



Analyse und Dokumentation

BSc Psychologie SoSe 2025

Belinda Fleischmann und Dirk Ostwald

	Gruppe 1/2	Gruppe 3	Format	Thema
1	Do, 10.04.	Fr, 11.04.	Seminar	(1) Quarto, Zotero, Tidyverse
2	Do, 17.04.	Fr, 25.04.	Seminar	(2) Forschungsethik
3	Do, 24.04.	Fr, 02.05.	Seminar	(3) Wissenschaftliche Berichte
4	Mi, 30.04.	Fr, 09.05.	Seminar	(4) Offenheit und Transparenz
5	Do, 08.05.	Fr, 16.05.	Praxisseminar	Offene Übung
6	Do, 15.05.	Fr, 23.05.	Präsentationen	Einfache Lineare Regression
7	Mi, 21.05.	Fr, 30.05.	Präsentationen	Korrelation
8	Do, 05.06.	Fr, 06.06.	Präsentationen	Einstichproben-T-Test
9	Do, 12.06.	Fr, 13.06.	Präsentationen	Zweistichproben-T-Test
10	Do, 19.06.	Fr, 20.06.	Präsentationen	Einfaktorielle Varianzanalyse
11	Do, 26.06.	Fr, 27.06.	Präsentationen	Zweifaktorielle Varianzanalyse
12	Do, 03.07.	Fr, 04.07.	Präsentationen	Multiple Regression
13	Do, 10.07.	Fr, 11.07.	Präsentationen	Kovarianzanalyse
	Juli		Klausurtermin	

(4) Offenheit und Transparenz

Motivation

Methodentransparenz

Datentransparenz

Selbstkontrollfragen

Motivation

Methodentransparenz

Datentransparenz

Selbstkontrollfragen

Motivation



Illustration by David Parkins

Chambers (2019)

Das Replizierbarkeitskrisennarrativ

Psychologie – 64 von 100 Studien nicht replizierbar

- Open Science (2015)

Nulleffekte in preregistrierten Replizierbarkeitsstudien

- Hagger u. a. (2016), Wagenmakers u. a. (2017), O'Donnell u. a. (2018)

Verhaltensökonomie – 7 von 18 Studien nicht replizierbar

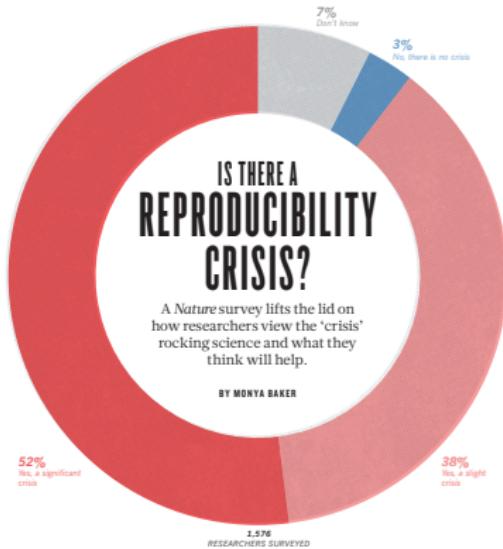
- Camerer u. a. (2016)

Biologie – 47 von 53 Studien nicht replizierbar

- Begley und Ellis (2012)

Reproduzierbarkeitskrise in Machine-Learning-basierter Wissenschaft

- Kapoor und Narayanan (2022)



Baker (2016)

Das Replizierbarkeitskrisennarrativ

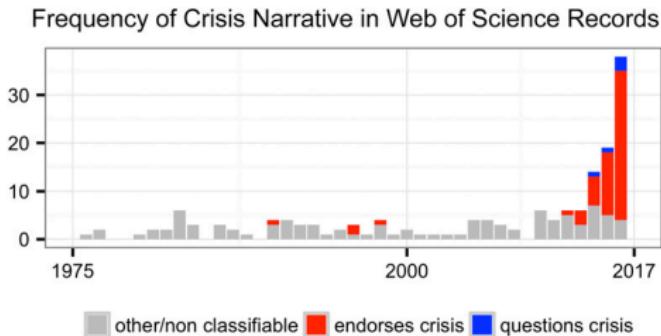
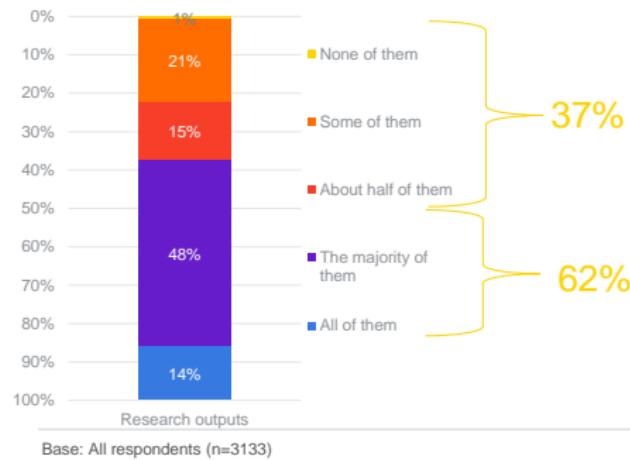


Fig. 1. Number of Web of Science records that in the title, abstract, or keywords contain one of the following phrases: "reproducibility crisis," "scientific crisis," "science in crisis," "crisis in science," "replication crisis," "replicability crisis." Records were classified by the author according to whether, based on title and abstracts, they implicitly or explicitly endorsed the crisis narrative described in the text (red), or alternatively questioned the existence of such a crisis (blue), or discussed "scientific crises" of other kinds or could not be classified due to insufficient information (gray). The complete dataset, which includes all titles and abstracts and dates back to the year 1933, is available in [Dataset S1](#). This sample is merely illustrative, and does not include the numerous recent research articles and opinion articles that discuss the "science is in crisis" narrative without including any of the above sentences in the title, abstract, or keywords.

Fanelli (2018)

Das Replizierbarkeitskrisennarrativ

Thinking about the various research outputs that you interacted with (or encountered) last week what proportion of the outputs would you consider trustworthy?



<https://senseaboutscience.org/wp-content/uploads/2019/09/Quality-trust-peer-review.pdf>

Das Replizierbarkeitskrisennarrativ

Which of the following mechanisms do you employ to compensate for any lack of confidence you have in the content you are considering reading/accessing?



Base: All respondents that do not think all research outputs are trustworthy
(n=2715)

<https://senseaboutscience.org/wp-content/uploads/2019/09/Quality-trust-peer-review.pdf>

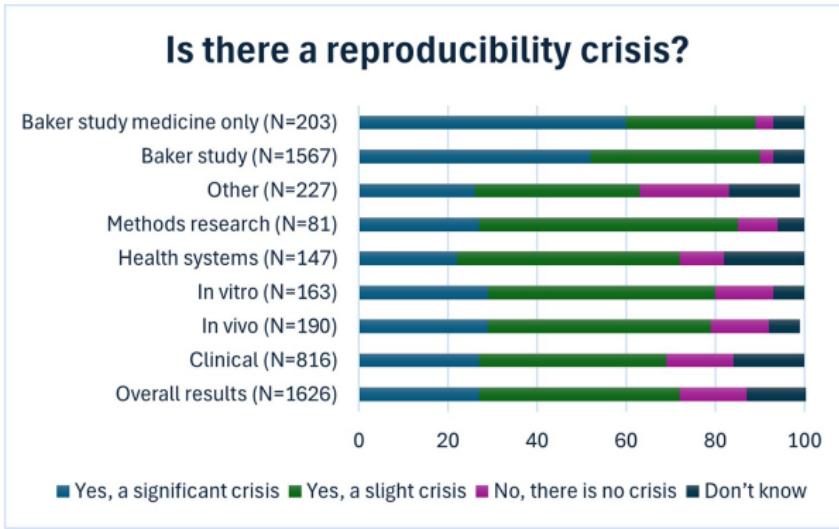


Fig 1. Participant perceptions of a reproducibility crisis. Data is presented overall for all participants in the current study and is broken down by research focus area in medicine. Results are presented in context to the overall Nature study findings and specifically to participants from this study indicating they worked in medicine. The underlying data for this figure can be found at <https://osf.io/dbh2a>.

<https://doi.org/10.1371/journal.pbio.3002870.g001>

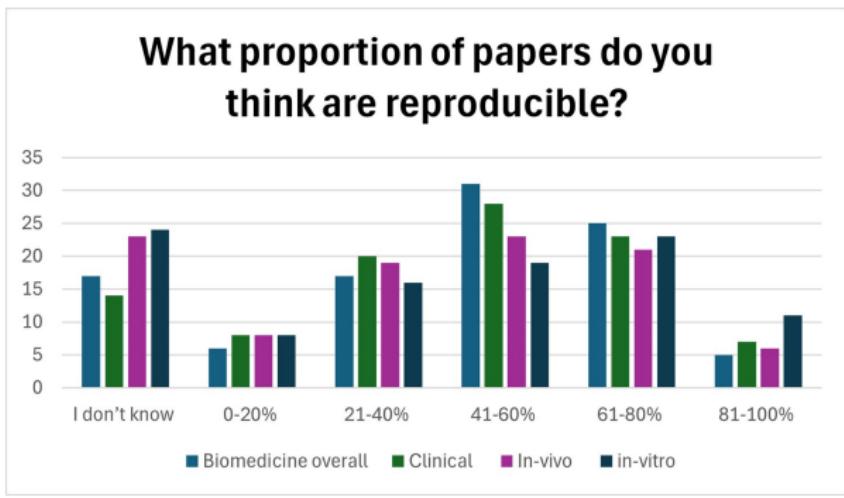


Fig 2. Participants perceptions of the proportion of papers they think are reproducible in biomedicine overall and by biomedical research area. The underlying data for this figure can be found at <https://osf.io/dbh2a>.

<https://doi.org/10.1371/journal.pbio.3002870.g002>

Das Replizierbarkeitskrisennarrativ

Table 2. Participant perceptions of the causes of irreproducibility.

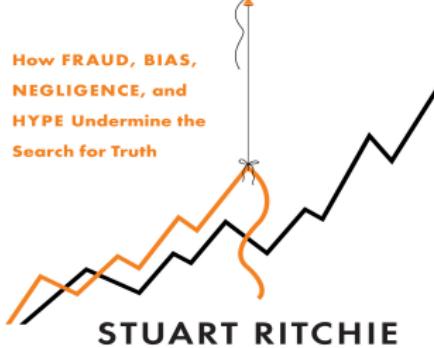
	N(%)					
	Always contributes	Very often contributes	Sometimes contributes	Does not contribute	Unsure	Missing data
Selective reporting of the published literature	131 (8)	638 (40)	714 (45)	43 (3)	73 (5)	31
Selective publication of entire studies	182 (11)	698 (44)	577 (36)	71 (4)	71 (4)	31
Pressure to publish	300 (19)	693 (43)	473 (30)	75 (5)	57 (4)	32
Low statistical power	185 (12)	706 (44)	579 (36)	76 (5)	48 (3)	36
Poor statistical analysis	197 (12)	615 (38)	649 (41)	99 (6)	44 (3)	26
Not enough internal replication (E.g., by the original lab/authors)	132 (8)	539 (34)	697 (44)	93 (6)	142 (9)	27
Insufficient study oversight	86 (5)	376 (24)	799 (50)	194 (12)	143 (9)	32
Lack of training in reproducibility	153 (10)	522 (33)	622 (39)	168 (11)	135 (8)	30
Failure to make materials openly available	141 (9)	449 (28)	722 (45)	191 (12)	99 (6)	28
Failure to make original study data openly available	137 (9)	476 (30)	685 (43)	205 (13)	94 (6)	33
Poor study design	208 (13)	584 (36)	678 (42)	96 (6)	38 (2)	26
Fraud	185 (12)	120 (8)	624 (40)	320 (20)	330 (21)	51
Poor quality peer review	140 (9)	437 (27)	755 (47)	192 (13)	72 (5)	34
Problems the design of replication studies	103 (6)	406 (25)	809 (51)	162 (10)	123 (8)	27
Technical expertise required for replication	96 (6)	429 (27)	743 (46)	190 (12)	144 (9)	28
Variability of standard reagents	82 (5)	288 (18)	617 (39)	229 (14)	380 (24)	34
Bad luck	23 (1)	70 (4)	461 (29)	568 (36)	466 (29)	42

<https://doi.org/10.1371/journal.pbio.3002870.t002>

Cobey u. a. (2024)

Science Fictions

How FRAUD, BIAS,
NEGLIGENCE, and
HYPE Undermine the
Search for Truth



Ritchie (2020)

Motivation

Methodentransparenz

Datentransparenz

Selbstkontrollfragen

Ausgangslage

- Academia wertet spannende Resultate höher als sorgfältige Arbeit
- Academia interessiert sich wenig für die eigentliche Arbeit, sondern die Resultate
- Academia liebt komplexe Analysen ohne den Anspruch, sie verstehen zu wollen
- Academia mag keine Nullergebnisse

Konsequenzen

- Publizierte Resultate sind oft nicht reproduzierbar und aufbaufähig
- Ressourcenverschwendungen
- Geringes innerakademisches Vertrauen in publizierte Resultate
- Gefahr des geringen extraakademischen Vertrauens in publizierte Resultate

Lösung

- Gewährleistung von Reproduzierbarkeit durch Methoden- und Datentransparenz

Replizierbarkeit

Andere Wissenschaftler:innen nutzen andere (neue) Daten und potentiell andere Methoden und kommen zur gleichen Schlußfolgerung wie eine Originalstudie

⇒ Abhängig von den wahren, aber unbekannten, Parametern

⇒ Unbeinflussbar

Reproduzierbarkeit

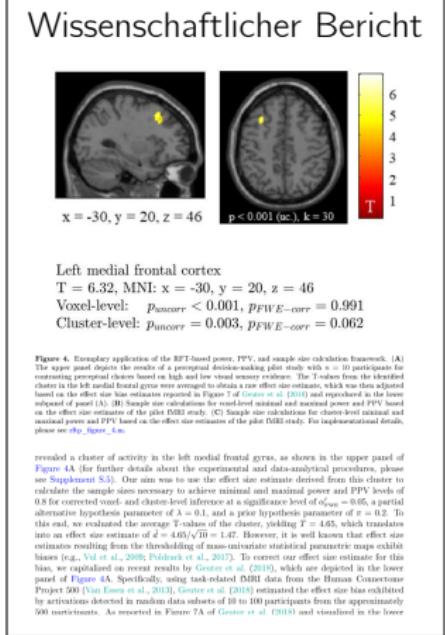
Andere Wissenschaftler:innen nutzen die gleichen Daten und die gleichen Datenanalysemethoden und erhalten die gleichen Resultate (cf. Peng (2011))

⇒ Abhängig von der Sorgfältigkeit der wissenschaftlichen Arbeit

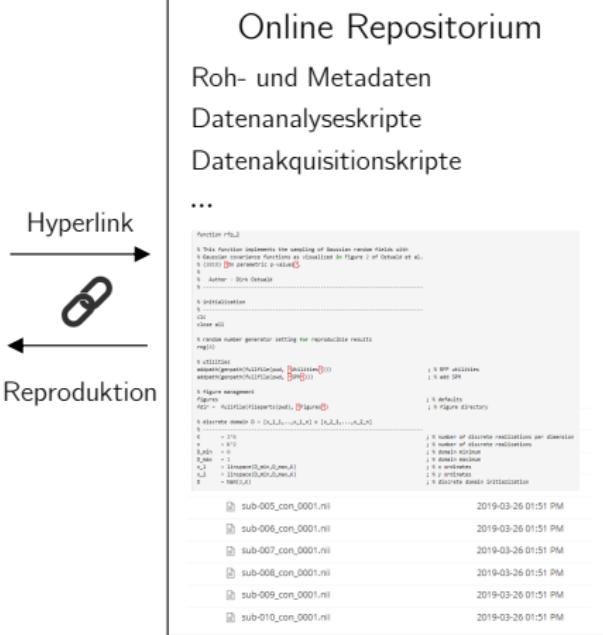
⇒ Beeinflussbar

⇒ Menschen machen Fehler

Replizierbarkeit und Reproduzierbarkeit



revealed a cluster of activity in the left medial frontal gyrus, as shown in the upper panel of Figure 4A. (For further details about the experimental and data-analytical procedures, please see [Supplement S.3](#)). Our aim was to use the effect size estimate derived from this cluster to calculate the sample size required to achieve minimum, maximum power and a significance level of 0.8 for corrected voxel- and cluster-levels at a significance level of $\alpha_{\text{c},\text{corr}} = 6.05$, a partial alternative hypothesis parameter of $\lambda = 0.1$, and a prior hypothesis parameter of $\pi = 0.2$. To this end, we evaluated the average T-values of the cluster, yielding $T = 4.65$, which translates into an effect size estimate of $d = 4.65/\sqrt{10} = 1.47$. However, it is well known that effect size estimates obtained from pilot studies are subject to bias due to low statistical power and selection biases (e.g., [Vil et al., 2009; Poldrack et al., 2017](#)). To correct our effect size estimate for this bias, we capitalized on recent results by [Gheser et al. \(2018\)](#), which are depicted in the lower panel of Figure 4A. Specifically, using task-related fMRI data from the Human Connectome Project 500 ([Van Essen et al., 2013](#); [Gheser et al. \(2018\)](#) estimated the effect size bias exhibited by activations detected in random data subsets of 10 to 100 participants from the approximately 500 participants. As is depicted in Figure 7A of [Gheser et al. \(2018\)](#) and visualized in the lower



Wissenschaftliche Qualitätssicherung

- Pre- und Postpublikations-Mehraugenprinzip
- Reproduzierbarkeit bei identischen Daten und Analysen gesichert
- Replikationspotential für neue Daten und Analysen erhöht

Nachhaltigkeit

- Möglichkeit der Datenwiederverwendung in neuen Kontexten
- Maximierung der Anzahl experimenteller Einheiten
- Ermöglichung automatisierter Metaanalysen

Ethischer Imperativ

- Respekt im Umgang mit öffentlichen Geldern
- Respekt für die Beiträge von Forschungspersonen
- Minimierung von Forschungsrisiken

Maßnahmen

- Computercode als ausführlichste Form der Dokumentation
- Referenzierung datenanalytischer Skripte in Methods und Results Sections
- Verfügbarkeit zum Zeitpunkt der Veröffentlichung (Preprint/Journal Submission)

Voraussetzungen

- Automatisierte Datenanalyse von Rohdaten zu Abbildungen und Tabellen
- Lesbarer, gut-strukturierter und extensiv kommentierter Code
- Verzicht auf Variablennamen mit persönlichkeitsrelevanten Merkmalen

Motivation

Methodentransparenz

Datentransparenz

Selbstkontrollfragen

Maßnahmen

- Digitale Rohdaten als ausführlichste Form der Datengrundlage
- Formatierung anhand akzeptierter Datenstandards
- Verfügbarkeit zum Zeitpunkt der Veröffentlichung (Preprint/Journal Submission)

Voraussetzungen

- Vorliegen digitaler Rohdaten
- Verfügbarkeit von Speicherplatz
- Respekt datenschutzrechtlicher Belange

Open Science Framework

- Nichtkommerzielles Datenrepository
- Projektarchivierung bei Preprint/Journal Submission/Revision
- Seit 2020 beschränkter Speicherplatz pro Projekt

GitHub

- Kommerzieller Dienst zur Versionsverwaltung für Software-Entwicklungsprojekte.
- Kollaborative Softwareentwicklung (Track Changes)
- Oft irrtümlich zur Analysecodearchivierung benutzt

Forschungsdatenzentrum des ZPID

- Digitales Forschungsdatenzentrum für die psychologische Forschung
- Teil der öffentlich finanzierten Leibniz-Gemeinschaft
- Unterstützung bei Dokumentation und Archivierung als kostenpflichtige Services

Brain Imaging Data Structure

- Datenstandard für Neuroimaging- und Verhaltensdaten
- Stetige Weiterentwicklung auf weitere Datenmodalitäten
- Gorgolewski u. a. (2016)

PsyCurADat

- Datenstandard für psychologische Daten
- Zur Zeit noch in der Entwicklung
- Blask, Gerhards, und Jalynskij (2021)

Psychologische Daten sind in aller Regel sensible humane Daten

Datenschutzrechtliche Belange müssen respektiert werden

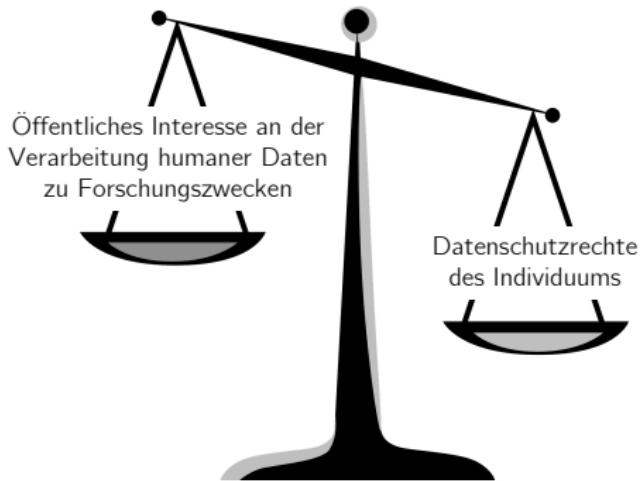
Das Datenschutzrecht gliedert sich in

- EU Datenschutzgrundverordnung ([DSGVO](#)) [EU2016/679]
- Bundesdatenschutzgesetz ([BDSG](#))
- Datenschutzgesetze der Bundesländer

Psychologische Daten fallen in aller Regel unter *personenbezogene Daten*

"Alle Informationen, die sich auf eine identifizierte oder identifizierbare natürliche Person beziehen; als identifizierbar wird eine natürliche Person angesehen, die direkt oder indirekt, insbesondere mittels Zuordnung zu einer Kennung wie einem Namen, zu einer Kennnummer, zu Standortdaten, zu einer Online-Kennung oder zu einem oder mehreren besonderen Merkmalen, die Ausdruck der physischen, physiologischen, genetischen, psychischen, wirtschaftlichen, kulturellen oder sozialen Identität dieser natürlichen Person sind, identifiziert werden kann"

Datenschutzrechtliche Aspekte



Möglichkeiten der Datentransparenz beim Umgang mit humanen Daten

Public sharing

- Open data platforms



Restricted sharing

- Peer-to-peer data sharing



Dynamic sharing

- Participant-centred platforms



Public Sharing

Datenbereitstellung auf weltweit frei zugänglichen Datenplattformen

- Allgemeiner Datenzugang für alle Formen der Datennutzung

Vorteile

- Einfach
- Etabliert
- Ressourcen sensibel

Nachteile

- Unwiderruflich
- Gefahr des Datenmissbrauchs
- Unklarer datenschutzrechtlicher Stand (DSGVO)

Restricted sharing

- Datenzugangsregelung mithilfe von Data Use Agreements

Vorteile

- Risikominimierung
- Klare Verantwortlichkeiten
- Teilweise etabliert

Nachteile

- Restriktiv
- Verantwortlichkeit auf Seiten der Wissenschaftler:innen
- Paternalistisch

Restricted sharing

The screenshot shows the homepage of PsychArchives, a disciplinary repository for psychological science. At the top left is the zpid logo with the text "Leibniz-Institut für Psychologie". At the top right is a link to "Contact the PsychArchives team". The main header "PsychArchives" is in white on a blue bar. Below the header, there are navigation links: Home, Contribute, Browse, DRO Types, and Info. The main content area has a blue background with a server and storage unit illustration. The title "Disciplinary Repository for Psychological Science" is centered. A text box describes PsychArchives as a repository for psychological science and neighboring disciplines, mentioning 20 different digital research object (DRO) types. It also highlights the COVID-19 Snapshot: MOnitoring (COSMO) project. A "Contribute" button is visible. At the bottom, there is a search bar with the placeholder "What are you searching for?" and a magnifying glass icon. A section titled "Highlighted Digital Research Objects" is at the very bottom.

Restricted sharing

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Dynamic sharing

- Proband:innenzentrierte Datenplattformen
- Datenzugangsregulation und Monetarisierung durch Proband:innen

Vorteile

- Digitales Empowerment
- Klare Verantwortlichkeiten
- Zukunftsorientiert

Nachteile

- Drop-out
- Nicht etabliert
- Ressourceintensiv

Dynamic sharing

Die elektronische Patientenakte (?)



Die ePA für alle:

Vorteil Nr. 8

Sie können bestimmen,
wer Ihre Daten sehen darf.

Methodentransparenz und Datentransparenz



Pillars of Open Science, UNESCO (2021)

Motivation

Methodentransparenz

Datentransparenz

Selbstkontrollfragen

Selbstkontrollfragen

1. Begründen Sie die Wichtigkeit, die Reproduzierbarkeit von Forschung durch Methoden- und Datentransparenz zu fördern.
2. Erläutern und differenzieren Sie die Begriffe Replizierbarkeit und Reproduzierbarkeit.
3. Nennen und erläutern Sie den Nutzen von Methoden- und Datentransparenz.
4. Nennen Sie die Kernaspekte und Voraussetzungen für Methodentransparenz.
5. Nennen Sie die Kernaspekte und Voraussetzungen für Datentransparenz.
6. Nennen Sie drei Online-Repositorien, die in der Forschung verwendet werden.
7. Nennen Sie zwei Datenstandards, die für die psychologische Forschung relevant sind.
8. Diskutieren Sie die Vor- und Nachteile verschiedener Formen von Data Sharing.

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