

Research Article

Ethnicity and Psychiatric Disorders

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Abstract

Psychiatric disorders are one of the leading causes of disease-related disability in the world today. However, little is known about the ethnic variation of these disorders within populations. This is especially true in contexts outside of the United States and the European Diaspora. This study provides new evidence from South Asia on ethnic differences in Major Depressive Episode, Major Depressive Disorder, Panic Attack, Panic Disorder, Post-Traumatic Stress Disorder, and Intermittent Explosive Disorder. We use data from 400 adult interviews conducted in Nepal in a controlled comparison design as a case study. We use a series of multilevel logistic regression models to predict ethnic group differences in psychiatric disorders and episodes with measures from clinically validated World Mental Health survey instruments. Compared to the Brahmin/Chhetri group, we found historically excluded Dalits had statistically significantly higher odds of almost all psychiatric disorders and episodes. We also found that historically resilient Janajatis had statistically significantly lower odds of being diagnosed with PTSD than the majority Brahmin/Chhetri group. We also found no significant gender difference in MDD or MDE. Psychiatric disorders and episodes vary significantly by ethnicity within a rural Asian population, but gender differences are small.

Keywords

- Mental Health
- Psychiatric disorders
- Asia
- Case study
- Ethnic disparities

ABBREVIATIONS

MDE: Major Depressive Episode; MDD: Major Depressive Disorder; PA: Panic Attack; PD: Panic Disorder; PTSD: Post-Traumatic Stress Disorder; IED: Intermittent Explosive Disorder

INTRODUCTION

Evidence that psychiatric disorders are a significant burden worldwide is substantial [1], but evidence regarding systematic variation across ethnic groups who share the same local, social, economic and environmental circumstances is rare. This is especially true outside of the United States and Europe, as most accumulated psychiatric health research involves populations in the American and European diaspora [1-3]. However, evidence of systematic variation across ethnic groups living under similar circumstances is a high priority because it can illuminate population level risk factors for disorders [4,5]. Not only does identification of clear ethnic differences help guide services aimed at treatment of disorders, a better understanding of historical differences in life experiences, practices, or beliefs may illuminate the mechanisms responsible for population level differences.

Many potential factors may contribute to psychiatric differences across ethnic groups, including genetic predisposition, socialization, stress, and life experiences. Because differences found across countries or regions often confound differences in ethnicity with differences in social and economic circumstances, most international comparative research does not yield clear evidence of differences from ethnicity alone. Instead, we use a case controlled comparison design to examine ethnic difference within a population all living in a single valley in Nepal. The country's longstanding caste system that prohibits marital exogamy has strong consequences for long-term ethnic differences across groups living in close physical proximity. This design eliminates national and regional differences in social, political, geographic and economic context.

This study presents new evidence on differences in psychiatric disorders and episodes among three major Nepalese ethnic groups: Brahmin/Chhetri, Dalit, and Janajati. Specifically, we examine five common conditions: Major Depressive Episode (MDE), Major Depressive Disorder (MDD), Panic Attack (PA), Panic Disorder (PD), Post-Traumatic Stress Disorder (PTSD), and Intermittent Explosive Disorder (IED). Using case controlled comparison design we are able to isolate differences across three major Nepalese ethnic groups. We explain in more detail below.

Theoretical Framework

Because of our interest in understanding the mechanisms revealed by differences in ethnicity and psychiatric disorders, we consider multiple potential sources of differences. To understand the relevance of both genetic and social factors to the comparison, we will first discuss the history of these ethnic groups in Nepal. Next, we will consider a purely biological basis, independent of cultural and contextual factors. Finally, we will consider the potential for cultural contexts to determine cultural differences with an exploration of the country's main ethnic groups.

History of Nepalese Ethnicities

The three groups we study, Brahmin/Chhetri, Dalit, and Janajati, differ from each other greatly in many aspects of life, such as ancestry, life experiences and positions within society. Nepal—which lies on the southern rim of Great Himalayas, bordering Tibet in the North and surrounded by India to the East, West and South—was once a sanctuary for waves of migrants coming from both north and south of its borders. This migration of peoples brought into the country new and different variations of religions, customs, and beliefs. The early migration from the north was largely of nomadic Mongoloid people from Tibet, followed by waves of Indo-Aryans from the south (northern India). Some of the migrants from the south, especially the Brahmans and Rajputs, were fleeing the religious crusades of invading Mughals (or Indian Muslims) and their suppression of Hindus; others (especially those from Bihar and West Bengal), were lured to Nepal by the possibilities of overtaking the Tarai land [6,7]. As of 1991, a large number of Indians from Bihar and other neighboring areas continued to cross the border into Nepal [8]. Most of those recent migrants were found in towns and cities, where they were engaged in semiskilled labor and mercantile activities. Dalits, on the other hand, were reported to enter Nepal with the flux of Brahmin/Chhetri trying to avoid the religious crusades of invading Mughals.

Dalits, who are at the bottom of the Hindu caste system and known as untouchables, make up a group of people who are religiously, culturally, socially and economically oppressed [9]. The multiple sources of oppression—religious, cultural, social, and economic—have important consequences for their life experiences and health status. Dalits were believed to be brought to Nepal by Brahmin/Chhetris to act as cheap labor for low quality, religiously impure jobs that Brahmin/Chhetris not supposed to perform, and to this day Dalits continue to perform the low skilled, low paying jobs as prescribed by Hindu caste system.

Janajati is the Nepali world for indigenous people. Hill Janajatis, with their Mongolian ancestry were often believed to have come from northern border of Nepal (Tibet). As their arrival to different parts of Nepal predated the recorded history of Nepal, they are considered indigenous. We grouped the indigenous people from the hills -Gurung, Tamang, Lama, Magar, Sherpa, Rai, Limbu, with indigenous people from the southern plain-Tharu, Kumal, and Bote (who are indigenous to our Study area Chitwan) into Janajati. Janajatis, particularly Hill Janajatis, have been associated with some forms of Buddhism, which deemphasizes violence. Janajatis, both Hill Janajatis and

Terai Janajatis, as indigenous groups to the new place, have developed and adopted several practices and techniques to address the adversity and hardship they face. As a result, they have developed high resilience and have honed their ability to tolerate hardship and have consistently been the top recruits for the British Gurkha Army [10-12]. This background of exposure to and participation in violence has led Janajatis to be known by many around the world as brave fighters [13]. This experience is so deeply engrained in the history of this group that it may have important implications for present-day Janajatis' prevalence of psychiatric disorders.

The history of Nepal's caste system can explain the current status of Brahmin/Chhetris in the country. Because of their higher caste status, Brahmin/Chhetris generally have higher social status, more access to public resources, and are less likely to be engaged in violence and stressful activities than their lower caste Dalit counterparts [14]. The Brahmin/Chhetri ethnic group has historically benefited from their higher status and power in becoming well educated and maintaining large plots of land. Few Dalits, on the other hand, attain high levels of schooling and therefore do not reap the same benefits as Brahmin/Chhetris, such as higher paying jobs; this enables the prevailing class to excel in comparison their counterparts who are less likely to own large tracts of land [15,16]. These distinct differences between Nepal's ethnic groups, along with the country's unique cultural history, and with it a clear religious element which has a longstanding connection to psychiatric health [17-19], acts as a basis for our anticipated ethnic variations in psychiatric disorders in Nepal. This history also implies individual experiences may have combined with other genetic and cultural factors to create current psychiatric status.

Potential for Genetic Differences

Nepal is home to both Asians of Indian decent and Asians of Eastern Chinese decent living in close proximity but barred by religion from marrying outside of their own ethnic groups for the past 4000-5000 years. This creates a context in which ethnic groups have distinct biological and genetic boundaries. Because of these potential biological differences, genetic factors may be relevant to any ethnic comparison within Nepal. Evidence demonstrates important genetic predispositions for certain psychiatric disorders. Genome-wide association studies (GWAS) have identified many robust associations for psychiatric disorders, such as alcohol dependence, schizophrenia, bipolar disorder and autism spectrum disorder [20-27]. As with GWAS of other disorders, these findings are primarily based on analyzing samples with European ancestry. The extent to which these associations and findings are transferable to non-European populations is less clear, creating a high scientific priority on psychiatric genetic research outside of European populations [28-30]. Nevertheless, it is plausible that ethnic differences within South Asia are associated with genetic variations relevant to psychiatric disorders. Differences in psychiatric disorders and episodes among ethnic groups in rural Nepal, therefore, may have a strong genetic component.

Cultural Context Differences

Ethnicity itself may be thought of in both cultural and social

dimensions. In Nepal, ethnic inequality is institutionalized in the caste system, where certain groups are favored in government, social, and professional positions [31]. These different social contexts can both put individuals at a higher risk of having a disorder and also affect the outcome after receiving a diagnosis. Culturally, ethnicities are viewed in terms of race, language, and place of origin, which can be correlated with religion, beliefs, values, and practices [32]. As a social construct, ethnicity is one of several factors driving interpersonal relationships and interactions within society [33-36]. Central to this are theories of relative deprivation and exclusion. Different ethnic groups in Nepal experience significantly different social contexts, partially sustained by the historical geographical segregation of the groups [37]. These different contexts enable better health circumstances for some groups relative to others, which may lead to differences in acquiring psychiatric disorders [38,39]. For instance, Kohrt et al., found that caste-based disparities in depression and anxiety in Nepal are mediated by poverty, lack of social support, and stressful life events [40].

Today, different ethnic groups have strong variations in social status, which could result in both different experiences and different reactions to similar experiences. Given the histories discussed above, we expect that Janajatis will have lower rates of depression, PTSD, and IED due to increased resilience to violence [41, 42]. Their strong culture of tolerating violence and history of engagement in armed conflict is likely to build resilience [43, 44]. Additionally, we expect Dalits to have higher rates of depression, PTSD and IED. Their history of social and economic exclusion is likely to expose them to higher levels of risk factors and less likely to promote resilience.

Research Setting

The data analysis described here comes from the Western Chitwan Valley of south-central Nepal. The administrative district of Chitwan is roughly 100 miles from Kathmandu and borders India. There is one large town, Narayanghat, and the rest of Chitwan's population, like much of Nepal's, lives in small, rural villages. Chitwan is a flat and fertile valley dominated by agriculture. Of households in the study area, 82 percent are involved in farming or animal husbandry.

This setting also experienced significant armed conflict, expanding the opportunities for conditions such as post-traumatic stress disorder and depressive and anxiety disorders. Perhaps the most significant conflict is the 10 years of armed conflict that cost an estimated 13,000 lives and considerable physical, psychological, political, social, and economic damage. Since that conflict ended in a peace agreement in 2006, Nepali society is undergoing a dramatic post conflict sociopolitical transformation. Following the peace agreement, Nepal experienced a series of major political transitions, and such events continue to expose the population to uncertainty. Even today, most of the protest programs are using the same tactics used by the Maoists during the armed conflict: public demonstration and strike, intimidation, extortion, abduction, beating, and killing. The uncertain political and economic future and lapse of public security continue to create heavy psychological stress in the general population. Different ethnic groups have varying exposures to these stresses,

which may be expressed through different psychiatric health outcomes.

Data on prevalence levels of psychiatric disorders, especially among different ethnic groups, are almost nonexistent. There is currently no reliable source of information about the prevalence of psychiatric disorders in Nepal. The WHO-Aims Report on Mental Health Systems in Nepal [45] states that although Nepal's mental health policy was formulated in 1996, there is no mental health service available in terms of service areas. There is one mental health hospital with a total of .20 beds per 100,000 population. The majority of patients are treated in outpatient facilities or not at all [45].

Rural Nepal provides an ideal setting in which psychiatric disorders and episodes among different ethnic groups can be examined. Because the recent conflict in the country likely resulted in different ethnic groups receiving varying exposures to violent events, we expect to see variations in depressive disorders, panic disorders, PTSD, and IED [42].

MATERIALS AND METHODS

Measuring psychiatric health outcomes and connections with ethnicity is a complex task, which led us to use a multiphase approach. First, to identify the most common psychiatric disorders and episodes in Nepal, we conducted a series of consultative meetings with Nepalese psychiatric health professionals and an extensive review of literature on Nepal. Second, we used cutting-edge tools in psychiatric health research, including research instruments (World Mental Health Composite International Diagnostic Interview [CIDI 3.0]), protocols, data entry, and data coding and validation procedures [46] that have been repeatedly tested, updated, and used extensively in 28 countries [1]. Finally, we adopted and translated these well-tested research instruments, protocols, and validation procedures to the Nepali language and the cultural context of Nepali society. The details of this translation and validation process are described elsewhere [46]. As documented there, this process produced high levels of clinical validation in our measures of our psychiatric disorders.

Sample Design

The final Nepali CIDI 3.0 questionnaire was administered to a general population, systematically selected sample of 400 individuals living in the western Chitwan Valley. We used the sampling frame from the Chitwan Valley Family Study. This study is a longitudinal panel study of 151 communities, 2,300 families, and 15,000 individuals. It was used as a sampling frame, but those participating in that study were not part of this sample. Respondents were chosen with a two-stage sampling procedure. First, based on the distance to the urban center, the study area was divided into three distinct strata. Next, a sample of 4 to 6 neighborhoods, each consisting of between 10 and 15 households, were selected from each stratum. In addition, based on a local psychiatrist's recommendation, we purposefully chose 2 additional neighborhoods from poor slum areas that were likely to have a high prevalence of psychiatric disorders. This process yielded 17 neighborhoods (communities) with 198 households. Once a neighborhood was selected, all individuals age 18 and older residing in those households (defined as eating and sleeping most of the time in the past month) within the neighborhoods

were interviewed. This sampling procedure resulted in 400 individuals who were selected in a statistically representative manner that closely resembled the Chitwan Valley Family Study sample [46].

For validation purposes, we re-interviewed a subset of this sample. This subset included 100 percent of the respondents who were diagnosed positive for at least one disorder through the CIDI-generated diagnosis and 10 percent of respondents who were diagnosed negative for all disorders through the CIDI-generated diagnosis. Diagnosis fit the criteria of both Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM IV) and the 10th revision of the International Statistical Classification of Diseases and Related Health Problems (ICD 10). This sampling procedure yielded 84 individuals, 50 positive cases and 34 negative cases. Out of 84 respondents, 80 of them were re-interviewed using the Nepali translation of the Structured Clinical Interview Diagnosis (SCID) questionnaire in a clinical setting by a psychiatrist. These reinterviews demonstrated a high level of concordance between survey measures and clinical diagnosis, meeting or exceeding standard of the World Mental Health surveys [46].

Measures

The analysis we present investigates 6 psychiatric conditions, including both disorders and episodes of disorders measured using this Nepali translation of WMH CIDI 3.0: Major Depressive Episode (MDE), Major Depressive Disorder (MDD), Panic Attack (PA), Panic Disorder (PD), Post-Traumatic Stress Disorder (PTSD), and Intermittent Explosive Disorder (IED). The measures of these disorders and episodes are based on the lifetime positive diagnosis for them using DSM IV criteria. If the respondent was diagnosed by CIDI as ever positive for that specific disorder or episode it is coded as "1," and "0" otherwise.

As mentioned above, we broke down ethnicity into three distinct groups: Brahmin/Chhetri, Dalits, and Janajati. Although we recognize that Nepal's ethnic groups are extraordinarily diverse, for the purposes of our analyses, we divided them into three comparative groups. The social structure of the groups is typically described as high caste Hindu groups (Brahmin/Chhetri), low caste Hindu groups (Dalit), and indigenous (Janajati).

To evaluate family-based social support we examine marital status and family size. In our analyses marital status is a dichotomous measure, where never married, divorced, separated, and widowed are all coded as not currently married. Those from larger families also appear to enjoy greater social support [47, 48]. We operationalised this with a continuous variable to examine the number of people who live in the respondent's household ranging from 2-8 people, where 8 represents every household with 8 or more people. 89% of the sample lived in homes with 8 or fewer people, but the full range extended to 17 people.

We use measures of age, gender, and education to control for other demographic influences on psychiatric health outcomes. Age is measured in years and ranges from 18-59 years, where 59 represents everyone aged 59 or older. 89% of the samples were 59 years of age or younger but the full range extended to 88 years. Gender is coded 0 for male respondents and 1 for female

respondents. Education records the number of years of formal schooling the respondent had completed ranging from 0-10 years, where 10 represents everyone with 10 or more years of education. 85% of the sample had 10 or fewer years of education, but the full range extended to 16 years of education.

Analytic Methods

We use multilevel logistic regression models to predict the outcomes: MDE, MDD, PA, PD, PTSD, and IED. We estimate the total associations between ethnic group and psychiatric condition. Specifically, we estimate models predicting MDE, MDD, PA, PD, PTSD, or IED separately, contingent on ethnicity and demographic characteristics.

RESULTS AND DISCUSSION

The distribution of characteristics of the study population by ethnic group is shown in Table 1. There were 189 Brahmin/Chhetri, 53 Dalit, and 158 Janajati in the sample. The average age was 39 for Brahmin/Chhetri, 36 for Dalit and 35 for Janajati. Most respondents were married: 81% Brahmin/Chhetri, 87% Dalit, and 79% Janajati. Similarly, more respondents were female (61, 62, and 55% for Brahmin/Chhetri, Dalit, and Janajati, respectively), which is likely a result of the high prevalence of out-migration for labor from this area among men and not women [49, 50]. The average household size was 6 in each ethnic group. As expected, Brahmin/Chhetris had the most education (5 years compared to 3 and 4 for Dalits and Janajatis, respectively). In the total sample, Panic Attack and Major Depressive Episode were the most common psychiatric afflictions we measured (6% and 5.5%, respectively). Those two disorders as well as Major Depressive Disorder and Intermittent Explosive Disorder had higher prevalence rates among Dalits.

We calculated the total associations between ethnic group and psychiatric condition (results not shown). Compared to our reference group (Janajati), Dalits had statistically significantly higher odds of being diagnosed with all disorders and episodes, excluding PTSD. Additionally, Brahmin/Chhetris had almost 5 times higher odds of being diagnosed with PTSD when compared with Janajati (p -value < .05). These results are consistent with our expectations that Janajatis would have lower rates of psychiatric conditions. This finding of lower rates of PTSD is particularly consistent with our expectation that the historical resilience of Janajatis contributes to their psychiatric health.

To better interpret these results and to gain a more complete understanding of ethnicity and these psychiatric conditions, we introduced several controls. In Table 2 we add controls for all covariates: age, gender, marital status, household size, and education, giving us net associations. Compared to Janajatis, Dalits had statistically significantly higher odds of all psychiatric conditions, excluding IED and PTSD. This included more than 6 times higher odds of an MDE diagnosis (p -value < .01) and was consistent with our expectations. We also found that age and gender were predictors of psychiatric conditions, but only in certain instances. Older age was significantly linked to a slightly increased risk for MDE and PA (p -value < .05) and females seemed to have slightly higher odds of being diagnosed with PTSD (p -value < .05). This result is consistent with other published research on the sample sample, which demonstrates

Table 1: Descriptive Statistics from the Chitwan Health and Stress Study (n = 400).

		Brahmin/Chhetri (n = 189)	Janajati (n = 158)	Dalit (n = 53)	Total Sample (n=400)
	Range	Mean Percent (SD)	Mean Percent (SD)	Mean Percent (SD)	Mean Percent (SD)
Psychiatric Disorder (%)					
Major Depressive Episode	0, 1	5.8(.23)	2.5(.16)	13.2 (.34)	5.5(.23)
Major Depressive Disorder	0, 1	5.3(.22)	3.2 (.16)	9.4 (.29)	5.0 (.22)
Panic Attack	0, 1	6.3 (.24)	3.8 (.19)	11.3 (.32)	6.0 (.24)
Panic Disorder	0, 1	0.5(.07)	0.0 (.00)	0.0 (.00)	0.25 (.05)
Post-Traumatic Stress Disorder	0, 1	5.8 (.23)	1.3(.11)	3.8 (.19)	3.7 (.19)
Intermittent Explosive Disorder	0, 1	0.5 (.07)	1.3 (.11)	5.7 (.23)	1.5 (.12)
Gender					
Female=1 (%)	0, 1	62 (.49)	54 (.50)	62(.49)	59 (.49)
Population Characteristics					
Age (mean)	18-59+	38.9 (13.82)	35.1 (12.95)	35.5 (12.47)	37 (13.41)
Married (%)	0,1	80.9 (.39)	78.5 (.41)	86.8 (.34)	80.8 (.39)
Household Size (mean)	2-8+	5.7 (1.83)	5.6 (1.66)	5.7 (1.56)	6.1 (1.73)
Education (mean years completed)	0-10+	5.4 (4.26)	4.1(3.88)	3.4 (3.03)	4.6 (4.04)

Table 2: Logistic Regression Estimates of the Odds of Psychiatric Disorders [Odds Ratios with Z-Statistic in Parentheses]

Ethnicity (Janajati)	MDE	MDD	PA	PTSD	IED
Brahmin/Chhetri	1.77 (0.91)	1.49 (0.68)	1.28 (0.45)	3.91 (1.68)^	.65 (-0.34)
Dalit	6.53 (2.83)**	4.08 (2.07)*	3.36 (1.97)*	2.95 (1.06)	6.44 (1.87)^
Gender (Male)					
Female	1.79 (1.12)	.92 (-0.17)	1.02 (0.04)	5.45 (2.06)*	.18 (-1.71)^
Other Population Characteristics					
Age	1.05 (2.17)*	1.03 (1.47)	1.06 (2.48)*	1.03 (0.96)	.94 (-1.22)
Married	.56 (-1.06)	.40 (-1.70)	1.24 (0.33)	1.27 (0.31)	.41 (-0.88)
Household Size	.87 (-1.05)	.82 (-1.43)	1.12 (0.92)	.89 (-0.77)	1.03(0.09)
Education	1.09 (1.17)	1.10 (1.21)	1.03 (0.35)	1.03 (0.31)	0.85 (-0.97)

^ p < .10 * p < .05 ** p < .01 One-tailed tests

that Nepalese women experience PTSD after trauma at higher rates than Nepalese men [42]. No other gender associations were statistically significant (at a p-value<.05). Note this is an important difference from most findings based on populations of Europe and escent. Most of those studies find substantial gender differences in disorders, for example MDD [51,52]. In this rural Asian population we do not find that strong gender difference. Additionally, age was associated with higher odds of having MDE and PA.

Interestingly, we find a difference in association with ethnicity between episodes of psychiatric disorders versus diagnosis of the disorder itself. Compared to Brahmin/Chhetris, Dalits had statistically significant higher odds of experiencing MDE (as opposed to MDD) in all models. Dalits also had higher odds of experiencing PA.

To expand our understanding, we performed an additional set of logistic regression tests using Brahmin/Chhetri as the

reference group (not shown in tables). In those tests, we included all covariates and found that Brahmin/Chhetris are statistically significantly different than Dalits in only MDE. We saw that Dalits had almost 4 times higher odds of MDE (p-value<.05), compared to Brahmin/Chhetris, consistent with our expectations. Dalits additionally had higher odds of MDD and PA, but those results were not statistically significant. Other results included Janajatis' lower odds of being diagnosed with PTSD, a finding not significant (at a p-value<.05).

Finally, because we did not find gender differences in MDE or MDD, we examined gender without any controls (not shown in tables). We also investigated models of MDE and MDD including an interaction term between ethnicity and gender. Neither the total association with gender nor the association with gender-ethnicity interactions was statistically significant. We conclude that gender differences in depression may be smaller in this setting than in other settings, and studies with larger samples will be required to detect them.

CONCLUSION

In this study we describe new evidence on variations in psychiatric disorders and episodes across ethnic groups in rural Nepal. The analyses demonstrate some substantial and important ethnic differences. Compared to Janajatis, we found that Dalits had higher odds of being diagnosed with MDE, MDD, and PA. Brahmin/Chhetris had almost 5 times higher odds of being diagnosed with PTSD when compared with Janajatis.

The specific results we find are consistent with major theories potentially explaining the link between ethnic differences and psychiatric conditions. Historical, cultural, and geographical restrictions have often prevented Nepal's ethnic groups from marrying and starting families with those outside of their group. Therefore, each group may have a distinct social and genetic makeup that has been preserved by the physical restraints of mountains and valleys, and the cultural restraints of common marriage within ethnicity [37]. Because of this social and physical segregation, other traits, including genetic traits, may have also remained isolated.

In addition to these potential genetic differences, Dalits are among Nepal's most excluded and lowest resourced ethnic group and we found that they had statistically significantly higher odds of almost every psychiatric condition we measured. When compared to Brahmin/Chhetris (the highest resourced ethnicity in Nepal), Dalits had almost 4 times higher odds of an MDE diagnosis (p -value<.05), significantly higher odds of an IED diagnosis, as well as higher (non significant) odds of MDD and PA. Compared to Janajatis, Dalits had significantly higher odds of all disorders but PTSD and IED. Because of their social status in comparison to both Brahmin/Chhetris and Janajatis, Dalits' low social capital, may be creating an increased risk of psychiatric illness. If social capital is protective of psychiatric health and Dalits are the socially worst off in Nepal, our results are consistent with the argument that social deprivation increases one's risk for psychiatric disorders [53,54]. This has been investigated in the past; however, like many other psychiatric studies, evidence is limited to mostly high resource settings [55]. Careful genetic analysis, beyond the scope of this study, is urgently needed to differentiate between potential differences in genetic predisposition and these difference in social conditions or interactions between the two.

We also found that Janajatis had statistically significantly lower odds of being diagnosed with PTSD than the Brahmin/Chhetri group when accounting for other covariates. There was no statistically significant correlation with Dalits and PTSD. One possibility for Janajatis lower odds of having PTSD is resiliency [56]. The Janajati group in Nepal has consistently been the recipient of recruitment attention from the British Gorkha military [57]. This history both being exposed to and being involved in violent activities is a substantial factor which may contribute to being desensitized to violence and more resilient to PTSD [11,58]. Interestingly, past research has found that being of "low caste" acts as a protective factor for developing PTSD, which may explain why we found no correlation between Dalits and the disorder [59]. Again, careful genetic analysis, beyond the scope of this study, is urgently needed to differentiate between potential mechanisms producing these differences.

Another interesting finding involves our results for gender and depression. Gender differences in depressive disorders are well documented around the globe, with studies finding that women have significantly higher rates of depression than men [60]. In fact, this has been discussed thoroughly in work using the same World Mental Health Survey instruments we employed in this study [61]. This has led many to posit that gender differences in depression have a biological basis [62,63]. However, this association may have contextual limitations. Some research exists on the topic, with results acting as indirect evidence pointing towards social and cultural differences, which may contribute to gender differences [64-67]. Our finding of no significant difference in two measures of depression between women and men motivates further investigation into the association between gender and depression in Nepal and other poor, agrarian settings. Our study was limited to 400 individuals – larger samples of Nepalese respondents will be needed to detect and document gender differences in depression in that setting.

This study has both strengths and limitations. One important limitation is that the measures are cross-sectional so do not measure change in psychiatric health status over time. Another is the small sample size could contribute to a lower overall power of the study and may have increased the failure to detect differences. A third is that our results are only generalizable to Brahmin/Chhetris, Dalits, and Janajatis in Nepal. Of course, the small size of the this sample makes the discovery of significant ethnic differences in disorders more interesting – those differences are likely to be found in any carefully conducted study of a larger sample in this setting.

Even with these limits, this study is among the first of its kind to investigate ethnic differences in psychiatric disorders in rural Nepal. The findings offer a unique lens through which other studies can further advance this topic. In poor countries with many unknowns about psychiatric disorders, and little data available to researchers, there is an even greater need to understand the mechanisms at work [5].

Understanding variations in psychiatric disorders across ethnic groups provides a starting point for any proposed public health interventions. Studies have shown that response to psychiatric treatment depends on several factors, including language and ethnicity of patient and physician, as well as any potential physician, community, or institutional bias [68,69]. If ethnic disparities exist in experiences of psychiatric symptoms and diagnosis of psychiatric disorders, there may be similar imbalances in treatment options [70]. Our evidence demonstrates that the least resourced ethnic groups may suffer the highest burden of psychiatric disorders, motivating specific targeting of new treatment resources to these groups. Mental health professionals in Nepal and elsewhere may have the greatest impact by targeting these groups in general, and in Nepal, Dalits specifically.

This investigation into the prevalence of psychiatric disorders outside of the context of rich American and European societies may also prove useful in those settings. The evidence we present adds to a growing literature on ethnic differences in psychiatric disorder that all points to excluded and low resourced groups as those facing the highest burden of these disorders [2,37-39]. As

evidence of this universal pattern continues to grow, motivation to invest more service delivery in activities targeting such groups will also grow across all settings.

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Ethical Approval

Ethical approval for the protection of human subjects was received from the University of Michigan's Internal Review Board (FWA00004969) and from the Institute for Social and Environmental Research—Nepal Institutional Review Board (IRB00002109 and Federal Wide Assurance FWA00004864).

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