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Late Responders Only Partly Resemble Nonrespondents in the Danish Psychiatric Patient Experience Survey

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Late Responders Only Partly Resemble Nonrespondents in the Danish Psychiatric Patient Experience Survey

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ABSTRACT

Background: Patient-experience surveys support healthcare quality monitoring and improvement, but selective participation may limit representativeness. Late responders are sometimes used as proxies for nonrespondents, but evidence on this approach is inconsistent. We examined whether late respondents resembled non-respondents and whether successive reminder waves altered satisfaction estimates.

Methods: We conducted a nationwide registry-based observational study including survey invitations to the Danish Psychiatric Patient Experience Survey from 2023 to 2024. Survey data were linked to demographic, socioeconomic, and clinical registries. Associations with response were analysed using multivariable logistic regression, associations with later response using ordinal logistic regression, and satisfaction using weighted linear regression with cluster-robust standard errors.

Results: Of the 67,229 invitations to the survey, 17,970 responses were received (27%). Response was more likely among women (odds ratio (OR) 1.36, 95% confidence interval (CI) 1.30, 1.41), people aged 50 years or older versus 18–24 years (OR 1.74, 95% CI 1.62, 1.87), and those with high versus low education (OR 1.66, 95% CI 1.56, 1.77), and less likely among immigrants from non-Western countries versus people of Danish origin (OR 0.65, 95% CI 0.59, 0.70). Among respondents, immigrants from non-Western countries were more likely to respond later (OR 1.39, 95% CI 1.18, 1.64), but patterns across other characteristics were inconsistent. Fully adjusted mean satisfaction was 3.98 after the initial invitation, 4.08 after the first reminder and 4.01 after the second reminder; the cumulative mean changed from 3.99 to 4.02 as successive waves were included.

Conclusions: Participation was socially and clinically selective, and late respondents only partly resembled non-respondents. Satisfaction estimates were remarkably stable across successive reminder waves. However, as satisfaction among non-respondents remains unobserved, non-response bias cannot be excluded.

Trial registration: N/A

Keywords: Patient satisfaction; mental health services; surveys and questionnaires; non-response bias; patient experience; quality indicators

Background

Patient-experience surveys are widely used to monitor healthcare quality and to inform improvement at system, organizational and clinical levels (1, 2). In psychiatric services, representative patient feedback is especially important because needs are complex, clinical states may fluctuate, and care pathways and contact channels vary across settings. Danish evidence further suggests that patient-reported experiences relate to perceived improvement and satisfaction in psychiatric inpatient care, underscoring the practical relevance of valid survey indicators in mental health (3).

A persistent concern when interpreting survey results is whether non-response introduces selection that distorts survey estimates. One commonly used, but indirect, approach to assess and understand the risk of selective response is the Continuum of Resistance Model, which suggests that late responders more closely resemble nonrespondents than early responders (4). If this assumption holds, systematic shifts in respondent characteristics or survey estimates across reminder waves can be used as an indirect proxy for nonresponse bias. Nonetheless, such approaches do not directly observe outcomes among nonrespondents and therefore provide only indirect evidence on potential bias. However, empirical support of this assumption is mixed across populations, topics and modes; some studies report changes in representativeness or estimates with additional reminders (5-7), whereas others observe limited or no meaningful change (8-10). These inconsistencies raise the possibility that the model does not uniformly capture nonresponse mechanisms, and that context such as population, topic, and survey administration is important.

In the Danish psychiatric patient-experience survey, concerns about nonresponse have increased following the transition from in-person distribution to monthly digital invitations via the national secure mail system. Pilot analyses under this strategy suggest that respondents and

nonrespondents differ by age, sex, and diagnoses, indicating a need to better characterize potential selection and its implications for survey results (11). A further investigation into selective participation is needed for the ongoing quality monitoring and service improvement, and because many healthcare systems are expanding digital collection of patient-reported experience measures.

Methods

Aim

We therefore aimed to: (1) compare demographic, socioeconomic and clinical characteristics of respondents and non-respondents and identify factors associated with response; (2) examine whether respondent characteristics differed across the initial invitation and two reminder waves, and whether the pattern was consistent with the continuum-of-resistance model; and (3) assess whether satisfaction ratings differed across response waves and how successive waves influenced the estimated mean satisfaction among respondents.

Design and setting

We conducted a retrospective registry-based observational study using the national Danish Psychiatric Patient Experience Survey and Danish social and healthcare registries. The study was reported according to The REporting of studies Conducted using Observational Routinely-collected health Data (RECORD) statement (12).

Denmark has a tax-funded, universal healthcare system organized into five regions that plan and deliver specialist mental health services, including hospital-based inpatient wards and outpatient clinics (13). Within this system, psychiatric care is provided free at the point of use, and routine

patient-experience surveys are conducted nationally to inform quality improvement. The present study draws on this nationwide survey conducted in 2023-2024.

Survey administration and participants

Since October 2022, the adult component of the national Psychiatric Patient Experiences Survey has run as a monthly, fully digital measurement administered by DEFACTUM on behalf of Denmark's five regions. Each month, a sample of eligible adult psychiatric in- and outpatients from all participating units is identified, and invitations are distributed via the national secure mail system(e-Boks); at most, an adult patient can be sampled once every nine months. Invitations are sent at the beginning of the month following the patient's contact, providing near-real-time results to regions, hospitals, and departments. Patients with severe intellectual disabilities (International Classification of Diseases, 10th revision codes F72-F73(14)) and those exempted from e-boks were excluded.

We divided invited participants into four groups based on the timing of their response: 1) response after initial invitation, 2) response after first reminder (sent after 7 days), 3) response after second reminder (sent after 14 days), and 4) non-respondent. Please note that each individual could potentially be present up to three times in the study period.

Data sources and variables

Using the unique personal identification number given to all residents of Denmark, information from the Danish Psychiatric Patient Experience Survey was linked to Danish registries.

Overall satisfaction was used as the primary outcome and was measured on a five-point Likert scale ("Not at all" to "To a very great extent"). "Not applicable/Don't know" responses were

treated as missing for satisfaction analyses. Satisfaction was analysed as a continuous score on the 1–5 scale, consistent with routine survey reporting.

We included the following variables from the Danish Civil Registration System (15):

- sex (male, female),
- age,
- cohabitation and marital status (Married/cohabiting or not married/living alone)(16)
- ethnic background (Danish origin/Majority, Immigrants or descendants from Western countries or Immigrants or descendants from non-western countries) (16).
- Region of residence (North Denmark Region, Central Denmark Region, Region of Southern Denmark, Region Zealand or Capital Region of Denmark)

The Danish National Patient Registry includes all in- and outpatient contacts to public and private hospitals in Denmark (17). For the analysis, we extracted the following variables:

- Contact diagnosis (14) (Grouped into seven clinically meaningful categories based on ICD-10 chapter F (psychotic, mood, anxiety/stress-related, eating disorders, personality disorders, neurodevelopmental disorders, and other mental disorders), Z03 (observation for suspected disease), and all remaining non-F diagnoses were classified as other non-psychiatric diagnoses.),
- Number of days with in- or outpatient contact with a psychiatric ward 365 days before index contact (the contact that triggered an invitation to participate in the survey).
- Comorbidity 5 years prior contact (based on the Charlson Comorbidity Index and divided into: 0, 1-2, and 3+ comorbidities) (18),

Other included variables were (16, 19, 20);

- Educational level: based on the highest attained educational level and divided into; low, medium, high or no/missing education (16).
- Income: based on the household income, divided into quintiles and categorized into; low (first quintile), medium (second to fourth quintile) or high (fifth quintile) (16).
- Labor market attachment: based on The Employment Classification Module, displaying the main occupation, based on the activity that generated the largest amount of income the preceding year. The variable was divided into; Working, temporarily unemployed, outside workforce and retired (16).

Statistical analysis

All eligible invitations during the study period were included, meaning no prespecified power calculation was performed. A combined calibration weight aligned respondents with the invited population within department-by-calendar-month strata. The weight was not applied to analyses comparing respondents with non-respondents because it could not be calculated in strata without respondents. In weighted analyses, the weight was specified as a probability weight, and standard errors were cluster-robust at the person level.

First, characteristics of respondents and nonrespondents were compared descriptively and associations between individual characteristics and responding (yes/no) were examined using multivariable logistic regression. Second, analyses restricted to respondents compared characteristics across response waves using descriptive statistics and multivariable ordinal logistic regression to estimate the probability of responding at a later wave relative to the initial invitation. The proportional odds assumption was assessed using the Brant test in an unweighted model.

There was some evidence of deviation from the proportional odds assumption (global test p=0.03), primarily driven by age and income, while most covariates satisfied the assumption. Therefore, we repeated the analysis using a generalized ordered logit model as a sensitivity analysis. We compared the direction, rather than the numerical magnitude, of associations in the response and response-wave models as an indirect assessment of the continuum-of-resistance hypothesis. Third, satisfaction scores were analysed among respondents using unadjusted and covariate-adjusted linear regression models. Marginal mean satisfaction by response wave was derived from these models. Finally, cumulative mean satisfaction was calculated as responses from successive waves were added and presented graphically with 95% confidence intervals. To examine robustness of the estimates, all analyses were repeated with cluster-robust standard errors at the department level. Overall satisfaction was the primary outcome; eight additional patient-experience items were analysed as secondary outcomes.

All analyses were conducted in Stata 19 (StataCorp, College Station, TX, USA).

Use of AI

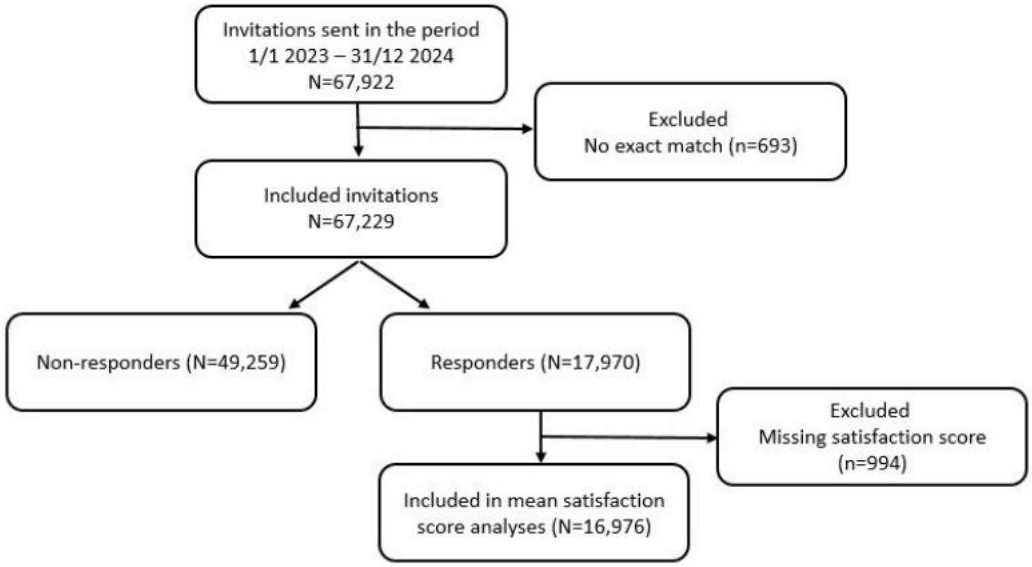
The authors made limited use of an AI-based large language model (ChatGPT, OpenAI) to assist with editing English grammar, phrasing, and formatting. The tool was not used to generate research ideas, perform data analysis, or draw scientific conclusions. All prompts contained only anonymized text with no directly identifiable personal or patient information, and all final content and interpretations were written, reviewed, and approved by the authors.

Results

Study population and response

A total of 67,922 invitations were sent to participate in the survey based on contacts with a psychiatric ward in the period 1/1-2023 to 31/12-2024. We excluded 693 invitations/contacts, where we could not identify the exact contact that triggered the invitation in the registries, resulting in a total of 67,229 survey invitations included in the analyses of non-response. Of these, 17,970 generated a response and 49,259 did not, corresponding to a response rate of 26.7% (**Figure 1**). Among respondents, 7,446 (41.4%) responded to the initial invitation, 4,813 (26.8%) after the first reminder and 5,711 (31.8%) after the second reminder. Overall satisfaction was available for 16,976 respondents.

Figure 1 Flow of participants



Participation and response timing

Respondents and non-respondents differed across demographic, socioeconomic and clinical characteristics (**Table 1**).

Table 1 Characteristics

	Total	Non-responders	Responders
	N=67,229	N=49,259	N=17,970

Age category			
18-24	15,672 (23.3%)	11,870 (24.1%)	3,802 (21.2%)
25-34	20,352 (30.3%)	16,225 (32.9%)	4,127 (23.0%)
35-49	17,017 (25.3%)	12,656 (25.7%)	4,361 (24.3%)
50+	14,188 (21.1%)	8,508 (17.3%)	5,680 (31.6%)
Sex			
Male	28,923 (43.0%)	22,401 (45.5%)	6,522 (36.3%)
Female	38,306 (57.0%)	26,858 (54.5%)	11,448 (63.7%)
Region of residence			
North Denmark Region	6,331 (9.4%)	4,755 (9.7%)	1,576 (8.8%)
Central Denmark Region	17,091 (25.4%)	12,163 (24.7%)	4,928 (27.4%)
Region of Southern Denmark	16,757 (24.9%)	12,398 (25.2%)	4,359 (24.3%)
The Capital Region of Denmark	20,084 (29.9%)	14,711 (29.9%)	5,373 (29.9%)
Region Zealand	6,763 (10.1%)	5,065 (10.3%)	1,698 (9.4%)
Missing	203 (0.3%)	167 (0.3%)	36 (0.2%)
Contact type			
Inpatient	8,520 (12.7%)	6,556 (13.3%)	1,964 (10.9%)
Outpatient	58,709 (87.3%)	42,703 (86.7%)	16,006 (89.1%)
ICD-10 diagnoses groups			
Psychotic disorders (F20-29)	17,184 (25.6%)	13,757 (27.9%)	3,427 (19.1%)
Mood disorders (F30-39)	13,375 (19.9%)	8,703 (17.7%)	4,672 (26.0%)
Anxiety/Stress (F40-48)	12,062 (17.9%)	8,600 (17.5%)	3,462 (19.3%)
Eating disorders (F50)	1,516 (2.3%)	1,006 (2.0%)	510 (2.8%)
Personality disorders (F60-69)	6,228 (9.3%)	4,512 (9.2%)	1,716 (9.5%)
Neurodevelopment (F70-98)	5,966 (8.9%)	4,572 (9.3%)	1,394 (7.8%)
Other mental disorders (F00-09, F51-59, F99)	4,154 (6.2%)	3,190 (6.5%)	964 (5.4%)
Observation for suspected condition (Z03)	5,470 (8.1%)	3,988 (8.1%)	1,482 (8.2%)
Other non-F diagnoses	1,274 (1.9%)	931 (1.9%)	343 (1.9%)
Contact days the previous year, Median (IQR)	9 (3-24)	9 (3-24)	9 (3-24)
Charlson Comorbidity Index			
No comorbidity	62,026 (92.3%)	45,692 (92.8%)	16,334 (90.9%)
1-2 comorbidities	4,719 (7.0%)	3,256 (6.6%)	1,463 (8.1%)
3+ comorbidities	484 (0.7%)	311 (0.6%)	173 (1.0%)
Marital Status			
Not married/living alone	54,984 (81.8%)	41,582 (84.4%)	13,402 (74.6%)
Married/cohabiting	12,042 (17.9%)	7,510 (15.2%)	4,532 (25.2%)
Missing	203 (0.3%)	167 (0.3%)	36 (0.2%)
Ethnicity			
Danish	57,341 (85.3%)	41,476 (84.2%)	15,865 (88.3%)
Immigrants or descendants from western countries	2,615 (3.9%)	1,912 (3.8%)	703 (4.0%)

Immigrants or descendants from non-western countries	7,070 (10.5%)	5,704 (11.6%)	1,366 (7.6%)
Missing	203 (0.3%)	167 (0.3%)	36 (0.2%)
Educational level			
Low education	26,420 (39.3%)	21,076 (42.8%)	5,344 (29.7%)
Medium education	25,584 (38.1%)	18,359 (37.3%)	7,225 (40.2%)
High education	14,331 (21.3%)	9,101 (18.5%)	5,230 (29.1%)
Missing	894 (1.3%)	723 (1.5%)	171 (1.0%)
Labor market attachment			
Working	28,026 (41.7%)	19,999 (40.6%)	8,027 (44.7%)
Temporarily unemployed	580 (0.9%)	416 (0.8%)	164 (0.9%)
Outside workforce	29,846 (44.4%)	22,996 (46.7%)	6,850 (38.1%)
Retired	3,981 (5.9%)	2,119 (4.3%)	1,862 (10.4%)
Missing/other	4,796 (7.1%)	3,729 (7.6%)	1,067 (5.9%)
Income			
Low income	13,860 (20.6%)	10,991 (22.3%)	2,869 (16.0%)
Medium income	40,120 (59.7%)	29,826 (60.5%)	10,294 (57.3%)
High income	13,046 (19.4%)	8,275 (16.8%)	4,771 (26.5%)
Missing	203 (0.3%)	167 (0.3%)	36 (0.2%)

Values are numbers (%) unless stated otherwise. Abbreviations: N Numbers, IQR Inter Quartile Range

In regression analyses, response was more likely among women, adults aged 50 years or older, outpatients, people who were married or cohabiting, and those with higher education or income. Response was less likely among adults aged 25–34 years, people outside the workforce, and immigrants from non-Western countries (**Table 2, model A**). Characteristics also differed across response waves (additional file 1).

Table 2 Associations between response and characteristics

	Model A (N=66,141)		Model B (N=17,765)	
	OR	95%CI	OR	95%CI
Age category				
18-24	ref.	-	ref.	-
25-34	0.75	(0.71;0.79)	1.14	(1.00;1.29)
35-49	1.02	(0.95;1.08)	1.08	(0.94;1.24)
50+	1.74	(1.62;1.87)	0.91	(0.78;1.05)
Sex				
Male	ref.	-	ref.	-
Female	1.36	(1.30;1.41)	0.89	(0.82;0.97)

Region of residence				
North Denmark Region	ref.	-	ref.	-
Central Denmark Region	0.75	(0.58;0.97)	1.00	(0.86;1.16)
Region of Southern Denmark	0.71	(0.52;0.96)	0.96	(0.82;1.11)
The Capital Region of Denmark	0.70	(0.51;0.96)	1.00	(0.87;1.16)
Region Zealand	0.63	(0.45;0.90)	1.17	(0.98;1.40)
Contact type				
Inpatient	ref.	-	ref.	-
Outpatient	1.20	(1.12;1.27)	1.23	(1.10;1.39)
ICD-10 diagnoses groups				
Psychotic disorders (F20-29)	ref.	-	ref.	-
Mood disorders (F30-39)	1.27	(1.19;1.35)	1.18	(1.04;1.33)
Anxiety/Stress (F40-48)	1.24	(1.16;1.32)	1.25	(1.10;1.42)
Eating disorders (F50)	1.42	(1.23;1.64)	1.24	(0.99;1.55)
Personality disorders (F60-69)	1.29	(1.20;1.40)	1.29	(1.11;1.49)
Neurodevelopment (F70-98)	1.16	(1.07;1.25)	1.49	(1.25;1.78)
Other mental disorders (F00-09, F51-59, F99)	0.95	(0.86;1.04)	1.09	(0.87;1.36)
Observation for suspected condition (Z03)	1.29	(1.19;1.40)	1.35	(1.13;1.61)
Other non-F diagnoses	1.12	(0.97;1.30)	1.13	(0.86;1.49)
Contact days the previous year	1.00	(1.00;1.00)	1.00	(1.00;1.00)
Charlson Comorbidity Index				
No comorbidity	ref.	-	ref.	-
1-2 comorbidities	0.97	(0.90;1.04)	0.88	(0.74;1.04)
3+ comorbidities	0.96	(0.77;1.19)	1.27	(0.87;1.84)
Marital Status				
Not married/living alone	ref.	-	ref.	-
Married/cohabiting	1.25	(1.18;1.31)	0.98	(0.88;1.10)
Ethnicity				
Danish	ref.	-	ref.	-
Descendants from western countries	0.91	(0.66;1.24)	0.96	(0.46;2.02)
Descendants from non-western countries	0.73	(0.64;0.84)	1.01	(0.77;1.33)
Immigrants from western countries	0.86	(0.78;0.96)	1.08	(0.88;1.33)
Immigrants from non-western countries	0.65	(0.59;0.70)	1.39	(1.18;1.64)
Educational level				
Low education	ref.	-	ref.	-
Medium education	1.30	(1.23;1.37)	0.94	(0.85;1.04)
High education	1.66	(1.56;1.77)	0.91	(0.81;1.03)
Labor market attachment				
Working	ref.	-	ref.	-
Temporarily unemployed	1.05	(0.87;1.27)	0.88	(0.61;1.26)
Outside workforce	0.86	(0.82;0.90)	0.94	(0.85;1.03)
Retired	1.14	(1.04;1.25)	0.78	(0.64;0.94)
Income				
Low income	ref.	-	ref.	-

Medium income	1.02	(0.96;1.07)	1.04	(0.92;1.16)
High income	1.25	(1.17;1.33)	0.99	(0.87;1.14)

Model A: Logistic regression, OR for response adjusted for department and month/year

Model B: Ordinal logistic regression, OR for late response

Abbreviations: CI Confidence Interval, OR Odds Ratio, N numbers

196

197 Later response was more likely among men, adults aged 25–34 years, outpatients, several
198 diagnostic groups and immigrants from non-Western countries; it was less likely among retired
199 respondents (**Table 2, model B**). These patterns only partly mirrored the respondent–non-
200 respondent comparison. Results from the generalised ordered logit sensitivity analysis were
201 consistent with the overall interpretation.

202 *Satisfaction estimates*

203 Lower satisfaction scores were associated with the low age category 18-24 years, inpatient
204 contacts, diagnoses, not being married/living alone, descendants from non-western countries, and
205 being outside the workforce (additional file 2). Fully adjusted mean satisfaction was 3.98 (95%
206 confidence interval 3.95, 4.02) after the initial invitation, 4.08 (95% confidence interval 4.03, 4.12)
207 after the first reminder and 4.01 (95% confidence interval 3.97, 4.05) after the second reminder
208 (**Table 3**).

Table 3 Mean satisfaction score divided into reminder waves

	Invite		First reminder		Second reminder	
	Mean	95% CI	Mean	95% CI	Mean	95% CI
Crude	3.97	(3.94;4.00)	4.05	(4.01;4.08)	3.96	(3.92;3.99)
Model 1	3.99	(3.95;4.03)	4.08	(4.04;4.13)	3.99	(3.95;4.03)
Model 2	3.98	(3.95;4.02)	4.08	(4.03;4.12)	4.01	(3.97;4.05)

Model 1: Weight adjusted with cluster-robust variance at the individual level

Model 2: Model 1 + adjusted for all other co-variates

Abbreviations: CI Confidence Interval

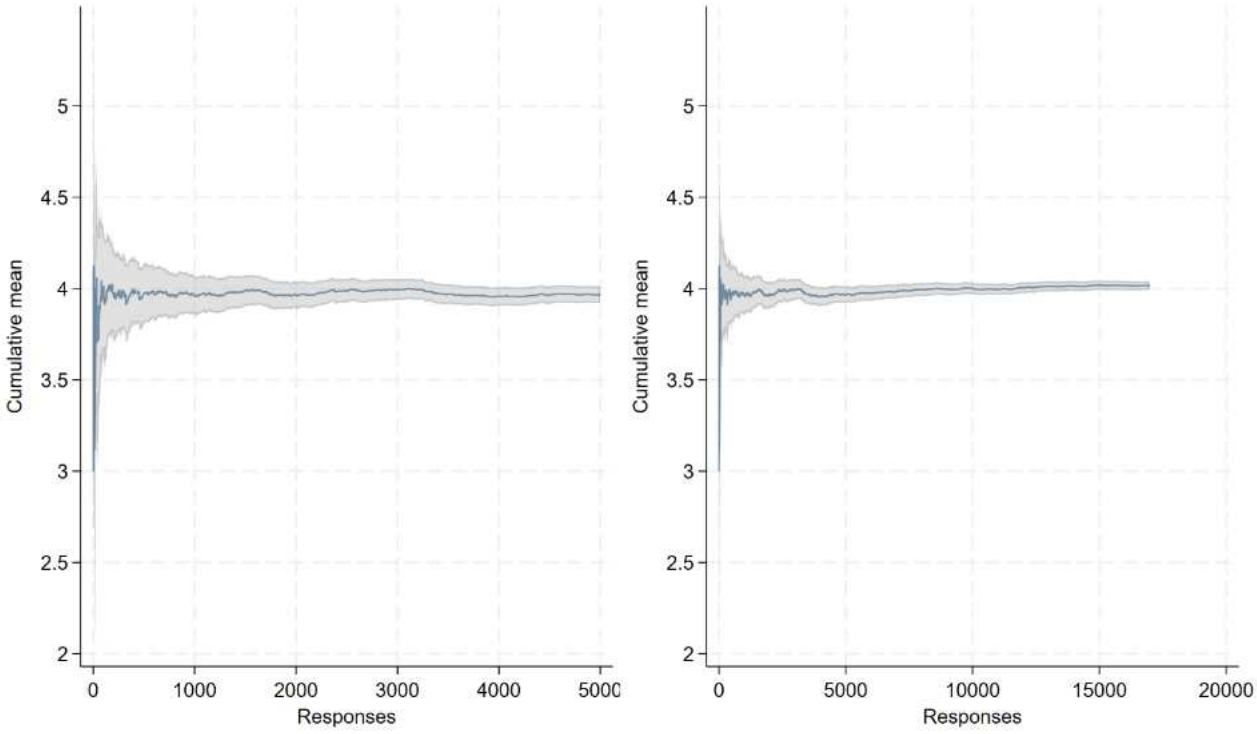
209

210 Adjustment and inclusion of successive response waves produced only small differences across
211 eight additional patient-experience items (additional file 3).

The cumulative mean satisfaction score was 3.99 (95% confidence interval 3.95, 4.03) using initial-invitation responses, 4.03 (95% confidence interval 4.00, 4.06) after adding first-reminder responses, and 4.02 (95% confidence interval 3.99, 4.04) after adding second-reminder responses (**Figure 2**). Department-clustered sensitivity analyses yielded similar conclusions.

Figure 2 Cumulative mean satisfaction scores with 95% confidence intervals.

The figure displays cumulative mean satisfaction scores by response date. The grey shaded area represents the 95% confidence interval. The left panel displays the first 5,000 responses, while the right panel displays all responses.



Discussion

Statement of principal findings

Participation in this nationwide psychiatric patient-experience survey was socially and clinically selective. Respondents were more often women, older, of Danish origin and socioeconomically advantaged, whereas several potentially vulnerable groups were underrepresented. Late

respondents shared some characteristics with non-respondents, but the pattern was inconsistent across variables. Despite these compositional differences, mean satisfaction changed little across observed response waves and when successive waves were added.

Interpretation

Our findings demonstrate clear evidence of selective participation in the psychiatric patient experience survey, with underrepresentation of social and clinically vulnerable groups. This pattern aligns with previous survey research showing lower response rates among younger individuals, men, and individuals with lower socioeconomic status (5, 6). In a psychiatric context, this is particularly important, as these groups may have distinct care needs and experiences. The lower response among patients with psychotic disorders and among individuals outside the workforce may reflect barriers related to illness severity, cognitive burden, or reduced engagement with digital communication platforms. The transition to a fully digital survey format may further contribute to this pattern. Although Denmark has high digital penetration, the use of secure digital mail systems may still disadvantage certain subgroups, including individuals with limited digital literacy or reduced access to digital tools.

When examining response patterns across reminder waves, we found that late responders shared some characteristics with non-respondents, including a higher likelihood of being male, younger, and of non-western origin. This provides partial support for the continuum of resistance model, which posits that late responders can serve as a proxy for non-respondents (4). However, this pattern was not consistent across all variables, and several characteristics did not follow this gradient. These findings are in line with previous studies reporting mixed evidence for the model (7-10) and suggest that its applicability may depend on context, including population, survey

mode, and topic. In the present setting, the model appears to capture some aspects of nonresponse mechanisms but does not fully explain the observed selection patterns. Importantly, despite the observed differences in respondent characteristics, the impact on the primary outcome, overall satisfaction, was minimal. Mean satisfaction scores remained highly stable across response waves, and the cumulative estimate changed only marginally with additional responses. One possible explanation is that differences in respondent characteristics may not necessarily translate into substantial differences in reported satisfaction. However, this cannot be directly assessed in the absence of data from nonrespondents. Alternatively, satisfaction as a global measure may be relatively insensitive to variation across subgroups, potentially due to ceiling effects or shared expectations of care. However, even in questions with lower satisfaction scores, where ceiling effects are less likely, the scores remained stable across reminder waves. This finding is consistent with prior research showing that additional reminders may have limited impact on accumulated survey estimates despite changes in response patterns (5, 6).

In the patient experience survey, the overall response rate was 27 %, and although low response rates are often assumed to imply nonvalid or biased results, this assumption is not supported by empirical evidence and largely reflects convention rather than scientific consensus (21-23). Instead, the key issue is whether differences in response propensity translate into differences in the outcome of interest. In our study, substantial differences in response patterns were observed, yet these translated into only minor changes in overall satisfaction estimates among respondents across reminder waves. However, certain groups remained consistently underrepresented, suggesting that repeated reminders alone may be insufficient to fully address selective participation. Satisfaction scores among non-respondents remain unobserved, and therefore the present analyses cannot directly assess whether nonrespondents differ in their reported

satisfaction, and residual nonresponse bias cannot be excluded. Consequently, although the low response rate reduces sample size and statistical precision, the possibility of systematic bias in satisfaction estimates remains an important consideration.

Strengths and limitations

This study has several strengths. First, it is based on nationwide data from a large population of psychiatric patients, enhancing the robustness and generalizability of the findings. Second, the linkage of survey data with high-quality Danish registry data allowed for detailed characterization of both respondents and non-respondents across a wide range of variables, including socioeconomic and clinical factors that are rarely available in survey studies. Third, the large sample size and use of appropriate statistical methods, including weighting and cluster-robust variance estimation, strengthen the validity of the results.

However, some limitations should be considered. First, the fully digital survey mode may have introduced systematic exclusion or reduced participation among certain groups, potentially amplifying selection bias. Second, weighing could not be applied in analyses comparing respondents and non-respondents, which may have influenced some estimates of association. Finally, the statistical analyses were conducted at the invitation (contact) level, with standard errors clustered at the individual level to account for repeated observations. Although this approach reflects that response behaviour is linked to specific care episodes, it may not fully capture potential clustering at higher organizational levels, such as departments. As a sensitivity analysis, we explored alternative model specifications, including clustering at the department level and the use of generalized ordered logit models to relax the proportional odds assumption. These analyses yielded similar results and did not alter the overall conclusions, suggesting that the findings are robust to different modelling choices.

Implications

The nationwide design and use of routinely collected data from a universal healthcare system support a high degree of generalizability within similar settings. The findings are likely applicable to other high-income countries with comparable healthcare structures and digital survey administration systems. In our study, reminders increased the number of responses but did not remove systematic underrepresentation. Quality-monitoring programmes should therefore examine response patterns by demographic, socioeconomic and clinical characteristics and should not assume that late respondents are a valid substitute for non-respondents without local validation. Alternative contact modes or targeted recruitment may be needed for groups that remain underrepresented after reminders. When reporting patient-experience indicators, organisations should distinguish stability across response waves from evidence that non-response bias is absent and consider presenting sensitivity analyses alongside routine estimates. Future studies should evaluate mixed-mode recruitment, investigate subgroup and service-level effects, and use direct follow-up or models for non-ignorable missing outcomes where feasible.

Conclusion

In conclusion, this study demonstrates that responses to a national psychiatric patient experience survey are socially and clinically selective, with underrepresentation of younger individuals, men, and socioeconomically disadvantaged groups. While late responders partially resemble non-respondents, the continuum of resistance model provides only limited insight into nonresponse mechanisms in this context. Importantly, despite these differences in respondent composition, overall satisfaction estimates were highly stable across response waves. This suggests limited

evidence that additional reminders meaningfully change estimated satisfaction scores among respondents. However, as satisfaction among nonrespondents remains unobserved, the presence of nonresponse bias cannot be ruled out.

List of abbreviations

AI: Artificial intelligence

CI: Confidence interval

ICD-10: International Classification of Diseases, 10th Revision

IQR: Interquartile range

N: Number

OR: Odds ratio

RECORD: REporting of studies Conducted using Observational Routinely-collected health Data

Declarations:

Ethics approval

Under Section 14(2) of the Danish Act on Research Ethics Review of Health Research Projects, ethical approval was not required, as this retrospective study was based exclusively on questionnaire and registry data without human biological material. Accordingly, the study was exempt from review by the relevant Research Ethics Committee (REC), the Central Denmark Region Committees on Health Research Ethics (De Videnskabsetiske Komitéer for Region Midtjylland). The study was conducted in accordance with the relevant ethical principles of the Declaration of Helsinki and applicable Danish legislation and regulations.

Consent to participate

Participation in the Danish Psychiatric Patient Experience Survey was voluntary, and informed consent was obtained from all participants before their participation in the survey. Personal data were processed in accordance with Section 10(1) of the Danish Data Protection Act. The research projects were registered with the Legal Office of the Central Denmark Region (case numbers 1-16-02-261-24 and 1-16-02-340-22).

Consent for publication

N/A

Availability of data and materials

The data that support the findings of this study are available from Statistics Denmark, but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available. Data are however available from the authors upon reasonable request and with permission of Statistics Denmark.

Competing interests

The authors declare they have no competing interests.

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Authors' contributions

All authors contributed to the conceptualization, methodology and review of the study and manuscript. CRB was responsible for the formal analysis, drafting the manuscript and overall project administration.

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