Pre-registration of a community-augmented meta-analysis (Study protocol)

1. Study Title

Keeping meta-analyses alive and well: Using PsychOpenCAMA to implement a community-augmented meta-analysis on the Dark Triad of personality

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4. Anticipated/Actual start date

Anticipated: 29.02.2020
Actual: after acceptance/publication of the study protocol

5. Anticipated completion date

As a CAMA is open-ended, there will be ongoing literature search, study selection and analyses during the study.
Anticipated date for final study selection: 30.06.2020

6. Conflicts of interest

No known conflicts of interest

7. Stage of review at time of this submission

The review has not yet started **X**

	Started	Completed
Preliminary searches	Yes	No
Piloting of the study selection process	No	No
Formal screening of search results against eligibility criteria	No	No
Data extraction	No	No
Risk of bias (quality) assessment	No	No
Data analysis	No	No

Existing data will be included in the CAMA (see section 10 – Existing data).

8. Study Description

A community-augmented meta-analysis (CAMA), first introduced by Tsuji et al. (2014), is a web-based research synthesis providing open-access to all data and results. The main idea of CAMA is to keep meta-analyses up-to-date by allowing the research community to continuously include new evidence, thus making meta-analyses replicable, expandable, and "living". The Leibniz Institute of Psychology Information (ZPID) is currently developing a platform, PsychOpenCAMA, which will enable the realization of CAMAs.

The proposed study will be a primer on how to conduct a CAMA with PsychOpenCAMA. As an exemplary illustration, a large-scale living meta-analysis on the Dark Triad of personality will be conducted. The field of the Dark Triad research appears particularly suited for a CAMA. There has been an ever-growing research interest and accumulation of evidence since the introduction by Paulhus and Williams (2002).

The meta-analytical investigation in the proposed CAMA will focus on overall interrelations between the three Dark Triad traits (Machiavellianism, narcissism and psychopathy) as well as univariate and multivariate sex differences. Overall component interrelations will be expressed by correlations (Pearson's r). Overall univariate sex differences will be investigated using the effect size estimate Hedge's g for every Dark Triad trait.

To investigate multivariate sex differences Mahalanobis' D will be computed. Primary known as a tool to value the influence of outliers in multivariate analyses (i.e. Mahalanobis distance), Mahalanobis' D can also be used as a multivariate effect size, particularly in relation to sex differences (Del Giudice, 2019). By computing Mahalanobis' D for every included study (i.e. multivariate difference between men and women), the investigation of overall sex-differences in the three-dimensional space of the Dark Triad of personality will be possible. Studies regarding sex differences in multi-dimensional personality revealed larger, robust sex differences compared to univariate investigations (Del Giudice, 2011; Del Giudice et al., 2012).

9. Domain being studied

As described in section 8 (study description), studied domain in this CAMA will be the Dark Triad of personality and its subclinical components Machiavellianism, narcissism and psychopathy (Paulhus & Williams, 2002).

10. Existing Data

The planned CAMA will be based on a recent master thesis – a meta-analysis on the Dark Triad of personality, which investigated component interrelations and univariate sex differences (Prinz, 2019). This meta-analysis included studies until March 2018 (cited reference search based on Paulhus & Williams, 2002). Thus, study characteristics, effect sizes and further relevant data are known and will be included into the proposed CAMA. Literature search and study selection process will be updated, to include more recent studies as well (see section 13 literature search). Moreover, existing data will be screened again as there will be additional methodological updates (e.g. multivariate analyses of sex differences).

Regarding the proposed CAMA, neither a systematic search and data extraction, nor any meta-analytic analyses have been conducted on the existing data so far.

11. Research Questions

1) How is a CAMA feasible in PsychOpenCAMA and what are the steps of the implementation process?

2) What is the correlative structure of the three Dark Triad traits (narcissism-Machiavellianism, narcissism-psychopathy, Machiavellianism-psychopathy)?

3) Are there equivalent differences between overall univariate and global multivariate sex differences in Dark Triad personality traits compared to investigations of other personality models (e.g. Del Giudice et al., 2012)?

12. Hypotheses

H1: There will be moderate correlations between the three Dark Triad traits (narcissism-Machiavellianism, narcissism-psychopathy and Machiavellianism-psychopathy), with the highest correlation between Machiavellianism and psychopathy.

H2: There will be significant univariate sex differences in all three Dark Triad traits (narcissism, Machiavellianism and psychopathy), where men scored higher in all traits.

13. Literature search

The main part of the literature search will be a continuous cited reference search in Google Scholar based on the introduction of the Dark Triad from Paulhus and Williams (2002).
As described above (section 10 – existing data), existing data of a prior meta-analysis will be included (Prinz, 2019). Literature search in this previous meta-analysis consisted of a forward (cited reference) search for Paulhus and Williams (2002). Data exists from 2002 (publication date) until March 1, 2018. Therefore, the continuous cited reference search of the proposed CAMA will focus on relevant literature past March 1, 2018.
Search date: continuous

Additional literature search will be conducted to identify studies, which did not cite the introduction article of Paulhus and Williams (2002).

1) Backward (reference list) search based on existing meta-analyses on the Dark Triad. Inclusion of additional studies already selected by Prinz (2019) from Muris et al. (2017)
2) Further database-search:
   - Web of Science, PSYNDEX, PsychINFO, Scopus and Open Access Theses and Dissertations (OATD)

<u>The following search-terms will be used for database search:</u>

- Dark Triad (title/keywords/topic) OR
- narcissism AND Machiavellianism AND psychopathy (title/keywords/topic)

<u>Additional information</u>

As a CAMA is open-ended, there will be an ongoing literature search and study selection.

14. Eligibility criteria

To investigate the research questions, studies included need to investigate/report:

- the three components of the Dark Triad (narcissism, Machiavellianism, psychopathy) within one sample
- results (mean and standard deviation) of men and women for the three traits

Meta-analyses and systematic reviews on the Dark Triad will be excluded.
There will be no restrictions regarding language, publication period and publication status.
Required translations for screening processes will be performed using Google Translate.

15. Participants/Population

There will be no restrictions regarding participants or populations investigated in the primary studies. Relevant sample characteristics will be coded and considered in explorative moderator analyses (e.g. sample age, sample size, nationality, etc.).

16. Scales

There are several individual measures for every Dark Triad component, as every trait has been emerged separately out of distinct research areas (Muris et al., 2017). The original and most commonly-used measures for each Dark Triad trait are:

- MACH-IV (Christie & Geis, 1970) for Machiavellianism
- Narcistic Personality Invenory (NPI; Raskin & Hall, 1979) for narcissism
- Self-Report Psychopathy Scale (SRP-III; Paulhus et al., 2009) for psychopathy

Additionally, there are two frequently-used collective assessments of the Dark Triad:

- Dark Triad Dirty Dozen (DTDD; Jonason & Webster, 2010)
- Short Dark Triad (SD3; Jones & Paulhus, 2014)

Further scales, newer versions as well as truncated measures are expected. Hence, there will be no restrictions for eligibility, regarding the scales used in the primary studies for assessing the Dark Triad traits. As there will be differences between the measures, characteristics of scales used will be coded and considered in explorative moderator analyses (e.g. language, no. of items, etc.).

17. Types of study and context

Every type of study will be included in the CAMA, except systematic reviews and meta-analyses on the Dark Triad (see section 13 – eligibility criteria). Grey literature/unpublished literature meeting the inclusion criteria will be selected as well (e.g. literature search in Google Scholar or OATD for grey literature). Characteristics of included studies will be coded and considered in explorative moderator analyses (e.g. type of literature, publication year, etc.).

18. Main Outcomes

The main outcomes are the interrelations between the three Dark Triad traits (narcissism-Machiavellianism, narcissism-psychopathy, and Machiavellianism-psychopathy, the overall univariate mean differences of men and women in every Dark Triad trait, as well as the overall multivariate difference between men and women in the Dark Triad.

Overall component interrelations will be expressed by correlations (Pearson's *r*). Overall univariate sex differences will be investigated using the effect size estimate Hedge's *g* for every Dark Triad trait (Machiavellianism, narcissism and psychopathy). To investigate multivariate sex differences Mahalanobis' D will be computed, combining sex differences in all three Dark Triad traits at once (for theoretical considerations see section 8 – study description).

19. Study selection

Literature will be screened for inclusion and exclusion criteria.

1) Abstract screening of all resulting literature to identify studies that certainly do not correspond the inclusion criteria
2) Full text screening of all remaining studies, whether all relevant statistical information is reported

Reasons will be specified for studies that are excluded. All information about the screening, inclusion, and exclusion process will be displayed in a PRISMA Flowchart.

20. Data extraction and coding

In PsychOpenCAMA the use of hierarchical structured, standardized coding schemes is planned. To facilitate the implementation, the coding scheme of the proposed CAMA will be divided into four levels. Information from one study is linked between the levels with unique study IDs. Coding will be conducted and recorded, using excel spreadsheets.

1) <u>Study Characteristics</u>
   author, title, year, literature type (published vs. unpublished), language of study, language of measure, total cites, citation density/cites per year, lab (authored/co-authored by Peter K. Jonason)

2) <u>Sample</u>
   N total, N men, N women, Age mean/sd, country, continent, OECD membership (yes vs. no), sample type (students, adults, adolescents, other)

3) Scales
   Number of scales used, number of items total, number of items used to assess every trait, Cronbach's Alpha of each scale, language of measurement, measurement type (individual vs. combined)

4) Outcomes (Intercorrelations, sex differences)
   Results from the study: intercorrelations total, intercorrelations for men and women, mean/sd for every trait for men and women

Additional information of the included studies (i.e. study and sample characteristics) will be extracted, in order to conduct explanatory moderator analyses in case of substantial between-study heterogeneity (for further explanation see section 22 – Study heterogeneity and moderator analyses).

Coded data will be checked by at least one additional independent person. Intercoder reliability will be assessed for at least 30 included studies, as a subsample of 20 to 50+ studies is recommended by Lipsey and Wilson (2001, p. 86). Divergent cases will be discussed until they are resolved. Study investigators will be contacted via e-mail, in cases of unreported, but relevant information.

21. Strategy for data synthesis

Computation of effect sizes:

The following effect sizes will be computed in the proposed CAMA:

1) Component interrelations → Pearson's *r*
   For synthesis Pearson's *r* will be converted into Fisher's *z*.
2) Univariate sex differences → Hedges' *g*
   Computation of Hedges' *g* for differences between men and women in psychopathy, Machiavellianism, and narcissism for every included study.
3) Multivariate sex differences → Mahalanobis' D
   Mahalanobis' D (i.e. multivariate differences between men and women in the dark triad) for every included study will be computed, following guidelines from Del Giudice et al. (2012).

Correction of effect sizes:

Due to possible biasing impacts of statistical and psychometrical artifacts, a psychometric approach will be followed in the proposed CAMA (Schmidt & Hunter, 2015). Therefore, individual corrections for measurement error variances will be applied, following recommendations and formulas of Wiernik and Dahlke (2020). Effect size corrections will be conducted for component interrelations (Pearson's *r*) and univariate sex differences (Hedges' *g*), using the R package 'psychmeta' (Dahlke & Wiernik, 2019).

Data will be synthesized from individual studies in 7 separate observational meta-analyses.

1) Component Interrelations (ES = Pearson's *r*)
   - Interrelations (Machiavellianism-narcissism)
   - Interrelations (Machiavellianism-psychopathy)
   - Interrelations (narcissism-psychopathy)

2) Univariate Sex Differences (ES = Hedges' *g*)
   - Sex differences (Machiavellianism)
   - Sex differences (narcissism)
   - Sex differences (psychopathy)

3) Multivariate Sex Differences (ES = Mahalanobis' D)
   - Multivariate sex differences (Dark Triad)

A random-effects meta-analysis with the restricted maximum-likelihood estimator (REML) will be conducted using the R package 'metafor' (Viechtbauer, 2010). The reasons for choosing a random-effects model are twofold. First, differences between the included studies (e.g. sample characteristics, scales used to assess the dark triad traits) are expected. Second, previous conducted meta-analyses revealed moderate to high heterogeneous effect sizes (e.g. Muris et al., 2017; Prinz, 2019). Every meta-analysis in this CAMA will be modelled in a two-level meta-analytic model, considering the sampling error (level 1) and the between-study heterogeneity (level 2). The results in this CAMA (overall estimates, individual study estimates) will be summarized in rainforest plots, using the R package 'metaviz' (Kossmeier, Tran & Voracek, 2019).

Sensitivity analysis

In order to examine the impact of individual studies on the overall effect and to identify potential outliers leave-one-out sensitivity analyses will be performed by excluding primary studies one at a time. Resulting exclusions will be made transparent and reasons will be reported.

22. Study heterogeneity and moderator analyses

Study heterogeneity

The study heterogeneity will be assessed using the Cochran *Q* Test. The amount of heterogeneity will be described using the I^2 statistic. It will be interpreted following the benchmarks from Higgins and Thompson (2002).

Moderator analyses

Moderator analyses will be applied explorative, in case of substantial between study heterogeneity. Previous considerations regarding possible moderators follow the investigations and results of Prinz (2019).

The following information of the included primary studies will be used for explorative moderator investigations:

1) Sample
   Continuous: total sample size (study), sample size men/women, sample age
   Categorial: country, continent, OECD membership, sample type

   As there are no restrictions in eligibility criteria regarding sample type (adult, adolescent, student, etc.), nationality and age (see section 15 – Participants), this information will be considered as possible moderating effects in explorative moderator analyses in the proposed CAMA.

2) Report
   Continuous: year of publication, citation density, total citations
   Categorial: literature type (published vs. grey literature), lab (Peter K. Jonason)

   Prinz (2019) included citation density (citations per year) and total citations per reference as moderators to investigate, whether studies showing larger effect sizes are

cited more often. As citations of a reference stay dynamic, up-to-date investigations of this variables will be of special interest.

Additionally, a lab effect (studies authored/co-authored by Peter K. Jonason) was investigated in the previous meta-analysis (Prinz, 2019). Although expected by the author, studies conducted by the lab of Peter K. Jonason did not show higher overall univariate sex differences in every Dark Triad trait. The multivariate analysis of overall sex differences in the proposed CAMA will possibly provide more insight into this aspect.

3) Measure

Continuous: Number of items used to assess Dark Triad traits

Categorial: language, type of measurement

There are several different scales used to assess the Dark Triad traits either separately or as a whole (for further explanations see section 16 – Scales). Since measures exist in different languages or vary regarding the number of items, these aspects will be considered as possible moderators in the proposed CAMA. The categorial moderator variable ‘type of measurement’ will divide measures into two groups (i.e. individual vs. combined Dark Triad scales).

Continuous moderator variables will be investigated computing meta-regressions. In case of indications of influence due to categorial moderator variables subgroup analyses will be conducted.

In sum, the above-mentioned variables will be analyzed to keep previous meta-analytic investigations up-to-date. Furthermore, the new methodological approach (i.e. multivariate investigation of sex differences) will reveal more insight into the magnitude of sex differences in three-dimensional space and thus, will possibly lead to changes in moderating effects. Additionally, the investigation will show, which and how moderator analyses are feasible in PsychOpenCAMA.

23. Publication bias

Investigations of possible publication bias in previous meta-analyses showed only slight to no indicators of selective reporting (Muris et al., 2017; Prinz, 2019). However, as evidence will be kept up-to-date in the proposed CAMA, analyses of publication bias are planned as well.

PsychOpenCAMA will enable some analyses to detect publication bias. An explorative analysis of funnel plots, Egger's regression test (Egger et al., 1997), as well as p-curve (Simonsohn et al., 2014) and p-uniform (van Assen et al., 2015) analyses will be conducted. As PsychOpenCAMA is currently under development, further analyses will be possibly provided. For documentation of the usage of PsychOpenCAMA further provided analyses on the platform will be used explorative.

24. Any additional information

The proposed CAMA will be undertaken as a master thesis, submitted by Lisa Bucher (University of Vienna) and will be published subsequently.

Implementation in PsychOpenCAMA

The implementation in PsychOpenCAMA will run parallel to data synthesis of the proposed meta-analysis. Once uploaded, ongoing analyses and results will be open-accessible. Search processes and study selection will continue as well to keep the CAMA up-to-date and "living".

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