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National norms of mental health for Denmark

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Significant Outcomes. Danish general population norms social functioning (Sheehan Disability Scale, SDS); personal recovery (Brief INSPIRE-O); symptom burden (Symptom Check List-10, SCL-10); subjective well-being (WHO-5).

Limitations. The response rate was reasonable (35%), and we were able to correct for different response tendencies depending on known socio-economic strata. However, selection effects due to unmeasured sample characteristics may affect the representativity of our data.

Abstract

Introduction. To facilitate interpretation and clinical utility, normative data provide a reference for a person's score on a particular outcome in relation to the general population. This study reports Danish general population norms for four mental health indicators, assessing social functioning (Sheehan Disability Scale, SDS) personal recovery (Brief INSPIRE-O), symptom burden (Symptom Check List-10, SCL-10) and subjective well-being (WHO-5).

Methods. The study was a cross-sectional survey study organized by the State's statistical authority among the general population of adult Danish residents in Denmark, ranging in age between 18 to 79 years.

Results. A total of 8,003 citizens was contacted including reminders during March 2nd to April 11th 2019 by electronic letters, resulting in 2,819 (35%) citizens providing complete responses. Female gender, higher age, Danish origin and living with a partner were associated with increased participation, and decreased participation was observed in male immigrants. We found a mean score of subjective well-being slightly lower than the population norm typically found in Danish general population studies. Elderly persons, Danes, and persons living with a partner reported better subjective mental health. Subjective well-being and personal recovery were positively correlated with social contacts and self-reported general health rating, and negatively correlated with social functioning and symptoms of depression and anxiety.

Conclusion. This normative data provides a reference for interpreting mental health status. Our findings indicate slightly poorer subjective mental health than previously found. There is a need for special attention to engage male immigrants in studies on mental health in the general population.

Introduction

Patient-reported outcome measures (PROM) of mental health are outcome measures provided by the patient to evaluate the benefit of a treatment from the patient's perspective.[1] In order to improve the clinical utility and interpretation of PROMs, it is necessary to compare the scores of an individual with normative scores.[2] Normative data can provide a reference point for a person's score on a particular PROM in relation to the general population, adjusted for sex, age and other potentially important variables.[3] Such data may be useful both prior to treatment, for identifying targets of treatment (e.g., high levels of depression) and areas of ressources (e.g., intact functioning), as well as after treatment, by providing a population reference point to evaluate progress in mental health. For that purpose, a patient's response profile could be compared to the general population, both at the baseline diagnostics as well as after therapy. On a group level data from PROMs can be analyzed pre-and post-treatment to inform about change among the patient population receiving treatment. This information can guide decisions on the development of service delivery and resource allocation to ensure best practice in the mental health setting.[4] As a national monitoring initiative across mental health services PROMs can contribute to promote mental health among the citizens of a nation.[5, 6]

A substantial focus on the use of routine outcome monitoring systems has been on the mental health research agenda during the last two decades [7]. Several countries have implemented routine monitoring systems on a large scale (e.g., in the UK "Improving Access to Psychological Therapy"[8], in Australia, "New Access"[9], and in Norway, "Prompt mental health care"[10]). Such initiatives allow for a continuous improvement and monitoring of the patient perspective in investigations of the accountability of treatments, therapists and treatment centers, which is

necessary to ascertain that patients treated in routine care will actually receive the best treatment meeting their needs and supporting their recovery process.[7]

The PRO model of MHS-CR

The Mental Health Service, Capital Region of Denmark (MHS-CR) is the largest mental health service in Denmark and provides treatment to approximately 40% of all patients with mental disorders in Denmark referred for treatment in the secondary sector. It covers a catchment area of 1.85 million people with 9 treatment sites and receives approximately 345,000 visits per year. To monitor treatment outcomes for patients with nonpsychotic disorders, MHS-CR has implemented an internet-based PRO assessment ("Treatment Effect", TE), collecting data pre- and post-treatment for all patients receiving treatment. As mental health does not only reflect the absence of negative affect (depression, anxiety, and perceived stress) but also implies the presence of positive affect, the assessment battery encompasses symptoms of distress, social functioning, well-being, and personal recovery. As a result, the general outcome battery comprised of short scales measuring symptom burden (SCL-10)[11], well-being (WHO-5)[12], social functioning (Sheehan Disability Scale, SDS)[13], and personal recovery (Brief INSPIRE-O)[14].

To support interpretation of test results in TE, the clinician has access to graphs and diagrams which summarize PROM results, and metrics based on Bech and colleagues[11] work which classifies the identified treatment need for each patient. This classification is based on scores from SCL-10 and WHO-5 and can range from "no or minimal need of treatment" to "moderate need of treatment" to "severe need of treatment". These data were calculated on previously collected patient data as part of a preliminary validation of the system.

Currently, there is a lack of Danish normative data for many of the PROMS used in the system to monitor treatment outcomes within Mental Health Services, Capital Region Denmark (MHS-CR), making the interpretation of PROM scores difficult for both patients and clinicians.

Study aim

The present study provides Danish general population norms (for SDS, Brief INSPIRE-O) as well as updated norms (for SCL-10, WHO-5) for mental health on the routine measures that are used in MHS-CR PRO model. This normative data will provide a distribution-based reference for interpreting mental health status. Given that norms for the Danish general population on functioning (SDS) and personal recovery (Brief INSPIRE-O) do not exist, the results of this study will be of value to clinicians and administrators by defining and updating caseness scores for PROMS.

Method

The study was a cross-sectional survey study among the general population of adult Danish residents in Denmark, ranging in age between 18 to 79 years.

Study population and procedure

In Denmark, all residents have a unique personal number that is used to identify the individual in interactions with the welfare system, schooling, and work status. With the authority by Statistics Denmark, digital correspondence can be sent to these personal numbers. In our study, Statistics Denmark collected data by contacting a random sample of 8,003 residents, 18–79 years of age, drawn from the five different regions in Denmark. The participants received the initial questionnaire with sociodemographic and health-related questions and voluntarily participated in the study by answering questions electronically.

Response rates were summarized using strata defined by Gender, Age group, Region, Country of origin (Danish, Western, Non-Western), family status (partner, children) and income. Moreover, Statistics Denmark provided us with weights, which were used to determine if study participation was systematically associated with specific socioeconomic strata (age group, gender, status of education, region of residence, family type, work status, family income, and country of origin). To approximate the true proportions of these strata in the general population in Denmark, the inverse of these weights were assigned to the responses of the study participants, thus increasing the weight of individual responses from underrepresented strata.

Measures

For the current study, the survey sample is described according to age group, gender, region of residence, family type, and country of origin. For reasons of privacy, this information from the Danish register was made available to us in categories, and information on education, work status and family income was only provided if participants reported it in the survey.

Self-reported general health was determined according to answers to the question, "*How would you describe your general health?*" on a Likert scale with six categories (poor = 0, not good, neutral, good, fairly good, excellent = 5). Social contact was determined according to answers to the question, "*How often do you do social activities with family you do not live with?*". The same question was repeated regarding "friends," "colleagues or fellow students," "neighbors or people in the community" and "people from the internet". We used an aggregated score for social contacts.

To measure personal recovery, the original 5-item Brief INSPIRE scale developed by Williams and colleagures [14] as a patient-rated experience measure of staff support for personal recovery was modified to a 5-item patient-rated outcome measure called Brief INSPIRE-O. Brief

INSPIRE consists of one item chosen from five domains identified in a systematic review of recovery processes (connectedness, hope, identity, meaning, empowerment, collectively referred to as 'CHIME') [15]. For each item, the Brief INSPIRE question is 'My worker helps me with', and rating is made on a 5-point Likert scale with (0) not at all; (1) a little; (2) to some degree; (3) quite a lot; (4) a lot. Williams and colleagues report an internal consistency of 0.86, with a one-factor solution explaining 72% of the variance. We changed the wording to capture an individual's experience of personal recovery according to the five domains, rather than the individual's experience of staff support in achieving personal recovery. For example, "*My worker helps me to feel supported by other people*" was modified to "*I feel supported by other people*". These changes were implemented in Brief INSPIRE-O for the items representing each of the five CHIME domains. Scoring is the same for Brief INSPIRE-O as for Brief INSPIRE: total item scores are multiplied by 5 to range from 0 (low recovery) to 100.

For symptom burden, SCL-10[11] was used, covering five depression items and five anxiety items derived from the SCL-90-R.[16] SCL-90-R is a 90-item self-report symptom inventory for the assessment of psychological symptoms and psychological distress. Bech and colleagues[11] found SCL-10 to be a valid generic scale for measuring change in the symptom burden for patients with depression or anxiety disorders during treatment. The scores of the 10 individual items (range 0…4) are multiplied by 2.5 to obtain a range from 0 (low symptoms) to 100.

For subjective well-being, The World Health Organization Well-Being Index (WHO-5) is a rating scale with 5 positively phrased items scored on a Likert scale from 5 (all of the time) to 0 (none of the time) was used. The scale is among the most widely used questionnaires for assessing subjective psychological well-being and is a sensitive screening tool for depression. In

a systematic review, Topp and colleagues[12] found high clinimetric validity and sensitivity. The WHO-5 scores of the individual items (range 0…5) are multiplied multiplied by 20 to obtain a range from 0 (low well-being) to 100.

For social functioning, Sheehan's Disability Scale[13] is a widely used three-item global measure assessing work/studies, social life, and family life. The extent to which each of these areas of function has been disrupted by their symptoms is rated from 0 (not at all) to 10 (extremely), with a sum score ranging from 0 (low disability) to 30. The scale has shown robust psychometric properties including discrimination between active and inactive treatments.[13, 17]

Data analysis

The sample characteristics and completion rates are described below. Averages and standard deviations as well as a threshold for a normal range were determined using the weighted sample of responders for each of the mental health parameters in focus, with the weights provided by Danmark Statistik described above. The normative area covers scores falling within the healthiest 84% of the population, which is a commonly accepted criterion for defining deviance from normal.[18] In a normally distributed population, this corresponds to mean minus standard deviation (but see next paragraph). We chose this somewhat "inclusive" criterion because we are more concerned with underidentification of distress than overidentification in the context of PROMs. Reliability was estimated using Cronbach's α. For each outcome measure, we performed a multiple regression of the test score on the sociodemographic variables (Gender, Age group, Region, Country of origin, Partner, Children) to test which of these variables have a substantial influence on the result. Spearman's correlation was used to test the level of associations between PROMs.

As the survey was sent to members of the general population, that is, a mostly healthy population, it is not unexpected that the distributions of test scores were heavily skewed in favor of healthy results. In the presence of such ceiling effects, individual cutoffs cannot be determined on the basis of linear models and the assumption of Gaussian distributed residuals. Therefore, the normative area was defined based on percentiles, and age- and gender-specific percentiles were determined by quantile regression[19] (these are provided in the supplementary material).

Results

Response rates

A total of 8003 citizens were contacted, with 2819 (35%) participants providing complete responses, and 585 (7%) participants providing partial responses. Out of those people providing

Table 1. Response rates depending on sociodemographic variables from the Danish register

Sociodemographic variables	Response rates		
	n (total sample)	*n (full responses)*	*%*
Total sample	8300	2819	34
Gender			
Male	4143	1267	31
Female	4157	1552	37
Age group			
18-29 years	1713	388	23
30-39 years	1244	306	25
40-49 years	1450	442	31
50-59 years	1516	637	42
60-69 years	1228	579	47
70-79 years	1149	467	41
Region			
Northern Jutland	863	293	34
Central Jutland	1916	692	36
Southern Denmark	1694	587	35
Capital	2591	830	32
Zealand	1236	417	34
Country of origin			
Danish	7095	2594	37
Non-western immigrant/descendant	756	130	17
Western immigrant/descendant	449	95	21
Highest educational level			
Primary school or undisclosed	2226	510	23
Upper secondary education	3399	1146	34
Short-cycle higher education	405	173	43
Medium-cycle higher education	1253	589	47
Long cycle higher education	1017	401	39
Family composition			
Single without kids	2550	706	28
Single with kids	474	141	30
Couples without kids	2756	1199	44
Couples with kids	2520	773	31
Socio-economic status			
Self-employed	320	130	41
Employee intermediate level+	1888	819	43
Employee basic level	2405	734	31
Student	858	220	26
Unemployed	2829	916	32

Note. Level of education was provided in the following five categories: primary and lower secondary education (9 years); upper secondary education (3 years or less); short-cycle higher education (3 years or less); medium-cycle higher education (3 to 5 years); long-cycle higher education (more than 5 years). Socio-economic status was provided in the following five categories: Self-employed; employee intermediate level+ (based on at least short-cycle higher education); Employee basic level (any status as working).

full responses, 1552 were women, and 1267 were men. This response rate is similar to other surveys of PROMs in the population.[20] Table 1 shows the relative proportions of responders for different strata of the sample. Female gender, higher age, Danish origin and living with a partner were associated with an increased tendency for participation.

Table 2 shows descriptive statistics (reliability, mean, standard deviation, median) as well as the area within the normative area as defined above for the four outcome measures. The five items of the SCL-10 related to depression had a Cronbach's α of .88, and a mean and standard deviation of 13.6 and 11.4. For the five anxiety items the Cronbach's α was .78, and the mean and standard deviation was 8.7 and 8.9, respectively. Age- and gender-specific norms are given in the online supplement (Table S3).

Table 2. Descriptive statistics and normal range for the PROM measures in MHS-CR

Measure	*Range*	*Cronbach's α*	*Mean*	*SD*	*Median*	*Normal range*†
Brief INSPIRE-O	0 to 100	0.83	71.1	19.5	75	50 or more
SCL-10	0 to 100	0.89	22.3	18.6	18	42 or less
SDS	0 to 40	0.90	5.2	6.7	3	11 or less
WHO-5	0 to 100	0.91	63.9	22.0	68	40 or more

† The "normal range" is defined as the 84th centile of the healthier part of the distribution.

Sociodemographic effects on mental health

Completion rates for the Brief INSPIRE-O were high (about 2% missing among responders). The internal consistency was quite homogeneous across the 5 items (α = 0.83), with a heavy skewness in favor of responses at the "good" end of the scale—not unexpected, given that the sample represents the general, mostly healthy population. Density estimates for different strata are shown

in the online supplement (Figures S1 and S2). Multiple regression (Table 3) indicated numerically better mental health in women, Danes, and persons with partners, compared to the respective reference groups.

For the SCL-10[11] in our sample, the internal consistency was again quite homogeneous (α = 0.89), despite the fact that the scale aggregates five items for depression (α = 0.88) and anxiety (α = 0.78) each. Similar to INSPIRE-O, skewness was observed towards the "good" (here, numerically low) end of the scale (Figures S3 and S4 in the online supplement). Multiple regression indicated slightly better (= numerically lower) responses in men, elderly persons, Danes, and persons living with a partner (Table 3). More details are found in the online supplement.

For the SDS, reliability estimated by internal consistency was rather high (α = 0.90) although the SDS consists of only three items. As before, skewness was observed towards the numerically lower end of the scale (= little impact on functioning, Figures S5 and S6). Multiple regression indicated slightly "better" (= numerically lower) responses in elderly persons, Danes, and persons living with a partner (Table 3).

The internal consistency for the WHO-5 was again quite homogeneous (Cronbach's α = 0.91). Considerable skewness was observed towards the numerically higher end of the scale (= high well-being, see also Figures S7 and S8). Multiple regression indicated slightly "better" (= numerically higher) responses in elderly persons, Danes, and persons living with a partner (Table 3).

Validity considerations

Correlations between the PROMs and aggregate social contacts and the self-reported general health rating were for Brief INSPIRE-O r = .26 and .54, respectively, for SCL-DEP r = –.19 and −0.51, for SCL-ANX r = −.14 and −.40, for SDS r = −.19 and −.53, and for WHO-5 r = .23 and

.52, respectively. Note that the correlations are rather low, since the sample comprises a mostly healthy population, with little variance in the true scores. However, all correlations are in the expected direction. Subjective well-being and personal recovery are positively correlated with social contacts and self-reported general health rating, while functioning and symptoms of depression and anxiety are negatively correlated.

Table 3. Multiple regression of PROM measures on socioeconomic strata.

	Brief INSPIRE-O		SCL-10		SDS		WHO-5	
	Effect	*P*	Effect	*P*	Effect	*P*	Effect	*P*
Intercept	67.0		28.6		7.5		58.3	
Gender								
M	(Ref)		(Ref)		(Ref)		(Ref)	
F	1.8	.014	2.5	< .001	0.0	.95	−1.3	.11
Age								
18–29	(Ref)		(Ref)		(Ref)		(Ref)	
30–39	−0.7	.59	−3.8	< .001	−0.1	.73	0.2	.90
40–49	−2.7	.026	−3.4	.003	0.2	.56	−0.8	.56
50–59	−0.3	.77	−5.7	< .001	−0.4	.31	2.2	.097
60–69	0.7	.58	−8.5	< .001	−2.0	< .001	7.7	< .001
70–79	0.9	.51	−10.0	< .001	−2.5	< .001	12.5	< .001
Region								
North Jutland	(Ref)		(Ref)		(Ref)		(Ref)	
Mid Jutland	0.5	.69	−0.7	.60	−0.5	.26	0.9	.52
South DK	−1.6	.25	1.1	.37	0.0	.94	−1.7	.25
Capital	1.2	.34	−1.1	.34	−0.6	.16	1.0	.48
Zealand	−2.0	.17	0.1	.93	0.2	.73	−1.4	.39
Origin								
Dane	(Ref)		(Ref)		(Ref)		(Ref)	
Western	−4.8	.002	5.5	< .001	1.9	< .001	−6.7	< .001
Non-Western	−2.1	.11	6.3	< .001	1.6	< .001	−1.2	.42
Family								
Single w/o child	(Ref)		(Ref)		(Ref)		(Ref)	

	Brief INSPIRE-O		SCL-10		SDS		WHO-5	
	Effect	*P*	Effect	*P*	Effect	*P*	Effect	*P*
Single with child	−0.8	.62	−1.1	.48	−1.4	.012	−1.9	.30
Partnered wo	6.4	< .001	−4.7	< .001	−2.2	< .001	6.0	< .001
Partnered + ch	6.9	< .001	−5.8	< .001	−2.5	< .001	5.8	< .001

Normative data for this study was conducted during the outbreak of Covid-19 which resulted in a range of health safety measures being implemented (e.g. systematic lockdowns). These safety measures could have potentially impacted on the mental health of the general people population and the normative data collected. Analysis of data collected pre and post lockdown did not show systematic decline in any of the PROMs investigated (actually, a slight improvement, see supplement for details).

Discussion

This study provides Danish general population norms on the mental health scales (PROMs) used by the largest mental health service in Denmark in their model of patient-reported outcomes. We aimed to provide a distribution-based reference for interpreting mental health status on function (SDS), recovery (Brief INSPIRE-O), and symptom burden (SCL-10), as well as updated norms on subjective well-being (WHO-5).

Across the four measures, the pattern of responses were quite homogeneous, with high internal consistency. As the population is mostly healthy, with little variance in the observed scores, the distributions were all skewed in a healthier direction. This pattern is quite common in studies providing reference data for PROMs[21]. By using a survey approach with weights assigned to the responses of the study participants, we aimed to achieve true proportions of the sociodemographic strata in the general population in Denmark in our response rates. Our survey can therefore be considered largely representative of the total Danish population. However, there

was an overrepresentation from women, people living in a relationship, older people and those Danish in origin, whereas male immigrants were underrepresented. This underrepresentation of male immigrants occurs in comparable countries for instance Sweden[22] and this group displayed an increased drop-out in the follow-up five years later[23]. This finding demonstrates a need for special attention to engage male immigrants in studies on mental health in the general population. Thus, it is advised to encourage study participation in population surveys develop strategies by considering ethnicity[24], and translating questionnnaires into the individual respondents' native tongue.[25] Eventhough we used weights from known confounders (Gender, Age, socioeconomic status, Nationality) to upweight responses from underrepresented societal strata, we did not attempt to adjust for missingness due to unknown confounders. It is clear that people who are difficult to reach, for whatever unknown reason, are therefore underrepresented in our data, and we cannot entirely rule out that the scores from these people differ from the responders in some systematic way.

We found a mean score of subjective well-being (WHO-5) of 63.9 (SD 22.0) which is slightly lower than the general population norm of 70 generally found in Danish general population studies[11] (e.g., N = 14,442 from the study by Ellervik and colleagues[26] reporting a mean score of 70.6 (17.1)); however, that was based on a subsample of the population with "No current ICD-10 depression". Our sample most likely also included people from the general population with a current diagnosis of mental illness, as we included people with mental disorders. Another possible explanation is that data were collected at the start of the COVID-19 pandemic, which may have had a negative impact on population well-being. On the symptom burden measure SCL-10, we found a mean score of 22.3 (SD 18.6), which falls in the upper range of the reference range for no or mild treatment need of 0–25, based on the earlier population data from Olsen and colleagues[27] reported in Bech and colleagues[11].

The results on WHO-5 and SCL-10 may be an important supplement to the results from Bech and colleagues[11], which were based on a patient population and found areas for no or mild need of treatment to be 100–50 for WHO-5 and 0–25 for SCL-10. In our population data, the corresponding normative areas were 100–40 for WHO-5 and 0–42 for SCL-10. If the population reference data is used, lower scores (between 41 and 49) for the WHO-5 would fall within a normal range rather than indicate a moderate need of treatment. Similarly, on the SCL-10, a score between 26 and 41 would be considered normal, rather than indicate moderate treatment need.

In terms of the SCL-10 being a symptom measure of anxiety and depression, we found significant effects of gender and age on scores with higher scores for women and younger adults. This pattern is in accordance with previous studies[28–30] and could be important for interpreting data in the context of what constitutes a "normal" level of experience. Although, from one perspective, the scores may seem high, however in a large-scale survey, Elnegaard and colleaguees[31] found that 9 out of 10 individuals in the general population reported experiencing at least one physical symptom (constipation, tiredness back pain etc.) during the previous four weeks. This has been labelled the "symptom iceberg", suggesting that most symptoms are mild, frequently reported in the population and do not require intervention. It is reasonable to assume that experiences of psychological distress are similar to experiences of physical symptoms.

On the recovery measure Brief INSPIRE-O, we found a mean of 71.1 (SD 19.5). As the scale in its current form has not been previously published, comparisons with earlier data is not possible. This study provides the first data on personal recovery among the general population. Interestingly, there seems to be less of an effect of age group on this measure compared to the other PROMs.

Finally, the findings for social function as measured with SDS showed the mean scores of 5.2 (SD 6.7) correspond closely to the 6.08 (SD 7.00) found in an American primary care

sample[32]. It is interesting that we found higher levels of subjectively reported functioning among older respondens living with a partner as other studies have often found that patient-reported health (e.g. EQ-5D) decreases with age.[28]

As expected we found that subjective well-being and personal recovery are positively associated with social contacts and self-reported general health, while functioning and symptoms of depression and anxiety are negatively associated. This finding advocates for the importance of securing easy access to treatment of poor mental health and symptoms of depression and anxiety for instance via a national initiative as done in the UK "Improving Access to Psychological Therapy"[8], in Australia, "New Access"[9], and in Norway, "Prompt mental health care.[10]

Limitations

A limitation regarding the representativeness of our survey sample is that the weights from Statistik Denmark are based on simple statistical models with only main effects based on standard sociodemographic measures (age group, gender, status of education, region of residence, family type, work status, family income, and country of origin), but they do not include interactions, investigating whether there are specific effects related to combinations of these variables. Our strategy to reweight the responses based on sociodemographic variables to compensate for different responder rates implicitly assumes that these sociodemographic variables sufficiently explain the differences in responder rates (corresponding to the classical assumption of "missingness at random" in missing data imputation). Of course, the problem may be more complex, with our non-responders differing systematically, though in an unknown way, from our responders. The data collections were carried out from 2 March to 11 April 11 2019, with the first national Covid-19 lockdown beginning on 11 March which could have affected the level of mental health in this study, however we did not find any immediate detrimental effect of lockdown. In fact, we noted a small improvement of reported outcomes when comparing early

(pre-lockdown) to late responders. Extrapolating the effect of late responders to nonresponders would imply that the norms presented here are slightly too pessimistic (see Table S6 for details).

Conclusion

This study collected norms on a number of PROMS from a representative sample of Danes. This normative data for wellbeing (WHO-5), symptoms (SCL-10), functioning (SDS) and personal recovery (Brief INSPIRE-O), can promote the utility and intepretation of PROM's used to measure treatment outcomes for mental health services using those PROMs (e.g. the Capital Region of Denmark). Overall, our findings are comparable to previous reported norms, however, possibly indicating slightly poorer subjective mental health than previously found.

In conclusion, from the perspective of society welfare, we recommend national initiatives to secure easy access to treatment of poor mental health including a national system for monitoring treatment effect.

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