

# BMJ Open Comparison of industry payments to psychiatrists and psychiatric advanced practice clinicians in the USA, 2021: a cross-sectional study

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## ABSTRACT

**Objectives** To compare industry payment patterns among US psychiatrists and psychiatric advanced practice clinicians (APCs) and determine how scope of practice laws has influenced these patterns.

**Design** Cross-sectional study.

**Setting** This study used the publicly available US Centers for Medicare and Medicaid Services Sunshine Act Open Payment database and the National Plan and Provider Enumeration System (NPPES) database for the year 2021.

**Participants** All psychiatrists and psychiatric APCs (subdivided into nurse practitioners (NPs) and clinical nurse specialists (CNSs)) included in either database.

**Primary and secondary outcome measures** Number and percentage of clinicians receiving industry payments and value of payments received. Total payments and number of transactions by type of payment, payment source and clinician type were also evaluated.

**Results** A total of 85 053 psychiatric clinicians (61 011 psychiatrists (71.7%), 21 895 NPs (25.7%), 2147 CNSs (2.5%)) were reviewed; 16 240 (26.6%) psychiatrists received non-research payment from industry, compared with 10 802 (49.3%) NPs and 231 (10.7%) CNSs ( $p < 0.001$  for pairwise comparisons). Psychiatric NPs were significantly more likely to receive industry payments compared with psychiatrists (incidence rate ratio (IRR), 1.85 (95% CI 1.81 to 1.88);  $p < 0.001$ ). Compared with psychiatrists, NPs were more likely to receive payments of > United States Dollars (US \$) 100 (33.9% vs 14.6%; IRR, 2.14 (2.08 to 2.20);  $p < 0.001$ ) and > US\$ 1000 (5.3% vs 4.1%; IRR, 1.29 (1.20 to 1.38);  $p < 0.001$ ) but less likely to receive > US\$ 10 000 (0.4% vs 1.0%; IRR, 0.39 (0.31 to 0.49);  $p < 0.001$ ). NPs in states with 'reduced' or 'restricted' scope of practice received more frequent payments (reduced: IRR, 1.22 (1.18 to 1.26); restricted: IRR, 1.26 (1.22 to 1.30), both  $p < 0.001$ ).

**Conclusions** Psychiatric NPs were nearly two times as likely to receive industry payments as psychiatrists, while psychiatric CNSs were less than half as likely to receive payment. Stricter scope of practice laws increases the likelihood of psychiatric NPs receiving payment, the opposite of what was found in a recent specialty agnostic study.

## STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ This study cross-referenced two national databases and found a low rate (<0.2%) of inconsistent provider types across psychiatric clinicians.
- ⇒ This study successfully captured the number and percentage of over 85 000 psychiatric clinicians receiving industry payments and the value of payments they received.
- ⇒ This study did not capture payments below the minimum Open Payments reporting threshold (US\$ 11.04 in 2021).
- ⇒ Due to data limitations, this study was unable to compare payments to psychiatrists and APCs in years prior to 2021.

## INTRODUCTION

Associations of industry payments with the prescribing behaviour of physicians and patient outcomes are well established.<sup>1–4</sup> Industry payment to psychiatric clinicians is of interest to the broader medical community given well documented and recent clinician-level and institutional-level distortions in prescribing patterns, the March 2020 suspension of previously required face-to-face visits prior to controlled substance prescription and the rapid proliferation of venture-capital backed telepsychiatry services such as Cerebral and Done.<sup>5–8</sup> In the 2-year period from 2016 to 2017, industry payments amounting to over US\$ 110 million were made to over 50% of active psychiatrists.<sup>9</sup> In addition to physicians, there are extensive interactions between industry and advanced practice clinicians (APCs)—APCs, including nurse practitioners (NPs), clinical nurse specialists (CNSs), physician assistants (PAs) and other clinicians received US\$ 121 million in payments in 2021.<sup>10 11</sup> These payments have occurred in tandem with an increase in APCs entering the workforce and state legislation enabling broader scopes of practice with

greater prescribing authority.<sup>12 13</sup> From 2011 to 2019, the number of psychiatric NPs treating Medicare patients increased by 162%.<sup>14</sup>

Recent studies have focused on comparing the prescribing behaviour of physicians and APCs. There is evidence that NPs and PAs demonstrate similar prescribing behaviour to physicians in primary care roles.<sup>15</sup> However, NPs and PAs have also been shown to prescribe opioids at higher rates than physicians, with evidence of industry targeting APCs to promote this behaviour.<sup>16–18</sup> With the rapidly growing presence of APCs in psychiatry, it is critical to better understand industry's targeted promotional efforts through payments and other transfers of value, potentially influencing prescription patterns.

In 2021, the Open Payments Program began collecting data on industry payments to APCs, in addition to physicians and academic medical centres.<sup>19</sup> Accordingly, in this cross-sectional study, we cross-reference the Centers for Medicare & Medicaid Services (CMS) Open Payments Program and National Plan & Provider Enumeration System databases to consider the following questions: (1) What differences, if any, exist between patterns in industry payments to psychiatrists and advanced practice providers? and (2) Does prescribing power impact likelihood of advanced practice providers receiving industry payment? We hypothesised that, contrary to previous specialty agnostic analysis, psychiatric APCs may be more likely to be targets of industry payment than psychiatrists due to recent changes in psychiatric care delivery highlighted above.<sup>11 20</sup> We further hypothesised a positive correlation between state scope-of-practice freedom and industry payments to APCs, as companies may be incentivised to target APCs in states that allow greater prescribing power to increase the impact of payments on care.

## METHODS

### Institutional approval and participant consent

This study was based on publicly available information, in accordance with 45 CFR §46, and thus did not require Institutional Review Board approval. Informed consent was not required as no patient-level data were collected. This study followed a Strengthening the Reporting of Observational Studies in Epidemiology reporting guideline for cross-sectional studies.

### Data sources and study population

To examine industry funding to APCs, we cross-referenced the Center for CMS National Plan and Provider Enumeration System (NPPES)<sup>21</sup> and 2021 Open Payments Database (OPD)<sup>22</sup> of general (non-research) industry payments to clinicians, matching clinician identifiers between the two datasets using national provider identifier (NPI) codes. Psychiatric APCs were defined as non-physician clinicians with active NPIs and a listed psychiatric clinical specialty in either database, as determined by the taxonomy codes in online supplemental table 1. Those listed as psychiatric clinicians in the OPD receiving any payment from industry

above the 2021 Open Payments reporting threshold of US\$ 11.04<sup>23</sup> were defined as having received industry payment; those who were listed in the NPPES but had no record of receiving payment in the OPD were defined as having not received industry payment. We excluded PAs, which had no specialty classifications listed in the OPD, from this analysis. We also excluded psychiatric clinicians with inconsistent clinician types between the two databases (eg, listed as both NP and CNS; <0.2% of sample).

### Scope of practice data

Scope of practice data was obtained using the Internet Archive to access the American Association of Nurse Practitioners (AANP) data on state scope-of-practice laws at the start of 2021.<sup>24</sup> These laws were stratified by the AANP as 'full' scope of practice, laws which 'permit all NPs to evaluate patients; diagnose, order and interpret diagnostic tests; and initiate and manage treatments, including prescribing medications and controlled substances, under the exclusive licensure authority of the state board of nursing'; 'reduced' scope of practice, laws which 'reduce the ability of NPs to engage in at least one element of NP practice... [requiring] a career-long regulated collaborative agreement with another health provider in order for the NP to provide patient care, or it [limiting] the setting of one or more elements of NP practice; or "restricted" scope of practice, laws which "restrict the ability of NPs to engage in at least one element of NP practice... [requiring] career-long supervision, delegation or team management by another health provider in order for the NP to provide patient care."<sup>24</sup>

### Study outcomes

To assess overall patterns in psychiatric clinician payment, we assessed the number and proportion of each psychiatric clinician type listed in the OPD (ie, psychiatrist, psychiatric NPs and psychiatric CNSs) receiving industry payment. We further assessed the median amount per payment, number of payments, total payment amount, top quintile payment criteria and top 5% payment criteria by clinician type. We assessed any differences in these figures between groups in a series of pairwise comparisons and bivariate regressions to calculate differences in medians and incidence rate ratios (IRRs), respectively. We then assessed distribution of payments by industry type using a classification scheme previously reported by Zhang and Anderson.<sup>20</sup> Assessments of the association between gender and scope of practice on likelihood of receiving industry payment were also performed. Finally, we assessed state-by-state differences in likelihood of receiving payment by clinician, for those clinician types with adequate sample size for meaningful comparative analysis (psychiatrists and psychiatric NPs).

### Statistical analysis

First, we compared the proportions of clinicians receiving payment by clinician type. We used  $\chi^2$  tests to determine significant differences. Shapiro-Wilk testing was used

to assess normality to inform subsequent analysis; as payment data were found to have a non-normal distribution, non-parametric equality-of-medians tests were used to compare between groups.<sup>25 26</sup> Median testing was used to determine significance in differences in median amount of payments received by clinicians as well as to determine significant differences in top quintile and top 5% payment criteria by specialty.

Second, bivariate Poisson regression models with robust sandwich error variances were used to assess all IRRs reported in accordance with statistical guidelines.<sup>27 28</sup> Analyses were two-tailed with significance set at  $p < 0.05$ ; Bonferroni adjustment for multiple comparisons was performed to determine significance of state-by-state variation in payments to providers as each of these analyses by definition necessitated a large number (50) of statistical comparisons. Stata V.17.0 was used for all analyses.

### Patient and public involvement statement

None.

## RESULTS

### Overall payments

There were a total of 85 053 psychiatrists, psychiatric NPs and psychiatric CNSs in NPPES and OPD (table 1). Of 16 240 of 61 011 (26.6%) psychiatrists, 10 802 of 21 895 (49.3%) NPs and 231 of 2147 (10.7%) psychiatric CNSs received non-research payments from industry in 2021. Psychiatric NPs were significantly more likely to receive payments from industry than psychiatrists (IRR, 1.85 (95% CI 1.81 to 1.88);  $p < 0.001$ ) (table 1); both psychiatric NPs and psychiatrists were significantly more likely to receive payment from industry than psychiatric CNSs ( $p < 0.001$  both comparisons).

In terms of total compensation from industry, psychiatric NPs were significantly more likely to have taken  $>US\$ 100$  (33.9% of NPs vs 14.6% of psychiatrists; IRR, 2.14 (95% CI 2.08 to 2.20);  $p < 0.001$ ) and  $>US\$ 1000$  from industry than psychiatrists (5.3% of NPs vs 4.1% of psychiatrists; IRR, 1.29 (95% CI 1.20 to 1.38),  $p < 0.001$ ) but were significantly less likely to have received  $>US\$ 10 000$  (0.4% of NPs vs 1.0% of psychiatrists; IRR, 0.39 (95% CI 0.31 to 0.49);  $p < 0.001$ ); CNSs were less likely than psychiatrists and psychiatric NPs to receive any of these payment amounts from industry. Proportional distributions of income from industry payments among psychiatrists, psychiatric NPs and psychiatric CNSs are detailed using Lorenz curves in figure 1.<sup>29</sup>

### Form and nature of payments

Psychiatrists, psychiatric NPs and psychiatric CNSs received a total of 501 464 payments with a total value of US\$ 50 203 456 (table 2). Across the different types of payments, the 'food and beverage' category had the greatest number of payments for all clinician types, totalling 92.6% of payments, while the 'consulting' category had the highest value of payment at 75.9% of the total

value of all payments. Regardless of categories, psychiatrists received the greatest number of payments and monetary value of payments.

Examining types of payments to psychiatric clinicians by monetary value and number per clinician listed in either NPPES or OPD, psychiatrists received the highest value of payments in all categories except for 'education' and 'food and beverage' categories (table 3). Psychiatric NPs received the highest value of payments in 'food and beverage' at US\$ 174.10 per capita. Psychiatric NPs also received the highest value of payments in 'education', at US\$ 4.59 per capita. Consulting formed the majority of the value of payments for psychiatrists, accounting for 81.6% of the value of all payments, despite accounting for just 6.1% of payments. Consulting also formed a substantial minority of the value of payments for psychiatric NPs and CNSs (44.1% and 42.6%, respectively), despite accounting for a small fraction of the number of payments to each of these APCs (1.3% and 1.5%, respectively).

### Gender, scope of practice and geographic associations with payments

Female psychiatrists (IRR, 0.76 (95% CI 0.73 to 0.78);  $p < 0.001$ ) and NPs (IRR, 0.94 (95% CI 0.90 to 0.99);  $p = 0.004$ ), but not female CNSs (IRR, 1.10 (95% CI 0.63 to 1.94);  $p = 0.730$ ), were less likely to receive payments from industry than men. AANP 'reduced' and 'restricted' scope of practice classifications were significantly associated with higher likelihood of receiving industry payment (reduced: IRR 1.22; (95% CI 1.18 to 1.26);  $p < 0.001$ ; restricted: IRR, 1.26 (95% CI 1.22 to 1.30);  $p < 0.001$ ). NPs in 'restrictive' scope of practice states received an average of US\$ 155.17 more than those in 'full' scope of practice states (IQR, \$47.50 to \$262.85;  $p = 0.005$ ). However, NP-'reduced' and 'restricted' scope of practice states were also associated with significantly higher rates of industry payment to psychiatrists (reduced: IRR, 1.35 (95% CI 1.30 to 1.40);  $p < 0.001$ ; restricted: IRR, 1.54 (95% CI 1.48 to 1.59);  $p < 0.001$ ).

State of practice had a significant effect on likelihood of receiving payment for psychiatrists and psychiatric NPs (figure 2). For psychiatric NPs, practice in Washington, Oregon, Minnesota, New York, Vermont, Maine, Massachusetts and District of Columbia was associated with a lower likelihood of receiving industry payment ( $p < 0.001$  for all mentioned states); all of these states featured 'full' NP scope of practice laws in 2021. Notably, practice in all of these states was also associated with a lower likelihood of receiving industry payment by psychiatrists ( $p < 0.001$  for all mentioned states). In contrast, practice in Arkansas, Louisiana and Alabama, all states with 'reduced' scope of practice laws in 2021, was significantly associated with higher likelihood of payment to psychiatric NPs ( $p < 0.001$  for all mentioned states). All of these states were also significantly associated with higher likelihood of payment to psychiatrists ( $p < 0.001$  for all mentioned states).

**Table 1** Characteristics of non-research payments to psychiatric care providers, 2021

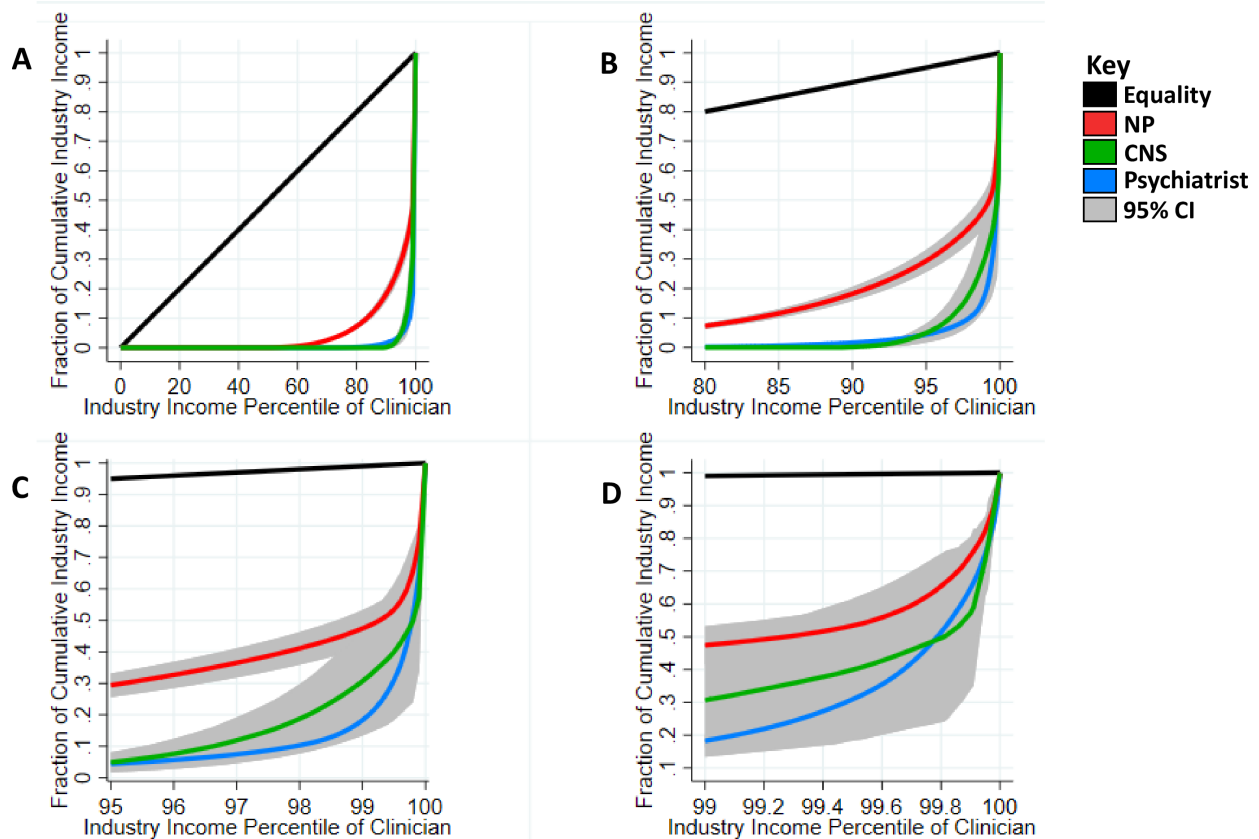
	Psychiatrist, number (%) (n=61011)	Psychiatric nurse practitioner, number (%) (n=21895)	Psychiatric clinical nurse specialist, number (%) (n=2147)	P value, NP vs physician	P value, CNS vs physician	P value, NP vs CNS
Clinicians receiving any payment	16240 (26.6)	10802 (49.3)	231 (10.7)	<0.001***	<0.001***	<0.001***
Clinicians receiving > US\$ 100 from industry	8882 (14.6)	6855 (31.3)	142 (6.6)	<0.001***	<0.001***	<0.001***
Clinicians receiving >US\$ 1000 from industry	2472 (4.1)	1161 (5.3)	27 (1.3)	<0.001***	<0.001***	<0.001***
Clinicians receiving > US\$ 10 000 from industry	640 (1.0)	91 (0.4)	3 (0.1)	<0.001***	<0.001***	<0.001***
Median amount per payment*, US\$ (IQR)	19.03 [14.45–26.50]	18.13 [13.83–24.79]	17.27 [13.81–23.24]	<0.001***	0.187	0.954
Median number of payments* (IQR)	3(1–15)	5(2–21)	4(1–18)	<0.001***	0.021*	0.228
Median total payment amount*, US\$ (IQR)	120.00 [33.69–444.47]	159.78 [51.03–458.49]	122.32 [40.11–412.33]	<0.001***	0.846	0.035*
Top Quintile Payment Criteria*, US\$	657.57	582.44	538.61	<0.001***	0.002**	0.571
Top 5% Payment Criteria*, US\$	6652.20	1591.21	1873.04	0.004**	0.616	0.620
Receiving any payment, IRR (CI)	Reference	1.85 [1.81–1.88]***	0.40(0.36–0.46)***	–	–	–
Receiving >US\$ 100, IRR (CI)	Reference	2.14 [2.08–2.20]***	0.40 [0.34–0.48]***	–	–	–
Receiving >US\$ 1,000, IRR (CI)	Reference	1.29 [1.20–1.38]***	0.23 [0.14–0.36]***	–	–	–
Receiving >US\$ 10,000, IRR (CI)	Reference	0.39 [0.31–0.49]***	0.09 [0.02–0.36]**	–	–	–

\*P&lt;0.05, \*\*P&lt;0.01, \*\*\*P&lt;0.001.

Empty cells left empty as comparisons were not pairwise as in other comparisons denoted within these columns.

\*Of all those receiving payment.

. CNS, clinical nurse specialist; IRR, incidence risk ratio; NP, nurse practitioner;



**Figure 1** Lorenz curves of industry income distribution by provider type, 2021. (A) All psychiatric clinicians. (B) Top 20% of psychiatric clinicians by industry income percentile. (C) Top 5% of providers, same metric. (D) Top 1% of clinicians, same metric. CNS, nurse specialist; NP, nurse practitioner.

## DISCUSSION

While previous research has examined industry payments to physicians and APCs in an aggregate manner,<sup>11 20</sup> this work is the first to compare industry payments to physicians and APCs within psychiatry. We found substantial differences in likelihood of receiving payment by clinician type, substantial differences in overall nature of payments by clinician type and substantial variation in payments across clinician type by gender, scope of practice and geographic region. As associations of industry payment (even small payments)<sup>30</sup> with prescription patterns are well established,<sup>31–33</sup> these findings imply that the type of psychiatric clinician one receives care from may make one more or less likely to be prescribed treatments encouraged by certain industry sponsors.

Psychiatric NPs were nearly two times as likely to receive payments from industry than psychiatrists in a given year, a finding in contrast to previous specialty non-specific analysis, which finds little difference in rates of industry payment between physicians and NPs.<sup>11</sup> NPs were more likely to have received more than US\$ 100 and more than US\$ 1000 than psychiatrists, but psychiatrists were more likely to have received more than US\$ 10000 in industry payments; while almost double the percentage of NPs accept payment from industry compared with psychiatrists, psychiatrists are more likely to accept larger amounts from industry. In contrast, psychiatric CNSs

were less than half as likely as psychiatrists and less than a quarter as likely as NPs to receive payment from industry. The reasons behind this discrepancy in industry payment likelihood among psychiatric APCs are unclear but may stem from historical differences in their clinical roles, current practice patterns and industry targeting. The CNS role evolved as advanced nursing ‘with practice options consistent with traditional scope’ of nursing, while the NP role evolved as advanced nursing expanding ‘nursing into areas of practice traditionally held by physicians’.<sup>34</sup>

Among those clinicians receiving payment, payments to psychiatrists and APCs were similar, with ‘food and beverage’ payments constituting the greatest number of payments and ‘consulting’ constituting the highest value of payments, a finding in accordance with OPD analyses of payments to clinicians in several other non-surgical specialties.<sup>35 36</sup> While consulting fees made up the majority of payment value for psychiatrists, it constituted only the plurality of payment value for NPs and CNSs. A potential reason for this discrepancy could be that psychiatrists hold a greater proportion of leadership positions in the field than psychiatric APCs, which may make them more highly valued by industry payors and increase their opportunities to receive large consulting and related payments.

Likelihood of payment to both NPs and psychiatrists was negatively associated with female gender as well as by geographic region and according to NP scope of practice.



**Table 2** Distribution of industry payments to psychiatric clinicians by number and monetary value, 2021

Type of payment	Number of payments			Value of payments (US\$)			Total	CNS	NP	Psychiatrist	Total	
	Psychiatrist	NP	CNS	Psychiatrist	NP	CNS						
Commercial*	15	0	0	\$108477.00	\$-	\$-	15	0.0%	0.0%	0.3%	\$108477.00	0.2%
Consulting†	18331	2610	48	\$34,743,400.00	\$3,304,636.00	\$54014.00	20989	6.1%	1.3%	81.6%	\$38,102,050.00	75.9%
Education‡	3198	2524	51	\$262055.00	\$100543.00	\$1884.00	5773	1.1%	1.3%	0.6%	\$364482.00	0.7%
Food and beverage	269844	190826	3747	\$5,693,839.00	\$3,811,815.00	\$70267.00	464417	89.9%	96.6%	13.4%	\$9,575,921.00	19.1%
Gift§	8770	1497	3	\$1,779,686.00	\$272121.00	\$719.00	10270	2.9%	0.8%	4.2%	\$2,052,526.00	4.1%
Total	300158	197457	3849	\$42,587,457.00	\$7,489,115.00	\$126884.00	501464	100%	100%	100%	\$50,203,456.00	100%

Empty cells empty because there were no payments in these categories.

\*Includes payment for acquisitions, licenses and royalties.

†Includes payments for consulting fees, honoraria and other services.

‡Includes payment for education, grants and supply and device loans.

§Includes payments for charitable contributions, entertainment, travel and lodging and gifts.

CNS, clinical nursing specialist; NP, nurse practitioner.

**Table 3** Distribution of industry payments to psychiatric clinicians by number and monetary value per capita, 2021

Type of payment	Number of payments			Value of payments (US\$)		
	Psychiatrist	NP	CNS	Psychiatrist	NP	CNS
Commercial*	0.00	0.00	0.00	\$1.78	\$-	\$-
% total	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%
Consulting†	0.30	0.12	0.02	\$569.46	\$150.93	\$25.16
% total	6.1%	1.3%	1.2%	81.6%	44.1%	42.6%
Education‡	0.05	0.12	0.02	\$ 4.30	\$ 4.59	\$ 0.88
% total	1.1%	1.3%	1.3%	0.6%	1.3%	1.5%
Food and beverage	4.42	8.72	1.75	\$93.32	\$174.10	\$32.73
% total	89.9%	96.6%	97.3%	13.4%	50.9%	55.4%
Gift§	0.14	0.07	0.00	\$ 29.17	\$ 12.43	\$ 0.33
% total	2.9%	0.8%	0.1%	4.2%	3.6%	0.6%
Total	4.92	9.02	1.79	\$ 698.03	\$ 342.05	\$ 59.10

Denominator for per capita calculations=total number of clinician type in OPD and NPPES databases.

\*Includes payment for acquisitions, licenses and royalties.

†Includes payments for consulting fees, honoraria and other services.

‡Includes payment for education, grants and supply and device loans.

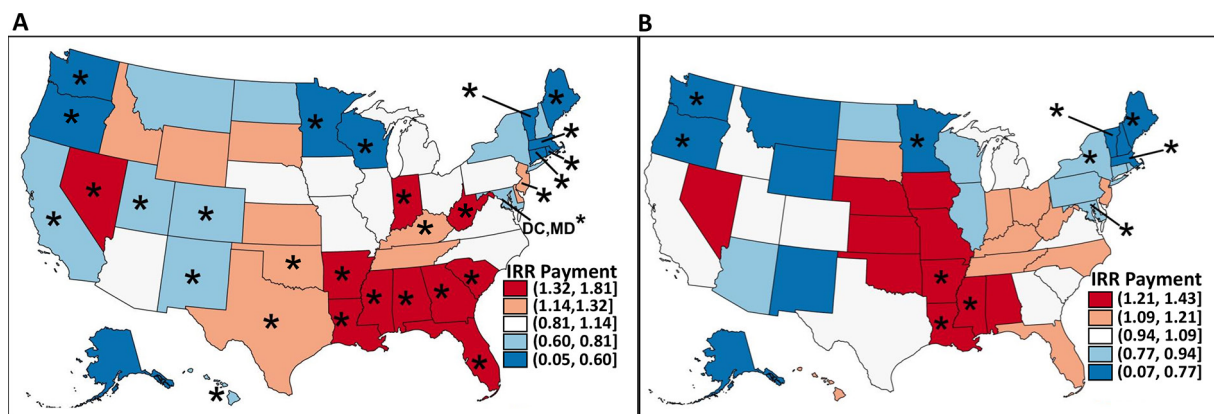
§Includes payments for charitable contributions, entertainment, travel and lodging and gifts.

CNS, clinical nursing specialist; NP, nurse practitioner; NPPES, National Plan and Provider Enumeration System; OPD, Open Payments Database.

While our findings of lower likelihood of industry payment to female clinicians support previously published literature in other specialties,<sup>37 38</sup> the geographic and scope-of-practice associations we report are novel. Psychiatric NPs and psychiatrists alike in restrictive NP scope of practice states were more likely to receive industry payment than those in full scope of practice states, findings in contrast to recent specialty non-specific analyses of APCs, which found scope of practice was negatively associated with IRR of receiving payment.<sup>11</sup>

There are several reasons that may explain the negative association between scope of practice and payment from industry. First, states following best practice ‘full’ scope-of-practice laws for APCs as endorsed by the National

Academy of Medicine<sup>39 40</sup> seem to have a higher proportion of APCs, which practice in very large, consolidated health systems as opposed to independent hospitals or private practices.<sup>41</sup> These large, consolidated, multistate health systems may present less conducive environments for industry financial relationships with psychiatrists and APCs alike. Our finding that both NPs and psychiatrists are less likely to receive industry payment in these states provides support for this hypothesis.<sup>42</sup> APCs may also be more likely to find receiving payment or other items of value from industry acceptable when they are not able to prescribe medication or otherwise practice under the license of a physician, as these APCs are not directly responsible for medical therapy selection. These suggestions are



**Figure 2** Association of state of practice with likelihood of receiving industry payment by provider type, 2021. (A) Psychiatrists. (B) Psychiatric nurse practitioners. DC, District of Columbia; IRR, incidence rate ratio; MD, Maryland. \*Significant difference from median likelihood state ( $p < 0.001$ ). Median likelihood state psychiatrists: Illinois; median likelihood state nurse practitioners: Colorado.

hypothesis-generating, and future research to elucidate the association between scope of practice and industry payment to APCs is warranted, particularly in psychiatry.

Receiving payments from industry has the potential to influence medical judgement and treatment across a broad range of medical specialties, irrespective of clinician type.<sup>32 33 42 43</sup> In this study, we found that NPs receive significantly more overall industry payments compared with psychiatrists. Since any receipt of industry payment has been associated with greater likelihood of prescribing the company's product, these industry payments may pose a similar threat to quality of patient care among NPs as in physicians and could increase the risk of inappropriate prescription use.

This study had several notable limitations. Specialty-specific analysis of payments to APCs in the OPD is limited as subspecialty data for PAs and other APCs are not readily available. Further limitations include a lack of longitudinal data and reliance on data that could have been affected substantially by the COVID-19 pandemic, which in some states potentiated temporary emergency expansion of NP scope of practice; these limitations may mean our findings are not generalisable to other years and may account for decreased overall payments to psychiatrists in 2021 relative to prior years.<sup>24 44</sup> Still further difficulties exist in that clinicians may have incorrectly reported their specialty of practice. Though the Open Payments dataset and NPPES have both been previously shown to be reliable with relatively low error rates,<sup>45 46</sup> we were able to detect a small rate of inconsistent clinician specialties across datasets, and further distortions may exist in our data.

## Conclusions

As APCs become a larger part of the psychiatric workforce and receive wider scope of practice permissions, understanding their financial relationships with industry and factors that may influence those relationships are important to inform future policy decisions. This study is the first to characterise relationships to psychiatric APCs and compare these relationships to those of psychiatrists. We found 10.7% of psychiatric CNSs, 26.6% of psychiatrists and 49.3% of psychiatric NPs received industry payments in 2021. Likelihood of receiving payment varied substantially by gender, scope of practice and state of practice. Notably, the association between scope of practice laws and payments to NPs in psychiatry is the inverse of that seen in a recent specialty agnostic analysis. These findings merit further research and can inform future mental healthcare-specific policy in this country.

**Contributors** All contributors meet authorship criteria for this manuscript under ICMJE guidelines, having contributed to the following four ICMJE-recommended domains for authorship: 1. Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; 2. Drafting the work or revising it critically for important intellectual content; 3. Final approval of the version to be published; 4. Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. Furthermore, no one else who fulfils these criteria has been excluded as an author of this study.

Specific author contributions: JH: conceptualisation, methodology, investigation, formal analysis, data curation, writing—original draft, project administration, final approval of the version to be published, agreement to be accountable for all aspects of the work, and guarantor of this study. LO: investigation, writing—original draft, writing—review and editing, final approval of the version to be published, agreement to be accountable for all aspects of the work. MSL: writing—original draft, writing—review and editing, final approval of the version to be published, agreement to be accountable for all aspects of the work. SW: writing—original draft, writing—review and editing, final approval of the version to be published, agreement to be accountable for all aspects of the work. MH: writing—original draft, writing—review and editing, final approval of the version to be published, agreement to be accountable for all aspects of the work. QWS: writing—review and editing, final approval of the version to be published, agreement to be accountable for all aspects of the work. JSR: supervision, project administration, writing—review and editing, final approval of the version to be published, agreement to be accountable for all aspects of the work. TGR: supervision, project administration, methodology, formal analysis, data curation, writing—review and editing, final approval of the version to be published, agreement to be accountable for all aspects of the work.

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**Data availability statement** Data are available in a public, open access repository. All data are publicly available at the OPD and NPPES websites.

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