Attitudes towards Open Science and Public Data Sharing: A Survey among Members of the German Psychological Society.

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Contributions:

Andrea Abele-Brehm has written the paper and has analyzed the data. All authors were involved in designing and executing the study and in discussing the results. Mario Gollwitzer, Ulf Steinberg and Felix Schönbrodt gave critical feedback to former versions of the paper. Ulf Steinberg programmed the study

Abstract

Central values of science are, among others, transparency, verifiability, replicability and openness. The currently very prominent Open Science (OS) movement supports these values. Among its most important principles are open methodology (comprehensive and useful documentation of methods and materials used), open access to published research output, and open data (making collected data available for re-analyses). We here present a survey conducted among members of the German Psychological Society (*N* = 337), in which we applied a mixed-methods approach (quantitative and qualitative data) to assess attitudes towards OS in general and towards data sharing more specifically. Attitudes towards OS were distinguished into positive expectations ("hopes") and negative expectations ("fears"). These were un-correlated. There were generally more hopes associated with OS and data sharing than fears. Both hopes and fears were highest among early career researchers and lowest among professors. The analysis of the open answers revealed that generally positive attitudes towards data sharing (especially sharing of data related to a published article) are somewhat diminished by cost/benefit considerations. The results are discussed with respect to individual researchers' behavior and with respect to structural changes in the research system.

Abstract: 187 words

Key words: open science, public data sharing, attitudes towards open science: data sharing hopes and data sharing fears

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Open Science (OS) is a term reflecting the idea that scientific knowledge of all kinds should be openly shared. The current prominence of OS is connected to the debate about replicability of psychological research (Open Science Collaboration, 2015; Pashler & Wagenmakers, 2012), although it should be noted that “Closed Science” is certainly not the only factor responsible for low replication rates (Fiedler & Schwarz, 2016). Transparency, verifiability, replicability, and openness are central values of science (De Winter, 2014; Resnik, 1998). Although there are several overlapping definitions of “OS”, all of them represent these central values. Among the most important principles of OS are open access to published research, open methodology (comprehensive and useful documentation of methods and materials), and open data (making collected data available for re-analyses). Whereas open methodology was already one of the principles that Wilhelm Wundt defined for good experimentation (Wundt, 1896), open data is a principle that is currently heavily discussed (see, for example, the recent debate on “Research Parasites” vs. “Research Symbionts” in the medical community; Farnham et al., 2017; Fecher & Wagner, 2016; Longo & Drazen, 2016).

Responding to claims that data should, in principal, be made accessible to other researchers for secondary use, the German Psychological Society (“Deutsche Gesellschaft für Psychologie”; DGPs) has developed and published specific recommendations for data management practices in psychological science (Schönbrodt, Gollwitzer & Abele-Brehm, 2017). Whereas public data sharing is not the only topic addressed in these recommendations, it is nevertheless one of the most important ones. A central element of these recommendations is that data should, in principal, be accessible for re-analyses, preferably in a secure, reliable, and competently managed repository. The recommendations differentiate between “Type-1” data sharing and “Type-2” data sharing. “Type-1” data sharing refers to data that are necessary to reproduce the findings of a published research article, whereas “Type-2” data sharing (after a specified embargo period) refers to data that have been collected in a

research project, but have not yet been analyzed or reported (for details, see Schönbrodt et al., 2017, p. 24-26).[1]

Previous research has shown that early-career researchers in Germany are relatively sceptical regarding the current system of doing and publishing research (Stürmer, Oeberst, Trötschel & Decker, 2017). They are worried that questionable research practices such as publishing only studies that "worked" (while burying null results in a file-drawer) or selective reporting of hypothesis-consistent effects, are relatively common due to the incentives of the current scientific system (Stürmer et al., 2017, p. 367). A majority of respondents in this study therefore approved of the idea of making data available online at the time of publication. Other findings by Houtkoop et al. (2018) also show that authors of psychological publications think that data sharing is desirable and profitable. Respondents rated desirability and profitability higher for their entire research field than for their own research. Respondents also mentioned a number of barriers that diminish researchers' willingness to share their data, such as fear that their data might be misinterpreted by peers. Fears related to data sharing were rated lower for one's own research projects than for the researcher community in their field. These findings suggest that there is generally a positive attitude towards OS, but also some reservation whether data sharing will benefit young researchers' careers. Attitudes towards OS may, therefore, be ambivalent and/or attitudes towards OS and opinions about factors being beneficial versus impedimental for one's career are disringuishable constructs.

In order to gain more knowledge about the attitudes about OS in general and about the DGPs data management recommendations in particular, we conducted a survey among members of DGPs in 2017. We reasoned that the attitudes of members of DGPs, especially of those who are interested and have a stance in the scientific discourse about Open Science, are of particular relevance for the OS movement in Germany. Most DGPs members

[1] https://www.dgps.de/index.php?id=143&tx_ttnews[tt_news]=1737&cHash=c1bf294cd4ef4ed13a4560a7ad4f74f9
English version: https://psyarxiv.com/vhx89/

are active researchers who disseminate their knowledge, information, and values to the next generation of researchers, who review manuscripts and grant proposals, who are journal editors, members of funding agency boards, members of academic personnel selection committees, heads of departments, etc. Hence, their attitudes towards OS in general and towards public data sharing more specifically are important, because these attitudes may not only influence their own research practies, but also those of their undergraduate and doctoral students, post-docs, colleagues, and the wider community. Their behavior may also enhance or impede structural changes in the scientific system.

Our approach was a mixed-method study in which we assessed attitudes by means of rating scales and also by responses to open questions. We asked both for opinions regarding data sharing Type 1 and data sharing Type 2 (see above). We studied opinions on these two types of data sharing, because both are discussed in the current literature and opinions might differ between both types of data sharing.

Methods

Participants and Procedure

Invitations were sent via the mailing list of the DGPs; a reminder was sent after two weeks. We explicitly addressed the data management issues and asked for opinions regarding the data management recommendations. At the time the survey was advertised (November 2017), DGPs had 4.121 members with an email account. One-hundred and fifty of these accounts turned out to be invalid. Moreover, we do not know how many of the mails immediately entered the “spam” folder. The link to the survey was opened by 666 persons. From these persons, 76 did not answer any question. From the remaining 590 persons, 253 were excluded according to a prespecified exclusion criterion (that is, they had answered less than two thirds of the questions). The final sample comprised N = 337 participants. We will discuss the response rate later. Three-hundred and eight participants answered all attitude-related questions.

We asked our participants to answer two sociodemographic questions, one was age group (less than 30 years, *N* = 28; 30 to 50 years, *N* = 201; older than 50 years, *N* = 62; *N* = 17 persons did not answer this question), the other was occupational group[2]. Occupational group was distinguished into pre-docs (i.e., researchers who are currently working on or completing their dissertation, *N* = 32), post-doctoral researchers on a "Mittelbau" position at a university (*N* = 91)[3], post-doctoral researchers working outside academia (*N* = 18), university professors (*N* = 129), and professors teaching at universities of applied sciences ("Hochschulen für Angewandte Wissenschaften"; formerly "Fachhochschulen") in Germany (*N* = 19).[4] In the following analyses we will combine the groups of university professors and professors teaching at universities of applied sciences into one "professors" group. Nineteen persons did not answer this question.

Compared to the distribution of age groups and occupational status groups among all members of the DGPs (age: 13% younger than 30 years; 54% between 30 and 50 years of age; 33% older than 50 years; occupational status: Pre-Doc: 22%; persons with a doctoral degree: 40%; professors: 38%) the percentages in the present sample roughly reflect the age and status distribution of the member population.

Online Questionnaire

The survey started with scales and open-ended questions measuring the degree of approval to several issues of the DGPs data management recommendations (see Gollwitzer et al., 2018). The second part assessed attitudes and opinions and the socio-demographic questions. The complete survey is available online (Abele-Brehm, Gollwitzer, Schönbrodt, & Steinberg, 2018; in German) and all primary data including the codebook are also available online (Steinberg, Abele-Brehm, Gollwitzer, & Schönbrodt, 2018).

[2] Because of data protection issues we refrained from measuring further socio-demografic variables as, for instance, gender or research field within psychology.
[3] "Mittelbau" means that these persons had no professorship and many of them had fixed-term contracts lasting maximally 12 years.
[4] "Universities of applied sciences" offer bachelor and masters studies, are more applied and less research-oriented than universities.

We created 14 items that measured attitudes towards OS in general and towards public data sharing more specifically (see Table 1). Responses to these items were measured on 4-point rating scales (1 = *do not agree*, 2 = *slightly agree*, 3 = *fairly agree*, 4 = *fully agree*). We additionally included two open-ended questions regarding public data sharing Type 1 and Type 2. Participants first received a definition of Type 1 (later Tape 2) data sharing as explained in Schönbrodt et al. (2017, p. 24, p.26) and then were asked the following questions: "What do you think will be the long-term consequences if researchers are obliged to share the raw data that are part of a publication?", and "What do you think will be the long-term consequences if researchers are obliged to publicly share data they have collected in a funded project, but that have not been presented in a publication yet?"

Results

Ratings

Table 1 shows the attitude items and responses to them. We performed an exploratory factor analysis on these measures. As we had no a priori expectations regarding association between resulting factors, we chose oblimin rotation. The analysis yielded two factors with Eigenwert > 1. The first factor (explaining 39% of the observed total variance; 10 items with loadings > .40) comprises items assessing positive expectations regarding OS and public data sharing ("hopes"), the second factor (explaining 15% of the observed total variance; 4 items with loadings > .40) comprises items assessing negative expectations regarding the consequences of public data sharing ("fears;" see Table 2). The two factors are uncorrelated (r = -.06, *ns*). Following this factorial structure we constructed two scales. One scale (10 items) was called "hopes associated with OS and public data sharing " (Cronbach's α = .90). The second scale (4 items) was called "fears associated with public data sharing" (Cronbach's α = .67).

Figure 1 shows the means of these scales separated by occupational group. Hopes associated with OS varied significantly by occupational group, $F(3, 285) = 5.30$, $p = .001$, η^2

= .05, BF_{10} = 23[5]. The mean value of "hopes" was lowest among professors and highest among doctoral students, expressed most hopes with the other occupational groups in between. Fears also differed significantly between status groups, $F(3, 285) = 11.69$, $p < .001$, $\eta^2 = .11$, $BF_{10} = 8*10^4$. Both doctoral students and post-doctoral researchers on a "Mittelbau" position expressed more fears than professors, with the other occupational groups in between.

We also looked at the correlations between both scales in the different status groups. The correlation between "hopes" and "fears" was significantly negative for post-doctoral researchers on a "Mittelbau" position ($r = -.43$, $p < .001$). The more these persons appreciated OS and data sharing, the less they expressed fears of possible negative consequences. In all other occupational groups this correlation was relatively small and not significant (rs < -.17, *ns*).[6]

Qualitative Analysis of Open-Ended Answers

The question on long-term consequences of data sharing Type 1 was answered by 165 participants (Type 2: 158 participants). We analyzed these answers in a two-step process. First, we categorized them as expressing positive, negative, or both positive and negative consequences. Then we identified common themes within these groups of answers and illustrated them with exemplary answers of our participants. As these data are available online, readers are able to evaluate our categorizations (see Levitt et al., 2018; on data reporting in case of qualitative analyses).

Figure 2 shows that answers regarding Type 1 public data sharing were clearly more positive (58%) than negative (18%) or both positive and negative (24%). Regarding public

[5] We computed a Bayesian ANOVA with the BayesFactor package (Morey & Rouder, 2015), using the "medium" default setting for the effect size prior under H_1. A BF_{10} of 23 indicates that the empirical data are 23 times more likely under H_1 than under H_0. This indicates very strong evidence for H_1 (Lee & Wagenmakers, 2013).

[6] We also categorized the answers to both scales as either high (mean 3 and higher) or low (mean lower than 3) and performed a χ^2 analysis on the resulting two by two table. This analysis also revealed no systematic relation between both answers, $\chi^2 < 1$.

data sharing Type 2, the numbers are 43% positive, 34% negative, and 23% both positive and negative.

Table 3 summarizes the themes and examples of answers regarding consequences of Type 1 data sharing. Transparency of science, trustworthiness of findings, more rigor in data collection and analysis, possibility of secondary usage and higher quality and – positively evaluated – lower quantity of published articles were most frequently mentioned. Increased collaboration between researchers was also mentioned as a positive consequence of Type 1 data sharing. Negative consequences most frequently mentioned were increased costs (both time and money) for data management, emergence of "data cemeteries", a culture of distrust, and that public data sharing does not necessarily solve the problem of fraud. Combined positive and negative consequences mentioned most frequently were that data sharing is "good, but time-consuming"; "good, but data protection security issues have to be covered"; and "good, but the structure of scientific incentives has to change in order to give OS and public data sharing a chance".

Regarding consequences of Type 2 data sharing 30 participants answered with "see above", that is, they referred to the answer they had given with respect to consequences of Type 1 data sharing (12 positive, 8 negative, 10 both positive and negative). Table 4 summarizes the remaining themes and examples of answers regarding consequences of Type 2 data sharing. Positive consequences of public data sharing Type 2 were expected to be better usage of existing data, better spending of research money and a more parsimonious data collection. As negative consequences participants mentioned "Research Parasites", that is, researchers who do not collect own data but solely rely on others' data. They mentioned "Data Trash", e.g., shared data files that are not worth being shared. Furthermore, they mentioned legal and ethical concerns. The combined positive and negative answers concerned cost/benefit considerations; they again expressed that in order to be effective all researchers should comply because otherwise there will be competitive advantages for non-compliers.

A comparison between the open answers regarding consequences of Type 1 versus Type 2 public data sharing reveals a similar pattern: Data sharing has many positive consequences, but the scientific incentive system must be such that data collection and data sharing is reinforced and that it becomes a common practice performed by ideally all researchers. One fifth (data sharing Type 1) to one third (data sharing Type 2) of respondents thinks negatively about data sharing, particularly because they think that benefits are smaller than costs. Answers categorized as both positive and negative often combine the considerations made by respondents who were either positive or negative regarding data sharing.

Professors were more critical regarding consequences of data sharing Type 1 (44% positive responses) than pre-docs (80% positive responses) with the other groups in between (67% to 72% positive responses, χ^2 (6, 161) = 14.04, $p < .03$).[7] Professors (33% positive responses) were more sceptical regarding data sharing Type 2 than pre-docs (60% positive responses), post-doctoral researchers on "Mittelbau" positions (51% positive responses) and particularly post-doctoral researchers working outside academia (82% positive responses), χ^2 (6, 154) = 17.49, $p < .01$.

Discussion

We presented findings from a survey conducted among members of the German Psychological Society regarding OS and data sharing. One might question whether the relatively low response rate allows for valid interpretations. The relatively low relative number of respondents (divided by the total number of members of the DGPs) nonewithstanding, it should be noted that (1) the distribution of age groups and occupational status groups in our sample mirrors the population distribution of DGPs members, and that (2) the invitation to the survey already mentioned that the survey would be about "data management" and the recently published DGPs recommendations. Therefore, it is reasonable to assume that only members who (a) are interested in "Open Science" and (b) who have a stance towards data

[7] A recent study by Campbell, Micheli-Campbell & Udyawer (2018) similarly showed that younger researchers were more willing to share data than more senior researchers.

sharing began completing our survey, while researchers who (c) have not even noticed the DGPs recommendations on data management so far, (d) think that OS and data management is irrelevant for them, and (e) do not have a strong opinion on OS and data sharing did not even begin completing the survey. Thus, even if our data are not representative for the entire population of DGPs members, they might still allow valid conclusion about the most relevant sub-population of DGPs members, that is, those who have read the data management recommendations and made up their mind about them. Although we can, at this point, only speculate about systematic differences between responders and non-responders and about reasons for completing vs. not completing the survey, we believe that the low response rate in our survey does not necessarily undermine or compromise the validity of our findings.[8]

Attitudes towards OS and towards public data sharing were generally positive, but there were also fears that sharing data may have negative consequences for an individual's career; especially if not all researchers participate and if "Research Parasites" would unilaterally profit from those who share their data, that is, if incentives remain unchanged and "Research Parasites" cannot be turned into "Research Symbionts" (Fecher & Wagner, 2016). Interestingly, the hopes and fears associated with data sharing were – with one exception – uncorrelated, more hopes were not associated with more fears; and more hopes were also not associated with less fears. The only group in which the correlation between hopes and fears was highly negative was post-doctoral researchers on a "Mittelbau" position in academia – those for whom the question of incentive systems, cost-benefit analyses regarding their scientific practices (i.e. the amount of time they invest into preparing codebooks for their data instead of writing papers), and insecurities of the academic job market matter most. These participants were relatively optimistic, that is, the more hopes they associated

[8] One could, of course, also argue that more than 80% of DGPs members do not care enough about OS to even open the link.

with OS, the less fears did they express. These correlational findings suggest that our respondents' attitudes towards OS reflect both positive and negative expectations regarding the specific benefits and impediments of OS and the consequences of these practices for a person's career.

Not surprisingly, respondents who have not completed their doctoral studies and/or do not yet occupy a tenured position expressed more fears than particpants who already occupied a professorship (similarly: Houtkoop et al., 2018). Professors expressed both less fears, but also less hopes associated with public data sharing than pre- and post-doctoral researchers. Additionally, considering the open responses, these least positive attitudes expressed by professors reflect both a generally lower optimism regarding the consequences of OS and less optimism regarding the cost-benefit ratio of data sharing. It is unclear whether this higher skepticism is due to insistence on research routines that do not encompass OS and that should not be changed, reluctance regarding more "bureaucracy", or weaker beliefs in the usefulness of OS methods per se. This pattern calls for a deeper and more careful discussion of OS practices and standards among all occupational status groups – not only in workshops for early-career researchers, but also in workshops for more senior researchers. We now observe quite a few initiatives that bring OS ideas and practices into everyday psychological research like, for instance, the establishment of OS centers at universities, the call for OS practices in job advertisements (Schönbrodt, Maier, Heene, & Bühner, 2018; see also Abele-Brehm & Bühner, 2016), the provision of training workshops in OS practices, or the call for more research on the consequences of OS on theorizing and findings (e.g. Renkewitz & Heene, 2018).

The generally positive attitude towards OS and public data sharing and, at the same time, the differentiated viewpoints regarding the consequences of such an approach were most evident in the open answers. Regarding Type 1 data sharing, three main positive consequences were mentioned and should be highlighted: transparency of science, optimal usage of data, and more cooperation between researchers. The first two consequences have

already been discussed in the literature, but the third has received less attention yet (see, however, McKiernan et al., 2016): If researchers and research groups make use of OS by engaging in collaborative efforts, and if this collaboration takes place in a climate of respect and trust, then a positive consequence could be the emergence of more cumulative knowledge. This is a possibility (and a hope), and OS is the prerequisite for it.

The opinions regarding data sharing Type 2 were somewhat less positive. Besides concerns that researchers who collect data would profit less than researchers who use others' data, two issues seem to be particularly relevant. First, legal and ethical issues, which have partially been addressed in the data management recommendations of the DGPs, but that cover still more topics to be discussed (see Gollwitzer, Schönbrodt, Steinberg & Abele-Brehm, 2018). Second, respondents questioned whether all data collected in third-party funded projects are "worth" being shared publicly, that is, whether there is always a sufficient number of re-users to justify the work expenditure. We think that it is almost impossible to decide in advance whether data will be used by others or not. This seems to be more a question of good data storage management that ensures that open data is also FAIR (findable, accessible, interoperable, and reuseable; Wilkinson et al, 2016). We also think that technological developments, such as, a dataset search that has just been integrated into google scholar (Noy, 2018), will facilitate and accelerate this process and create a certain demand for FAIR datasets.

Some sceptics also argued that questionable research practices and data fraud can occur even if OS and data sharing were widely implemented. This is, of course, true, but the idea of OS is transparency, and the question whether transparency and a higher commitment to data sharing and OS practices will eventually decrease QRPs and, thus, increase the robustness and replicability of psychological effects remains to be determined empirically. Regardless of the outcome of such an investigation, open data allows to verify anal-

yses and to conduct in-depth post-publication peer reviews, and therefore is a crucial condition for raising an appropriate and constructive level of “organized skepticism,” which can be considered a value of science (Merton, 1942).

In summary, the hopes generally associated with data sharing and OS especially among young researchers might imply that these practices become more and more a common standard in science. However, besides positive attitudes (and respective behaviors) of researchers which can contribute to a “bottom-up” approach, a “top-down” approach (system level) is necessary. More and more journal editors obligate their authors to publicly share their data; funding agencies are developing respective policies (and offer money for data management); hiring committees consider OS practices as selection criteria (Schönbrodt et al., 2018; see also Abele-Brehm & Bühner, 2016); and research organizations provide more and better repositories for data sharing. OS should also become an issue in methodology curricula, and respective tools should be broadly discussed. The future will show how respective changes might influence the progress in psychological science.

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Table 1: Items and responses regarding attitudes towards Open Science and public Data Sharing (*N* = 308)

Item	Response categories				Item statistics	
	Do not agree	Slightly disa-gree	Slightly agree	Strongly agree	*M*	*SD*
1. I have more trust into research findings when the respective data are published	9%	14%	41%	36%	3.04	0.95
2. I have more trust into researchers who publish their data than into those who don't.	14%	17%	37%	32%	2.86	1.02
3. The costs of publishing research data stand in no relation to the useful-ness of publishing them	17%	38%	30%	15%	2.43	0.94
4. Publishing research data is generally dispensable	65%	28%	4%	3%	1.45	0.70
5. Science profits from data sharing	3%	5%	35%	57%	3.45	0.73
6. Given the present scientific context data sharing is bad for my career	40%	33%	20%	7%	1.93	0.93
7. I would gladly share my data, but only when other researchers share them as well	25%	27%	33%	15%	2.38	1.02
8. Publishing research data will soon be obligatory	7%	24%	47%	22%	2.86	0.84
9. In selection decisions people who share their data should be preferred (given the same qualification)	24%	21%	31%	24%	2.55	1.10
10. It should be taken for granted that research data are published	9%	16%	34%	41%	3.08	0.96

11. I am afraid that after publishing my data others will find errors in my analyses	28%	33%	32%	10%	2.21	0.96
12. I am afraid that I could have a competitive disadvantage when I share my data for usage by others	27%	26%	34%	13%	2.33	1.02
13. Science should be open and transparent	1%	1%	22%	76%	3.74	0.52
14. I can take an advantage when I publish my research data	11%	29%	35%	25%	2.75	0.96

Table 2. Exploratory Factor Analysis with Oblimin Rotation (4 iterations) Varimax Rotation of Attitude Items (*N* = 308)

Item	Factor 1 Loading*	Factor 2 Loading*
10	.83	-
2	.81	-
9	.81	-
1	.79	-
14	.76	-
4 (recoded)	.70	-
3 (recoded)	.67	-
5	.64	-
8	.63	-
13	.45	-
12	-	.79
7	-	.76
6	-.31	.62
11	-	.59

* Loadings < .30 are not mentioned

Table 3. Open answers* regarding consequences of Type 1 public data sharing (*N* = 165)

	Exemplary Content	Exemplary Answers
Positive	Transparency, trust, honesty Increased quality of publications (with reduced quantity) More accuracy in research More control of questionable research practices; of publication bias; of p-hacking Better data usage (secondary data usage; meta-analyses) Educational gain More cooperation between scientists	"More trust into research findings; validity and replicability can be better assessed; stimulation of further research questions; more cooperation between researchers; more efficient working" "There will be more meta-analyses. This is particularly important in Clinical Psychology as these original studies usually have too few participants" "Relief of participants because of secondary data usage; consequently more willingness to participate in new studies; I also think that public data sharing Type 1 is of educational value because newcomers become better informed" "Higher pressure on scientists to comply with rules of good scientific practice; more trust into findings; higher probability of replications"
Negative	More bureaucracy Data misuse by secondary data users Data cemeteries More costs Less creativity	"Further increase of administrative work in which science is being choked" "More mainstream research, less extraordinary approaches" "Increase of research-parasites especially in fields with expensive data collection (MRT, EEG, VR…); researchers who collect data will have a disadvantage compared to those who do meta-analyses or reanalyze data" "Less data will be collected"

	No effective means for prevention of scientific misconduct	"Worst case would be that researchers get paralyzed because of fear of having missed something and being accused by others" "Again trust is replaced by control" "If this should be a means of protection against data fraud, then the repository data will be faked"
Both positive and negative	Better data documentation, but more time and money to do this Should be an option not an obligation Incentive structures must change if OS should have a chance Secondary data usage comprises both chances and dangers	"Public data sharing can only be established if more researchers do it and if criteria for evaluation of scientific merits are reconsidered" "Higher reliability of published results, but also more time constraints for scientists" "Data sharing is good, but pre-registration is better" "Public data sharing is good on the one hand, but on the other hand problems of data protection security will increase" "More discipline, more controversial discussions, less creativity"

*Answers translated by the authors of this paper

Table 4. Open answers* regarding consequences of Type 2 public data sharing (*N* = 165)

	Exemplary Content	Exemplary Answers
Positive	Better usage of collected data and resources More parsimonious data collection Economic use of project money	"More research questions can be addressed; especially because different expertise can be applied to the data; scientific findings become more generalizable, for instance by use of meta-analytic techniques" "There will be more ex-ante considerations which measures to take and how this can be justified" "One answer to the file-drawer problem" "Resources are better used; perhaps one can assess in advance of own data collection if a certain hypothesis or design is of use"
Negative	Research parasites Data trash More costs and bureaucracy Legal and ethical concerns	"Data collection becomes more and more unattractive, research methods become more restricted; persons who re-analyze existing data have an advantage" "There will be more data trash because it is impossible to distinguish between findings that speak against a tested hypothesis and findings that were inappropriately collected (mistakes in research practice)" "Research becomes even more complicated; expenditure and bureaucracy increase and leave less and less time for actually doing research" "Useless data will be accumulated because legal regulations for data re-usage and for data security issues have not been established internationally"
Both positive and negative	Theoretically a wise endeavor, but costly (time and money)	"Much work, but desirable; possibly less publications because of time constraints due to public data sharing; however, if better publications, then it is a positive consequence" If all researchers do it then it will be positive. I fear, however, that some researchers won't comply and will have a competitive advantage"

	Not every data collection is worth being published Competitive disadvantage for researchers who collect data	“I ask myself if there will be many cases in which smaller or less well-known data files will be re-used; I am pretty sure that other projects have data that are interesting for me, but I do not know them and do not know how to seek for them”

* Answers translated by the authors of this paper

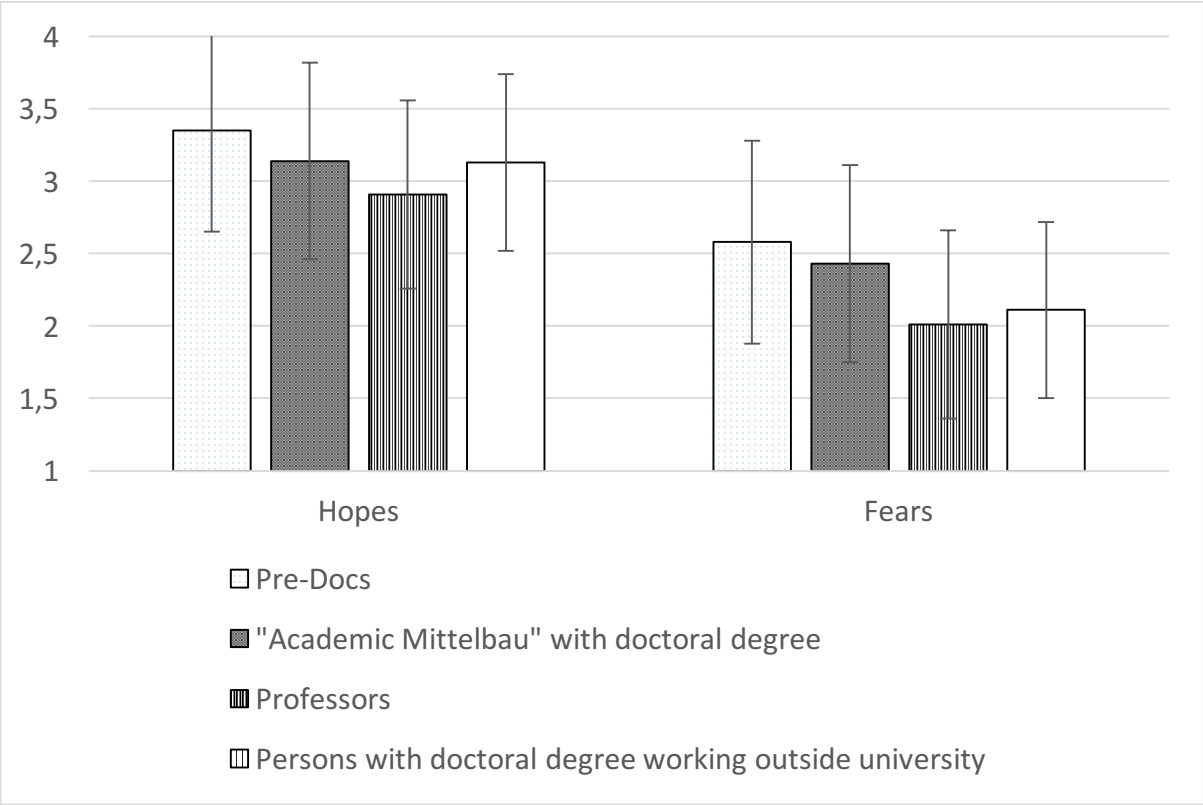

Figure 1. Attitudes towards Data sharing in the different Occupational Groups (*N* = 308)

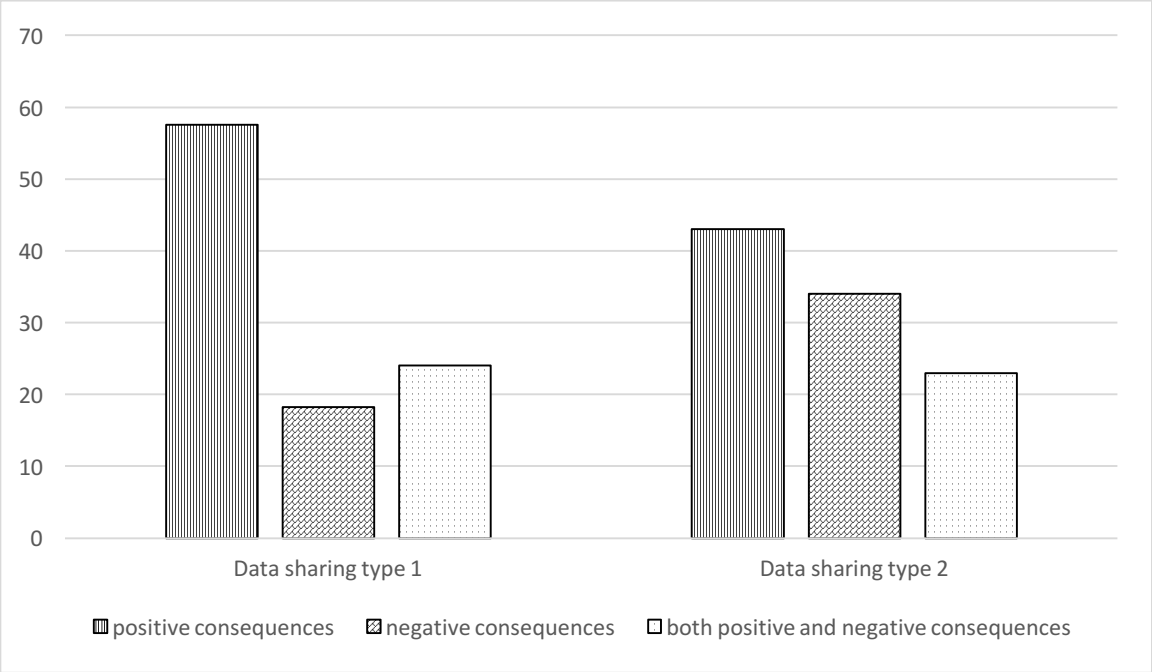

Figure 2. Open answers regarding consequences of public data sharing Type 1 and Type 2; percentage classified as positive, negative and both positive and negative (*N*= 161, Type 1; *N* = 154, Type 2)