

Mental Health Patterns and Consequences: Results from Survey Data in Five Developing Countries

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The social and economic consequences of poor mental health in the developing world are presumed to be significant, yet remain underresearched. This study uses data from nationally representative surveys in Bosnia and Herzegovina, Indonesia, and Mexico and from special surveys in India and Tonga to show similar patterns of association between mental health and socioeconomic characteristics. Individuals who are older, female, widowed, and report poor physical health are more likely to report worse mental health. Individuals living with others with poor mental health are also significantly more likely to report worse mental health themselves. In contrast, there is little observed relation between mental health and consumption poverty or education, two common measures of socioeconomic status. Indeed, the results here suggest instead that economic and multidimensional shocks, such as illness or crisis, can have a greater impact on mental health than poverty. This may have important implications for social protection policy. Also significant, the associations between poor mental health and lower labor force participation (especially for women) and more frequent visits to health centers suggest that poor mental health can have economic consequences for households and the health system. Mental health modules could usefully be added to multipurpose household surveys in developing countries. Finally, measures of mental health appear distinct from general subjective measures of welfare such as happiness. JEL codes: O12, I10, I32, O15.

Mental health has received more attention in public health and policy spheres since the release of the World Health Organization's (WHO) flagship report, *Mental Health: New Understanding, New Hope* (WHO 2001). According to widely circulated estimates, unipolar depressive disorders are the leading cause of loss of disability adjusted life-years (DALYs) in the Americas and the third

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leading cause in Europe, but they also rank highly in lower income countries. They are the second leading cause in the Western Pacific, the fourth in South-East Asia, and the fifth in the Eastern Mediterranean (Ustun and others 2004).¹ While depression is not in the top 10 in Africa, it is recognized as a major source of disability, particularly in conjunction with HIV/AIDS epidemic (Freeman and others 2005).

The few low-income country estimates of poor psychological health suggest that prevalence is not systematically lower than it is in wealthier countries (Bijl and others 2003). The lifetime prevalence of psychiatric illness in rural Ethiopia was found to be 31.8 percent (Awas, Kebede, and Alem 1999). A community survey of 1,454 adults in Sao Paulo, Brazil, found a lifetime prevalence for any psychiatric disorder of 45.9 percent (Andrade and others 2002). And a review of five prevalence studies in four countries undergoing rapid socioeconomic change found lifetime prevalence rates of common mental disorders ranging from 23 percent in Pelotas, Brazil, to 46 percent in Goa, India (Patel and others 1999).

An economist's viewpoint adds to this literature in two ways. First, there are calls for broadening the concept of well being to include markers of "human development" other than income or consumption. Mental health could well be an important addition, as poor mental health directly affects well being. Understanding how (and whether) mental health indicators can be collected in the context of large-scale household surveys is thus important. Second, the impact of mental health on economic behavior is of inherent interest. To the extent that it affects labor force participation or productivity, there may be a direct economic rationale for public investments in improving mental health.

Incorporating mental health measures in household surveys would extend social science research on health, which attempts to understand the relations between poor physical health and economic and social outcomes (Strauss and Thomas 1998). The consequences of mental disorders such as depression and anxiety are presumed to be significant, yet are underresearched in low-income countries. A comparative research project of the World Bank's Development Research Group attempted to address this knowledge gap by investigating the socioeconomic context of poor mental health in low- and middle-income countries. The research produced three country studies from Tonga, India, and Indonesia (Stillman and others 2006; Das and Das 2006; Friedman and Thomas 2007). To study the correlates of mental health in a broad variety of low- and middle-income country settings, it used data from these countries as well as Bosnia and Herzegovina and Mexico.

This review argues that including mental health modules in multipurpose household surveys is relatively straightforward and informative in that they capture "real" underlying psychological illnesses. Validation studies from the

1. Such statements should be treated with caution given the sparse data on both physical and mental health available in many countries in these regions.

Bosnian and Indian data sets used here show that the mental health measures collected from surveys are highly correlated with clinical diagnoses of psychiatric disorders such as depression. In addition, associations between mental health and sociodemographic correlates are similar across all five countries, suggesting stability in what is being measured. The review also shows that mental health status is associated with labor supply and health care use, conditional on self-reported physical health status and other socioeconomic variables commonly collected in household surveys.

Two additional findings suggest that mental health measures complement traditional welfare measures, such as income, consumption, and poverty. Unlike studies in high-income countries, in low-income countries the correlation between mental health and levels of income or consumption is not strong. Poor mental health is not a “disease of affluence” in the developing world—nor is it a disease of poverty. But the country cases in the comparative research show that individual responses to long- or short-term shocks differ noticeably whether one looks at monetary measures of welfare, such as income and consumption, or at mental health indicators.

Section I of this article describes the survey instruments used to measure mental health and their validation. Section II examines the association between mental health and potential individual and household predictors. Section III considers the relations between mental health and two behavioral outcomes: labor supply and health care use. Section IV reviews the implications of these findings and contrasts them with the happiness literature, discusses potential response biases arising from self-reported mental health measures and how these may affect the findings here, and suggests probable productive paths of future research.

I. DATA: MEASURING MENTAL HEALTH IN MULTIPURPOSE HOUSEHOLD SURVEYS

The psychological health literature has used two approaches to measure mental distress through surveys. The first attempts to diagnose specific psychiatric illnesses with data on symptoms collected through survey interviews. Used most widely is the Composite International Diagnostic Interview in its various formats, translations, and revisions. A second approach in low-income countries is to measure general psychological distress, rather than to diagnose specific manifestations of mental illness. Common examples include variants of the General Health Questionnaire (GHQ) of Goldberg (1972) and the Mental Health Inventory (MHI-5) of Veit and Ware (1983). These measures have been found to detect major depression, general affective disorders, and anxiety disorders (Berwick and others 1991; McCabe and others 1996). However, both approaches have found large differences in the overall case prevalence and proportion of respondents answering “yes” to specific questions across countries, differences ascribed in part to differences in cultural norms related to disease attribution and the stigma of mental illness (Patel, Pereira, and Mann 1998; Aidoo and Harpham

2001; Cross-National Collaborative Group 1992; WHO International Consortium in Psychiatric Epidemiology 2000; Demyttenaere and others 2004).

The multipurpose surveys used in this article follow the second approach, each fielding a widely used mental health screening instrument in the context of general household surveys. Table 1 summarizes the survey year, geographic coverage, mental health instrument, and sample size in each country. Nationally (or near-nationally) representative surveys of more than 10,000 households were carried out in Mexico and Indonesia, each using a variant of the GHQ to measure mental health. A nationally representative survey of more than 5,400 households in Bosnia and Herzegovina used the Center for Epidemiological Studies Depression Scale (CESD) of Radloff (1977), a 20-question self-reported depression scale. Also used here are two smaller special purpose surveys. The first is a longitudinal study of 300 households in Delhi, India, which do not differ in observable characteristics from a representative sample of households in this city (Das and Sánchez-Páramo 2003). It used the most comprehensive mental health instrument, the 90-question Symptom Checklist 90 Revised (SCL-90R). The second special survey is one of 230 Tongan households taken from villages in which some individuals had applied for an emigration lottery (Stillman, McKenzie, and Gibson 2006). It used the MHI-5 to measure mental health.

These data offer four advantages over those used in many previous studies. First, the surveys sample households from a representative population frame. Previous studies sample opportunistically, such as patients at health clinics (such as Patel, Pereira, and Mann 1998), with possible biases from nonrandom use of health clinics. Second, surveying households rather than individuals permits examining the mental health outcomes of different members of the same household. Third, the comprehensiveness of the surveys provides richer measures of socioeconomic characteristics, including expenditure- or income-based measures of poverty, rather than more blunt indicators, such as earning less than one-quarter the minimum wage or the presence or absence of electricity or tap water (such as Patel and Kleinman 2003). Fourth, mental health can be linked with behaviors in the labor and health care markets.

The exact content of the mental health questionnaires varies across countries, but they are similar in concept. Typical questions ask respondents the frequency in the last month of a similar range of internal states (“feeling sad or blue,” “feeling anxious or nervous”) or related behaviors (“difficulty falling asleep,” “distracted from everyday activities”). The frequency of such states or behaviors is recorded on a four-point scale that ranges from “never” or “almost never” to “very often.” In line with the standard analysis of the GHQ and MHI-5, the individual survey responses are scored by assigning a low ordinal value (1 point) to categorical responses of infrequency and high ordinal values (up to 4 points) to the categories with most frequent responses.² The average response

2. The MHI-5 used in Tonga had a five-point scale while the GHQ adapted in Indonesia had a three-point scale. Both were standardized to a 1–4 range for table 1.

TABLE 1. Overview of data sets employed in the Five Study Countries

Country	Year of survey	Number of households	Number of observations	Level of representation	Mental health survey	Mental health measure	
						Instrument	Mean Standard deviation
Bosnia and Herzegovina	2001	5,409	12,956	National	CESD	1.495	0.502
	2003	300	784	Seven neighborhoods in New Delhi ^a	SCL-90R	1.535	0.416
Indonesia	2000	>10,000	25,470	National	GHQ derived	1.413	0.508
	2002	>10,000	19,798	National	GHQ derived	1.341	0.358
Mexico	2005	230	714	Special sample of migrant-sending villages	MIH-5	1.745	0.337
Tonga							

Note: CESD is the Center for Epidemiological Studies Depression Scale; SCL-90R is the Symptom Checklist 90 Revised; GHQ is the General Health Questionnaire; MIH-5 is the Mental Health Inventory.

^aIndistinguishable from a representative sample of the city.

Source: Authors' compilation.

across all questions (with each question given equal weight) constitutes the respondent's mental health score, often known as the Global Severity Index (GSI), which is higher for those reporting worse mental health.³

In contrast to subjective measures of well being, such as satisfaction with life, mental health measures can be validated against well-defined objectives—particularly whether answers to the questions predict clinical diagnoses of depression, anxiety, and other mental health disorders. Both the GHQ and MHI-5 perform well in this regard. Validations of the mental health modules for the specific populations used in the studies were attempted for the Bosnian and Indian data. In India, survey teams administered the survey to 38 individuals seeking outpatient treatment at two psychiatric facilities. They found the mental health scores to be significantly lower for the general population than for the selected subpopulation known to suffer from psychiatric disorders. In Bosnia and Herzegovina, a selected sample of 184 individuals—who had visited primary health care facilities in the Canton of Middle Bosnia—were administered the household survey module and then examined by a psychiatrist for known psychiatric disorders. The household survey had a 97.5 percent sensitivity rate and a 75 percent specificity rate (Kapetanovic 2004).⁴

Table 1 also presents the mean and standard deviation of the raw scores by country. Because of concerns with cross-national comparability, this review does not directly compare levels of psychological distress across national surveys. Instead, it explores the observed commonalities and differences in correlates of mental health, standardizing the mental health scores by subtracting the country mean and dividing by the country standard deviation. The standardized GSI then has a mean of zero and a standard deviation of one for each country.

II. CHARACTERISTICS OF THOSE WITH POOR MENTAL HEALTH — PATTERNS AND DIVERGENCES

Summarizing and extending the work in Das and others (2007), this section examines the correlation of mental health with individual, household, and community factors. It identifies demographic and socioeconomic characteristics that could be consistently measured across the different data sets and that the existing literature has found associated with mental health. These include age,

3. In addition, for each country except Tonga, three common questions ask whether the respondent has recently felt sad, felt anxious, and had trouble sleeping. An index formed using only these three questions has correlations of 0.84–0.90 with the overall index for each country, and similar results are obtained using this less comprehensive measure. To include Tonga in the analysis and use the most common indices, the authors analyze the more comprehensive measures.

4. Although these results are promising for the relevance of household survey modules to assessing mental health distress, validation exercises are made on a sample of individuals that might differ significantly from the larger population of interest. Field validations in future related studies may address this concern.

gender, marital status, physical health, and education. Added to these characteristics are household measures of expenditure (income for Tonga), household size, and the average mental health of other household members. Also included for the three large surveys are community-level mental health scores, the average mental health of other households in the community.⁵

Mental Health in the Cross-Section

Table 2 reports the results of ordinary least squares (OLS) regressions of the standardized mental health scores on these characteristics, with the analysis restricted to 15- to 80-year-olds and standard errors clustered at the household level. A possible concern is that much of the linear association between mental health scores and the covariates is driven by differences between individuals with very good mental health compared with average mental health, masking heterogeneity relevant to those with the worst mental health scores (presumably those in greatest need of treatment). Table 3 thus reports marginal effects from probit estimation of the probability of an individual being in the worst 10 percent or worst 5 percent of mental health scores in each country—typically referred to as the “caseness” category in the psychology literature.⁶

The results of both the OLS and the probit estimations confirm widely reported associations across countries between mental health status and demographic and household factors, with some exceptions. Consistent with the literature (Awass, Kebede, and Alem 1999; Andrews, Henderson, and Hall 2001), the tendency in all five countries is for mental health to worsen with age, significant in all countries except Tonga.⁷ A second common regularity in the literature is a tendency for women to have worse mental health (Awass, Kebede, and Alem 1999; Kessler and others 2005), found in four of the five countries, with the effect strongest in Mexico, where women are 8 percentage points more likely to be in the worst 10 percent of mental health scores. Tonga is again the exception, with women having significantly better mental health in

5. The main results do not change appreciably with the inclusion of community fixed effects to control for unobserved community factors, so those results are not reported here.

6. Attempts to compare mental health prevalence across countries by the WHO International Consortium in Psychiatric Epidemiology (2000) yielded 12-month prevalence rates of 22.4 percent in Brazil, 12.6 percent in Mexico, and 8.4 percent in Turkey. Taking the worst 10 percent and worst 5 percent as cutoffs thus appears likely to include many individuals with diagnosable disorders. A more inclusive cutoff of 20 percent yields qualitatively similar results, as does a nonlinear Box-Cox transformation of mental health.

7. Das and others (2007) carry out semiparametric regressions to examine nonlinearities in age and other covariates. There is slight evidence for a nonlinear relation between age and mental health in Tonga, with mental health falling and then improving with age, while results for all other countries and variables are linear. Adding a quadratic term in age to the OLS regression in table 2 gives a *p*-value of 0.08. This quadratic relation appears to be driven by a few outliers, as the quadratic term becomes insignificant (*p*-value of 0.33) if the analysis is restricted to those aged 70 and younger. So, only linear terms are reported in this article.

TABLE 2. Correlates of Mental Health in the Five Study Countries

Variable	Tonga		India		Mexico		Bosnia and Herzegovina		Indonesia	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Age	0.000112 (0.0016)	0.000635 (0.0014)	0.00208 (0.0019)	0.00324* (0.0017)	0.000656* (0.00039)	0.00116*** (0.00036)	0.00442*** (0.00069)	0.00614*** (0.00048)	0.00152*** (0.00037)	0.00155*** (0.00034)
Female dummy variable	-0.0483** (0.024)	-0.0697*** (0.023)	0.105*** (0.030)	0.145*** (0.032)	0.156*** (0.0066)	0.173*** (0.0070)	0.0874*** (0.0095)	0.147*** (0.0080)	0.0767*** (0.0073)	0.0837*** (0.0077)
Married dummy variable	0.159*** (0.044)	0.145*** (0.037)	-0.0171 (0.057)	-0.0484 (0.051)	-0.000198 (0.012)	0.00732 (0.010)	0.0736*** (0.021)	0.0641*** (0.015)	-0.0992*** (0.012)	-0.0910*** (0.011)
Widowed dummy variable ^a	0.128 (0.090)	0.183** (0.082)	-0.120 (0.11)	-0.170* (0.096)	0.0583*** (0.019)	0.0626*** (0.018)	0.116*** (0.037)	0.133*** (0.026)	0.0465** (0.023)	0.0452** (0.021)
Years of education	0.00418 (0.0039)	0.00493 (0.0032)			-0.00951*** (0.0012)	-0.00653*** (0.0011)	-0.0104*** (0.0016)	-0.00496*** (0.00080)	-0.00140 (0.0011)	-0.00135 (0.00093)
Primary to high school			-0.0836** (0.039)	-0.0720** (0.035)						
High school or more			-0.153*** (0.051)	-0.109** (0.043)						
Log household consumption per capita	-0.0438** (0.017)	-0.0192** (0.0076)	0.0485 (0.033)	0.0281 (0.021)	0.000169 (0.0054)	0.00502 (0.0043)	-0.0853*** (0.015)	-0.0139*** (0.0053)	0.00873 (0.0065)	0.00541 (0.0048)
Household size	-0.0122* (0.0070)	-0.00141 (0.0034)	0.0156 (0.012)	0.00968 (0.0070)	0.00113 (0.0026)	0.000610 (0.0020)	-0.0314*** (0.0077)	-0.00564* (0.0030)	0.00186 (0.0018)	-0.0000531 (0.0012)
Poor physical health ^b			0.236*** (0.058)	0.189*** (0.050)	0.379*** (0.021)	0.339*** (0.021)	0.723*** (0.097)	0.528*** (0.059)	0.378*** (0.015)	0.337*** (0.014)
Elderly dependents ^c	-0.280** (0.11)	-0.175*** (0.060)	-0.187 (0.16)	-0.169* (0.098)	0.0282 (0.023)	-0.0205 (0.019)	-0.0919** (0.038)	-0.174*** (0.018)	0.0398 (0.029)	0.0176 (0.022)
Young dependents ^d	-0.255*** (0.098)	-0.192*** (0.049)	0.00626 (0.10)	0.00729 (0.070)	0.0572** (0.023)	0.0273 (0.018)	-0.0920 (0.059)	-0.0358 (0.023)	0.0516** (0.026)	0.0448** (0.019)
Household mental health		0.592*** (0.045)		0.404*** (0.067)		0.222*** (0.017)		0.544*** (0.020)		0.364*** (0.022)

Community mental health									
Constant	1.954*** (0.096)	0.730*** (0.11)	1.051*** (0.26)	0.968*** (0.17)	1.245*** (0.043)	0.187*** (0.068)	0.354*** (0.020)	0.517*** (0.042)	0.707*** (0.039)
Number of observations	685	685	738	738	17,905	17,905	11,870	11,870	19,697
R-squared	0.10	0.32	0.08	0.18	0.14	0.20	0.61	0.22	0.15

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

Note: Higher score means worse mental health. Numbers in parentheses are robust standard errors clustered at the household level.

^aIncludes those separated and divorced.

^bNo individuals reported themselves in poor physical health in the Tongan survey, so this variable is not included in the Tongan analysis.

^cNumber of household members older than age 60.

^dNumber of members aged 15 and younger.

Source: Authors' analysis based on data described in text.

TABLE 3. Correlates of Severe Mental Health in the Five Study Countries: Marginal Effects from Probit Estimation of Being in the Worst 10 Percent or Worst 5 Percent of Mental Health Scores

Variable	Tonga		India		Mexico		Bosnia and Herzegovina		Indonesia	
	Worst 10% (1)	Worst 10% (2)	Worst 10% (3)	Worst 5% (4)	Worst 10% (5)	Worst 5% (6)	Worst 10% (7)	Worst 5% (8)		
Age	0.0000921 (0.0013)	0.000986 (0.0010)	0.000522** (0.00026)	0.0000575 (0.00020)	0.000783*** (0.00018)	0.000298*** (0.000063)	0.000688*** (0.00021)	0.000137 (0.00014)		
Female dummy variable	0.0000756 (0.026)	0.0437** (0.021)	0.0789*** (0.0057)	0.0443*** (0.0043)	0.0260*** (0.0043)	0.00731*** (0.0018)	0.0306*** (0.0049)	0.0150*** (0.0032)		
Married dummy variable	0.0846*** (0.032)	0.0121 (0.033)	0.0122 (0.0075)	0.00654 (0.0059)	0.0206*** (0.0053)	0.00294 (0.0019)	-0.0514*** (0.0083)	-0.0131*** (0.0052)		
Widowed dummy variable ^a	0.125 (0.15)	-0.0472 (0.034)	0.0335** (0.016)	0.0246* (0.013)	0.0896*** (0.033)	0.00832 (0.0067)	0.00519 (0.012)	0.0215*** (0.0097)		
Years of education	-0.00182 (0.0034)		-0.00435*** (0.00081)	-0.00308*** (0.00061)	-0.000773*** (0.00027)	-0.000270** (0.00012)	-0.000558 (0.00063)	-0.000528 (0.00039)		
Primary to high school		-0.0258 (0.024)								
High school or more		-0.0372 (0.024)								
Log household consumption per capita	0.000774 (0.0093)	0.00228 (0.014)	0.0000798 (0.0030)	0.00135 (0.0023)	-0.00464** (0.0022)	-0.00148* (0.00088)	0.000546 (0.0032)	-0.00441*** (0.0021)		
Household size	0.00774** (0.0038)	0.00764* (0.0046)	0.000174 (0.0014)	-0.000830 (0.0012)	-0.00148 (0.0011)	-0.000405 (0.00052)	0.000353 (0.00085)	-0.000671 (0.00055)		
Poor physical health ^b		0.0961** (0.044)	0.181*** (0.019)	0.124*** (0.017)	0.155*** (0.034)	0.0959*** (0.022)	0.175*** (0.010)	0.102*** (0.0076)		
Old dependents ^c	-0.0492 (0.086)	-0.0182 (0.060)	-0.00969 (0.015)	-0.00225 (0.0100)	-0.0201*** (0.0070)	-0.0100*** (0.0027)	-0.000732 (0.015)	0.000631 (0.0094)		
Young dependents ^d	-0.124** (0.055)	-0.0827 (0.052)	0.0141 (0.014)	0.00341 (0.011)	-0.0120 (0.011)	-0.00827* (0.0046)	0.0358*** (0.013)	0.00922 (0.0085)		

Household mental health	0.414*** (0.043)	0.140*** (0.028)	0.0805*** (0.0085)	0.0473*** (0.0060)	0.0653*** (0.0055)	0.0196*** (0.0025)	0.138*** (0.0096)	0.0637*** (0.0058)
Community mental health			0.182*** (0.027)	0.113*** (0.019)	0.0549*** (0.0077)	0.0116*** (0.0031)	0.267*** (0.026)	0.124*** (0.016)
Observations	685	738	17,905	17,905	11,870	11,870	19,697	19,697

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

Note: Marginal effects are the change in probability associated with a discrete change in dummy variables from zero to one and with an infinitesimal change in continuous variables. Numbers in parentheses are robust standard errors clustered at the household level.

^aIncludes those separated and divorced.

^bNo individuals reported themselves in poor physical health in the Tongan survey, so this variable is not included in the Tongan analysis.

^cNumber of household members older than age 60.

^dNumber of members aged 15 and younger.

Source: Authors' analysis based on data described in text.

the OLS regression. But much of this appears driven by subclinical differences, since the probit results show a small and insignificant effect of being female.

A third consistent finding in the literature is that respondents who are separated, divorced or widowed report worse mental health compared to those who are married (Andrade and others 2002; Andrews, Henderson, and Hall 2001; Kessler and others 2005; Weissman and others 1996). This is found to be the case in all countries except India, where widows report significantly better mental health. The difference in India appears driven by differences among individuals with relatively good mental health, because the coefficient becomes smaller and insignificant when the likelihood of being in the worst 10 percent of mental health scores is examined. In addition, small sample sizes (4 percent or 69 individuals are widowed) merit some caution in interpreting this result. The results here are also consistent with previous studies that have highlighted the links between poor physical and poor mental health (Kessler and others 1994; Bijl and others 2003). Physical health is measured as a binary variable based on self-assessed general health status, with a large and significant effect.⁸ Individuals with poor physical health are between 10 percent (India) and 18 percent (Mexico) more likely to be in the worst 10 percent of mental health.

There is less of a pattern for household size and the presence of old and young dependents in the household. Individuals in larger households have marginally better mental health in Bosnia and Herzegovina, with no significant relation elsewhere. Elderly dependents in the household are associated with significantly better mental health in Bosnia and Herzegovina and Tonga, but no significant relation elsewhere, while the significant positive and negative associations with young dependents in the OLS results become less pronounced in the probit regressions.

The demographic patterns are similar to those found previously in the literature, but the association between mental health and per capita household expenditure is tenuous at best, in contrast to the view that poverty is strongly associated with mental health disorders (Patel and Kleinman 2003). In the OLS results, only Bosnia and Herzegovina and Tonga show a significant negative relation between per capita consumption and individual mental health. The effects are small, and even smaller in the probit results: a doubling of household per capita expenditure in Bosnia and Herzegovina results in a 0.4 percentage point greater likelihood of an individual being in the worst 10 percent of mental health scores. There is a small significant negative gradient in the probit results for those in the worst 5 percent of mental health scores in Indonesia. The OLS results for Mexico, India, and Tonga show a slight positive gradient, though this is not significant at conventional levels.⁹

8. No individuals reported themselves in poor physical health in the Tongan survey, so this variable is not included in the Tongan analysis.

9. The lack of association between mental health and poverty is not a result of the household average mental health status capturing a poverty effect. Results are similar when the household average mental health is omitted from these regressions.

The association between schooling and mental health is also small. All five countries have a negative coefficient on years of schooling in the probit regressions. But this is significant at the 5 percent level only in Mexico, where one additional year of schooling is associated with a 0.4 percentage point drop in the likelihood of being in the worst 10 percent of mental health scores—and in Bosnia and Herzegovina, where the equivalent association is a 0.08 percentage point drop. The OLS results show similarly small effects. The largest effect is in India, where those with high-school education have a mental health score 0.15 standard deviations better than those with less than a primary education.

All five surveys measured mental health for multiple adults within the household, enabling examination of the coprevalence of mental health. There are several possible channels for such a correlation. It may reflect omitted household variables, such as household-specific shocks or a lack of health services. It could also reflect unobserved individual traits, if assortative mating leads those with poor mental health to marry and perhaps pass on genetic factors influencing mental health of other family members. But it is also plausible that the presence of one household member with poor mental health creates a poor mental health environment for other household members, a “contagion” effect. Tables 2 and 3 show a strong and significant positive relation between an individual’s mental health and that of the family.¹⁰ A one standard deviation change in the mental health of household members is associated with a 0.22–0.59 standard deviation change in own mental health.

For Bosnia and Herzegovina, Mexico, and Indonesia it is possible to look at the relation between individual mental health and the mental health of others in the surrounding community. There is a significant and positive association, even after controlling for household average mental health, with the size of the coefficient up to twice that at the household level. Some of the explanations that account for the within-household clustering of poor (or good) mental health can also apply to the community.

Mental Health and Shocks

The cross-sectional analysis shows no significant relation between mental health and poverty, but it does find strong clustering of mental health outcomes within households and, to less extent, within communities. One interpretation of this intrahousehold clustering is that it reflects, in part, the effect of common household (or community) shocks. The three country-specific studies produced by the Development Research Group’s comparative project examine in detail the impact of shocks on mental health and provide some support for this interpretation.

10. The household measure of mental health is the average across household members (excluding the individual respondent). Similarly, the average community mental health score can be defined as the average across the community (excluding the household in question).

Two of the studies demonstrate that shocks involving large changes in income led to changes in mental health. Friedman and Thomas (2007) consider the impact of a negative shock—the Indonesian financial crisis—finding that the crisis worsened mental health of households, more so for households more affected by the crisis. And they find that this effect persists up to three years after the onset of crisis, despite a rapid recovery in consumption and income to precrisis levels.¹¹ Stillman, McKenzie, and Gibson (2006) examine the effect of a positive shock—winning an emigration lottery allowing migration from Tonga to New Zealand—and find that it produces large increases in income and improvements in the mental health of the migrating households.

Although the Indonesian and Tongan case studies show that large shocks can have significant effects on mental health, the effect may be due only in part to changes in income. It is likely that the financial crisis led to many other covariate changes in household circumstances, including a reduced availability of community public services or household dislocation as a result of migration. Similarly, the reduced-form impact of migration on mental health possibly encompasses a host of changes other than income to the individual, which the authors explore.

The Indian study, using the well-documented difference in mental health scores between men and women as a motivating question, attempts to isolate exactly how a specific shock affects mental health, though the authors make less progress in identifying a causal impact. Das and Das (2006) show that the male–female difference in mental health scores is directly related to the number of pregnancies a women has lost, due to abortions, miscarriages, or infant deaths. In households without such losses, there is no gender difference in reported mental health scores. This finding can be interpreted in different ways. By combining the quantitative analysis with anthropological narratives, the authors present qualitative evidence on the pathways for producing these data.

Together, the three case studies provide strong evidence that while income and poverty are not strong predictors of mental health status, shocks that affect the economic or demographic nature of the household may have significant influences on mental health. The next section explores the possible consequences of poor mental health for economic behavior.

III. POSSIBLE CONSEQUENCES OF POOR MENTAL HEALTH FOR ECONOMIC BEHAVIOR

The multipurpose surveys enable examining associations between mental health and two development-related outcome measures—labor force

11. Related evidence is found in de Mel, McKenzie, and Woodruff (2008), who show no relations among mental health recovery from the tsunami in Sri Lanka and income recovery of microenterprise owners.

participation and health care use. While a causal effect cannot be ascribed to mental health (except under the strong condition of selection on observables), this as an exploratory step intended to show how poor mental health status is correlated with economic behavior and how these patterns may vary around the developing world.

Labor Force Participation

Labor force participation is an important determinant of socioeconomic welfare, and many researchers observe a strong empirical association between mental illness and labor force participation in developed countries (Bjorklund 1985; Ettner, Frank, and Kessler 1997; Kessler, Turner, and House 1989; Dooley, Prause, and Ham-Rowbottom 2000). The association could reflect difficulties in finding and sustaining work for those with depression or mental health problems arising from a lack of work.

Table 4 presents the marginal effect of mental health on labor supply from probit regressions. Panel A shows the effect when the standardized GSI is used as the measure of mental health status; panel B shows the effect of being in the worst 10 percent of mental health scores within a country. Estimation is restricted to 18- to 60-year-olds, separately by gender because of gender differences in labor market behaviors.

Table 4 finds that the association between labor force participation and mental health status varies by gender and country. In both Mexico and Bosnia and Herzegovina, there is no significant association, and the coefficients are small. But in Indonesia both men and women exhibit significant if fairly slight associations. A one standard deviation improvement in mental health status increases labor force participation by 1.3–1.7 percentage points, while individuals in the worst 10 percent of mental health scores have 4.6–5.1 percentage point lower participation rates. In India, there is no significant effect for men, but a very large effect for women. The labor force participation rate of women aged 18–60 is only 30.4 percent, so the 17.7 percentage point lower participation rate for women in the worst 10 percent of mental health scores cuts labor force participation in half. The Tongan results show a sizable and significant negative effect of mental health on labor force participation for women when the standardized GSI measure is used, and a large but insignificant effect of being in the worst 10 percent of mental health scores. In contrast, there is no effect of the standardized GSI measure for men, but a large significant negative effect of being in the worst 10 percent.

The negative relation between psychological distress and labor force participation often observed in developed countries does not consistently translate to the developing country setting. Bosnian and Mexican respondents in psychological distress show no tendency to work less than others in their communities. A slight tendency is observed in Indonesia, and a much greater tendency exists for women in India.

TABLE 4. Impact of Mental Health on Labor Force Participation in the Five Study Countries: Marginal Effects from Probit Estimation (18- to 60-year-olds)

Measure	Tonga		India		Mexico		Bosnia and Herzegovina		Indonesia	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Panel A										
Standardized mental health index	0.00765 (0.028)	-0.0863*** (0.029)	0.00910 (0.022)	-0.0462* (0.026)	0.000961 (0.0052)	-0.00455 (0.0074)	0.0192 (0.015)	0.0183 (0.013)	-0.0173*** (0.0043)	-0.0130*** (0.0056)
Panel B										
Dummy variable for being in worst 10%	-0.2090**	-0.1077	-0.0317	-0.1769**	0.011	-0.017	-0.0362	0.0042	-0.0508***	-0.0463**
Labor force participation rate	(0.097) 0.59	(0.131) 0.37	(0.079) 0.84	(0.061) 0.30	(0.017) 0.89	(0.023) 0.38	(0.062) 0.73	(0.046) 0.43	(0.019) 0.83	(0.019) 0.50
Number of observations	299	320	334	345	6,665	8,675	4,597	4,980	9,626	10,742

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

Note: Marginal effects are the change in probability associated with a discrete change in dummy variables from zero to one and with an infinitesimal change in continuous variables. Probits also include age, marital status, education, household size, elderly and young dependents, and physical health status. Numbers in parentheses are robust standard errors clustered at the household level.

Source: Authors' analysis based on data described in text.

Use of Health Services

Large proportions of severely mentally ill populations in the developing world receive no treatment for their disorders, suggesting widespread underuse and poor access. The situation is further complicated when patients present with primarily somatic complaints for psychiatric conditions. A study of primary care attendees in Goa, India, revealed that 97 percent presented with physical symptoms, but roughly half of them were psychiatric cases according to biomedical criteria (Patel, Pereira, and Mann 1998). This has a direct bearing on diagnosis and treatment, because somatic symptom presentation is associated with lower recognition rates of mental disorders by primary care physicians (Paykel and Priest 1992).

The three large nationally representative surveys (Bosnia and Herzegovina, Mexico, and Indonesia) permit examining how much mental health status predicts use of health facilities in the month before the survey, after conditioning on self-reported physical health status, income, and other possible determinants of use. Panel A of table 5 depicts the probit marginal effect when the standardized GSI is used as the measure of mental health status; panel B depicts the marginal effect of being in the worst 10 percent of mental health scores within a country.

The results suggest that individuals with poor mental health are more likely to use health services. This effect occurs for both men and women in all three countries, with similar-sized absolute effects in Mexico, a stronger effect for men in Bosnia and Herzegovina, and a stronger effect for women in Indonesia. Comparing the size of effects and the proportions using health facilities reveals quite large associations. For example, a Mexican male in the worst 10 percent of the mental health distribution has a 0.06 larger probability of using health facilities, which is 54 percent of the 0.11 for all Mexican males using health facilities.

The common observation in both developed and developing economies that individuals with poor mental health present themselves to health facilities more frequently, independent of their (self-assessed) physical health, is also found in the data. This behavior may pose economic and social burdens on households with individuals in psychological distress and on the health system, especially if the underlying cause of illness is misdiagnosed.

IV. DISCUSSION: IMPLICATIONS FOR RESEARCH AND POLICY

Household surveys in five low- and middle-income countries covering Latin America, Eastern Europe, East Asia and the Pacific, and South Asia reveal significant associations between mental health scores and gender, the physical health of the respondent, marital status, and the mental well being of other members in the household and community. These relations hold (with occasional deviations) across all the countries with roughly comparable

TABLE 5. Impact of Mental Health on Health Facility Use in the Five Study Countries: Marginal Effects from Probit Estimation

Measure	Mexico		Bosnia and Herzegovina		Indonesia	
	Men	Women	Men	Women	Men	Women
Panel A						
Standardized mental health index	0.0347*** (0.0053)	0.0473*** (0.0053)	0.0826*** (0.0093)	0.0573*** (0.0085)	0.00566*** (0.0021)	0.0127*** (0.0022)
Panel B						
Dummy variable for being in worst 10%	0.0653** (0.026)	0.0889*** (0.019)	0.272*** (0.051)	0.0752** (0.029)	0.00991 (0.0085)	0.0247*** (0.0092)
Proportion using a health facility in the last month	0.111	0.211	0.204	0.262	0.050	0.076
Number of observations	8,538	10,720	6,007	6,794	11,948	13,296

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

Note: Marginal effects are the change in probability associated with a discrete change in dummy variables from zero to one and with an infinitesimal change in continuous variables. Probits also include age, marital status, education, household size, elderly and young dependents, physical health status, and log household consumption or income per capita. Numbers in parentheses are robust standard errors clustered at the household level.

Source: Authors' analysis based on data described in text.

magnitudes. In contrast, there is no consistent relation between mental health scores and socioeconomic measures, such as the respondent's education or the per capita expenditure (or income) of the respondent's household. There is evidence in some countries that lower mental health is associated with reduced labor force participation, especially for women. Mental health is also a significant predictor of health care use and thus perhaps of the burdens on a health system ill-equipped to diagnose and provide care.

These results provide the setting for a discussion of the validity of mental health modules in multipurpose household surveys, the possible use of mental health in a broader definition of welfare than traditional measures, and the implications for research and policy on mental health.

Including Mental Health in Multipurpose Household Surveys

Kahneman and Krueger (2006, p. 7) in a review of subjective welfare measures suggest that "the validity of subjective measures of well being can be assessed, in part, by considering the pattern of their correlations with other characteristics of individuals and their ability to predict future outcomes." The patterns of correlations between survey mental health measures and age, gender, widowhood, sickness, and the mental health of other family members are remarkably stable across countries and different surveying techniques. This is reassuring because it suggests that such measures reflect the real psychological condition of individuals. Moreover, unlike other subjective measures of well being, mental health measures have been further corroborated by studies showing that these general purpose mental health questions strongly predict clinical diagnoses of depression and anxiety disorders.

In addition, mental health status helps predict labor force participation and health care use, conditional on other socioeconomic variables typically collected in multipurpose household surveys. Further, the associations between mental health scores and individual and household characteristics are very similar in surveys where questionnaires were fielded on a first visit to households and where they were fielded after a period of acquaintanceship. Finally, shorter modules (such as the GHQ-12) reveal associations similar to those of the longer SCL-90R, which took one hour to field for nonliterate respondents.¹² The results thus suggest that mental health screening questionnaires can be meaningfully added to multipurpose household surveys, such as the Living Standards Measurement Studies. In addition to their intrinsic interest, they provide additional predictive power for economic behavior beyond the physical health measures and socioeconomic variables traditionally collected.

A concern with self-reporting of physical health status is that it results in measurement errors correlated with socioeconomic characteristics, including income (Strauss and Thomas 1998; Lokshin and Ravallion 2005). Strauss and

12. Indeed, most of the relevant information for the nine dimensions covered in the SCL-90R is contained in the depression and anxiety components (Das and Das 2006).

Thomas (1998) note that reports of specific functions, such as activities of daily living, are believed to be more accurate and less subject to these sources of measurement error than questions about general health. In this regard, the questions used to construct the mental health indices—such as those about the frequency of having difficulty falling asleep, or of being distracted from everyday activities—may be less prone to reporting bias than are the questions about general health.

Even so, there may still be biases in the reporting of mental health symptoms. Sociologists and psychologists have identified three effects that may influence accurate reporting of internal states: the overall tendency to say yes or no, the need for social approval, and the perception of the desirability of a trait (boys don't cry, so men often do not report whether they tend to "suddenly cry without reason"). Although the literature is not extensive, an early study (Gove and Geerkin 1977) suggests that these biases are not correlated with demographic variables such as sex, race, education, income, age, marital status, and occupation—the categories examined in this article. Their results were corroborated by Vernon, Roberts, and Lee (1982) and Hunt, Auriemma, and Cashaw (2003). In all three studies, reporting bias tends to underestimate the prevalence of psychiatric disorders such as depression but not to alter observed correlations between mental health and demographic characteristics. One caveat: these studies were all in high-income countries, so there is a need for further research in developing country contexts.

Mental Health and Welfare Measurement: Going Beyond Measures of "Happiness"

An additional reason for including mental health measurement in household surveys is that it can allow consideration of a broader notion of welfare than is offered by the traditional focus on income and expenditure. Consider the burgeoning literature on happiness and its correlates (see Kahneman and Krueger 2006 for a recent review). World Value Surveys, for instance, collect information on global life satisfaction or happiness with the single question "All things considered, how satisfied are you with your life as a whole these days?" An extensive literature analyzes the correlates of positive reports, so a natural question is whether information revealed through mental health questionnaires are partially orthogonal to information contained in questions on life satisfaction and happiness and thus add value in their own right.

First impressions suggest that happiness and common mental disorders have to be closely related—it seems difficult for the same person to report high levels of mental distress *and* high levels of happiness. Indeed, studies report a high correlation between measures of life satisfaction and measures of psychological depression (Kahneman and Krueger 2006). But a deeper examination of the correlates of mental health and happiness imply the need for a more nuanced explanation. The differences arise both in correlations between mental health and happiness and an individual's *characteristics* (age, gender, income)

and in correlations between mental health and happiness and an individual's *life events*.

The analysis in this article reveals several areas for the associations of individual characteristics with mental health to differ from the associations in the happiness literature. Women generally report worse mental health than men, whereas happiness is unrelated to gender. Layard (2005), arguing for a single dimension of happiness and mental health, points out that depression is higher among women due to biogenetic markers. Yet the findings here—that life events can affect male and female mental health in a different manner (see discussion below)—suggest that gender is one wedge for distinguishing happiness measures from mental health measures. Mental health almost universally worsens with age, whereas the relation between age and happiness is complicated and highly nonlinear—there is some indication that happiness is lowest in households with teenagers, at least in developed countries. The relations are more similar for education and poverty or income. More education improves mental health (albeit slightly) *and* makes one happier; more income does neither.

A second possible difference between mental health and happiness is in habituation and adaptation, measured through the lens of changing life circumstances. A consistent finding in the literature on happiness is that individuals habituate or adapt to new circumstances in their lives. While changes such as marriage and recovery from illness are associated with greater happiness in the short run, the effects vanish after a while. On this, the related studies in the comparative project are suggestive. In India, women who report child loss (through miscarriages, abortions, or deaths) are at significantly higher risk of mental health problems than those who do not. Indeed, the female mental health penalty observed in the data is entirely driven by the difference between men and women in households that experienced the loss of a child (Das and Das 2006). In Indonesia, the mental health of the population worsened dramatically following the economic crisis of the 1990s, but although consumption recovered by 2000, mental health did not (Friedman and Thomas 2007). And as shown earlier in all five countries, poor physical health, measured through self-reported health status, is strongly correlated with poor mental health.

Implications for Further Research on Mental Health and Development

Effective public health policy requires understanding the mechanisms that determine poor mental health and, in turn, the implications of poor mental health for individuals and their families. The descriptive analysis here provides suggestive evidence for some of these mechanisms and thus a possible role for public health interventions.

The lack of any relation between conventional economic welfare measures and mental health outcomes across a diverse sample of developing countries suggests that poverty alone is not a strong determinant of poor mental health. Undermining a straightforward equity rationale for public investments in mental health are the higher prevalence among the poor of other health problems, such as tuberculosis and malaria, and the continuing financing gaps for

these illnesses. But the lack of a relation between consumption poverty and mental health certainly does not support arguments that suggest no scope for public interventions to improve mental health.

Country studies in India, Indonesia, and Tonga suggest that changes in life circumstances brought on by positive or negative events have fairly long-lasting implications for mental health. In addition, two of the strongest factors associated with poor mental health are poor physical health and widowhood. These findings are consistent with studies that report worsened mental health outcomes in populations that have suffered conflict or disasters (UNHCR 2005; Lopes Cardozo and others 2004). The Indian and Indonesian studies suggest that the trauma from adverse events may persist long after the recovery of more traditional measures of welfare, and there may very well be real individual and household costs to this persistence.

Possible impacts of mental health on labor force participation and health-seeking behavior have already been discussed. Additional examples of such costs along the health dimension include lower adherence to dietary recommendations and medication regimes among diabetics with depressive symptoms than among diabetics without (Ciechanowski, Katon, and Russo 2000); high comorbidity rates for smoking and psychiatric disorders, with smoking twice as common among mentally ill than mentally healthy populations (Lasser and others 2000); an association between maternal mental health and child welfare in two South African studies, with maternal depression significantly increasing the odds that a child will experience growth faltering (Harpham and others 2005; Patel and others 2004). There is also evidence of such costs in other dimensions of welfare, such as education (Kessler and others 1995).

If negative shocks lead to worse mental health, which in turn may reduce labor supply and increase spending on health care, as the comparative research project suggests, then this chain of events raises the possibility of a behavioral poverty trap. Clearly, more research is needed to better understand the causal mechanisms and dynamic phasing, including the short- and long-term effects of negative and positive shocks to mental health. Research on the cost-effectiveness of interventions targeted to those in poor mental health will also shed needed light on the rationale for publicly financed mental health interventions. The clustering of mental health outcomes within households and communities raises the possibility that such treatments targeted to the household or community may be more cost-effective than those targeted to individuals—and this should be investigated.

An important limitation of this study—and of the household survey-based methodology—is the inability to differentiate common from severe mental disorders. Although both cause personal misery, the literature notes a clear distinction, especially in the context of findings that the annual prevalence of common mental disorders exceeds 10 percent in many countries: 16.9 percent in Lebanon, 17.8 percent in Colombia, 20.4 percent in Ukraine, and 26.3 percent in the United States (WHO World Mental Health Survey Consortium

2004). Severe mental disorders (such as schizophrenia), brought on by biogenetic causes and possible interactions with the environment, have much lower prevalence and require specialized studies rather than multipurpose surveys to identify—and most likely a separate policy response. In several low-income countries, the institutional capacity for treating such disorders is very poor, with frequent human-rights violations of the severely ill (WHO 2001).

A final limitation of this study—one mentioned throughout the text—is that, without an experimental setup, the associations presented can have multiple interpretations. For instance, the concordance of mental health outcomes within households could reflect unobserved household shocks, assortative matching (people in poor mental health are more likely to marry each other), genetic links between parents and children, or a “contagion” effect (caring for a mentally ill person in the household leads to a deterioration in the mental well being of the caretaker). Longitudinal data and experimental mental health interventions are needed to separate these disparate channels and to explore the links between mental health outcomes and broader measures of welfare that incorporate risk and vulnerability in their construction.

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