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OPTIONS LAB
Collaboratory in HIV/STI treatment and prevention science

Screening for Fraudulent Responses in a Web-Based Survey on Sexual Orientation Disclosure in Healthcare

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Background

- Fraudulent data have been a major barrier to response validity in web-based HIV research.
- Previously used strategies include limiting recruitment, using software, using data analytics, embedding anti-fraud questions, and using specific criteria to remove fraudulent responses.
- There has been much debate on the optimal practice and strategy of limiting or removing fraudulent online responses.

Objectives

- To describe a multi-pronged approach to removing fraudulent responses from a cross-sectional online survey about sexual orientation disclosure in primary care.

Methods

Eligibility Criteria

- Self-identify as a gay, bisexual or other man who has sex with / is sexually attracted to men.
- Is an Ontario Resident.
- Be able to communicate in English and provide informed consent for participation.

Recruitment

- Recruited participants via:
  - a) Information cards at Hassle Free Clinic, a major Toronto sexual health clinic
  - b) Posters in Hassle Free Clinic and LGBTQ2S+ Community-based organizations
  - c) Online advertisements via social media accounts of LGBTQ2S+ Community-based organizations
  - d) Geosocial networking sites such as Scruff, Jack'd, and Grindr
- Data collected using the Hosted In Canada survey platform

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BLACK C•A•P

ACAS
Improving the Sexual Health of East & Southeast Asians

ASAAP
ALLIANCE FOR SOUTH ASIAN AIDS PREVENTION

GMSH Gay Men's Sexual Health Alliance

MAX
OTTAWA'S HEALTH CONNECTION FOR GUYS INTO GUYS

Methods cont.

Criteria

- 10 potential fraud-detection criteria were considered based on previous literature.

Participant paradata (behaviour) criteria		Participant response criteria
1) Duplicated IP addresses <u>Short survey completion time</u> 2) <5 minutes 3) <10 minutes 4) <15 minutes	<u>Survey start and end times</u> 5) Duplicated start times 6) Duplicated end times 7) Duplicated start or end times 8) Duplicated start and end times	9) Anti-fraud questions pertaining to: a) Embedded directives (e.g. QBotA: "Select the fifth option…") b) Community knowledge (e.g., QBotB: "When is Pride month in Ontario?...") c) Honeypot questions that only bots can see (e.g., QBotC: "If you are a bot, select any answers…") 10) Straightlining (i.e., repeated responses) on open-ended questions

Analysis

- Assuming IP address duplication is the most reliable criterion, we calculated tetrachoric correlation coefficients (r_{tet}) between this and other criteria.
- Assuming internal consistency of psychometric scales would improve with removal of fraudulent responses, we calculated Cronbach's alpha (α) for the 10-item Nebraska Outness Scale (NOS), after removing responses meeting each criterion. The NOS was used because half of the items are reverse scored.
- One criterion from both criteria 2-4 and 5-8 were selected based on the highest r_{tet} value. All other criteria were deemed acceptable if $\alpha<0.7$. Afterward, selected criteria were ordered from highest to lowest r_{tet} value to be applied sequentially to the study responses, findings were summarized in a table and a flow chart.

Results

Table 1: Screening of Fraudulent Criteria

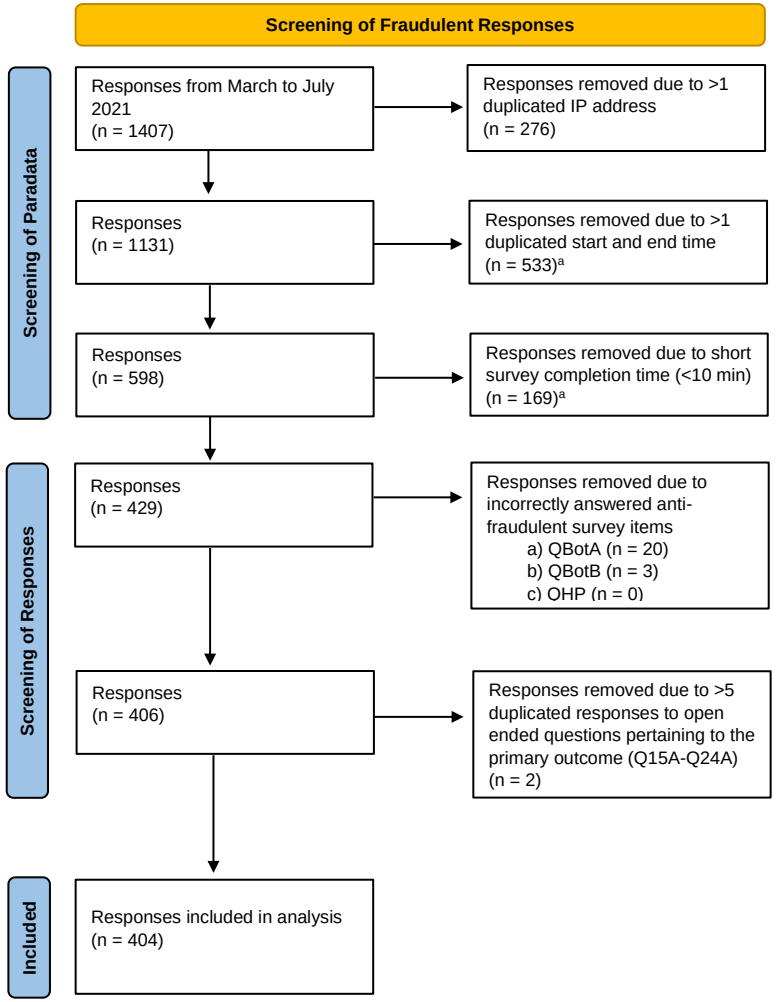
Criteria	n that met criterion	r_{tet}[a]	α after criterion applied	Overall n after applying criterion sequentially[b]	α after applying criterion sequentially
No criteria applied	NA	NA	NA	NA	0.743
1) Screening of paradata					
IP addresses are duplicated[a]	276	N/A	0.728	1131	0.728
Criteria based on survey start and end time					
Start time of survey were duplicated	763	0.183	0.836	N/A	N/A
End time of survey were duplicated	790	0.205	0.836	N/A	N/A
Start or end time of survey were duplicated	848	0.149	0.841	N/A	N/A
Start and end time of survey were duplicated	705	0.239	0.832	598	0.827
Criteria based on survey completion time					
Survey completion time <5 minutes	246	0.310	0.770	N/A	N/A
Survey completion time <10 minutes	630	0.316	0.795	429	0.833
Survey completion time <15 minutes	916	0.284	0.774	N/A	N/A
2) Screening of responses					
Responses removed due to incorrectly answered anti-fraud survey items	78	0.0233	0.747	406	0.835
Straightlining on at least half of the open-ended questions	70	0.622	0.719	404	0.836

[a] Tetrachoric correlation coefficients for each criterion was calculated in comparison to the IP address duplication criterion

[b] Selection of criteria for sequential removal was based on the highest tetrachoric correlation coefficients per criteria group

- The optimal criteria to remove fraudulent responses were 1) duplicated IP addresses, 2) identical start and end times, 3) completion time <10 minutes, 4) anti-fraud questions and 5) straightlining on open-ended responses.
- Most criteria had a positive weak association (range r_{tet}:0.183-0.622) to the IP address criteria. However, almost all individual criteria had a moderate internal consistency (min α=0.719).
- In the end, the five selected criteria yield the highest internal consistency (α=0.836) when applied sequentially, resulting in 404 responses (out of 1407) being included in the final analysis.

Results cont.



[a] Response time seconds were rounded down to the nearest minute

Figure 1. Screening of Fraudulent Responses

Discussion

Strengths

- We screened a large sample size (n=1407), explored numerous criteria, and demonstrated that internal consistency increases with each criterion applied.

Limitation

- Despite the use of various criteria, we cannot be certain that the included data does not contain fraudulent responses. Non-fraudulent responses could have also been lost with each criteria applied.

Conclusions

- Paradata, anti-fraud questions and serial assessment of internal consistency are useful ways to remove fraudulent data from web-based surveys. Future online HIV research should consider other rigorous criteria or tools in removing fraudulent responses, such as validated anti-fraud questions.

Acknowledgements

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