

January 13, 2023

Sethuraman Panchanathan, Director  
National Science Foundation  
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CC: Daniel Reed, Chair, National Science Board  
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Alondra Nelson, Deputy Director, White House Office of Science & Technology Policy  
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Peggy Carr, Co-Chair, NSTC Subcommittee on Equitable Data  
Rajesh Nayak, Co-Chair, NSTC Subcommittee on Equitable Data  
Shalanda Young, Director, U.S. Office of Management & Budget  
Karin Orvis, U.S. Chief Statistician, U.S. Office of Management & Budget  
Sabeel Rahman, Associate Administrator, OMB Office of Information & Regulatory Affairs  
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Emilda Rivers, Director, NSF National Center for Science & Engineering Statistics  
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Rhonda Davis, Head, NSF Office of Equity & Civil Rights  
Amanda Greenwell, Head, NSF Office of Legislative & Public Affairs

Dear Director Panchanathan:

We, the undersigned 1,700 scientists, are writing to express our grave concerns over NSF's National Center for Science & Engineering Statistics' refusal to support LGBTQ+ scientists by making necessary changes to its data practices and its significant misrepresentations of its own pilot data made to the U.S. Office of Management & Budget (OMB). Among us are Nobel laureates, members of the National Academies, university officials, and a broad range of constituents across the U.S. scientific workforce. We ask that NSF adopt inclusive sexual orientation and gender identity questions for its 2023 national workforce surveys, as well as publicly disclose the results of its pilot research into the viability of these questions in a transparent manner.

LGBTQ+ people are estimated to be [20% less represented](#) in STEM fields than statistically expected, and are [less likely](#) than non-LGBTQ+ people to major in STEM, persist in STEM, earn STEM degrees, and be in STEM occupations. LGBTQ+ scientists experience [more career barriers and workplace harassment](#) than non-LGBTQ+ scientists, even when controlling for other demographic and career-related factors. Yet NSF, NIH, Congress, and the White House are helpless to act because NSF is unwilling to properly collect the necessary data. Only NSF's workforce data can shape national policies, determine eligibility for diversity funding, and allow researchers and policymakers to fully understand and address LGBTQ+ disparities.

In 2018, NSF [committed](#) to piloting a sexual orientation question and an expanded gender question beyond binary categories. After years of delays and even [NSF's attempt to leave out sexual orientation from the pilot](#), NSF has [now completed](#) the work and made its decisions.

Stunningly, NSF has decided to abandon collecting sexual orientation data altogether. It has justified this move with flawed analyses, inappropriate benchmarks, and selective reporting of its own pilot data to OMB (see [Appendix](#)). An accurate analysis of the available pilot data clearly supports NSF adopting a sexual orientation question for its surveys (see [Appendix](#)). In brief, respondents overwhelmingly reported feeling comfortable completing NSF's sexual orientation question. Quality assessment metrics, such as item non-response (INR) and breakoff rates, showed that the sexual orientation question (e.g., INR: ~2%) performed better or on par with NSF's race question (INR: 2.33%) and far better than NSF's salary (INR: 6.30%) and earned income (INR: 4.54%) questions. It even performed better than the Department of Education's sexual orientation question that was adopted six years ago (INR: 3.4%).

For gender, NSF piloted a less inclusive design ('male', 'female', 'transgender', 'neither') as well as a more inclusive design ('male', 'female', 'transgender', 'gender non-conforming', 'non-binary', 'genderfluid', 'genderqueer') that would allow respondents to check all that apply and write in alternatives. NSF has decided to move forward with the less inclusive design ('male', 'female', 'transgender') but revise it so that respondents can check all that apply and write in other options. The revised measure is less considerate of the breadth of gender minority identities, and more expansive options would allow non-binary and other gender minority respondents to feel included in NSF's data collection process. The rejection of the more inclusive measure is poorly justified, with NSF claiming identifiability concerns that are easily resolved through aggregation and suppression techniques that NSF already uses (see [Appendix](#)). We ask that NSF strongly reconsider adopting the more inclusive design for its surveys, especially given that its quality assessment metrics were excellent: INR and breakoff rates were virtually 0% (see [Appendix](#)). NSF has an opportunity to be a leader in federal data collection on inclusive gender.

NSF's [attempts first to omit](#) the sexual orientation item from the pilot despite an [earlier public commitment](#), followed now by misleading analyses and the decision to abandon the item in spite of its excellent methodological performance, suggest NSF has some unstated concern against collecting these data. Such evasive actions are an affront to NSF's obligation to ensure LGBTQ+ equity in its programs and opportunities and work in good faith to improve its sexual orientation and gender identity data practices, as directed by [Executive Order 14075](#). This decision also places NSF far out of sync with its federal counterparts like the Census Bureau, Department of Education, Department of Justice, and CDC, who have all collected these data for years and already vetted the sexual orientation question that NSF is considering through extensive testing.

We in the scientific community can only speculate as to why NSF's National Center for Science & Engineering Statistics has been so hesitant over the past four years to make the necessary changes to its data collection processes to support LGBTQ+ scientists. But the evasiveness NSF has shown in moving to collect sexual orientation data is easier to understand in light of signs of its broader negligence, as described in [Congress' letter to NSF](#) about NSF leadership's "disturbing" responses to sexual orientation-based harassment and significant deficiencies in ensuring a safe and inclusive workplace for sexual minorities. It gives the appearance of a broader climate at NSF that is hostile

toward sexual minorities and unwilling to take the most reasonable of steps to ensure their equity in the scientific workforce.

NSF's misleading, flawed, and what appear almost plainly anti-LGBTQ+ actions in this matter also fly in the face of NSF's stated Diversity and Inclusion [mission](#), NSF's Congressionally mandated 'Broadening Participation' [goals](#), and additional directives requiring NSF to advance the equity of underserved communities ([Executive Order 13985](#)) and prevent discriminatory practices against LGBTQ+ Americans ([Executive Order 13988](#)).

We ask that NSF:

- Adopt a sexual orientation question for its 2023 national workforce surveys, and correct its reported analyses to OMB.
- Strongly reconsider using the more inclusive version of the expanded gender question for its 2023 national workforce surveys.
- Publicly release its pilot results in an open and transparent manner to restore trust and confidence in NSF's National Center for Science & Engineering Statistics.

NSF must take these steps to abide by its [stated commitment](#) to “[expand] the opportunities in STEM to people of all racial, ethnic, geographic and socioeconomic backgrounds, sexual orientations, gender identities and to persons with disabilities”. Everyone who wishes to contribute to science must be enabled to pursue their scientific potential. NSF must ensure and advance the equity of LGBTQ+ scientists.

Signed,

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Nancy S. Williams, Associate Professor, Scripps College  
Bianca D.M. Wilson, Research Faculty, Williams Institute, UCLA  
Samuel Wilson, Senior Product Manager, Stanford University  
Stephanie N. Wilson, Adjunct Professor, University of Northern Colorado  
Kellie Windsor, Special Programs Coordinator, SHARP Literacy  
Canton Winer, PhD Candidate, University of California, Irvine  
Mary E. Winn, Associate Director; Lecturer, Van Andel Institute  
Manda Wittebort, Program Coordinator, University of Florida  
M Wittkop, Graduate Student, Montana State University  
Gloria Wong-Padoongpatt, Assistant Professor, University of Nevada, Las Vegas  
Laura Wonilowicz, Graduate student, UCLA  
Branskn Woo, Graduate student, Harvard University  
Rozalyn R. Wood, Graduate student, Icahn School of Medicine at Mt. Sinai  
Caroline Y. Wu, Software Development Engineer, Allen Institute for Artificial Intelligence  
Xiaomeng Xu, Associate Professor, Idaho State University  
Nicholas Yates, Adjunct, University of Maryland Baltimore County

Stephen T. Yeung, Senior Research Scientist, New York University  
Brandon J. Yik, Postdoctoral Research Associate, University of Virginia  
Jeremy B. Yoder, Associate Professor of Biology, California State University Northridge  
Tehshik P. Yoon, Professor, University of Wisconsin-Madison  
Jared W. Young, Professor, UCSD  
Hannah Young, Graduate Student, Icahn School of Medicine at Mount Sinai  
Soleil E. Young, Graduate Student, University of Wisconsin-Madison  
Colt B. Young, Board Certified Behavior Analyst, Stride Autism Centers  
Benjamin L. Young, Undergraduate Student, Saint Louis University  
Jacob Yount, Associate Professor, The Ohio State University  
Alessandra N. C. Yu, Graduate Student, Icahn School of Medicine at Mount Sinai  
Raymond Yu, Graduate Student, Univ of Southern California  
Sid Zadey, Researcher, Duke University  
Jamil Zaki, Associate Professor of Psychology, Stanford University  
Vic Zamloot, Graduate Student, City of Hope  
Daniel Zappala, Professor, Brigham Young University  
Xueling Zhang, Graduate Student, Emory University  
Rem Zhang, Graduate Student, Colorado School of Mines  
Irene Zhang, Graduate Student, University of Michigan  
Xiaoyu Zhao, Graduate student, University of Virginia  
Haiyi Zhu, Associate Professor, Carnegie Mellon University  
Kara Zielinski, Graduate Student, Cornell University  
Sophia N. Ziemian, Postdoctoral Associate, Cornell University  
Joanne F. Zinger, Associate Teaching Professor, University of California, Irvine  
Samuel Zorowitz, Graduate Student, Princeton University

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## APPENDIX

### Background

Since 1957, NSF’s National Center for Science & Engineering Statistics (NCSES) has administered annual and biennial surveys of the U.S. STEM workforce, including the National Survey of College Graduates (NSCG), Survey of Doctorate Recipients (SDR), and Survey of Earned Doctorates (SED). Everyone who receives a PhD in the U.S. is typically required by their doctoral institution to take the SED. The data and associated reports, such as the Congressionally mandated *Women, Minorities, and Persons with Disabilities in Science & Engineering Report*, are used widely by researchers and policymakers to understand and address educational and career barriers in STEM; to inform national policies related to STEM and higher education; and to determine underrepresented groups’ eligibility for funding and federal resources.

In October 2018, NCSES stated at a meeting at NSF headquarters, along with collaborators from the American Association for the Advancement of Science (AAAS) and the American Educational Research Association (AERA), that it would [begin piloting](#) a sexual orientation (SO) question and expanded gender (i.e., gender identity, GI) question, which was estimated to produce preliminary results by early 2019. The initial workforce survey targeted was the NSCG. NSF’s counterparts like the Census Bureau, Department of Education, Department of Justice, and CDC have all collected sexual orientation and gender identity (SOGI) data for years, and these agencies have run [extensive testing](#) and converged on well-vetted question designs that other agencies can adopt. The Department of Education even runs a survey, the Baccalaureate & Beyond Longitudinal Survey (B&B), that has the same core features as the NSCG, and the B&B adopted SOGI questions in 2018. Thus, NCSES’ piloting should have been very straightforward.

However, NCSES delayed the SOGI piloting for several years, citing limited time and resources. Following public pressure, NCSES indicated in September 2020 that its “current plan [was] to restart the SOGI research by early 2021” (personal communication with NCSES; September 28, 2020). NCSES indicated that it would cooperate with the Federal Committee on Statistical Methodology’s (FCSM) SOGI Research Group, a panel of experts on SOGI measurement across federal statistical agencies. The [FCSM SOGI Research Group](#) has advised federal agencies on best practices for adding SOGI questions to their surveys.

Finally, in October 2020, NCSES [sought OMB clearance](#) to initiate piloting as part of the non-production “bridge panel” for the 2021 NSCG ( $n = 5,000$ ), but surprisingly, only for GI – it left out SO from its piloting plans (see p. 18). Following public pressure that NCSES also pilot a SO item, which *Science* [reported](#) on, NCSES backtracked and included a SO item in the bridge panel. It also initiated an additional Mechanical Turk (MTurk) non-probability study that included both SOGI items ( $n = 2,800$ ). These actions suggested that NCSES had a predisposition to consider a GI question earnestly, while it preferred to avoid a SO question for its surveys.

List of Abbreviations	
NSF	National Science Foundation
NCSES	NSF National Center for Science & Engineering Statistics
OMB	U.S. Office of Management & Budget
NSCG	National Survey of College Graduates
SDR	Survey of Doctorate Recipients
SED	Survey of Earned Doctorates
AAAS	American Association for the Advancement of Science
AERA	American Educational Research Association
SO	Sexual orientation
GI	Gender identity
SOGI	Sexual orientation and gender identity
B&B	Baccalaureate & Beyond Longitudinal Survey
FCSM	Federal Committee on Statistical Methodology
MTurk	Amazon Mechanical Turk
HPS	Household Pulse Survey
HLSL	High School Longitudinal Survey
CDC	Centers for Disease Control and Prevention



NCSES has explained its initial omission of SO from the bridge panel by noting that the bridge panel was initially intended for testing modifications of existing questions rather than testing new questions, and “[s]ince the NSCG had not collected sexual orientation in the past, it was not possible to explore question wording modifications on this construct (which was the purpose of the bridge panel).” However, as NCSES “neared [its] data collection start, through conversations with the FCSM SOGI research group, NCSES concluded that including a sexual orientation question with more expansive response options could inform the broader federal government’s effort to measure and understand sexual minorities” (personal communication with NCSES; December 31, 2022). Clearly, however, NCSES always had the capability to expand the bridge panel’s purpose to test new questions such as SO if it so desired, as this is precisely what it did following reporting in *Science* and conversations with the FCSM SOGI Research Group.

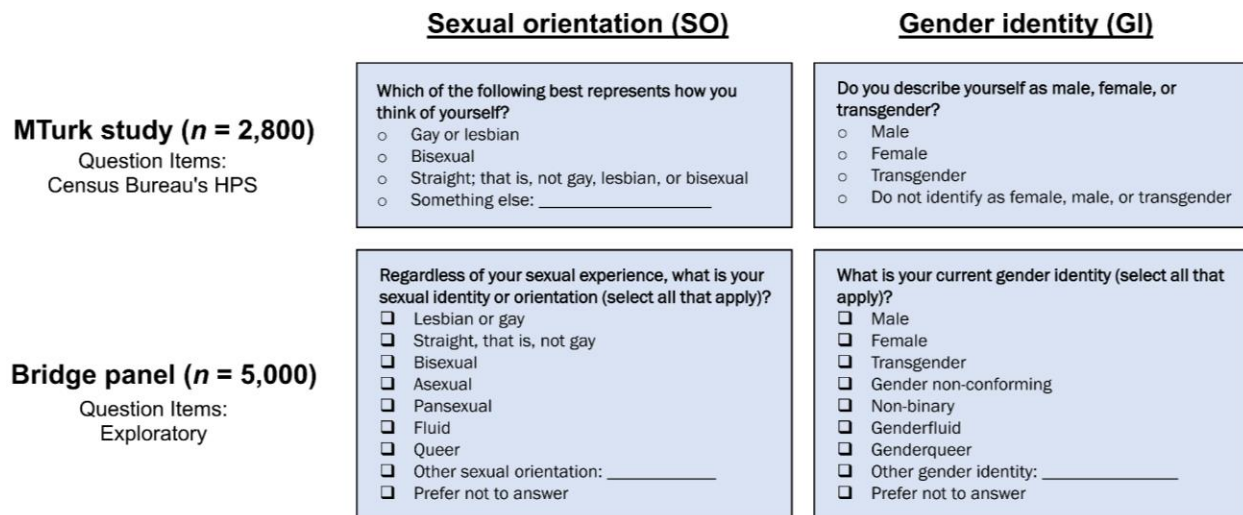
By comparison, in 2020, NCSES initiated and completed piloting for [COVID-19 impact questions](#) for a different survey, the Survey of Earned Doctorates (SED), and was able to receive OMB clearance in time to include an entirely new COVID-19 impact module for that very same year’s survey cycle (the [2020-21 SED](#)). Thus, when NCSES prioritizes a topic and is motivated to add new questions to its surveys, it is clearly able to do so efficiently and completely.

### **NSF NCSES’ Pilot Research**

As shown in Figure 1, NCSES’ MTurk study ( $n = 2,800$ ) featured a more traditional, restricted design for SOGI with mutually exclusive options, drawing its items from the Census Bureau’s Household Pulse Survey (HPS) and other federal surveys. The bridge panel ( $n = 5,000$ ) featured more inclusive, expanded options for SOGI, including the ability to check all that apply.

In both studies, NCSES tested a two-step GI question series (i.e., current gender identity and assigned sex at birth questions). The rationale for the two-step series is that using just a single gender question in population surveys can substantially undercount gender minority individuals (i.e., those whose gender identity differ from their assigned birth sex). For instance, some gender minorities may prefer to identify as a man or woman without identifying as “transgender” or “trans”. For this reason, expert reports by the [National Academies](#) and the [Williams Institute](#) recommend the two-step approach, which allows a fuller spectrum of gender minority respondents to be captured (any respondents whose gender identity differs from their assigned birth sex). This approach has now been widely adopted across U.S. population surveys, including virtually all federal surveys measuring GI (e.g., Census Bureau’s HPS) and the General Social Survey, the most widely cited non-government survey in the U.S.

It is noteworthy that NCSES included several exploratory design features in both studies, rather than tried-and-true designs whose viability NCSES could test in a straightforward, confirmatory manner. As NCSES stated, it used more expansive response options for SO in the bridge panel. It also used novel question wording in the bridge panel, including the unusual reference to “sexual experience”: “Regardless of your sexual experience, what is your sexual orientation or identity?” (Figure 1). In the MTurk study, it varied the SO item’s response order (straight vs. gay/lesbian listed first) to test for potential SO response order effects, and varied the placement of the two-step GI series (GI vs. assigned sex at birth appearing first) to test for potential GI context effects. (Note that it did not test for GI response order effects or SO context effects.)



**Figure 1.** NCSES' question designs for the two pilot studies.

The more expansive SO response options, as well as SO response order effects and GI context effects, have all been described as exploratory questions for future SOGI measurement research by the FCSM SOGI Research Group [white papers](#) and an expert [National Academies report](#) on SOGI measurement. Thus, these were admirable features of NCSES' study designs to assist the FCSM SOGI Research Group with exploratory research questions of broad interest to the federal government. However, if the aim is for NCSES to confirm that tried-and-true SOGI measures behave successfully and are viable for its surveys, these were unusual choices. They would certainly aid in the FCSM SOGI Research Group's broader understanding of SOGI measurement and help advise future revisions to federal surveys. However, it would seem unreasonable for NCSES to use these novel, exploratory questions of an academic nature to make crucial decisions on the basic viability of SOGI questions for its surveys, which should be the primary focus of NCSES' pilot studies. Nevertheless, it was assumed that NCSES would be testing separate questions: a) confirmatory analyses assessing basic viability of SOGI questions for its surveys using NCSES' standard quality metrics (e.g., item nonresponse rates); and b) exploratory analyses of interest to the FCSM SOGI Research Group (e.g., response order effects).

NCSES [presented](#) the MTurk study at the FCSM 2021 Research and Policy Conference, which has been the only public disclosure of NCSES' pilot data. On December 5, 2022, when given the opportunity to provide any factual or statistical corrections on its data for a forthcoming [Nature commentary](#), NCSES provided two descriptive statistics from the bridge panel study as part of its corrections for the commentary. Since then, in response to concerns raised, NCSES has declined to provide any further descriptive statistics from the bridge panel or from the 2021 NSCG more generally (personal communication with NCSES; December 31, 2022).

### NSF NCSES' Decisions for the 2023 Survey Cycle

Currently, NCSES is seeking OMB clearance for the 2023 NSCG. In its [recent submission](#) to OMB, NCSES summarizes its pilot results and explains its intent to 1) leave out a SO question, and 2)

replace its binary gender question with a two-step GI question series. NCSES' rationale for these two decisions is stated on [p. 15](#):

*NCSES, with assistance from the Census Bureau as the NSCG data collection contractor, collected sexual orientation and gender identity (SOGI) data on the 2021 NSCG nonproduction bridge panel. This data collection was conducted to explore the feasibility of collecting consistent and reliable SOGI data from the nation's college-educated population. The analysis of the resulting data included the investigation of various quality assessment metrics including item nonresponse, breakoffs, changed answers, previous clicks, and completion times. In addition, while the bridge panel was a nonproduction sample and will not be used to produce official statistics, the analysis included the investigation of weighted response distributions.*

*Overall, the analysis found that the gender identity question series performed well using the quality assessment metrics described above. On the other hand, the sexual orientation question took longer to complete, had a higher percent of changed answers, and was responsible for all of the breakoffs on these screens. The estimates of S&E status for most gender minority groups presented disclosure risk concerns which suggests the need for a less detailed gender identity question series than was used in the 2021 NSCG bridge panel. With these analysis findings in mind, and working in accordance with survey best practices (e.g., minimizing burden and privacy risk to respondents; designing surveys to detect differences between groups to inform policy discussions), the 2023 NSCG questionnaire will include a two-step sex-at-birth/gender identity question with four response options for the gender identity question. Given the quality concerns with the sexual orientation question, the 2023 NSCG questionnaire will not collect sexual orientation data. The question wording for the two-step sex-at-birth/gender identity question planned for use on the 2023 NSCG is based on the module in the Census Bureau's Household Pulse Survey, which was in turn based on modules in the Bureau of Justice Statistics' National Crime Victimization Survey and the National Center for Health Statistics' National Health Interview Survey.*

In response to concerns raised with NCSES on December 20, 2022 about the above justification, NCSES provided an additional justification for its decision to abandon the SO item, which was not reported to OMB (personal communication with NCSES; December 31, 2022):

*In addition, as we reported at the 2021 FCSM Research and Policy Conference and mentioned at our February 2022 virtual meeting with you, Felice Levin[e] [AERA collaborator], and Shirley Malcom [AAAS collaborator], our 2021 non-probability MTurk study found that the order of the response options in the sexual orientation question impacted the proportion of individuals who said they were gay or lesbian... Significantly more participants selected "gay or lesbian" when it was listed first. However, it is unclear which ordering produced more accurate responses. As a result, additional research is needed exploring the ordering of response options and its impact on estimates... [Thus,] metrics from the 2021 nonproduction bridge panel in combination with the 2021 non-probability MTurk study findings do present serious quality concerns that increase the*

*potential for measurement error and warrant further research before sexual orientation questions should be included on the NCSES surveys.*

### **NSF NCSES' Decision to Abandon a Sexual Orientation Item**

As described above, NCSES has justified abandoning the SO item because 1) it elicited more breakoffs, more changed responses, and took longer to complete than the GI item in the bridge panel; and 2) demonstrated a response order effect in the MTurk study. There are significant flaws with both of these concerns.

#### Bridge Panel Quality Metrics Justification (Reported to OMB)

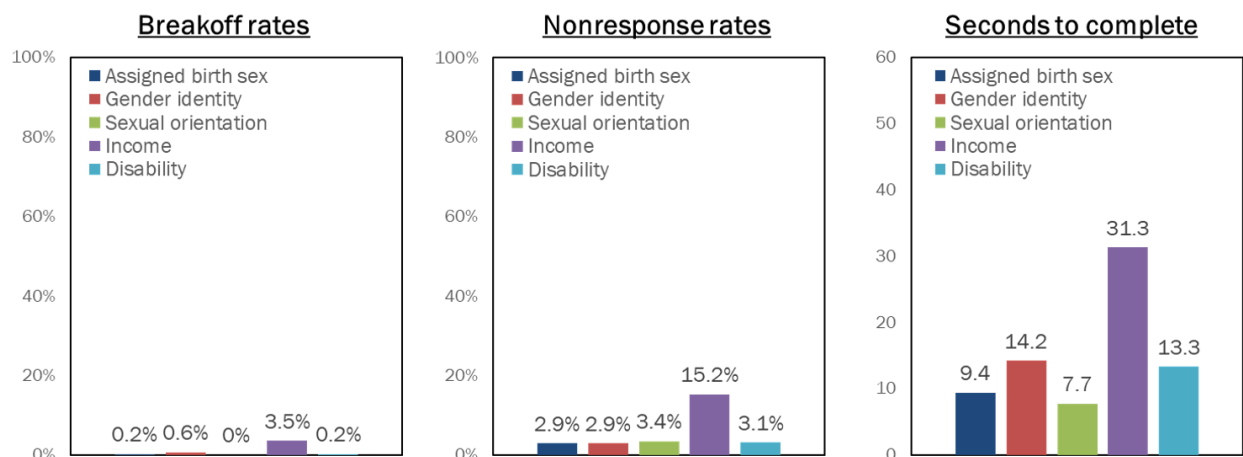
This justification is flawed for four reasons:

- Analyses suggest that the SO item likely performed better or on par with comparable NSCG items like race, income, salary, and disability in breakoff rates, completion times, and changed responses (however, NCSES has declined to provide data to confirm this).
- NCSES has already disregarded its own quality metrics from the bridge panel, instead moving forward with a GI question design based on quality metrics from the Census Bureau's HPS; yet in the HPS, these quality metrics are equally excellent for the SO question. NCSES is selectively drawing on different quality metrics for SO vs. GI.
- Even if the SO item's quality metrics were found to be truly inferior relative to appropriate benchmarks (comparable measures on the NSCG), it is clearly an artifact of the exploratory, poorly developed question wording that refers to "sexual experience", which would already be addressed by adopting the Census Bureau's HPS / MTurk design.
- If NCSES were still concerned about breakoffs despite knowledge that "[the addition of SOGI items does not lead to survey breakoffs](#)" in the Census Bureau's HPS, it could always move the SO item to the end of the survey, a common practice for sensitive items.

In spite of its reporting to OMB, NCSES has separately stated that quality assessment metrics for both SOGI items were very good in the bridge panel. While item nonresponse and breakoff rates for the GI item were "close to 0%", item nonresponse and breakoff rates for the SO item were "about 2%" (personal communication with NCSES; December 5, 2022). It is an unusual and unjustified choice to benchmark the SO item's quality metrics against the GI item's metrics for deciding whether to adopt these items on the 2023 NSCG. The appropriate benchmark is the quality assessment metrics for similar questions already included on the NSCG. This is how NCSES' counterpart agencies, such as the Department of Education's National Center for Education Statistics, have [benchmarked](#) SOGI questions for their surveys (Figure 2).

A ~2% item nonresponse and ~2% breakoff rate are very likely to constitute excellent performance compared to items that have long been included on the NSCG. The only [publicly available](#) quality assessment metrics for comparable items on the NSCG are for item nonresponse rates: earned income = 6.30%, salary = 4.54%, race = 2.33%. NCSES has not published nonresponse rates for other comparable items (e.g., for disability), or breakoff rates or completion times for any NSCG items, but these metrics tend to be highly correlated in similar federal population surveys. For instance, in the Department of Education's High School Longitudinal Survey ([HSLs](#)), which adopted a SO question in 2016, the metrics for SO were all substantially better than for income and

better or on par with disability (Figure 2). Comparing the three metrics across the five questions publicly available for the [HSLs](#) (SO, GI, assigned birth sex, income, and disability), as shown in Figure 2, indicates that these metrics tend to be extremely correlated: nonresponse and breakoff rates ( $r = .98$ ), nonresponse rates and completion times ( $r = .95$ ), and breakoff rates and completion times ( $r = .98$ ). Without NCSES providing the necessary data, this analysis suggests that the more favorable pattern of the SO item relative to the NSCG’s income, salary, and race items in nonresponse rates would be expected to replicate for breakoff rates and completion times. Thus, it is fair to say that the SO item’s quality assessment metrics in the bridge panel are likely far better than (or at least equal to) the NSCG’s income, salary, and race questions (and likely its disability question as well). In fact, on some metrics, the SO question in the bridge panel performed better than it does in similar surveys that have long included the question (e.g., SO had a nonresponse rate of 3.4% in the [HSLs](#)).



**Figure 2.** SO and GI questions are benchmarked against income and disability questions in the Department of Education’s National Center for Education Statistics’ [HSLs](#) survey.

After concerns were raised on December 20, 2022 regarding the bridge panel analysis and a request for these additional descriptive statistics (breakoff rates, nonresponse rates, completion times, and changed responses for SO, GI, race, income, salary, and disability questions), NCSES declined, citing [OMB Statistical Directive #4](#) to “ensure that all users have equitable and timely access to data that are disseminated to the public” and the fact that the “bridge panel findings are currently undergoing internal review” (personal communication with NCSES; December 31, 2022). This is despite the fact NCSES had already provided a portion of the results on December 5, 2022 for the forthcoming *Nature* piece, and the data in question are longstanding NSCG metrics (e.g., breakoff rate for NSCG’s income question) that are not part of the bridge panel or under internal review and a portion of which was already [published](#). NCSES did not offer an explanation for why it benchmarked the SO item’s quality metrics against the GI item’s, a method that is inconsistent with clear [precedents](#) of its peer statistical agencies.

With respect to the number of changed responses, it is unclear why NCSES cites this as a quality metric, as it has [not been used](#) in this way by peer agencies. Nevertheless, as is described below, the MTurk study showed that in the simpler SO and GI question designs in that study, the SO item



actually outperformed the GI item in terms of related metrics like self-reported response accuracy and question comprehension (Table 1). While benchmarking the SO item against the GI item is inappropriate, this result suggests that even if NCSES were genuinely concerned about these marginal comparisons between SO and GI performance in the bridge panel, adopting the more traditional SO question design of the MTurk study would, if anything, likely yield a more favorable pattern for SO than GI on changed responses. If NCSES would provide the necessary data, changed responses for SO in the bridge panel could be appropriately compared to the NSCG’s comparable questions, which would likely confirm they are negligible for SO.

In the MTurk study, while both SO and GI questions performed excellently on accuracy and comprehension metrics, the SO item actually performed better than the GI item across the board, including the extent to which respondents understood all the answer choices, perceived the answer choices to be complete, were able to accurately report their identity, their ease in answering the question, and certainty in their response, as shown in Table 1. Given that NCSES is focused on comparisons between SO and GI, it is noteworthy that it makes no mention of these more favorable findings of the SO item’s performance in the MTurk study. The MTurk study was also valuable in showing that LGBTQ+ and non-LGBTQ+ respondents alike overwhelmingly report feeling comfortable providing both SO and GI demographics to NSF.

SO Question	Straight participants			Sexual minority participants		
		Straight listed first	Gay/lesbian listed first		Straight listed first	Gay/lesbian listed first
I understood all of the answer choices.	1.04	1.05	1.04	1.07	1.04	1.09
I was able to accurately report my sexual identity.	1.04	1.05	1.03	1.24	1.20	1.28
How easy or difficult was it to answer the question?	1.05	1.06	1.04	1.35	1.28	1.42
I am certain of my sexual identity.	1.08	1.07	1.09	1.33	1.35	1.31
The answer choices for the question were complete.	1.32	1.30	1.33	1.84	1.79	1.89
GI Question	Cisgender participants			Gender minority participants		
		Assigned sex at birth first	Gender identity first		Assigned sex at birth first	Gender identity first
I understood all of the answer choices.	1.06	1.06	1.05	1.30	1.33	1.27
I was able to accurately report my gender identity.	1.03	1.03	1.03	2.24	1.89	2.60
How easy or difficult was it to answer the question?	1.03	1.03	1.04	1.85	1.78	1.93
I am certain of my gender identity.	1.04	1.04	1.04	1.40	1.28	1.53
The answer choices for the question were complete.	1.31	1.31	1.31	3.19	2.78	3.60

**Table 1.** Self-reported accuracy and comprehension metrics for the MTurk study, presented by NCSES at the 2021 FCSM Research and Policy Conference. Scores are on a 1-5 scale where a higher score means a less favorable evaluation of the question. Means collapsing across SO response order condition and across GI context condition have been imputed and were not presented by NCSES.

Citing concerns over disclosure risk, NCSES decided to adopt the simpler GI question from the MTurk study / Census Bureau's HPS (although revised to include check-all-that-apply and write-in abilities). In doing so, NCSES disregarded its own quality metrics from the bridge panel, instead moving forward with a GI item by drawing on the item's high-quality performance in the Census Bureau's HPS and other federal surveys (as NCSES does not have quality metrics data on the exact GI question design it has selected). However, in the Census Bureau's HPS, these quality metrics are equally excellent for the SO question, and it is already known that "[the addition of SOGI items does not lead to survey breakoffs](#)" or cause issues with related metrics in the HPS. Thus, NCSES is selectively drawing on different quality metrics for SO vs. GI: It is making decisions for SO based on the bridge panel's quality metrics, but making decisions for GI based on quality metrics from precedent surveys such as the HPS. NCSES should have every reason to be comfortable also adopting the analogous SO item from the MTurk study / HPS.

Unlike the question wording used in the MTurk study / Census Bureau's HPS, the bridge panel's SO item uses exploratory, poorly developed wording: "Regardless of your sexual experience, what is your sexual identity or orientation?" (Figure 1). The MTurk SO item's non-existent breakoffs in the Census Bureau's HPS strongly suggest that the ~2% breakoff rate NCSES is concerned about is just an artifact of this unusual reference to "sexual experience" in the bridge panel, which turned off respondents. Perhaps the expansive and exploratory, check-all-that-apply options may have contributed as well, although this seems far less likely. Regardless, this all is easily addressed by NCSES adopting the Census Bureau's HPS / MTurk design. Clearly, the breakoffs are not arising from more substantive population concerns: The NSCG population is college-educated and virtually identical to the Department of Education's B&B population, which has successfully included a SO measure since 2018. Thus, NCSES has no reason to be concerned about including a SO item in general; it just tested a poorly written question. Both the [National Academies](#) and [OMB's Guidance on Best Practices for SOGI Data Collection](#) recommend the SO item from Census Bureau's HPS as a well-vetted option agencies can adopt.

In short, NCSES' move to adopt the MTurk's study GI measure clearly shows it is comfortable adopting a question it tested in the MTurk study and previously used in other major federal surveys, even in the absence of NCSES having its own quality metrics such as breakoffs on the exact question design. Census Bureau data already show that, like the MTurk study GI item, the MTurk study SO item does not cause issues with breakoffs and related quality metrics.

**SUMMARY:** NCSES should release the data needed to appropriately benchmark the bridge panel's SO item against the NSCG's comparable measures. Nevertheless, it can be inferred based on other available data that this benchmark is highly likely to be successful, suggesting NCSES should move forward with a SO item. In addition, there is already very strong support in favor of NCSES adopting the MTurk / Census Bureau's HPS design for SO, which has been shown not to elicit breakoffs. If NCSES is somehow still concerned about breakoffs, the SO item could always be moved to the end of the survey, a common practice among peer agencies for sensitive items.

#### MTurk Response Order Effect Justification (Not Reported to OMB)

Following the concerns raised on December 20, 2022 about the bridge panel analysis, NCSES indicated that it deems it "critical to assess the quality of data across a variety of metrics to

determine [the SO item's] fitness for use" and provided an additional, new justification for abandoning the SO item: a response order effect in the MTurk study, which it describes as a "quality concern" (personal communication with NCSES; December 31, 2022).

This justification is flawed for four reasons:

- The response order effect constitutes weak statistical evidence.
- Response order effects are not a true quality criterion NCSES actually uses, as this criterion was not applied to other items (e.g., GI).
- The order effect was an exploratory, academic question inspired by the FCSM SOGI Research Group that was not meant to be used for assessing the viability of a SO item on a federal survey in a confirmatory manner.
- The effect likely reflects primacy bias due to unique MTurk [satisficing](#); NCSES should use the ordering established by precedents and recommended by the [National Academies](#).

NCSES presented this order effect at the 2021 FCSM conference, in addition to a host of other findings, without any special reference that this was perceived as a significant quality concern or one that would prohibit NCSES from ultimately adopting a SO item. Recall that response order effects with SO questions are deemed by the FCSM SOGI Research Group [white papers](#) and the expert [National Academies report](#) to be an exploratory, academic topic for future research on SOGI measurement, not one for making current decisions about adopting a SO item on a federal survey in a confirmatory manner, as in the present case.

At the 2021 FCSM conference, NCSES described different response patterns for SO when "straight; that is, not gay, lesbian, or bisexual" was listed first ( $n = 1,333$ ) vs. "gay or lesbian" was listed first ( $n = 1,345$ ), as shown in Table 2. In the talk, NCSES described a statistically significant response order effect, focusing specifically on the gay/lesbian responses. In its justification in abandoning the SO item, NCSES indicates that "the order of the response options in the sexual orientation question impacted the proportion of individuals who said they were gay or lesbian" (personal communication with NCSES; December 31, 2022).

NCSES described a statistically significant Fisher's exact test comparing gay/lesbian responses between the two order conditions. However, it did not have an a priori hypothesis about gay/lesbian responses in particular in this exploratory research question, and so it is not justified in conducting a Fisher's exact test on gay/lesbian responses in isolation (it would be equally unjustified to run a Fisher's exact test on any arbitrary subset of comparisons and response types). Back-calculating the count data from the rounded percentages NCSES presented (Table 2) indicates that the appropriate  $2 \times 4$  Fisher's exact test assessing the difference in overall response patterns between the two conditions has one of six possible significance levels:  $p = .0430, .0537, .0544, .0654, .0678, \text{ or } .0807$  (these are virtually identical for a  $2 \times 4$  chi-square test, which is more appropriate for large samples). Thus, the response order effect is borderline significant, and unless  $p = .0430$  it may not even be conventionally significant. Regardless, given the conditions' sample sizes, a  $p$  value between  $.0430$  to  $.0807$  constitutes weak evidence of a response order effect. Contemporary scientific standards and NSF's reproducibility standards would require this effect to be replicated. If NCSES had envisioned this effect to genuinely be a barrier to adopting the item back in 2021, the responsible thing to do would have been to attempt to directly replicate it, particularly given it is an MTurk study and not expensive or onerous.

Sexual orientation	Straight listed first	Gay/lesbian listed first
Straight	87.7%	86.4%
Gay/lesbian	2.9%	4.6%
Bisexual	7.4%	7.7%
Something else	2.0%	1.3%

**Table 2.** Frequency of reported SO in the MTurk study depending on whether straight vs. gay/lesbian was listed first, presented by NCSES at the 2021 FCSM Research and Policy Conference.

NCSES has not described any future investigation it has planned into understanding this borderline-significant response order effect since 2021, which would be expected if NCSES were genuinely concerned and interested in adopting a SO item. If this effect is truly significant and were to replicate, the most likely explanation is a simple [primacy effect](#) in response ordering (i.e., in both conditions, respondents were slightly more likely to select the first option). They were 1.7% more likely to select the gay/lesbian option when listed first, and 1.3% more likely to select the straight option when listed first. Primacy effects are highly prevalent in for-pay survey research like MTurk where respondents engage in disproportionate levels of survey [satisficing](#). This suggests that the MTurk respondents were not confused by the SO question; they were simply being lazy and selecting the first-listed option to rush through the survey and receive payment. Statisticians at the Census Bureau have [cautioned](#) about drawing inferences about the response distributions, in particular, of SOGI questions in MTurk non-probability samples: “[they] cannot be generalized to any population” and “it is not possible to draw any conclusions about [observed] differences or what they might indicate”.

Crucially, NCSES did not test response order effects for the GI item; instead, it tested the context effect of ordering the assigned birth sex vs. gender identity questions for the GI item. It is entirely possible if NCSES had varied the response order for the GI item, that a small primacy effect might emerge for GI (or any NSCG item for that matter). An expectation of zero primacy bias in response distributions on a financially incentivized MTurk survey is [unwarranted](#). Most importantly, if response order effects were a true metric NCSES uses for quality assessment, then NCSES would consider it mandatory for the GI item as well. NCSES is not justified in arbitrarily holding SO at a higher standard than GI with respect to response order effects.

As discussed earlier, the FCSM SOGI Research Group [white papers](#) and expert [National Academies report](#) have characterized response order effects with SOGI questions as an exploratory, future research question (among other topics), while simultaneously making recommendations on SOGI question designs agencies should adopt now. They do not characterize response order effects as an issue that should prohibit an agency from adding SOGI questions. With both the MTurk study and the bridge panel, NCSES seems to conflate pilot work needed to ensure basic viability of SOGI questions, which should be its primary focus, with academic work in collaboration with the FCSM SOGI Research Group that seeks to advance broader SOGI measurement issues. It is inappropriate to use an exploratory question on response order as a fundamental barrier against the SO item’s viability in the 2023 NSCG, particularly given that it is not a true quality criterion NCSES uses (e.g., it did not assess it for GI).

NCSES' reliance on the response order effect is also at odds with clear federal precedents that it already draws on. The MTurk SOGI items are derived from the Census Bureau's HPS, Department of Justice's National Crime Victimization Survey, and CDC's National Health Interview Survey. NCSES explicitly references these surveys in its decision to move forward with the GI item. However, with the SO item, extensive cognitive testing with the National Health Interview Survey has long made the [following conclusion](#), which led the National Academies to recommend always listing straight after gay/lesbian (see [Recommendation #2](#)):

*Respondents who identified as gay/lesbian or bisexual could answer questions about their sexual identity with relative ease, because their sexual identity was a central component of their sense of self. In contrast, respondents who identified as straight often did not find the concept of a sexual identity salient. In other words, they did not have a clear “heterosexual” or “straight” sexual identity beyond knowing that they were decidedly not gay, lesbian, or bisexual. Thus, to help these respondents (who comprise the majority of the population) select the optimal response category, the “straight” response option includes the phrase “that is, not gay.” Given this addition of wording, it [is] necessary to maintain logical cohesiveness by having the “straight, that is, not gay” response option follow after the “gay/lesbian” response option.*

It is unclear why NCSES does not heed the National Academies' recommendation or [OMB's Guidance on Best Practices for SOGI Data Collection](#), which also suggests this order. NCSES is departing from the federal precedents it already draws its SOGI items from, as well as expert recommendations, which all clearly stipulate which response ordering to use. Instead, NCSES ignores these to make invalid inferences based on ungeneralizable MTurk response distributions.

In its justification, NCSES has claimed that “it is unclear which ordering produced more accurate responses” and that “[a]s a result, additional research is needed exploring the ordering of response options and its impact on estimates” (personal communication with NCSES; December 31, 2022). It is unlikely that by “more accurate responses” NCSES implies a kind of ground-truth accuracy, as it is theoretically impossible to know which ordering yielded responses closer to true sexual minority population estimates: The federal government has not generated such estimates in an authoritative way (i.e., via the decennial Census), and the only available estimates would derive from the very same SO question with its own response order (e.g., in Census Bureau's HPS), making such an analysis circular. In the absence of any ground-truth data, NCSES would seem to imply that it wishes for a kind of self-reported response accuracy.

Yet, NCSES' own data presented in the same study already shows how response ordering relates to self-reported accuracy. When straight was listed first, sexual minority respondents reported being slightly more able to accurately report their SO and have greater ease in answering the question, whereas straight respondents showed no such difference, which NCSES described as a significant interaction (Table 1). Thus, listing straight first appears to make the question slightly easier for sexual minority respondents, although the differences are small and both orders were associated with extremely high levels of self-reported accuracy (Table 1). As such, even if the SO response order effect in the MTurk study were significant, reproducible, not at odds with federal precedents, able to be validly generalized, and a quality criterion NCSES actually used (as opposed to an exploratory endeavor), NCSES already knows how response ordering relates to self-reported



accuracy among respondents. Regardless, NCSES should simply use the response ordering established by the same precedent surveys it draws its items from, as is explicitly recommended by the [National Academies](#) based on extensive cognitive testing and suggested by [OMB's Guidance on Best Practices for SOGI Data Collection](#).

More generally, NCSES' decision to use the MTurk study for exploratory research questions, such as the SO item's response order effects (and use the bridge panel for understudied, exploratory wording, such as referencing "sexual experience"), suggests that NCSES was more focused on giving a public appearance of a commitment to SOGI data by collaborating with the FCSM SOGI Research Group on academic topics, without actually taking seriously an assessment of the basic viability of tried-and-true SOGI measures for its surveys. In doing so, it appears to have sacrificed significant quality of the results with respect to answering the simple question of including straightforward SOGI questions on its surveys. Just because the FCSM SOGI Research Group expressed interest in exploratory future work looking at response order with SO does not allow NCSES to justify making such an exploratory, rather than confirmatory, research question suddenly a fundamental quality criterion for the item's viability in the NSCG (while not making it a criterion for other items like GI). All the while, NCSES benefits from the public perception that it is committed to assessing the viability of SOGI questions for its surveys.

Finally, if NCSES truly has remaining quality concerns about SO that it believes cannot be addressed by existing data, federal precedents, or expert recommendations (albeit unjustifiably), it should be including the MTurk / Census Bureau's HPS measure or some other proposed SO measure on the 2023 NSCG's non-production bridge panel used for testing survey changes. However, NCSES has not described any concrete plan for further piloting of a SO item.

**SUMMARY:** NCSES' justification for abandoning the SO item due to a response order effect in the MTurk study, which was not reported to OMB, is unwarranted and does not reflect a genuine quality concern. NCSES should use the response ordering established by the same precedent surveys it draws its items from, as is explicitly recommended by the National Academies report.

### **NSF NCSES' Selection of the Less Inclusive Gender Identity Item**

NCSES cites disclosure risk and identifiability concerns in why it has chosen to adopt the expanded gender identity (GI) question that is relatively less inclusive (MTurk study design) than more inclusive (bridge panel design). These concerns are certainly important. NCSES uses several methods to avoid disclosure of identifiable information. It removes names and all identifying information, and out of an abundance of caution uses suppression techniques to protect confidentiality. For example, if a data cell has too few respondents such that an individual might possibly be identified (e.g., when cross-tabulated with other demographics or identifiers), NCSES suppresses the data cell. NCSES routinely uses such suppression techniques to deal with identifiability and disclosure concerns and can clearly apply the same techniques to its GI data.

The Census Bureau's HPS itself has [estimated](#) that transgender and other gender minority individuals constitute approximately 1% of the U.S. population. In its reports and data releases, NCSES has long included aggregate statistics on racial and ethnic categories that have an equivalent or even smaller prevalence in the U.S. population, such as Native Hawaiian or other Pacific

Islanders (0.3%) and American Indians or Alaska Natives (1.3%). Thus, NCSES will not encounter issues in providing statistics on the gender minority population in the aggregate as well. In the case of more fine-grained subgroup data, which the more inclusive GI question design (bridge panel) would provide, NCSES can always use suppression techniques to avoid identifiability risk in a situation where a data cell lacks sufficient sample. In specific data tabulations where a full range of response options might pose identifiability risk (especially when cross-tabulated with other variables), NCSES could suppress such data cells and provide only an aggregate transgender/gender-minority statistic. In other tabulations where the range of response options does not pose risk, no suppression would be needed and NCSES could provide disaggregated data so that variability by gender minority subgroups could be parsed.

The more expansive design would be more inclusive to the breadth of gender minority identities and allow non-binary and other gender minority respondents to feel included in NSF's data collection process. Even if fully disaggregated gender minority data could not be possible in a number of contexts due to identifiability risk, that in and of itself should not warrant rejecting the more inclusive question design, as levels of disaggregation can be calibrated to minimize risks post hoc. This comports with [OMB's Guidance on Best Practices for SOGI Data Collection](#), which states that "responses can...be aggregated to different levels (e.g., [sexual or gender minorities]) as needed for compliance with agency disclosure prevention protocols". The more inclusive question design's quality metrics were also excellent: item nonresponse and breakoff rates were "close to 0%" (personal communication with NCSES; December 5, 2022).

**SUMMARY:** NCSES should reconsider adopting the more inclusive GI question design from the bridge panel for the 2023 NSCG, as the identifiability concerns cited are easily resolved through aggregation and suppression techniques NCSES already uses.