# The association between data sharing and perceived effort moderated by gender

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#### Abstract

Data sharing is not yet used much in the field of traumatic stress. However, data sharing can be beneficial in this field as it often uses small sample sizes for research, and through data sharing sample sizes can increase. One factor that has a negative relation with data sharing is perceived effort. Furthermore, gender could also have a moderating effect on the relation between perceived effort and data sharing. Therefore, two hypotheses were established: H1: Higher perceived effort is related to less data sharing behaviour. H2: The association between perceived effort and data sharing is moderated by gender, such that the association between data sharing and perceived effort is stronger for females. In order to investigate these hypotheses a survey was used to ask traumatic stress researchers about their data sharing behaviour. To analyse the results a frequency analysis, Spearman's rho, and a multiple regression analysis were computed. The correlation between perceived effort and data sharing was found to be significant and negative ( $\rho = -0.16$ , p = .012, N = 208). The multiple regression analysis found a significant relation between perceived effort and data sharing (B = -0.16, SE = 0.05, p = .003), and a non-significant relation for gender (B = -0.26, SE = 0.36, p= .477), and the interaction term (B = -0.006, SE = 0.11, p = .956). Therefore, H1 is accepted and H2 is rejected. Some limitations of this study were the construction of outcome measures, underrepresented regions, and gender divide in the sample.

Keywords: data sharing, perceived effort, gender, traumatic stress researchers.

The association between perceived effort and data sharing moderated by gender Doing research can require much time and effort. Many things need to be done, reading scientific sources on the topic, setting up a study, finding enough participants, and then analysing and interpreting the results and writing a paper on it. One way of decreasing the amount of effort and time spent to do research is by reusing data from previous research. However, within various disciplines it is not yet common practice to share data, though it has been increasing throughout the years (Tenopir, et al., 2015).

There are several benefits to sharing data, such as enhancing transparency within science, increased accountability for researchers, more knowledge exchange between researchers, and also increasing the reproducibility for studies (Kim & Yoon, 2017; Martone, Garcia-Castro & VandenBos, 2018). With this shared data, other researchers using the data can be more efficient, as they do not have to collect all the data by themselves, and they can have larger data sets for analysis (Kim & Yoon, 2017).

One discipline where data sharing is still on the rise is traumatic stress (Olff et al., 2019). Traumatic stress can develop when a person experiences a frightful, or even life threatening event. There are different diagnoses for people who struggle with traumatic stress, such as post-traumatic stress disorder (PTSD) and acute stress disorder (ASD) (Turgoose et al., 2021). Not much prior research has been done on data sharing behaviour within the traumatic stress field. However, data sharing can have benefits within this field. Finding participants while researching traumatic stress can be difficult, and therefore many studies within this field have small sample sizes (Kassam-Adams & Olff, 2020). By reusing shared data within traumatic stress research, researchers are able to carry out their studies on larger sample sizes, which makes the results more generalizable to the population. Yet, not all researchers choose to share data.

According to Kim and Stanton (2016), there are a number of institutional and individual reasons as to why scientists chose to share or not share their data. In order to attain what different factors contribute to this, data was collected from 1317 scientist from 43 different disciplines in the United States of America. Factors that were found to be related to sharing behaviour are perceived career benefit, scholarly altruism, regulative pressure by journals, and normative pressure. In contrast, there was also one factor found that have a negative relation with sharing behaviour, perceived effort. This means that it takes too much effort for some scientists to share their data, as this can contribute to having to do extra work (Kim & Stanton, 2016).

Furthermore, there are also factors that contribute to scientists' data reusing behaviour. Research by Kim and Yoon (2017) analysed 1237 responses from scientists from 53 different disciplines. They found that several factors were positively related to reusing behaviour. These factors are perceived usefulness, perceived concern, organizational resource, and availability of a data repository. The most important factor was found to be perceived usefulness. This means that if scientists believe that reusing data from previous research will be beneficial to them, for example in regards to productivity and effectiveness, they are more likely to do so (Kim & Yoon, 2017).

Another factor that could influence data sharing behaviour is gender. A study by Zhu (2020) found that amongst researchers in the UK men were more likely to share data than women. A reason for this could be that men are more accepting of new technology than women are (Zhu, 2020).

Since data sharing is not yet common practice within the field of traumatic stress, this study aims to examine traumatic stress researchers' attitudes and behaviours regarding data sharing. Therefore, the research question for this study was: To what extent is traumatic stress researchers' data sharing behaviour associated with perceived effort and is this moderated by

gender? To answer this question two hypotheses were established: H1: Higher perceived effort is related to less data sharing behaviour. H2: The association between perceived effort and data sharing is moderated by gender, such that the association between data sharing and perceived effort is stronger for females.

#### Methods

### **Participants**

For this study participants were recruited who all worked as researchers within the traumatic stress field. The participants were able to participate in the study if they were proficient in English, Brazilian Portuguese, French, Japanese, or Spanish. A power analysis was conducted using G\*Power and it showed that the required amount of participants for this study would be 55 (expected effect size = 0.15,  $\alpha = 0.05$ , power = 0.80).

# Procedure

This study used an online survey to gather data from participants. Data collection started in May 2021 and ended in April 2022. Participants for this study were recruited through snowball sampling, word of mouth, social media, emailing colleagues and through selecting researchers who have published work within the traumatic stress field. These participants were invited to participate in the study through email. The first thing the participants saw when opening the link to the survey was a section on the consent process. In this section, the purpose of the study was explained, and how the gathered data would be used. Furthermore, it states that participating will be anonymous and voluntary. When the participants were asked some demographic questions and then they were given statements on data sharing and reusing. At the end of the survey the participants can submit their answers, thereby finishing the survey. This study has been ethically approved by the Institutional Review Board of The Children's Hospital of Philadelphia.

### Materials

The questions in the survey were based on previous research on data sharing and reusing by Kim and Yoon (2017). The survey is used for multiple studies, and includes questions that are not relevant for this study. Therefore, only parts relevant to this study will be discussed. The survey can be found in its entirety in the Appendix.

# **Background characteristics**

The first part of the study asked about the participant's background characteristics. The first question asked about the academic and/or research discipline the participant works in, the answering options were as follows: "Psychology", "Psychiatry", "Medicine - other than psychiatry", "Nursing", "Social Work", "Public Health", "Education", and "Other". Multiple answers could be selected for this question. The next question asked the participant to fill in how many years they have been conducting research within this discipline. Subsequently, it was asked in which career stage the participant is currently in, senior, junior or trainee. Next, the participant was asked to fill in how many publications including research data they have. The question after this was regarding the populations the participant has included in their research. The answering options were: "adults", "adolescents", and "children". For this question the participant was allowed to select multiple answers. Then, it was asked what types of data the participant has collected. The answering options were: "data from surveys / questionnaires", "data from standard interviews", "qualitative data", "intensive longitudinal (EMA / ESM) data", "experimental task performance data", "genetic data", "biological / physiological data (other than genetic)", "data retrieved from health / medical records", "data from other non-research records or sources (administrative data, online / social media data)", and "other". For this question multiple answers were allowed.

Next the participant was asked the fill in their age, gender, whether they consider themselves to be of an ethnic or cultural background that is under-represented amongst researchers in their discipline or research community, and lastly it was asked in which country the participant lives and works.

### Data sharing behaviour

In this survey six questions were asked about the participant's data sharing behaviour, namely: "How often have you deposited your data, related to an article you published, into an institutional repository (i.e. repository maintained by a journal, university, funder, national data archive, etc)?", "How often have you uploaded your data, related to an article you published, into a "public" Web space (e.g. PsyArxiv, MedArxiv, OSF)?", "How often have you deposited your data / dataset, not in connection to a specific publication, into an institutional repository?", "How often have you uploaded your data / dataset, not in connection to a specific publication, into an institutional repository?", "How often have you uploaded your data / dataset, not in connection to a specific publication, into a "public" Web space?", "How often have you been personally asked to share data for an article you published?", and "How often have you provided data (in response to a request) via personal communication methods? (e.g., email or fileshare)?". These questions could be answered with one of the following options: "never", "1 or 2 times", or "more than 2 times". The scores of these items were summed up to represent a total data sharing score, which ranges from 6 to 18. The Cronbach's alpha for these items is 0.74.

# **Perceived effort**

The survey contained three questions regarding the participant's perceived effort of data sharing: "Sharing data involves too much time for me (e.g. to organize / annotate).", "I would find data sharing difficult to do.", and "I have adequate time and funding for any effort that may be required in sharing my data.". These question could be answered on a 7-point Likert scale ranging from "strongly disagree" to "strongly agree". The scores of these items were summed up to represent a total data sharing score, which ranges from 3 to 21 The Cronbach's alpha for these items is 0.66.

# Data analysis

To describe the characteristics of the sample, a frequency analysis was conducted. Furthermore, in order to see whether data sharing behaviour and perceived effort are correlated, Spearman's rho was computed. Spearman's rho was used for analysis because the data was non-normally distributed. Additionally, a multiple regression analysis was done to see if the correlation between data sharing behaviour and perceived effort is moderated by gender. For this multiple regression analysis the independent variables were perceived effort, gender, and the interaction term, and the dependent variable was data sharing behaviour. As there were only 3 responses of "Non-binary" and "Prefer not to say" for the variable gender, these responses and 5 missing responses were removed for the analyses.

#### Results

# Frequency analysis of the background characteristics

The study included 210 participants. The majority of the participants in this study were women and were located in Europe. More than half of the participants were aged between 30 and 49. More information on the background characteristics of the participants can be found in Table 1.

## Table 1

Background characteristics	n	%
Gender		
Female	126	60.0
Male	84	40.0
Age		
20-29	25	11.9
30-39	64	30.5

Background characteristics of the participants (N = 210)

40-49	51	24.3
50-59	31	14.8
60-69	21	10.0
70+	6	2.9
Missing	12	5.7
Under-represented ethnicity/culture		
No	174	82.9
Yes	30	14.3
Prefer not to say	4	1.9
Missing	2	1.0
Region		
Europe	82	39.0
North America	53	25.2
Asia	26	12.4
South America	22	10.5
Australia	13	6.2
Africa	5	2.4
Middle East	5	2.4
Missing	4	1.9
Discipline		
Psychology	124	59.0
Psychiatry	39	18.6
Other	45	21.4
Missing	2	1.0
Career stage		
Senior	70	33.3
Junior	81	38.6
Trainee	57	27.1
Missing	2	1.0
Population research		
Adults	195	92.9
Adolescents	90	42.9
Children	74	35.2

Types of collected data		
Data from surveys /	194	92.4
questionnaires		
Data from standard interviews	134	63.8
Qualitative data	122	58.1
Data retrieved from health /	74	35.2
medical records		
Biological / physiological data	66	31.4
(other than genetic)		
Experimental task performance	56	26.7
Data		
Intensive longitudinal (EMA /	37	17.6
ESM) data		
Data from other non-research	35	16.7
records or sources		
(administrative data, online /		
social media data)		
Genetic data	28	13.3
Other	6	2.9

#### The association between perceived effort and data sharing behaviour

By conducting Spearman's rho a weak, but significant, negative correlation was found between perceived effort and data sharing ( $\rho = -0.16$ , p = .012, N = 208).

# The moderation of gender on perceived effort and data sharing behaviour

Furthermore, a multiple regression analysis was done to see if the correlation between perceived effort and data sharing is moderated by gender. A significant and negative association was found between perceived effort and data sharing (B = -0.16, SE = 0.05, p = .003). Moreover, gender was found to have a non-significant association (B = -0.26, SE = 0.36, p = .477), which was also the case for the interaction term (B = -0.006, SE = 0.11, p = .956).

# Discussion

The aim of this study was to analyse the association between perceived effort and data sharing for traumatic stress researchers, and whether this association was moderated by gender. There has barely been any research on data sharing behaviour in the traumatic stress field, therefore this study can give an insight into this matter, as it is one of the first studies looking into it. This study can give insight into traumatic stress researchers' behaviour and attitudes towards data sharing, and reveal why traumatic stress researcher in particular choose to share or not share their data.

A negative correlation between perceived effort and data sharing was found, which aligns with the hypothesis "H1: Higher perceived effort is related to less data sharing behaviour". Additionally, this finding also corresponds to the findings of Kim and Stanton (2016), which also conclude that perceived effort has a negative correlation with data sharing behaviour. This means that people who think that data sharing requires too much effort are less likely to share their data. According to Kim and Stanton (2016) data sharing can be time consuming and might require much effort for researchers. They need to organize their data and they also might need to give detailed explanations about their data for it to be understandable and usable for others. Therefore, perceived effort has a negative influence on data sharing behaviour (Kim & Stanton, 2016).

Furthermore, the moderator of gender on the association between data sharing and perceived effort was found to be non-significant. Because the moderation is non-significant, the hypothesis "H2: The association between perceived effort and data sharing is moderated by gender, such that the association between perceived effort and data sharing is stronger for females" is rejected. The results show that gender is not related to perceived effort and data sharing. This finding does not align with the findings of Zhu (2020), which state that male researchers in the UK are more likely to share their data. The discrepancy in these results could be because the study by Zhu (2020) looked at the relation between data sharing and

gender within multiple scientific fields, whereas this study looked at the moderation of gender on the correlation between perceived effort and data sharing within traumatic stress research. People within more technological fields which use more data sharing are more likely to be men (Zhu, 2020), whereas this study only focused on the traumatic stress field and had a sample with a female majority.

The results show that traumatic stress researchers are less likely to share their data if they find it to be too much effort. Thus, research institutions might try to lower perceived effort by teaching their researchers how to properly and efficiently share their data. If researchers are taught how to share data, they do not have to figure out how to do it on their own, which requires less effort from them. Moreover, if they are taught how to efficiently share their data they might realise that it took less effort than expected, therefore leading to more data sharing.

These findings might not be able to be generalisable to the entire field of traumatic stress research, as there are some limitations to this study. Firstly, to gain a final score in both data sharing and perceived effort, several items were summed-up. It is unsure if this is the best method for measuring perceived effort and data sharing. This is because someone might score high on one item and low on another, so the total score might seem low, even though they do share their data often or feel as though it takes much effort. For example, someone might have shared their data more than twice into an institutional repository, but never into any public repository, and they might have never been asked personally for their data. Although they have shared their data often in one way, they get a lower score because they have not shared their data in other ways. Moreover, they could have shared their data in an institutional repository more than 100 times, but it still counts as more than 2. This means that the total score more about the ways data is shared, and not how many times. Therefore, future research on this topic might find it interesting to find a more elegant method of reaching a

total score of data sharing and perceived effort. Furthermore, the majority of participants were located in Europe. Although this study was done by an international team and responses were received from all over the globe, some regions might be underrepresented in this sample. This could be because the survey was available in only 5 languages, and if someone is not proficient in any of these languages they are not able to fill in the survey. Lastly, there were more responses by women than men in the sample. It is unclear whether there or more female researchers in this field than male researchers, therefore it is uncertain whether or not the gender divide of this sample is equal to that of the entire traumatic stress field.

In conclusion, this study aimed to answer the question: "To what extent is traumatic stress researchers' data sharing behaviour associated with perceived effort and is this moderated by gender?". In order to answer this question, data was gathered through an online survey among 210 traumatic stress researchers. From the survey results it can be concluded that people who find data sharing to be too much effort are less likely to share their data. It was also found that gender does not moderate the relation between perceived effort and data sharing behaviour" should be accepted, however the hypothesis "H2: The association between perceived effort and data sharing is moderated by gender, such that the association between perceived effort and data sharing is stronger for females" should be rejected.

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#### Appendix

# International Survey on Data Sharing and Re-use in Traumatic Stress Research

The Global Collaboration on Traumatic Stress, a coalition of 11 scientific societies in the field of traumatic stress, is conducting a survey to better understand traumatic stress researchers' opinions and experiences regarding data sharing and data re-use. Results of this global survey will be shared on the Global Collaboration website (https://www.global-psychotrauma.net/), and will help us create tools and resources for traumatic stress researchers. The final dataset from this survey will be available upon request for use by other researchers.

If you are a traumatic stress researcher at any career stage (including trainees) we invite you to share your opinions and experiences by participating in this survey. The survey is anonymous, and your participation is voluntary. There are no known risks or personal benefits to you from participating in this study.

If you have questions about the survey, the study, or the study dataset, please contact the study team at childtraumadata@chop.edu.

By continuing to the survey, you are consenting to participate in this study.

THANK YOU for your participation.

Part 1 - So that we can describe the respondents to this survey, please tell us a bit about yourself.

1. What is your academic / research discipline? CHECK ALL THAT APPLY

- Psychology
- Psychiatry
- Medicine other than psychiatry specify:
- Nursing
- Social Work
- Public Health
- Education
- Other Specify: \_\_\_\_\_

2. How many years have you been conducting research in this discipline? (include research conducted during your training, e.g., masters, doctoral, or any post-

graduate/professional research)

3. What is your current job title / academic rank / trainee status? If multiple apply, select highest rank.

- Full Professor
- Associate Professor
- Assistant Professor / Lecturer
- Instructor
- Research scientist
- Post-doctoral trainee
- Doctoral/PhD student
- Masters student
- Other Specify:

4. In the last 5 years, how many publications involving research data have you published (including those as first author or co-author)?

5. How many of these publications involved analyses of research data collected by others outside you / your research team / your co-authors?

6. Is trauma / traumatic stress your primary research focus? Yes / No

SKIP PATTERN – If no ITEM 6 then go to ITEM 7

If yes - go to ITEM 8

7. What is your primary area of research?

8. What types of trauma have been included in your research? CHECK ALL THAT

# APPLY

- Acute/Single trauma
- Child Abuse/Maltreatment
- Chronic/Repeated Trauma
- Community Violence
- Death/Bereavement
- Disaster
- Intimate Partner Violence
- Medical Trauma
- Racism / Historical Trauma
- Rape/Sexual Assault

- Refugee/Displacement Experiences
- Secondary / Vicarious Traumatization in Professionals / Helpers
- Terrorism
- Torture
- War / Post-Conflict Settings Civilians
- War Military/Peacekeepers/Veterans
- Other(s) Specify:
- 9. What populations have been included? CHECK ALL THAT APPLY
- Adults
- Adolescents
- Children
- 10. What types of data have you collected? CHECK ALL THAT APPLY
- Data from surveys / questionnaires
- Data from standard interviews
- Qualitative data
- Intensive longitudinal (EMA / ESM) data
- Experimental task performance data
- Genetic data
- Biological / physiological data (other than genetic)
- Data retrieved from health / medical records
- Data from other non-research records or sources (administrative data, online / social

media data)

- Other – Specify: \_\_\_\_\_

- 11. What is your age in years?
- 12. How do you identify your gender?
- Male
- Female
- Non-binary
- Other
- Prefer not to say

13. Do you consider yourself to be of an ethnic / cultural background that is under-represented amongst researchers in the discipline / research community in which you work?"Yes / No / Prefer not to say

14. In what country do you live and work? [DROP DOWN LIST – SEE LIST AT END OF THIS DOC]

Part 2 - Please indicate to what extent you agree with the following statements, thinking about the institutions and research communities that you are part of.

IN MY RESEARCH COMMUNITY ....

RESPONSES FOR THIS SECTION: 1, Strongly Disagree | 2, Moderately Disagree | 3, Slightly Disagree | 4, Neutral | 5, Slightly Agree | 6, Moderately Agree | 7, Strongly Agree | -99, Don't Know

- 15. It is expected that researchers would share data.
- 16. Researchers share data even if not required by policies.
- 17. Many researchers are currently participating in data sharing.
- 18. Public funding agencies require researchers to share data.
- 19. Journals require researchers to share data.
- 20. Researchers can easily access metadata about existing data sources.
- 21. Researchers have the tools they need to share appropriate metadata along with their data.
- 22. Data repositories are available for researchers to deposit / share their data.
- 23. Researchers can easily access data repositories to request / acquire data for re-use.

24. It is difficult to publish work that is based in data re-use, i.e. new analyses of data collected by others.

25. Re-using data for new / secondary analyses has led to advances in the field.

Part 3 - Thinking about YOUR OWN VIEWS AND EXPERIENCES, please indicate the extent to which you agree with the following statements.

RESPONSES FOR THIS SECTION: 1, Strongly Disagree | 2, Moderately Disagree | 3, Slightly Disagree | 4, Neutral | 5, Slightly Agree | 6, Moderately Agree | 7, Strongly Agree

26. I am willing to help other researchers within my institution / research community by sharing data.

27. I am willing to help other researchers outside my institution / research community by sharing data.

28. I can earn academic 'credit' such as more citations by sharing data.

29. Data sharing would be helpful in my academic career.

30. Sharing data is an ethical obligation as a researcher.

31. Sharing data honors the contributions of research participants.

32. Sharing data has a high risk of violating the rights of research participants.

33. There is a high probability of losing publication opportunities if I share data.

34. Data sharing may cause my research ideas to be stolen by other researchers.

35. My shared data may be misused or misinterpreted by other researchers.

36. I believe that the overall riskiness of sharing data is high.

37. Sharing data involves too much time for me (e.g. to organize / annotate).

38. I would find data sharing difficult to do.

39. I have adequate time and funding for any effort that may be required in sharing my data.

40. I include statements about data sharing in my participant consent forms.

41. My institution's ethics committee / IRB makes it hard for me to share research data gathered in IRB approved studies.

42. When I begin a project, I organize the data to enable later data re-use and sharing.

43. I feel prepared (via training or experience) to manage my data in a way that facilitates re-use and sharing.

44. I know how to de-identify / anonymize my data so that it can be shared.

45. I know how to clearly document how my raw data was processed / cleaned for analysis.

46. Re-using other researchers' data can improve the quality of my overall program of research.

47. Re-using other researchers' data reduces the time/cost/effort I spend on my research.

48. If I re-use other researchers' data, I worry that I might misinterpret the data.

49. If I re-use other researchers' data, I worry that I might not be able to publish with that data.

50. Re-using other researchers' data requires too much time and effort to locate data sets.

51. Re-using other researchers' data requires too much time and effort to access (or get permission to use) data sets.

52. Re-using other researchers' data requires too much time and effort to process data sets for a new study.

Part 4 - How often have you...

RESPONSES FOR THIS SECTION: Never | 1 or 2 times | More than 2 times

53. Deposited your data, RELATED TO AN ARTICLE YOU PUBLISHED, into an institutional repository (i.e. repository maintained by a journal, university, funder, national data archive, etc)?

54. Uploaded your data, RELATED TO AN ARTICLE YOU PUBLISHED, into a "public" Web space (e.g. PsyArxiv, MedArxiv, OSF)?

55. Deposited your data / dataset, NOT IN CONNECTION TO A SPECIFIC PUBLICATION, into an institutional repository?

56. Uploaded your data / dataset, NOT IN CONNECTION TO A SPECIFICPUBLICATION, into a "public" Web space?

57. Been personally asked to share data for an article you published?

58. Provided data (in response to a request) via personal communication methods? (e.g., email or fileshare)?

59. Downloaded or requested data from a repository for your own analyses / research?

60. Directly requested data from another researcher / research team for use in your own work?

61. Collaborated with other researchers to combine (your & their) data for new analyses / new work?

62. Published results of work that included use of others' data?

Part 5 – Any additional comments?

63. Please share any additional comments about your views or experiences regarding data sharing or data re-use: OPEN TEXT FIELD

END OF SURVEY