-related PTSD including A2, and the mean (\pm SD) CAPS total score of these 6 patients was 57.8 ± 16.1 . However, in the present report, we adopted the manner of omitting item 8 (psychogenic amnesia in criterion C) when making the diagnosis of PTSD [15], because we were often unable to differentiate organic from psychogenic amnesia. For reference purposes, 8 (7.5%) patients met criteria for PTSD when item 8 was included in making the diagnosis of PTSD.

We examined the cross-country relationship between infant mortality rate and prevalence of PTSD. Methodologies which included the consecutive recruitment of accidentally injured patients in emergency departments or intensive care units, prospective design, and assessment according to internationally accepted diagnostic criteria suggest the validity and comparability of these data. Studies were excluded if they included help-seeking patients, patients recruited from police records, or all patients with traumatic brain injury. The data from seven studies undertaken in six developed countries (UK, US, Israel, Australia, Switzerland and Japan) [2–8] as well as our current data were used. We used data for the prevalence of chronic PTSD (4–12 months after the accident) because spontaneous remission is relatively common within 3 months of a traumatic event. Although self-reported questionnaires are likely to result in elevated PTSD estimates, we used large-scale data from the US and the UK [2, 3] for comparison. The infant mortality rates in each country for the year when each study was conducted or submitted to the journal were used [16].

The relation between infant mortality rate and prevalence of accident-related PTSD was nonlinear (fig. 1). On the basis of model fit, the best fitting was obtained with the quadratic model ($R^2 = 0.82$, $p = 0.01$), though a linear model was acceptable ($R^2 = 0.60$, $p = 0.02$). Infant mortality rate is well known to be associated with levels of basic health care, well-developed technology, and medical advances. These rates are also commonly included as part of standard of living evaluations in economics. There are many cultural differences among the six countries such as population density, ethnic background, founding history, dietary habit, and residential setting. The present study showed a plausible explanation for the observed discrepancy in the prevalence of PTSD following injury. These observations may provide clues regarding the estimated prevalence of accident-related PTSD and ways to reduce the number of patients that do develop PTSD.

The present Japanese study has methodological strengths, including consecutive sampling and standardized assessment. However, we also consider important limitations related to representativeness, such as sampling from only one hospital and a relatively high dropout rate. Furthermore, a higher prevalence of

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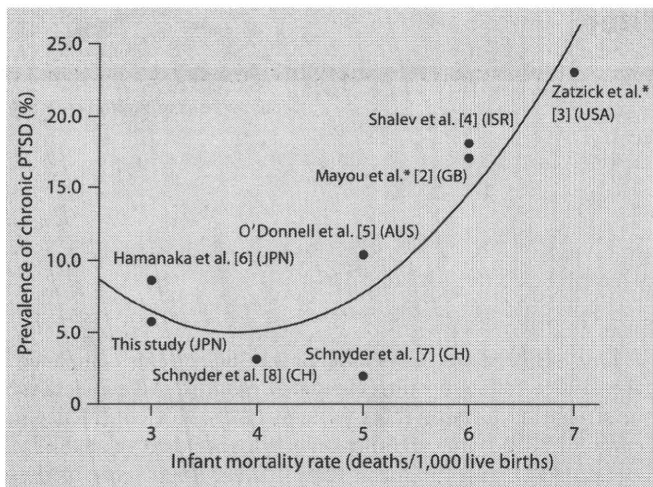


Fig. 1. Infant mortality and prevalence of chronic PTSD following accidental injury. In a multinational comparison of data, correlation using the quadratic model indicates a potentially substantial interaction between prevalence of PTSD at 4–12 months following accidental injury and infant mortality rate for the year in which the study was finished or the manuscript was received for publication. *Self-reported measures for PTSD were applied.

PTSD is well known among women in the general population [17] as well as among motor vehicle accident survivors [2]. Therefore, our low rate of PTSD seems to have been affected by the small proportion of women in our sample. In conclusion, this study gave a concrete sociocultural explanation for the observed discrepancy in the prevalence of PTSD across countries. This explanation may work in terms of preventing PTSD.

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ORIGINAL PAPER

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The Tachikawa cohort of motor vehicle accident study investigating psychological distress: design, methods and cohort profiles

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Abstract *Background* The Tachikawa cohort of motor vehicle accident (TCOM) Study has been carried out in Tokyo since 2004. This study examined the association of medical and psychosocial variables

evaluated shortly after admission to the acute critical care center with long-term psychiatric morbidity risk in patients with accidental injuries. *Methods* Between May 2004 and January 2008, patients with accidental injury consecutively admitted were recruited to the TCOM Study. Psychiatric morbidity as a primary endpoint was measured using a structured clinical interview at 1, 6, 18 and 36 months after involvement in a motor vehicle accident (MVA). The baseline investigation consisted of self-administered questionnaires concerning acute psychological responses and personality. Medical information was obtained from patients' medical charts. Various socio-demographic data, health-related habits and psychosocial factors were assessed by interview. To examine potential biomarkers of psychological distress, blood samples were collected. *Results* Out of 344 patients who were asked to participate in this study, 300 (87%) patients with MVA-related injury were enrolled. Corresponding rates for the questionnaires on psychological responses and blood sampling were 98–99 and 79%, respectively. The cohort sample was composed of 78% men; the median age was 34 years; and 45% of the participants were motorcycle drivers. *Conclusions* The TCOM Study should prove useful for researchers examining the association between biopsychosocial variables and psychological distress and may contribute to the formation of a framework for providing care for patients with MVA-related injury.

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Key words motor vehicle accident – severe injury – cohort study – post-traumatic stress disorder – psychiatric morbidity

Introduction

Over the past decade, increasing attention has been devoted to psychiatric morbidity following physical injuries [7, 24, 30, 34, 38, 44]. This kind of research is

essential, because advances in injury care systems have increased the number of seriously injured people who are able to survive their injuries and can be assisted to recover through rehabilitation [21]. For instance, nearly one-third of injured patients appear to develop trauma-related psychiatric illness and the major diagnoses are post-traumatic stress disorder (PTSD) and major depressive disorder (MDD) [15, 30, 34, 38]. MDD and PTSD are independent sequelae of traumatic events, have similar prognoses, and interact to increase distress and dysfunction [38]. Both should be targeted by early treatment interventions and by neurobiological research [38]. Injuries affect all populations, regardless of age, sex, income and geographic region. From a global perspective, it was estimated that approximately 16% of the world's burden of disease was attributable to injury in 1998 [19]. In particular, injuries attributable to motor vehicle accidents (MVAs) are expected to be the third contributor to worldwide burden of disease by the year 2020 [27], and already the leading injury-related cause of death among youth is MVA [19]. However, there is as yet no valid epidemiological study examining psychiatric morbidity after a MVA in Japan. Furthermore, this important issue has been neglected because of lack of investigator and mental health resources.

We therefore deployed several trained research nurses, a resident psychiatrist and a research psychiatrist in an acute critical care center to overcome the barrier to study implementation. Then we designed and implemented a cohort study which is called the Tachikawa cohort of motor vehicle accident (TCOM) Study. The aims of the TCOM Study were to (1) identify the prevalence of PTSD, MDD and other common psychiatric diagnoses at 1, 6, 18 and 36 months following

MVA, (2) identify factors that increase risk of poor psychiatric outcomes, and (3) examine other post-injury outcomes including quality of life and posttraumatic growth. We assumed that the factors associated with psychiatric outcome would be heart rate, brain-derived neurotrophic factor (BDNF), omega-3 fatty acids, sense of life-threat, intrusive memory, negative cognitive appraisal, harm avoidance temperament, resilience to stress, litigation, and physical impairment. The unique point of this cohort is the collection of serum samples from baseline to follow-up. In an earlier interim publication, we presented psychiatric morbidity at 1 month post-injury in one part of the entire sample [23]. We believe that even observational research should be reported transparently so that readers can be updated on what was planned, performed and found, and what conclusions were drawn. In 2007, the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement was released [47] and in accordance with this statement, we disclose here the study design prior to publishing follow-up data. This transparency is important, because the primary endpoint should not be changed conveniently according to the follow-up data. Concealing the design or changing the endpoint renders comparability difficult.

This paper describes the design and implementation of the TCOM Study and presents baseline observations. We also describe the study methods in detail, including recruitment of the cohort, data collection methods, and our active follow-up system. We believe that the information described here can provide a background for future reports from the TCOM study and may give practical information for comparison with existing large studies [15, 30, 34–38, 44–46] (see review in Table 1).

Table 1 Existing large cohort studies evaluating the prevalence of psychiatric morbidity after injury

Study	City	Study sample and setting	No.	Follow-up	ISS	Primary endpoint	Instrument
Shalev et al. [38]	Jerusalem Israel	Traumatized patients Arriving at emergency room; MVA was most frequent (85.8%)	211	4 months	NA	PTSD and depression	CAPS SCID
Ursano et al. [44]	Unknown USA	Recruited through local police reports (28%), Hospitals (47%) & from police records (25%); all cases were MVA	122	1 year	NA	PTSD	SCID
Schnyder et al. [34, 35]	Zurich Switzerland	Injured accident patients Consecutively admitted to the ICU; MVA was most frequent (62%)	121	1 year	Range, 10–51 Mean, 21.8 SD = 9.9	PTSD and depression	CAPS HADS
O'Donnell et al. [30]	Victoria Australia	Injured patients consecutively Admitted to a level 1 trauma service; MVA was most frequent (74%)	363	1 year	≥15, 33% 10–14, 31% 0–9, 36%	Major psychiatric Diagnoses	CAPS SCID
Vaiva et al. [45, 46]	Lille France	Admitted to the Traumatology Dept; All cases were MVA	108	1 year		PTSD	CAPS MINI
Gil et al. [15]	Haifa Israel	Injured accident patients Admitted to 2 surgical wards; MVA was most frequent (90%)	120	6 months	Mean, 5.8 SD = 3.6	PTSD and major Psychiatric diagnoses	CAPS SCID
Schnyder et al. [36]	Zurich Switzerland	Hospitalized for the treatment of physical injuries at the Traumatology Dept.; MVA was third most frequent (31.4%)	255	6 month	Median, 9 Range, 1–66 Mean, 11.7	PTSD and depression	CAPS HADS

No. number of patients from whom written informed consent was obtained, ISS injury severity scale, NA not assessed, PTSD post-traumatic stress disorder
CAPS clinician administered PTSD scale, SCID structured clinical interview for DSM, HADS hospital anxiety and depression scale
MINI mini-international neuropsychiatric interview

Methods

■ Study setting and requirement procedure

The TCOM Study was approved by the Institutional Review Board and Ethics Committee of the National Disaster Medical Center (NDMC), Tokyo. The geographic area of the NDMC has a population of 1,700,000, and its acute critical care center is responsible for level 1 trauma service. Admission to an acute critical care center as defined by the NDMC refers to an admission to an intensive care unit on an emergency basis.

Participants admitted to the acute critical care center of the NDMC between 30 May 2004 and 8 January 2008 (about 44 months) were recruited consecutively. First, we took part in a daily conference held at the acute critical care center and reviewed the medical and nursing records of newly admitted patients; second, with the permission of the physicians, we screened eligible patients. Baseline investigations (T_1) were conducted after the cessation of intravenous narcotic administration; repeated assessments of cognitive function using the mini-mental state examination (MMSE) [12] were performed by trained research nurses or trained psychiatrists. After enrollment, patients underwent a short physical examination, and then completed questionnaires and interviews. All participants were given a gift voucher (1,000 JPY [9 USD]) for their participation after each assessment. The median number of days between the accidents and the baseline assessments was 2.3 days (range = 0–23). After providing a complete description of the study, written informed consent was obtained from every patient.

■ Eligibility criteria

The inclusion criteria were as follows: (1) MVA-related severe physical injury causing a life-threatening or critical condition; (2) consecutive admittance to the acute critical care center; (3) age between 18 and 69 years; and (4) native Japanese speaking ability. The exclusion criteria were as follows: (1) diffuse axonal injuries, brain contusion, and subdural and subarachnoid bleeding detected by computed tomography and/or magnetic resonance imaging (with the exception of concussion), because the presence of traumatic brain injury creates considerable difficulties when assessing psychological responses to injury; (2) cognitive impairment, defined as a score of <24 on the MMSE; (3) currently suffering from schizophrenia, bipolar disorder, drug (non-alcohol) dependence or abuse, or epilepsy prior to MVA; (4) marked serious symptoms such as suicidal ideation, self-harm behavior, dissociation, or a severe physical condition preventing the patient from tolerating the interview; and (5) living or working at a location more than 40 km from NDMC.

■ Baseline data and specimen collection

The assessments included general socio-demographics, detailed information about the MVA, injury severity score (ISS) [5], glasgow coma scale (GCS) score [42], status during the MVA (e.g., vehicle driver), vital signs first recorded on admission to the emergency room, lifestyle, family history of psychopathology as determined in a structured interview, a sense of life-threat during the MVA as determined in the structured interview, feeling of self-reproach, loss of memory regarding the MVA (defined as having a score of <2.1 on the Gil's Memory of Traumatic Event Questionnaire) [15], pain as measured subjectively on a Likert scale, performance status as defined by the Eastern Cooperative Oncology Group [31], consumption of alcohol prior to the MVA as determined in the structured interview, and involvement in previous MVAs. The psychometric instruments used were the impact of event scale revised (IES-R) [4, 49], the hospital anxiety and depression scale (HADS) [20, 51], the peritraumatic dissociative experience ques-

tionnaire (PDEQ) [22], the peritraumatic distress inventory (PDI) [8], the temperament and character inventory [9, 18], the stress coping inventory [11] and the social support questionnaire [14, 33]. At the beginning of study, the PDEQ and PDI were not in fact included among the assessment tools, but were added in the middle of the study.

Serum collection

To examine the potential biomarkers of psychobiological distress and resilience (brain-derived neurotrophic factor, omega-3 fatty acids, neuropeptide Y, dehydroepiandrosterone, dehydroepiandrosterone sulfate, and cortisol) and its predictive value with regard to successful adaptation to extreme stress, 10-mL blood samples were drawn at baseline (T_1) and follow-up investigations. Serum samples from the subjects were collected between 10:00–12:00 or 14:00–17:00 before meals, and then stored in separate -80°C freezers.

■ Primary, surrogate and secondary endpoints at follow-up investigations

Table 2 shows the measures utilized, their content area, and the occasions on which they were used. Briefly, follow-up investigations were planned at 1 month (T_2), 3 months (T_3), 6 months (T_4), 9 months (T_5), 18 months (T_6), and 36 months (T_7) after MVA. The measures of the primary and surrogate endpoints are reviewed briefly below. We used telephone, e-mail and letter to correspond with the participants, and made an appointment or asked them to answer the questionnaire 2 weeks before the next investigation. As a general rule we allowed 4 weeks as the range of the investigation period. To maintain the response rate, we planned to distribute a seasonal newsletter to the participants at 2, 4 and 13 months after MVA. It contained a flow chart of the study, greeting and a short feature about seasonal news written by investigators.

Psychiatric diagnoses

Trained psychiatrists conducted the follow-up face-to-face assessments at 1, 6, 18, and 36 months after MVA. PTSD was diagnosed using the Clinician Administered PTSD Scale [6]. PTSD was diagnosed using the "1–2" rule (i.e., diagnostic criteria were met for each symptom if frequency ≥ 1 and intensity ≥ 2) [50]. Participants were deemed to have partial PTSD if they fulfilled only two out of the three symptom criteria [B (re-experiencing), C (avoidance), D (hyper-arousal)], and criteria A-1 (stressor), E (duration), and F (impairment) according to the diagnostic and statistical manual of mental disorders, 4th edition, text revision (DSM-IV-TR) [3]. Other common psychiatric illnesses were diagnosed using the Mini International Neuropsychiatric Interview (MINI) with the exception of the 2 modules pertaining to PTSD and antisocial personality disorder [32, 39]. Minor depressive disorder was defined according to the criteria of DSM-IV-TR for the presence of either a depressed mood or a loss of interest and a total of 2–4 depressive symptoms [3]. Psychiatric morbidity (at least one diagnosis of psychiatric illness, including minor depression or partial PTSD) and PTSD syndrome (full PTSD and partial PTSD) at 6 months post-accident were considered as the primary endpoint. Psychiatric morbidity and PTSD syndrome at 1 and 18 months post-accident were also of interest. Pre-accident common psychiatric illness was retrospectively assessed using the MINI. Regarding to the incidence of MVA-related psychiatric illness that is identified as occurring post-trauma, the retrospective structured interview provides the opportunity to exclude those who had a psychiatric illness at the time of injury. A random sample of 30 cases assessed by two raters (one conducting the interview and one observing) was used to assess

Table 2 Content areas and Instruments

Construct	Instrument	Occasion
Primary endpoint		
Psychiatric diagnoses	Clinician administered PTSD Scale Mini-international neuropsychiatric interview	T ₂ , T ₄ , T ₆ , T ₇
Surrogate endpoint		
Psychological distress	Impact of event scale revised Hospital anxiety and depression scale	T ₁ , T ₂ , T ₃ , T ₄ T ₅ , T ₆ , T ₇
Quality of life	Medical outcomes study 36-item short form Health survey	T ₂ , T ₄ , T ₆ , T ₇
Secondary endpoint		
Sense of Coherence	Sense of coherence	T ₃ , T ₆ , T ₇
Growth	Posttraumatic growth inventory	T ₅ , T ₆ , T ₇
Cognition	Posttraumatic cognitions inventory	T ₂ , T ₄
Service use	Ad hoc questionnaire	T ₂ , T ₄ , T ₆ , T ₇
Litigation	Ad hoc questionnaire	T ₂ , T ₄ , T ₆ , T ₇
Perceived loss	Ad hoc questionnaire	T ₂ , T ₄ , T ₆ , T ₇
Biological marker	Serum	T ₁ , T ₂ , T ₄ , T ₆ , T ₇
Other data		
Injury severity	Injury severity score	T ₁
Wakefulness	Glasgow coma scale	T ₁
MVA-related memory	The Gil's memory of traumatic event questionnaire	T ₁
Performance status	The eastern cooperative oncology group performance status	T ₁
Cognitive screening	The mini-mental state examination	T ₁
Dissociation	Peritraumatic dissociative experience questionnaire ^a	T ₁
Distress	Peritraumatic distress inventory ^a	T ₁ , T ₃
Personality	Temperament and character inventory	T ₁
Coping	Stress coping inventory	T ₂
Support	Social support questionnaire	T ₂

T₁ baseline, T₂ 1 month after MVA, T₃ 3 months after MVA, T₄ 6 months after MVA

T₅ 9 months after MVA, T₆ 1.5 years after MVA, T₇ 3 years after MVA

^aTaken among patients who had certain MVA-related memory from the middle of the study

inter-rater reliability. The ratings for three major diagnoses of PTSD syndrome, depression, and alcohol-related disorder were reliable, with kappa values of 1.0, 0.9, and 1.0, respectively. In addition, in case that the participant met the criteria of psychiatric morbidity, we did not treat him or her by ourselves during the follow-up period but rather referred him or her to an independent physician.

Psychological distress

To assess psychological distress, the IES-R [4, 49] and HADS [20, 51] were administered. HADS [20, 51] includes a 7-item anxiety subscale and a 7-item depression subscale for assessing general psychological distress for the preceding week. Each item is rated on a scale of 0–3, with high scores denoting greater psychological distress. On the other hand, the IES-R [4, 49] assesses the level of symptomatic responses to a specific traumatic stressor (MVA in our study) in the past week. The degree of distress for each item is rated on a 5-point scale, ranging from 0 = not at all to 4 = extremely. There are three subscales (i.e., intrusion, avoidance, and arousal).

Quality of life

To assess the level of functioning of the subjects, the Medical Outcomes Study 36-Item Short Form Health Survey (SF-36) [13, 25] was administered. The SF-36 is based on a conceptual model consisting of physical and mental health constructs, and is designed to measure perceived health status and daily functioning. It consists of 36 items scored in the following 8 domains; physical functioning, role-physical functioning, bodily pain, general health perception, vitality, social functioning, role-emotional functioning, and mental health [48].

The scores of the IES-R, HADS, and SF-36 were considered as the surrogate endpoint. Other measures considered as the secondary endpoint are shown in Table 2. Briefly, to assess a resilience to stress and the capacity to cope with it, the Sense of Coherence Scale [1, 2, 40] was administered. To assess positive psychological change against the traumatic event and examine the relationship between posttraumatic psychopathology and growth, the posttraumatic growth inventory [41, 43] was administered. To examine the value of cognitive appraisal on posttraumatic psychopathology, the posttraumatic cognitions inventory [10, 28] was administered. Furthermore, ad hoc questionnaires were used to assess service use, litigation and perceived loss.

Tracking those lost to follow-up

Participants considered “lost to follow-up” were determined primarily from (1) returned mailed invitations for follow-up investigations by the Japan Post Service as “undeliverable” or “moved, no forwarding address”, (2) those who refused our offer to keep participating in the study on three consecutive occasions, and (3) inability to get hold of the participants by phone or e-mail. Establishing communication by telephone and e-mail was abandoned if unsuccessful after three attempts on three different days and at two different times (midday or evening).

Potential sources of bias

First, data were obtained from only one teaching hospital in the suburbs of Tokyo. From our clinical impression, the proportion of MVA occurring during motor sports or leisure time was higher in our sample than that actually observed in central Tokyo. In relation to sample characteristics, there are not a little cases of one-car accidents involving a motorcyclist, which allows us to examine the difference in incidence of PTSD between one-car accidents and

others types of accident. Second, many patients had to be excluded due to age (under 18 or over 70) and traumatic brain injury, which may limit the generalizability and clinical relevance of the study.

Sample size

In previous epidemiological studies, the incidence of overall psychiatric morbidity at 12 months post-injury varied from 21 to 26% [30, 34]. On the basis of our pilot investigation, we estimated that the incidence of overall psychiatric morbidity at 6 months post-injury would be 25% and the width of the 95% confidence interval would be 15%. According to the formula [16], 128 subjects were needed. However, the dropout rate in our pilot investigation using a mail questionnaire was 54% at 6 months post-injury. Therefore, we needed to recruit at least 280 subjects at the initial investigation.

Results

Nine thousand five hundred and eleven patients were admitted to the ICU of NDMC during the study period. Figure 1 shows a flow chart of the patients included and excluded from the study. Although dissociation is a frequent psychopathological symptom in the early aftermath of trauma, exclusion due to massive dissociation occurred only rarely ($n = 1$). After giving a complete description of the study, written informed consent was obtained from 300

patients (87.2%). The patients who refused to participate in the study ($n = 44$) did not significantly differ from those who participated ($n = 300$) in terms of sex, age, ISS score [5], GCS score [42], or status during the MVA. The median number of days between the accident and T_1 was 2.0 (range = 0–23, mean = 3.8, SD = 4.2). Demographic, behavioral and medical characteristics, and acute psychological distress at T_1 are shown in Tables 3, 4, and 5. The corresponding rates for the HADS and the IES-R were 98 and 99%, respectively. Of 300 participants, serum sample was obtained from 237 (79%) patients at T_1 .

Discussion

The most important contribution of this study that can be drawn from the data presented is that this is the first and largest Japanese cohort of patients with MVA-related injuries recruited and investigated. Cross-country differences including societal attitude toward trauma, levels of basic health care, accessibility to medical services, and inequality of income distribution or wealth distribution might play important roles in the development of PTSD. Second, we collected not only psychosocial variables but also

Fig. 1 Enrollment of study participants

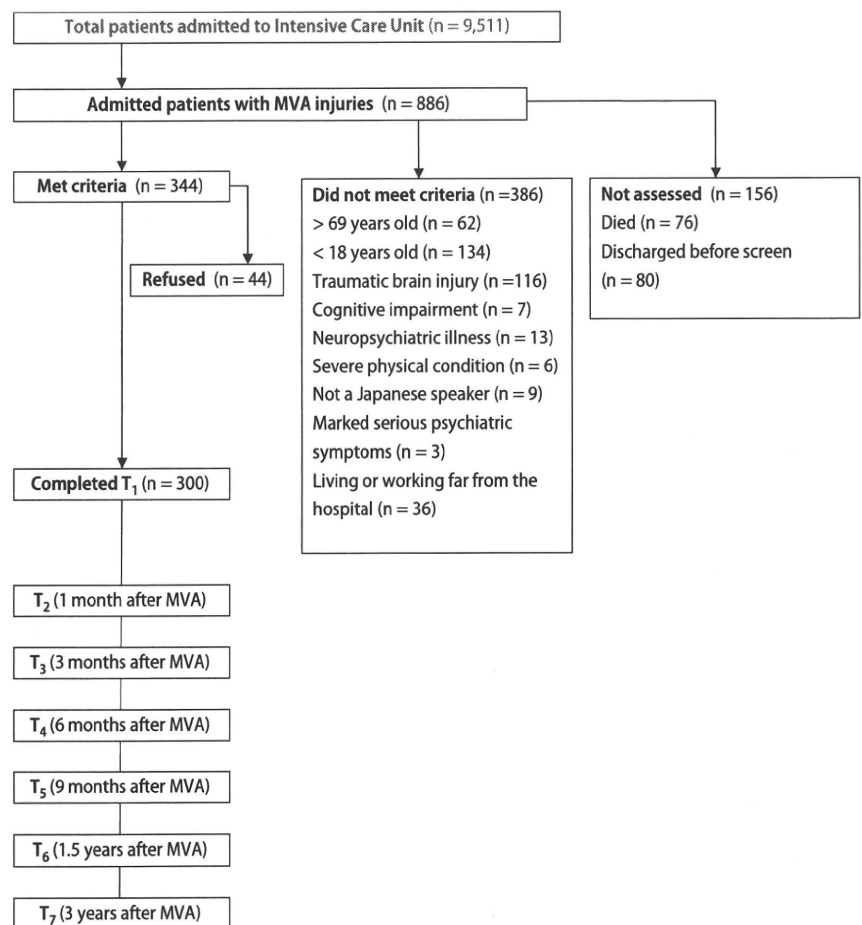


Table 3 Baseline demographics of 300 cohort members

Characteristic	No	%
Age, mean years \pm SD, range	36.5 \pm 15.0 (18–69)	
Gender		
Men	233	77.7
Women	67	22.3
Status during MVA		
Vehicle driver	70	23.3
Motorcycle driver	136	45.3
Passenger	17	5.7
Bicyclist	42	14.0
Pedestrian	29	9.7
Highest level of education		
Junior high school	66	22.0
High school	110	36.7
Junior or technical college	76	25.3
University or higher	48	16.0
Marital status		
Married or having a partner	131	43.7
Never married	142	47.3
Divorced or widowed	27	8.0
Living alone	71	23.7
Employment status		
Paid worker (full- or part-time)	228	76.0
Student	43	14.3
Unpaid work (homemaker, retired)	27	9.0
Unknown	2	0.7
Annual income (JPY)		
Less than five million	150	50.0
Five to ten million	88	29.3
More than ten million	15	5
Unknown	47	15.7

SD standard deviation, MVA motor vehicle accident

serum samples. Except for our study, only Vaiva et al. have collected blood samples and investigated plasma gamma amino-butyric acid levels in 108 patients with MVA-related injuries as a predictive factor for subsequent PTSD [45, 46]. Longitudinal cohort studies of posttraumatic stress provide an optimal method for exploring the course of PTSD and for examining its potential predictors; thus, we will be able to report the long-term consequence of MVA-related injuries and find new valid biomarkers for estimating the development of post-trauma psychiatric morbidity.

It has also been reported in the US that a large proportion of the population are involved at some time in a life-threatening accident (men 25%, women 14%) [17]. In Japan, as an example, about 10% of new patients requiring admission to an acute critical care center have severe physical injuries resulting from MVAs [29]. Furthermore, according to the National Comorbidity Survey Replication [26], an estimated 53.4% of adults in the US have 1 or more of the psychiatric or physical problems assessed in the survey. People with psychiatric or physical problems reported an average 32.1 more role-disability days in the past year than those without psychiatric or physical problems, which is equivalent to nearly 3.6 billion days of role disability in the population. Musculoskeletal disorders and major depression had the greatest effects on disability days. Therefore, this

Table 4 Baseline behavioral characteristics of 300 cohort members

Characteristic	No	%
Alcohol drinking		
Never drinker	51	17.0
Chance drinker	31	10.3
Drink 1–3 days a month	61	20.3
Drink 1–2 days a week	59	19.7
Drink 3–4 days a week	29	9.7
Drink almost every day	65	21.7
Past drinker	4	1.3
Smoking		
Never smoker	109	36.3
Past smoker	32	10.7
Current smoker	159	53.0
Habit of exercise		
Less than some days in a year	189	63.0
Once a month to twice a week	76	25.3
Three times a week or more	35	11.7
Having physical problem before MVA	91	30.3
Drinking alcohol before MVA within 2 hours	29	9.7
Taking medicine before MVA within 6 hours	32	10.7
Performance status		
0	7	2.3
1 (Symptomatic but completely ambulant)	77	25.7
2 (Symptomatic, < 50% in bed during the day)	53	17.7
3 (Symptomatic, > 50% in bed, but not bed bound)	100	33.3
4 (Bed bound)	63	21.0
Having pain	278	92.7
Involvement in previous MVAs	186	62.0
Sense of life threat during MVA	97	32.3
Loss of MVA-related memory	93	31.0
Feelings of self-reproach	162	54.0
Self-reported history of psychiatric illness	30	10.0
Family history of psychopathology ^a	34	11.3

SD standard deviation, MVA motor vehicle accident

^aincluded first- and second-degree relatives

study will undoubtedly provide valuable public health data for future policy making for human health.

Swiss and Australian samples in previous similar and valid studies are useful for comparative purposes [30, 36] (see review in Table 1). All three sample populations were comparable with the present study in terms of sample size ($n = 300$), follow-up duration (3 years), the ISS score (median = 8, range, 1–48), and the primary endpoint and instruments (CAPS). More specifically, the present cohort study showed no difference in gender ratio (men 78%, women 22%) or mean age (36.5 years, SD = 15.0) from the three previous studies [30, 36]. Furthermore, our study showed no difference in other demographic characteristics such as marital status, living arrangement, employment status, and educational level from the Swiss studies [36]. Three samples differed in terms of the timing of baseline assessment; 2.0 days in the present study, 5.0 days in the Swiss studies [36] and 7.7 days in the Australian study [30]. Furthermore, the questionnaire assessing initial psychological distress was not identical to those in the previous studies [30, 36] and is likely to be non-comparable; however, IES-R and HADS data showed low levels of psychological distress at baseline. Finally, the unique point of our cohort is that we use serum samples.

Table 5 Baseline medical characteristics and acute psychological distress of 300 cohort members

Characteristic	No.	Mean	SD	Median (range)
Glasgow coma scale on admission	300			15.0 (3–15)
Heart rate on admission, bpm	300	84.9	16.5	
Systolic BP on admission, mmHg	300	137.4	26.4	
Diastolic BP on admission, mmHg	300	77.3	20.5	
RR on admission, times per min	300	20.0	6.9	
Laboratory data				
Leukocyte count/ μ l	295	8597	3564.1	
Erythrocyte count, $\times 10^9/\mu$ l	295	414.6	226.0	
Hemoglobin, g/dl	295	12.8	6.3	
Platelet, $\times 10^9/\mu$ l	295	23.0	11.1	
C-reactive protein, mg/dl	289			1.1 (0–19.1)
Creatine phosphokinase, IU/l	289			286 (15–11270)
Injury severity score IES-R				
Total score	299	17.9	14.7	15.0 (0–62)
Intrusion	300			5.0 (0–26)
Avoidance	299			4.0 (0–30)
Hyper-arousal	300			5.0 (0–24)
HADS				
Total score	294	9.6	7.1	8.0 (0–35)
Anxiety	295			4.0 (0–21)
Depression	294			3.0 (0–19)

No. varied according to the number of patients who completed the assessment, SD standard deviation

BP blood pressure, RR respiratory rate, IES-R impact of event scale-revised, HADS hospital anxiety and depression scale

The present study has a strong methodology. First, a significant point to be emphasized is that, in addition to the assessment of PTSD, a broader area of outcomes were evaluated, including the number of psychiatric diagnoses, quality of life and posttraumatic growth. Second, we used both a standardized structured interview and self report scales in a face-to-face interview. The limitation of the present study is that the range of interval between admission and the time of initial assessment might have been wide. Further studies are needed to address such an issue. On the other hand, another advantage of the present study is that we could estimate the response rate at baseline investigation (i.e., 87%). This sufficient response rate was probably due to the close collaboration with the emergency department and the diligent recruitment by trained research nurses.

In conclusion, the results of future investigations on the bio-psychosocial variables associated with the psychiatric morbidity may have scientific and public mental health implications. It has been suggested that cohort studies may be the most rational way of choosing specific interventions to be tested in future

clinical trials. The results of the present study may also help guide healthcare providers in providing care for injured patients with post-trauma psychiatric morbidity.

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When we published the article

“Matsuoka Y et al. (2008) The Tachikawa cohort of motor vehicle accident study investigating psychological distress: design, methods and cohort profiles. Soc Psychiatry Psychiatr Epidemiol (published online first 25.9.2008)” [The online version of the article can be found at <http://dx.doi.org/10.1007/s00127-008-0438-6>]

the author asked us to correct some of the values in his table 3. You may find the corrected table below:

Table 3 Baseline demographics of 300 cohort members

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Men	233	77.7
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Status during MVA		
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Motorcycle driver	136	45.3
Passenger	17	5.7
Bicyclist	42	14.0
Pedestrian	29	9.7
Highest level of education		
Junior high school	63	21.0
High school	111	37.0
Junior or technical college	78	26.0
University or higher	48	16.0
Marital status		
Married or having a partner	131	43.7
Never married	142	47.3
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Living alone	71	23.7
Employment status		
Paid worker (full- or part-time)	230	76.7
Student	43	14.3
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Unknown	1	0.3
Annual income (JPY)		
Less than five million	150	50.0
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More than ten million	15	5
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SD standard deviation, MVA motor vehicle accident

The publisher apologises for any inconvenience caused by this mistake.

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Mental disorders and termination of education in high-income and low- and middle-income countries: epidemiological study

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Background

Studies of the impact of mental disorders on educational attainment are rare in both high-income and low- and middle-income (LAMI) countries.

Aims

To examine the association between early-onset mental disorder and subsequent termination of education.

Method

Sixteen countries taking part in the World Health Organization World Mental Health Survey Initiative were surveyed with the Composite International Diagnostic Interview ($n=41\,688$). Survival models were used to estimate associations between DSM-IV mental disorders and subsequent non-attainment of educational milestones.

Results

In high-income countries, prior substance use disorders were associated with non-completion at all stages of education (OR 1.4–15.2). Anxiety disorders (OR=1.3), mood disorders

(OR=1.4) and impulse control disorders (OR=2.2) were associated with early termination of secondary education. In LAMI countries, impulse control disorders (OR=1.3) and substance use disorders (OR=1.5) were associated with early termination of secondary education.

Conclusions

Onset of mental disorder and subsequent non-completion of education are consistently associated in both high-income and LAMI countries.

Declaration of interest

R.C.K. has been a consultant for GlaxoSmithKline, Kaiser Permanente, Pfizer Inc, Sanofi-Aventis, Shire Pharmaceuticals and Wyeth-Ayerst; has served on advisory boards for Eli Lilly & Company and Wyeth-Ayerst; and has had research support for his epidemiological studies from Bristol-Myers Squibb, Eli Lilly & Company, GlaxoSmithKline, Johnson & Johnson Pharmaceuticals, Ortho-McNeil Pharmaceutical Inc, Pfizer Inc and Sanofi-Aventis.

Studies of mental disorders may underestimate the long-term adverse consequences of such disorders owing to a dominant focus on disability contemporaneous with the acute phases of disease. Of particular concern is the impact of mental disorders on educational attainment, an important determinant of adult life chances in both high-income and low- and middle-income countries.¹ Early-onset mental disorders (LAMI) – i.e. those beginning in childhood or adolescence – may increase the risk of early termination of education.^{2–5} The latter has been shown to have adverse life-course consequences on individuals, such as poor health, as well as societal consequences, such as greater demand on social welfare entitlements. Early termination of education also affects the standard of living, social mobility and upbringing of citizenship. Because of these connections between mental disorders and educational attainment, mental health should be a focus of concern in the discussion of policy on education and workforce development. To date, studies of mental disorders and subsequent educational attainment have been limited to the USA and New Zealand. These studies found significant associations between mental disorders and subsequent early termination of education at all levels from primary through tertiary education, with stronger associations for substance use disorders and disorders of impulse control, such as attention-deficit hyperactivity disorder (ADHD) or conduct disorder, than for anxiety or mood disorders, such as generalised anxiety disorder or major depression.^{2–6} None the less, it is unclear whether these preliminary findings are similar across a broader range of high-income countries or in countries where national healthcare and educational institutions are less developed.

Method

This study was part of the World Mental Health (WMH) Survey Initiative, a project of the World Health Organization (WHO) that aims to obtain accurate cross-national information about the prevalence, risk factors, impairment, pattern of treatment and societal cost of mental disorders in both high-income and LAMI countries (www.hcp.med.harvard.edu/wmh/). Recent WMH studies on the social consequences of mental disorders have demonstrated that mental disorders have more adverse effects on role functioning than most physical diseases,⁷ and that untreated mental disorders have substantial adverse effect on the number of out-of-role days and work functioning.⁸ Our study examines the association between mental disorders and termination of education, which is another important indicator of human capital development.

Sample

Using the WMH Survey Initiative version of the WHO Composite International Diagnostic Interview (CIDI, version 3.0),⁹ 16 cross-sectional surveys were carried out in seven countries classified as LAMI – China (Beijing and Shanghai), Colombia, Lebanon, Mexico, Nigeria, South Africa and Ukraine – and nine countries classified as high-income – Belgium, Germany, Israel, Italy, Japan, The Netherlands, New Zealand, Spain and the USA (online Table DS1). The assignment of country developmental status was based on a cut-off of 0.9 on the Human Development Index.¹⁰

All surveys were based on either multistage, clustered area probability household samples or individuals randomly selected from national registers. All interviews were carried out face to face by trained lay interviewers. The western European surveys were carried out jointly.¹¹ The weighted average response rate was 70.8%.

Internal subsampling was used to reduce respondent burden by dividing the interview schedule into two parts. Part 1 included the core diagnostic assessment of mental disorders. Part 2 consisted of a detailed risk-factor questionnaire (including years of education and indicators of childhood and family adversity) and a series of diagnoses of secondary interest. All respondents completed part 1 ($n = 113\,216$). Respondents who met criteria for any mental disorder, as well as a probability sample of those who did not, were administered part 2 of the interview, except in Israel and South Africa where all respondents completed both parts. Data for part 2 respondents were weighted by the inverse of their probability of selection for part 2 of the interview to adjust for differential sampling. Analyses in this article were based on the weighted part 2 subsample ($n = 41\,688$). Additional weights were used to adjust for differential probabilities of selection within households and to match the samples to population sociodemographic distributions.

Measures

The WMH CIDI is a fully structured diagnostic interview for assessing mental disorders and collecting detailed information about the risk factors, impairment, consequences and treatment.⁹

Mental disorder status

Four categories of mental disorders were considered: anxiety disorders (generalised anxiety disorder, specific phobia, panic disorder and/or agoraphobia, post-traumatic stress disorder, separation anxiety disorder and social phobia); mood disorders (major depressive disorder, dysthymia and bipolar disorder); behaviour/impulse control disorders (intermittent explosive disorder, conduct disorder, oppositional defiant disorder and ADHD); and substance use disorders (alcohol and drug abuse and dependence). Disorders were assessed using the definitions and criteria of DSM-IV.¹² The CIDI organic exclusion rules were imposed in making all diagnoses. For each disorder retrospective age-at-onset reports, on both important symptoms and full syndromes, were obtained using a specially designed series of questions to minimise response bias. Such data were important in analysing the association between onset of prior mental disorders and subsequent termination of education.

Educational attainment

Respondents were asked how many years of education they had completed. Although countries varied in the age of starting school and the duration of each stage of education, we standardised the stage of education within country by years of education. We assumed an orderly academic progression and defined four educational milestones as follows: finishing primary education, finishing secondary education, entry to tertiary education and graduation from tertiary education (including university or other higher levels of education after secondary education). The standardisation of these educational stages across countries was performed with information supplied by researchers from all participating countries. Data on childhood adversities, collected through questionnaires on risk factors included in the survey instrument, were included as covariates because of their known association with both educational attainment and risk of mental disorders.^{13,14} These adversities included three forms of child

maltreatment (physical abuse, sexual abuse, neglect), three forms of loss of parents (parental death, parental divorce, other parental loss), three forms of parental psychopathology (parental mental disorder, parental substance use, antisocial personality disorders), family violence, family economic adversity and severe childhood physical illness (further information about the questionnaire is given in online Table DS2). Respondents who met the criteria specified for a given adversity before the age of 18 years were coded as having experienced childhood family adversity. We then estimated the risk of early termination of education attributable to mental disorders, controlling for childhood adversities, within each of the 16 countries studied.

Training and field procedures

The WHO translation protocol was used to translate instruments and training materials. Experienced CIDI trainers in the USA trained bilingual supervisors in each country. The surveys were conducted in the local official languages of the survey sites by trained lay interviewers. Two surveys were carried out in bilingual form (Dutch and French in Belgium; Russian and Ukrainian in Ukraine). In Nigeria, interviews were conducted in the four languages (Yoruba, Hausa, Igbo and Efik) used in the respective regions where the survey was carried out. Consistent interviewer training documents and procedures were used across surveys. People who could not speak the survey languages were excluded. Standardised descriptions of the goals and procedures of data use and its protection, and the rights of respondents were provided in both written and verbal forms to all potentially eligible respondents before their verbal informed consent to participate was obtained. Quality control protocols, described in detail elsewhere,¹⁵ were standardised across countries to check on interviewer accuracy and to specify data cleaning and coding procedures. The institutional review board of the organisation that coordinated the survey in each country approved and monitored compliance with procedures for obtaining informed consent and protecting participants.

Statistical analysis

Data on the age at onset of each disorder were combined with information on educational attainment to fit a discrete-time survival model in which disorders were treated as time-varying predictors of early termination of schooling.¹⁶ Each year of education was treated as a separate observational record with a dichotomous outcome variable,^{17,18} i.e. whether the respondent prematurely terminated (coded 1) or completed (coded 0) schooling in that year. The resulting data array consisted of 494 063 person-year observations (equivalent to a median of 12 years of education for each of the 41 688 respondents).

Models of the association between mental disorders and subsequent early termination of education included respondents' childhood family adversities, statistical controls for birth cohort (age at the time of interview), dummy variables for countries, and sociodemographic variables related to both educational attainment¹⁹⁻²¹ and mental disorders.²² These included measures of family of origin, socioeconomic status (standardised years of education of parents), respondents' and their families' place of birth (i.e. whether respondents were born in their country of residence, whether their parents/grandparents were born in their country of residence). Individual country-level models differed from one another owing to differences in the covariate information collected in the surveys. Respondents' place of birth was not included in surveys in Beijing, Shanghai, Colombia, Lebanon, Mexico, Nigeria and South Africa. Parental neglect, death and divorce were not included in the models for Europe

and New Zealand. To accommodate these differences in covariate information across the surveys, the number of childhood family adversities for each person-year was summed and standardised by person-year within each country. We then compared countries by including these individual measures and their interactions with country.

To estimate the societal-level associations of mental disorders with educational attainment, we used logistic regression equations to predict termination prior to each of the educational milestones from predictors including all the control variables listed above and binary indicators for individual mental disorders. On the basis of these equations we calculated the population attributable risk proportion using the difference between average predicted probability of completing the milestone with and without mental disorders.

Separate models were estimated for each of the 17 disorders and 4 disorder categories described earlier. In addition, we estimated models for any mental disorder and for composite disorders (no disorder *v.* exactly one disorder, exactly two disorders, or three or more disorders). The relationships between mental disorders and subsequent non-completion of each educational milestone are presented as odds ratios. Odds ratios greater (or less) than 1.0 are associated with greater (or lower) chances of educational non-completion. With sociodemographic variables controlled, an odds ratio of 2.0 can be interpreted as showing that the odds of early educational termination among people with a particular prior disorder were twice the odds of termination among others. Confidence intervals and statistical tests were calculated using the Taylor series linearisation method as implemented in the SUDAAN software package (Software for Survey Data Analysis, version 8.1 on UNIX-Solaris/SUN OS) to account for the complex sample design. Significance was assessed using two-sided tests at the 0.05 probability level.

Results

Prevalence of educational non-completion

The sample included 41 688 individuals: 26 109 in high-income countries and 15 579 in LAMI countries (online Table DS1). In the high-income countries a small minority (6%) did not complete primary education; of those who did so, 24.7% did not complete secondary education; 49.3% of those who completed secondary school did not enter tertiary education; and 46.2% of those who entered tertiary education left before completing 4 years at that level.

Termination of education typically occurred earlier in the LAMI countries than in the high-income countries: 16.6% of the former sample did not complete primary education; 46.1%

of those who completed primary education left school before completing their secondary education; 40.1% of those who completed secondary education did not enter tertiary education; and 55.1% of those who entered tertiary education did not complete it (Table 1). In each sample, a small number of respondents (289 in the high-income country sample and 342 in the LAMI country sample) were still in secondary or tertiary education when they were interviewed.

Association between mental disorder and early termination

In the total sample of all surveyed sites, respondents with one or more prior mental disorders of any type were significantly likely to terminate secondary education (OR=1.2–1.3, Wald $\chi^2=38.5$, $P<0.01$) and tertiary education (OR=1.0–1.2, Wald $\chi^2=5.7$, $P=0.02$) before completion. Different patterns of association were found between high-income and LAMI countries on the association between mental disorders and early termination of education. For instance, respondents having more disorders were significantly associated with higher odds of early termination than those having one disorder in high-income countries, but not in LAMI countries. To take account of this variation we conducted subsequent analyses separately for high-income and LAMI countries.

High-income countries

Of the 68 associations between individual mental disorders and subsequent termination of education in the high-income countries examined, 40 associations showed statistically significant odds ratios greater than 1.0. Table 2 shows the associations of the four mental disorder categories; complete results are shown in online Table DS3. For primary education, substance use disorders showed a significant and strong association with early termination at this stage (ORs 8.1–19.0), partly because of the small number of respondents with such disorders. There were a few significant associations between termination at this stage and disorders such as post-traumatic stress disorder (OR=3.8, 95% CI 1.4–10.3), dysthymia (OR=2.9, 95% CI 1.1–7.6) and oppositional defiant disorder (OR=2.9, 95% CI 1.1–7.7).

Every disorder examined was significantly associated with termination prior to completion of secondary education among those who completed primary education. However, the significant associations with termination were less substantial for anxiety (ORs 1.2–1.6) and mood disorders (ORs 1.4–1.7) than for impulse control (ORs 2.0–3.6) and substance use disorders (ORs 2.4–3.9). Drug abuse (OR=3.5, 95% CI 2.8–4.4) and dependence (OR=3.9, 95% CI 2.6–5.8) and conduct disorders (OR=3.6, 95% CI 2.5–4.9)

Table 1 Prevalence of termination prior to completion of four educational milestones

Educational milestone	At risk, <i>n</i>	Terminated prior to completion, <i>n</i>	Censored, ^a <i>n</i>	Proportion terminated	Proportion terminated
				among those at risk % (s.e.)	among total part 2 sample % (s.e.)
High-income countries					
Primary school	26 109	1 761	0	6.0 (0.2)	6.0 (0.2)
Secondary school	24 348	6 867	2	24.7 (0.4)	23.3 (0.3)
Entry to tertiary education	17 479	7 744	130	49.3 (0.5)	34.9 (0.4)
Tertiary education	9 605	4 619	157	46.2 (0.7)	16.3 (0.3)
LAMI countries					
Primary school	15 579	2 974	0	16.6 (0.4)	16.6 (0.4)
Secondary school	12 605	6 186	40	46.1 (0.6)	38.4 (0.5)
Entry to tertiary education	6 379	2 660	141	40.1 (0.8)	17.9 (0.4)
Tertiary education	3 578	2 038	161	55.1 (1.1)	14.1 (0.4)

LAMI, low- and middle-income.

a. Censored observations represent respondents who were 18 years old at the time of interview, or were 19–21 years old and still at university.