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# BMJ Open

## Short-term functions and long-term consequences of checking behavior as a transdiagnostic phenomenon: Protocol for a systematic review

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## 23 ABSTRACT

24 **Introduction:** Checking behavior (CB) occurs in various mental health problems, such as obsessive-  
25 compulsive, generalized anxiety, eating, body dysmorphic and illness anxiety disorders. Etiological  
26 models of these disorders postulate a negative reinforcing effect of CB by reducing negative affect (i.e.  
27 anxiety) and a maintenance of the pathology due to a lack of reality-testing of concerns. This paper  
28 details methods for a systematic review that will be conducted to synthesize empirical evidence testing  
29 these theoretical assumptions across different disorders.

30 **Methods and Analysis:** We will search PsycINFO, PubMed, PSYINDEX, and Scopus for studies  
31 investigating the valence of situations in which CB occurs, as well as the immediate and longer-term  
32 effects of CB on cognitive and emotional measures in clinical and analogue samples. The selection  
33 process, data extraction and quality assessment of included studies will be performed by two  
34 independent reviewers. In the case of inconsistencies, a third reviewer will be involved. Study results  
35 will be reported in a narrative synthesis.

36 **Ethics and dissemination:** Ethics approval will not be required as this is a protocol for systematic  
37 review. The results are mainly disseminated through peer-reviewed publications.

38 **Protocol registration number:** PROSPERO, CRD42021238835.

39  
40 **KEYWORDS:** Safety Behavior, Checking, Obsessive-Compulsive Disorder, Generalized Anxiety  
41 Disorder, Eating Disorders, Anorexia Nervosa, Bulimia Nervosa, Binge Eating Disorder, Body  
42 Dysmorphic Disorder, Illness Anxiety Disorder

## 43 STRENGTHS AND LIMITATIONS OF THIS STUDY

- 44 • This systematic review addresses a gap in research as it will be the first to provide a detailed  
45 synthesis of the evidence regarding the valence of situations in which CB occurs, as well as the  
46 postulated immediate and longer-term effects of CB across different disorders and subthreshold  
47 forms.

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3 48 • The results of this systematic review are expected to foster our understanding of the mechanisms  
4  
5 49 of action underlying CB, which is of high clinical relevance.  
6  
7 50 • As the review includes non-randomized studies that are likely to produce evidence of low  
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9 51 certainty, risk of bias and the strength of evidence collected from each study will be assessed using  
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11 52 the GRADE system.  
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14 53 • The protocol is written following the PRISMA-P guidelines.  
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## 71 INTRODUCTION

### 72 Rationale

73 Safety behavior represents a core feature of various mental disorders[1, 2] and is defined as “actions  
74 taken to prevent, avoid, or escape a feared outcome”[3]. Besides avoidance, safety behavior includes  
75 checking behavior (CB), which manifests in different ways depending on the respective disorder. The  
76 earliest descriptions of CB can be found regarding obsessive-compulsive disorders (OCD)[4, 5].

77 CB is the most common compulsion in OCD[6] and manifests, for example, as controlling the absence  
78 of potential sources of danger in one’s surroundings (e.g., stoves, windows or doors) or repetitive  
79 requests for reassurance from others[7, 8]. It belongs to the “repetitive behaviors [...] that the individual  
80 feels driven to perform in response to an obsession or according to rules that must be applied rigidly”  
81 (part of Criterion A in the Diagnostic and Statistical Manual of Mental Disorders [DSM-5])[9].  
82 Etiological models[7, 10] define CB as having a “preventive” character, because it is aimed to ward off  
83 misfortune and to lessen anxiety and discomfort. For example, this negative affect-reducing function of  
84 CB is a core aspect of Rachman’s cognitive theory, which posits that people repeatedly check for safety  
85 in situations where they feel unsure about the absence of harm in order to gain relief from their  
86 indisposition, uncertainty, and anxiety[7]. Thus, the model assumes that people check for the safety of  
87 the environment in response to negative emotional states. Rachman postulates that as a consequence of  
88 negative reinforcement, the behavior becomes more likely to occur, producing negative emotions and  
89 therefore contributing to the maintenance of the psychopathology[7].

90 Besides OCD, CB can also be observed in people suffering from generalized anxiety disorder  
91 (GAD)[11-13]. While CB is not yet represented in the diagnostic criteria for GAD[14], it has been  
92 described predominantly in the form of interpersonal checking (i.e., seeking reassurance from others,  
93 for example before making decisions, when engaging in activities or asking a loved one if he or she is  
94 upset)[8, 15]. Similar to OCD, cognitive models of GAD[16-18] suggest that safety behaviors such as  
95 CB are performed in order to reduce the likelihood of feared negative events, to control worries and  
96 reduce or prevent discomfort. As a consequence, it is hypothesized that they turn into a self-perpetuating  
97 mechanism due to negative reinforcement.

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3 98 While in OCD and GAD, checking primarily refers to objects, environment, relationships, and  
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5 99 achievement (see above), in other disorders, the main focus of CB is one's own body. Disorders with  
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7 100 body-related CB include eating disorders (EDs)[19], body dysmorphic disorder (BDD)[20] and illness  
8  
9 101 anxiety disorder (IAD)[21]. In EDs, i.e. anorexia nervosa (AN), bulimia nervosa (BN) and binge eating  
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11 102 disorder (BED), CB expresses itself as controlling one's own body in terms of its weight or shape, and  
12  
13 103 manifests in behaviors such as repeated weighing, measuring the circumference of body parts, inspecting  
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15 104 one's body or individual body parts in the mirror, seeking reassurance about one's appearance and  
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17 105 comparing it to others[19, 22]. Although the literature highlights the importance of CB in ED  
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19 106 pathology[23], it is not explicitly listed in the diagnostic criteria of the DSM-5 for any of these three  
20  
21 107 disorders. Nevertheless, it can be found indirectly in the criteria for AN (criteria B and C) and BN  
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23 108 (criterion D), which describe aspects of body image disturbance (e.g. overvaluation of weight and  
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25 109 shape), a component of which are behaviors such as avoidance or checking[24]. This does not apply to  
26  
27 110 BED, although the literature suggests that body image disturbance can also be an important part of the  
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29 111 symptomatology of the disorder[25]. Etiological models for EDs postulate that CB contributes to the  
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31 112 maintenance of the disorder by increasing the perception of bodily imperfections[22, 26]. In line with  
32  
33 113 the theories for OCD and GAD (described above), it is hypothesized that body checking reduces  
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35 114 negative affect, which is triggered, for example, by dysfunctional body-related information  
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37 115 processing[27]. This negative reinforcement may then lead patients to believe that it is helpful to perform  
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39 116 CB. In contrast, theories postulate that CB increases anxiety and can foster distorted perception and  
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41 117 evaluation of one's body[22, 27].

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46 118 CB in BDD is described as controlling one's perceived defect by inspecting it in the mirror or other  
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48 119 reflective surfaces (e.g. shop windows, car mirrors) in a ritualistic way, taking photos, comparing it with  
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50 120 other people (in real life, media, photos of oneself in the past), checking its size or contour by touching  
51  
52 121 it with one's fingers, and asking others for reassurance (e.g. whether the perceived flaw has become  
53  
54 122 worse or is adequately camouflaged)[28-30]. It is explicitly mentioned as a part of the diagnostic  
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56 123 criterion B in the DSM-5[31]. As already described for OCD, GAD and EDs, cognitive-behavioral  
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58 124 models of BDD[28, 30, 32, 33] postulate that CB serves to reduce negative emotions (e.g. anxiety,  
59  
60 125 disgust, anger, shame) or uncertainty and therefore provides immediate relief in the short term. In the

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3 126 long term, CB is hypothesized to increase selective attention and may intensify the dysfunctional beliefs  
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5 127 about the supposed flaw(s), thus contributing to the maintenance of the disorder[28, 30].  
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8 128 In IAD, CB manifests as repeatedly checking one's body for signs of illness (e.g. breast self-  
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10 129 examination) or seeking reassurance from others about health and signs of a severe illness (e.g. family,  
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12 130 friends, health care physicians, or alternative sources such as medical textbooks)[21, 34]. Similar to  
13  
14 131 BDD, CB is specified as a diagnostic criterion for IAD in the DSM-5[30]. In line with the theoretical  
15  
16 132 assumptions described above, cognitive-behavioral models of IAD[35, 36] ascribe an immediate relief  
17  
18 133 from anxiety and a quick reassurance to the utilization of CB. In the long run, it is hypothesized that  
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20 134 receiving such reassurance leads to an increase in health anxiety and intensified checking[34].  
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### 23 135 **Objectives**

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26 136 In sum, although CB looks phenomenologically different depending on the respective disorder,  
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28 137 etiological models across disorders outline checking as an important behavior which provides immediate  
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30 138 relief from negative states in the short term, therefore reinforcing itself and leading to a self-perpetuating  
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32 139 mechanism, and hence contributing to the maintenance of the pathology in the long term. Although the  
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34 140 mechanism of action of CB has been postulated in numerous models of different disorders, empirical  
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36 141 support for these assumptions is lacking. To date, several empirical studies have investigated the  
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38 142 proposed mechanisms in each disorder, but a systematic overview of studies is yet to be undertaken.  
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40 143 Current cognitive-behavioral treatments for these disorders are based on the aforementioned models and  
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42 144 include ritual prevention as one therapeutic technique aimed at reducing CB and consequently related  
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44 145 disorder-specific symptoms. Depending on whether or not the empirical evidence supports the models  
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46 146 and the proposed function of CB, the focus of these interventions would need to be intensified or altered,  
47  
48 147 respectively. As such, our systematic review is intended to synthesize existing evidence for the  
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50 148 reinforcing function of CB across OCD, GAD, EDs, BDD and IAD. The current study protocol outlines  
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52 149 the methods of our investigation and is based on the PRISMA-P checklist (Additional file 1). It is  
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54 150 registered on PROSPERO database and will address the following research questions: 1) Which  
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56 151 (emotional) states are people in when engaging in CB? 2a) What effect does CB have on emotional,  
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3 152 cognitive and disorder-specific outcomes in the short-term? 2b) What effect does CB have on emotional,  
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5 153 cognitive and disorder-specific outcomes in the long-term?  
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## 8 154 **METHODS**

### 10 155 **Eligibility criteria**

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13 156 Studies will be selected according to the criteria outlined below.  
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#### 16 157 Types of studies / Study Designs & Setting

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19 158 All types of studies investigating the effect of CB will be included. There will be no restrictions  
20  
21 159 regarding study design, setting or publication year. We will only consider original empirical papers. If  
22  
23 160 our search yields studies investigating the effect of CB in an experimental design (and consequently  
24  
25 161 using an instruction to check), there might be the need to delimit CB from exposure. Therefore, we will  
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27 162 exclude studies investigating CB with an instruction to check for therapeutic purposes.  
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#### 30 163 Participants

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33 164 There will be no limits on study participants in terms of age, gender, or ethnicity. We will include both  
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35 165 studies with clinical and nonclinical samples to take into account that CB might also play an important  
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37 166 role in analogue samples, e.g. with high trait worry, weight concerns, or appearance-related concerns.  
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#### 40 167 Outcomes of interest

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43 168 We will accept any outcome measure indicating changes in emotional (e.g. anxiety) and cognitive (e.g.  
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45 169 worry) measures both globally and specific to disorders. To be included, studies will need to have  
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47 170 investigated at least one outcome.  
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#### 50 171 Language

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53 172 Only studies reported in or translated into English, German, French, or Italian will be included.  
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#### 56 173 Information sources

57  
58 174 The following electronic databases will be searched: PsycINFO, PubMed, PSYINDEX and Scopus.  
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60 175 Furthermore, we will screen the bibliographies of relevant articles for additional studies. Additionally,

176 research registries (ClinicalTrials.gov, PROSPERO and the International Clinical Trials Registry  
177 Platform of the World Health Organization) will be searched for eligible unpublished studies.

## 178 Search strategy

179 During the design of the search strategy, library staff were on hand to advise us. To generate search  
180 terms, we screened reviews and primary studies as well as the respective keywords (using the  
181 “Thesaurus of Psychological Index Terms” and “Medical Subject Headings”). The search terms  
182 available for selection were presented to and discussed by a group of experienced clinical researchers.  
183 Finally, relevant keywords and, if necessary due to lack of indexing, free text words were selected for  
184 each disorder. Since checking behaviors have not yet been keyworded, their search was limited to free  
185 text words. To reduce irrelevant hits, only studies that included checking terms in the title or abstract  
186 were searched. To be implemented in the scientific databases, the disorder-related search terms were  
187 combined using the Boolean operator "AND" with the free text words for Checking. Only a limit to  
188 human studies will be set. The full search strategy for one database is displayed as additional file  
189 (Additional file 2). This will be adapted for each database according to the respective guidelines.

## 190 Study records

### 191 Selection process

192 In a first step, two independent reviewers will screen the titles and abstracts yielded by the search after  
193 removal of duplicates. We will then obtain the full text for potentially eligible studies. If the full text is  
194 not available, e.g., through institutional membership, we will contact the authors to request access. By  
195 screening the full text in a second step, the two reviewers will assess for inclusion in the review based  
196 on the criteria outlined before. We will note the reason for exclusion of any study and present the  
197 selection process in a PRISMA flow diagram (Additional file 3). In the case of discrepancies between  
198 the two reviewers in either step, a third reviewer will be consulted. None of the reviewers will be blind  
199 to the journal titles or to the study authors or institutions.

### 200 Data Extraction

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3 201 For all included studies, data will be extracted by two independent raters using a data collection form  
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5 202 developed for this review (Additional file 4). Both reviewers will pilot this in advance with five studies  
6  
7 203 and make adjustments prior to the extraction of data if necessary. We plan to extract the following  
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9 204 information and data from each study: 1) Basic characteristics of the study: authors, title, publication  
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11 205 year, country; 2) Sample: sample size, average age, gender, type of sample (clinical vs. analogue),  
12  
13 206 diagnosis and criteria for diagnosis (clinical samples) or type of symptoms in analogue samples,  
14  
15 207 comorbidities; 3) Setting (e.g. online survey, laboratory experiment); 4) Type of CB investigated; 5)  
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17 208 Assessment time points; 6) Instruments for the assessment of outcomes and type of outcomes  
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19 209 investigated; 7) Study results with regard to the research questions.  
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## 22 210 Data Synthesis

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25 211 Selected studies will first be assigned according to the disorder or psychopathology they investigated.  
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27 212 Within these five groups, studies will additionally be categorized according to which research question  
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29 213 they address. Due to the expected low number of eligible studies, we will carry out a narrative synthesis  
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31 214 and compile a table outlining characteristics and findings of every study.  
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## 34 215 Risk of Bias

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37 216 We will assess the risk of bias within randomized trials using the Cochrane Collaboration tool for  
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39 217 assessing risk of bias[37] and within non-randomized studies with the Risk Of Bias In Non-randomized  
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41 218 Studies of Interventions (ROBINS-I) tool[38]. The strength of evidence collected from each study in the  
42  
43 219 review will be assessed using the Grading of Recommendations Assessment, Development and  
44  
45 220 Evaluation (GRADE) system[39]. The evaluation process will be conducted by two independent  
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47 221 reviewers. If necessary, a third reviewer will resolve disagreements.  
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## 50 222 **ETHICS AND DISSEMINATION**

### 51 223 **Patients and Public Involvement**

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56 224 This systematic review will be based on previously published data, so patients and the public will not  
57  
58 225 be directly involved in the design, interpretation or dissemination of the results.  
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3 227 **STATEMENTS**  
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6 228 **Authors' contribution**  
7

8 229 SV and ASH developed the primary idea for the review, and this was refined with the help of MV and  
9 230 VO. All authors contributed to the development of the protocol document. All authors read and agreed  
10  
11 231 the final version of the manuscript. MV is the guarantor of the review.  
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15 232 **Ethics approval and consent to participate**  
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17  
18 233 Ethics approval will not be required as this is a protocol for systematic review.  
19

20  
21 234 **Availability of data and materials**  
22

23  
24 235 No additional data available.  
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26  
27 236 **Competing interests**  
28

29 237 The authors declare that they have no competing interests.  
30

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52 246 **Patient and public involvement**  
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54 247 As this research will be based on already published data, patients and the public will not be involved in  
55 248 the design, interpretation or dissemination of the results.  
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59 **REFERENCE LIST**  
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### 43 **Additional files**

44  
45 PRISMA-P checklist (Additional file 1.docx)

46  
47  
48 Search strategy (Additional file 2.pdf)

49  
50 PRISMA flow diagram (Additional file 3.doc)

51  
52  
53 data collection form (Additional file 4.docx)

## PRISMA-P 2015 Checklist

This checklist has been adapted for use with systematic review protocol submissions to BioMed Central journals from Table 3 in Moher D et al: Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Systematic Reviews* 2015 4:1

An Editorial from the Editors-in-Chief of *Systematic Reviews* details why this checklist was adapted – Moher D, Stewart L & Shekelle P: Implementing PRISMA-P: recommendations for prospective authors. *Systematic Reviews* 2016 5:15

Section/topic	#	Checklist item	Information reported		Line number(s)
			Yes	No	
<b>ADMINISTRATIVE INFORMATION</b>					
<b>Title</b>					
Identification	1a	Identify the report as a protocol of a systematic review	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1-2
Update	1b	If the protocol is for an update of a previous systematic review, identify as such	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Registration</b>	2	If registered, provide the name of the registry (e.g., PROSPERO) and registration number in the Abstract	<input checked="" type="checkbox"/>	<input type="checkbox"/>	38
<b>Authors</b>					
Contact	3a	Provide name, institutional affiliation, and e-mail address of all protocol authors; provide physical mailing address of corresponding author	<input checked="" type="checkbox"/>	<input type="checkbox"/>	8-10
Contributions	3b	Describe contributions of protocol authors and identify the guarantor of the review	<input checked="" type="checkbox"/>	<input type="checkbox"/>	228-231
<b>Amendments</b>	4	If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Support</b>					
Sources	5a	Indicate sources of financial or other support for the review	<input checked="" type="checkbox"/>	<input type="checkbox"/>	240-242
Sponsor	5b	Provide name for the review funder and/or sponsor	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Role of sponsor/funder	5c	Describe roles of funder(s), sponsor(s), and/or institution(s), if any, in developing the protocol	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<b>INTRODUCTION</b>					
<b>Rationale</b>	6	Describe the rationale for the review in the context of what is already known	<input checked="" type="checkbox"/>	<input type="checkbox"/>	72-134
<b>Objectives</b>	7	Provide an explicit statement of the question(s) the review will address with reference to	<input checked="" type="checkbox"/>	<input type="checkbox"/>	135-153



Section/topic	#	Checklist item	Information reported		Line number(s)
			Yes	No	
		participants, interventions, comparators, and outcomes (PICO)			
<b>METHODS</b>					
<b>Eligibility criteria</b>	8	Specify the study characteristics (e.g., PICO, study design, setting, time frame) and report characteristics (e.g., years considered, language, publication status) to be used as criteria for eligibility for the review	<input checked="" type="checkbox"/>	<input type="checkbox"/>	155-172
<b>Information sources</b>	9	Describe all intended information sources (e.g., electronic databases, contact with study authors, trial registers, or other grey literature sources) with planned dates of coverage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	173-177
<b>Search strategy</b>	10	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated	<input checked="" type="checkbox"/>	<input type="checkbox"/>	178-173
<b>STUDY RECORDS</b>					
Data management	11a	Describe the mechanism(s) that will be used to manage records and data throughout the review	<input checked="" type="checkbox"/>	<input type="checkbox"/>	200-214
Selection process	11b	State the process that will be used for selecting studies (e.g., two independent reviewers) through each phase of the review (i.e., screening, eligibility, and inclusion in meta-analysis)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	191-199
Data collection process	11c	Describe planned method of extracting data from reports (e.g., piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators	<input checked="" type="checkbox"/>	<input type="checkbox"/>	191-209
<b>Data items</b>	12	List and define all variables for which data will be sought (e.g., PICO items, funding sources), any pre-planned data assumptions and simplifications	<input checked="" type="checkbox"/>	<input type="checkbox"/>	204-209
<b>Outcomes and prioritization</b>	13	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	<input checked="" type="checkbox"/>	<input type="checkbox"/>	167-170, 200-209
<b>Risk of bias in individual studies</b>	14	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	215-221
<b>DATA</b>					
<b>Synthesis</b>	15a	Describe criteria under which study data will be quantitatively synthesized	<input type="checkbox"/>	<input type="checkbox"/>	
	15b	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data, and methods of combining data from studies, including any planned exploration of consistency (e.g., $I^2$ , Kendall's tau)	<input type="checkbox"/>	<input type="checkbox"/>	
	15c	Describe any proposed additional analyses (e.g., sensitivity or subgroup analyses, meta-regression)	<input type="checkbox"/>	<input type="checkbox"/>	
	15d	If quantitative synthesis is not appropriate, describe the type of summary planned	<input checked="" type="checkbox"/>	<input type="checkbox"/>	210-214
<b>Meta-bias(es)</b>	16	Specify any planned assessment of meta-bias(es) (e.g., publication bias across studies, selective reporting within studies)	<input type="checkbox"/>	<input type="checkbox"/>	

Section/topic	#	Checklist item	Information reported		Line number(s)
			Yes	No	
<b>Confidence in cumulative evidence</b>	17	Describe how the strength of the body of evidence will be assessed (e.g., GRADE)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	218-220

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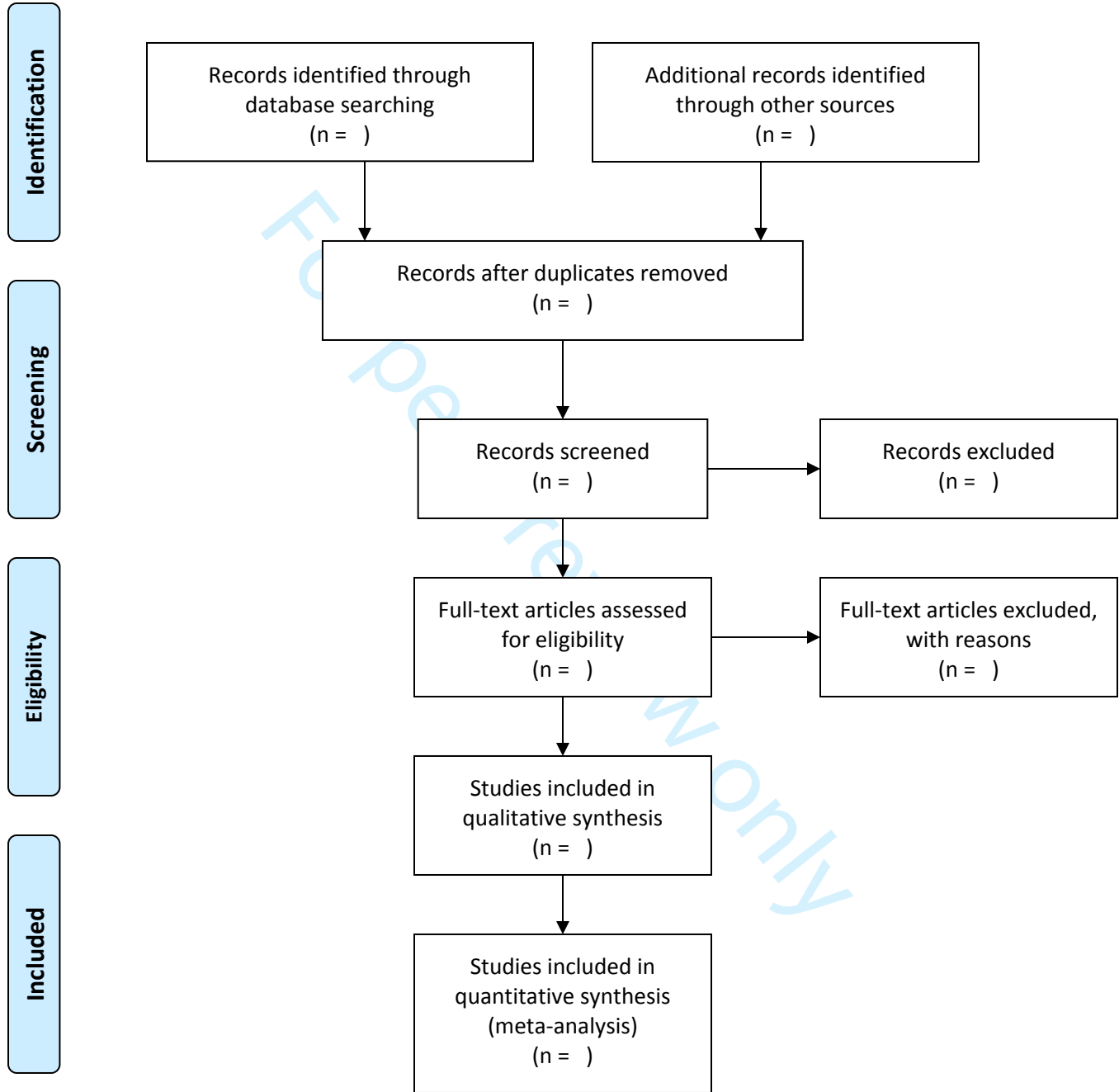
- 8 1 (Checking\* or gazing\* or "safety behavi\*r" or "reassurance seek\*").ti,ab. (7270)  
9 2 obsessive compulsive disorder/ or compulsions/ or Generalized Anxiety Disorder/ or worry.ti,ab. or  
10 eating disorders/ or anorexia nervosa/ or binge eating disorder/ or bulimia/ or body image/ or body  
11 image disturbances/ or body dysmorphic disorder/ or dissatisfaction/ or hypochondriasis/ or health  
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# PRISMA 2009 Flow Diagram



From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

For more information, visit [www.prisma-statement.org](http://www.prisma-statement.org).

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**Data Extraction Form**1  
2 Reviewer:3  
4 Date:**Disorder:** OCD  GAD  ED  BDD  IAD**Research question:** (1) situation  (2a) short-term  (2b) long-term**BASIC CHARACTERISTICS**9  
10 Ref ID:11  
12 Author(s):13  
14 Publication title:15  
16 Publication year:Country:**SAMPLE**17  
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20 Sample Size:21  
22 Average Age:23  
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26 Type of sample:

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- Diagnosis and criteria for diagnosis (clinical samples):
  - Type of symptoms (analogue samples):

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31 Co-morbidities:**STUDY DESIGN**32  
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35 Setting:36  
37 Type of CB investigated:38  
39 Assessment time points:40  
41 Instruments for the assessment of outcomes and types of outcomes investigated:**STUDY RESULTS**42  
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45 Research question and outcome:**Brief summary** (add research question and disorder in each case):– Confirmed  Rejected

# BMJ Open

## Short-term functions and long-term consequences of checking behavior as a transdiagnostic phenomenon: Protocol for a systematic review

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2021-056732.R1
Article Type:	Protocol
Date Submitted by the Author:	21-Dec-2021
Complete List of Authors:	Vivell, Maj-Britt; University of Konstanz, Institute of Psychology Opladen, Vanessa; Osnabrück University, Institute of Psychology Vocks, Silja; University of Osnabrück, Institute of Psychology Hartmann, Andrea; University of Konstanz
<b>Primary Subject Heading</b>:	Mental health
Secondary Subject Heading:	Research methods
Keywords:	Eating disorders < PSYCHIATRY, Anxiety disorders < PSYCHIATRY, Adult psychiatry < PSYCHIATRY, MENTAL HEALTH

SCHOLARONE™  
Manuscripts

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3 1 Short-term functions and long-term consequences of checking behavior as a transdiagnostic  
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10 4 Maj-Britt Vivell<sup>1</sup>, Vanessa Opladen<sup>2</sup>, Silja Vocks<sup>2</sup> & Andrea S. Hartmann<sup>1</sup>  
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16 6 <sup>2</sup> Osnabrück University, Institute of Psychology, Department of Clinical Psychology and  
17 7 Psychotherapy, Osnabrück, Germany  
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22 9 \*Corresponding author: Maj-Britt Vivell, M. Sc., Konstanz University, Institute of Psychology,  
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## 24 **ABSTRACT**

25 **Introduction:** Checking behavior (CB) occurs in various mental health problems. Cognitive-behavioral  
26 models for these mental disorders share similar theoretical assumptions. Thus, they postulate a negative  
27 reinforcing effect of CB by reducing negative affect (i.e. anxiety) and a maintenance of the pathology  
28 due to a lack of reality-testing of concerns. This paper details methods for a systematic review that will  
29 be conducted to synthesize empirical evidence testing these theoretical assumptions across obsessive-  
30 compulsive, generalized anxiety, eating, body dysmorphic and illness anxiety disorder. The results are  
31 expected to foster our understanding of the mechanisms of action underlying CB, which is of high  
32 clinical relevance. Depending on whether or not the findings confirm the model assumptions regarding  
33 CB, the focus of treatments would need to be intensified or modified.

34 **Methods and Analysis:** We will search PsycINFO, PubMed, PSYINDEX, and Scopus for studies  
35 investigating the emotional state in which CB is being used as well as the immediate and longer-term  
36 effects of CB on cognitive and emotional measures in clinical and analogue samples. The selection  
37 process, data extraction and quality assessment of included studies will be performed by two  
38 independent reviewers. In the case of inconsistencies, a third reviewer will be involved. Study results  
39 will be reported in a narrative synthesis.

40 **Ethics and dissemination:** Ethics approval will not be required as this is a protocol for systematic  
41 review. The results are mainly disseminated through peer-reviewed publications.

42 **Protocol registration number:** PROSPERO, CRD42021238835.

43  
44 **KEYWORDS:** Safety Behavior, Checking, Obsessive-Compulsive Disorder, Generalized Anxiety  
45 Disorder, Eating Disorders, Anorexia Nervosa, Bulimia Nervosa, Binge Eating Disorder, Body  
46 Dysmorphic Disorder, Illness Anxiety Disorder

## 47 **STRENGTHS AND LIMITATIONS OF THIS STUDY**



- 1  
2  
3 48 • This systematic review addresses a gap in research as it will be the first to provide a detailed  
4  
5 49 synthesis of the evidence regarding the valence of situations in which CB occurs, as well as the  
6  
7 50 postulated immediate and longer-term effects of CB across different disorders and subthreshold  
8  
9 51 forms.  
10  
11 52 • The results of this systematic review are expected to foster our understanding of the mechanisms  
12  
13 53 of action underlying CB, which is of high clinical relevance.  
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15 54 • As the review includes non-randomized studies that are likely to produce evidence of low  
16  
17 55 certainty, risk of bias and the strength of evidence collected from each study will be assessed using  
18  
19 56 the GRADE system.  
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22 57 • The protocol is written following the PRISMA-P guidelines.  
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24 58 • The heterogeneity and the expected small number of studies represents a limitation of this  
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26 59 systematic review.  
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## 72 INTRODUCTION

### 73 Rationale

74 Safety behavior represents a core feature of various mental disorders[1, 2] and is defined as “actions  
75 taken to prevent, avoid, or escape a feared outcome”[3]. In the narrower sense, this includes behaviors  
76 such as taking sedatives, not going to certain places without another person, or always carrying a bottle  
77 of water. Furthermore, it comprises avoidance behaviors and checking behavior (CB), which manifests  
78 in different ways depending on the respective disorder. The earliest descriptions of the latter can be  
79 found regarding obsessive-compulsive disorders (OCD)[4, 5].

80 In OCD, CB is the most common compulsion[6] and manifests, for example, as controlling the absence  
81 of potential sources of danger in one’s surroundings (e.g., stove turned off to prevent fire, windows or  
82 doors locked to prevent burglary) or repetitive requests for reassurance from others[7, 8]. Closely related  
83 to this, CB in generalized anxiety disorder (GAD) is also described[9-11], but mainly in terms of  
84 interpersonal checking (i.e., seeking reassurance from others, for example before making decisions,  
85 when engaging in activities or asking a loved one if he or she is upset)[8, 12]. While in OCD and GAD,  
86 checking primarily refers to objects, environment, relationships, and achievement, in other disorders,  
87 the main focus of CB is one’s own body. Disorders with body-related CB include eating disorders  
88 (EDs)[13], body dysmorphic disorder (BDD)[14] and illness anxiety disorder (IAD)[15]. In EDs, i.e.  
89 anorexia nervosa (AN), bulimia nervosa (BN) and binge eating disorder (BED), CB expresses itself as  
90 inspecting one’s own body in terms of its weight or shape, and manifests in behaviors such as repeated  
91 weighing, measuring the circumference of body parts, inspecting one’s body or individual body parts in  
92 the mirror, seeking reassurance about one’s appearance and comparing it to others[13, 16]. CB in BDD  
93 is described as inspecting one’s perceived defect by looking at it in the mirror or other reflective surfaces  
94 (e.g. shop windows, car mirrors) in a ritualistic way, taking photos, comparing it with other people (in  
95 real life, media, photos of oneself in the past), checking its size or contour by touching it with one’s  
96 fingers, and asking others for reassurance (e.g. whether the perceived flaw has become worse or is  
97 adequately camouflaged)[17-19]. Whereas checking in EDs and BDD refers to figure, weight, or  
98 appearance, checking in IAD focuses on health. It manifests as repeatedly inspecting one’s body for

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3 99 signs of illness (e.g. breast self-examination, lymph node palpation) or seeking reassurance from others  
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5 100 about health and signs of a severe illness (e.g. family, friends, health care physicians, or alternative  
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7 101 sources such as medical textbooks)[15, 20].  
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9

10 102 Although CB refers to different domains (e.g. weight, illness, safety of the environment) in all five  
11  
12 103 disorders, cognitive-behavioral theories regarding the mechanism of action of checking are very  
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14 104 alike[e.g. 7, 21-24]. Three central theoretical postulates are formulated in each case. First, it is proposed  
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16 105 that CB is used primarily when people are in order to respond to unpleasant emotional states[22, 25].  
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18 106 Relatedly, the second theoretical postulate states that CB is thought to have a negative affect-reducing  
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20 107 function in the short-term[17]. For example in OCD, it is postulated by Rachman (2002), that people  
21  
22 108 repeatedly check for safety in situations where they feel unsure about the absence of harm in order to  
23  
24 109 gain relief from their indisposition, uncertainty, and anxiety[7]. In EDs it is hypothesized that body  
25  
26 110 checking reduces negative affect which is triggered, for example, by dysfunctional body-related  
27  
28 111 information processing[22]. For BDD, it is postulated that there is distress caused by physical  
29  
30 112 appearance, which becomes very strong, for example, in social situations. CB, according to the theory,  
31  
32 113 serves to reduce these unpleasant emotions (e.g., fear, disgust, anger, shame) caused by appearance[23].  
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34 114 By providing immediate short-term relief from unpleasant feelings, the third theoretical assumption is  
35  
36 115 based on a learning theory mechanism[23]. It is postulated, that CB as a behavior is negatively reinforced  
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38 116 (i.e., produces the absence of a negative consequence), therefore increasing the likelihood that it will be  
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40 117 performed more frequently in the future[22] as patients experience CB to be helpful and necessary in  
41  
42 118 the short run. In contrast, theories postulate that repeated use of CB reinforces anxiety and  
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44 119 psychopathology in the long-term, turning into a self-perpetuating mechanism[24]. For example, it is  
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46 120 discussed that CB can foster distorted perception and evaluation of one's body in EDs[16, 22]. For BDD,  
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48 121 it is postulated that CB increases selective attention in the long-term and may intensify the dysfunctional  
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50 122 beliefs about the supposed flaw(s), thus contributing to the maintenance of the disorder[17, 19].  
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55 123 In sum, although CB looks phenomenologically different depending on the respective disorder,  
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57 124 etiological models across disorders outline checking as an important behavior which provides immediate  
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59 125 relief from negative states in the short term, therefore reinforcing itself and leading to a self-perpetuating  
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1  
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3 126 mechanism, and hence contributing to the maintenance of the pathology in the long term. Although the  
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5 127 mechanism of action of CB has been postulated in numerous models of different disorders, empirical  
6  
7 128 support for these assumptions is lacking. To date, several empirical studies have investigated the  
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9 129 proposed mechanisms in each disorder, but a systematic overview of studies is yet to be undertaken. A  
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11 130 systematic overview, however, is urgently needed, given that current cognitive-behavioral treatments  
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13 131 for these disorders are based on the aforementioned theories and include ritual prevention (i.e., not using  
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15 132 CB to learn that situations can be handled without this safety behavior) as one therapeutic technique  
16  
17 133 aimed at reducing CB and consequently related disorder-specific symptoms. Depending on whether or  
18  
19 134 not the empirical evidence supports the proposed emotion regulating mechanism of checking in the  
20  
21 135 cognitive-behavioral models, the focus of these interventions would need to be intensified or altered,  
22  
23 136 respectively. For example, as a function of CB, in addition to reducing negative affect, gaining certainty  
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25 137 could also play a role in different disorders[26]. Therefore, it might be worthwhile to address the  
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27 138 excessive need for certainty more directly through, e.g., cognitive interventions questioning the pursuit  
28  
29 139 of certainty[27] or promoting the willingness to experience fear and uncertainty[28].  
30  
31

### 32 33 140 **Objectives**

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35  
36 141 As such, our systematic review intends to synthesize existing evidence for the three postulates regarding  
37  
38 142 CB across the mental disorders OCD, GAD, EDs, BDD and IAD. The current study protocol outlines  
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40 143 the methods of our investigation and is based on the PRISMA-P checklist (Additional file 1). The  
41  
42 144 following research questions will be addressed: 1) Which (emotional) states are people in when engaging  
43  
44 145 in CB? 2a) What effect does CB have on emotional, cognitive and disorder-specific outcomes in the  
45  
46 146 short-term? 2b) What effect does CB have on emotional, cognitive and disorder-specific outcomes in  
47  
48 147 the long-term?  
49

### 50 51 148 **METHODS**

52  
53  
54 149 Our review has been registered with PROSPERO (CRD42021238835). The planned data selection  
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56 150 process runs from January to May 2022.  
57

### 58 59 151 **Inclusion and exclusion criteria**

60

152 The inclusion and exclusion criteria are shown in Table 1.

153 *Table 1*

	<b>Inclusion criteria</b>	<b>Exclusion criteria</b>
<b>Types of studies</b>	all study designs and settings original empirical papers and dissertations	therapeutically guided checking <sup>a</sup>
<b>Participants</b>	clinical and nonclinical samples	
<b>Type of checking</b>	disorder specific checking	checking not typical for the diagnosis
<b>Outcomes of interest</b>	global and disorder specific emotional (e.g. anxiety) or cognitive (e.g. worry) measures	
<b>Language</b>	English, German, French or Italian	

<sup>a</sup> If our search yields studies investigating the effect of CB in an experimental design, it may be necessary to distinguish CB from exposure as a treatment modality. Therefore, we will exclude studies investigating CB with an instruction to check for therapeutic purposes (e.g., in therapeutically guided mirror exposures).

154 Information sources

155 The following electronic databases will be searched: PsycINFO, PubMed, PSYINDEX and Scopus.

156 Furthermore, we will screen the bibliographies of relevant articles for additional studies. Additionally,

157 research registries (ClinicalTrials.gov, PROSPERO and the International Clinical Trials Registry

158 Platform of the World Health Organization) will be searched for eligible unpublished studies. The search

159 process will be presented in a PRISMA flow diagram (Additional file 2). It shows whether an article

160 stems from the electronic databases or from further literature research.

161 Search strategy

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3 162 During the design of the search strategy, library staff were on hand to advise us. To generate search  
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5 163 terms, we screened reviews and primary studies as well as the respective keywords (using the  
6  
7 164 “Thesaurus of Psychological Index Terms” and “Medical Subject Headings”). The search terms  
8  
9 165 available for selection were presented to and discussed by a group of experienced clinical researchers.  
10  
11 166 Finally, relevant keywords and, if necessary due to lack of indexing, free text words were selected for  
12  
13 167 each disorder. Since checking behaviors have not yet been keyworded, their search was limited to free  
14  
15 168 text words. To reduce irrelevant hits, only studies that included checking terms in the title or abstract  
16  
17 169 were searched. To be implemented in the scientific databases, the disorder-related search terms were  
18  
19 170 combined using the Boolean operator "AND" with the free text words for Checking. The only filter set  
20  
21 171 is that the search should be limited to studies with human participants. The full search strategy for one  
22  
23 172 database is displayed as additional file (Additional file 3). This will be adapted for each database  
24  
25 173 according to the respective guidelines.  
26  
27  
28

## 29 174 **Study records**

### 30 31 32 175 Selection process

33  
34 176 In a first step, two independent reviewers will screen the titles and abstracts yielded by the search after  
35  
36 177 removal of duplicates. We will then obtain the full text for potentially eligible studies. If the full text is  
37  
38 178 not available, e.g., through institutional membership, we will contact the authors to request access. By  
39  
40 179 screening the full text in a second step, the two reviewers will assess for inclusion in the review based  
41  
42 180 on the criteria outlined before. We will note the reason for exclusion of any study and present the  
43  
44 181 selection process in the PRISMA flow diagram (Additional file 2). In the case of discrepancies between  
45  
46 182 the two reviewers in either step, a third reviewer will be consulted. None of the reviewers will be blind  
47  
48 183 to the journal titles or to the study authors or institutions.  
49  
50

### 51 52 184 Data Extraction

53  
54  
55 185 For all included studies, data will be extracted by two independent raters using a data collection form  
56  
57 186 developed for this review (Additional file 4). Both reviewers will pilot this in advance with five studies  
58  
59 187 and make adjustments prior to the extraction of data if necessary. We plan to extract the following  
60

1  
2  
3 188 information and data from each study: 1) Basic characteristics of the study: authors, title, publication  
4  
5 189 year, country; 2) Sample: sample size, average age, gender, type of sample (clinical vs. analogue),  
6  
7 190 diagnosis and criteria for diagnosis (clinical samples) or type of symptoms in analogue samples,  
8  
9 191 comorbidities; 3) Setting (e.g. online survey, laboratory experiment); 4) Type of CB investigated; 5)  
10  
11 192 Assessment time points; 6) Instruments for the assessment of outcomes and type of outcomes  
12  
13 193 investigated; 7) Study results with regard to the research questions.

#### 14 15 16 194 Data Synthesis

17  
18  
19 195 Selected studies will first be assigned according to the disorder or psychopathology they investigated.  
20  
21 196 Within these five groups, studies will additionally be categorized according to which research question  
22  
23 197 they address. Due to the expected low number of eligible studies, we will carry out a narrative synthesis  
24  
25 198 and compile a table outlining characteristics and findings of every study.

#### 26 27 28 199 Risk of Bias

29  
30  
31 200 We will assess the risk of bias within randomized trials using the Cochrane Collaboration tool for  
32  
33 201 assessing risk of bias[29] and within non-randomized studies with the Risk Of Bias In Non-randomized  
34  
35 202 Studies of Interventions (ROBINS-I) tool[30]. The strength of evidence collected from each study in the  
36  
37 203 review will be assessed using the Grading of Recommendations Assessment, Development and  
38  
39 204 Evaluation (GRADE) system[31]. The evaluation process will be conducted by two independent  
40  
41 205 reviewers. If necessary, a third reviewer will resolve disagreements.

#### 42 43 44 206 **Patients and Public Involvement**

45  
46  
47 207 This systematic review will be based on previously published data, so patients and the public will not  
48  
49 208 be directly involved in the design, interpretation or dissemination of the results.

#### 50 51 52 209 **Dissemination**

53  
54  
55 210 The results of the review will be submitted for publication in a peer-reviewed psychological journal. In  
56  
57 211 addition, the results will be disseminated in various media such as symposia, congresses, seminars.

#### 58 59 60 212 **STATEMENTS**

1  
2  
3 213 **Authors' contribution**  
4

5  
6 214 SV and ASH developed the primary idea for the review, and this was refined with the help of MV and  
7  
8 215 VO. All authors contributed to the development of the protocol document. All authors read and agreed  
9  
10 216 the final version of the manuscript. MV is the guarantor of the review.  
11

12  
13 217 **Ethics approval and consent to participate**  
14

15 218 Ethics approval will not be required as this is a protocol for systematic review.  
16

17  
18 219 **Availability of data and materials**  
19

20  
21 220 No additional data available.  
22

23  
24 221 **Competing interests**  
25

26  
27 222 The authors declare that they have no competing interests.  
28

29  
30 223 **Funding**  
31

32 224 This work was supported by the German Research Foundation (Deutsche Forschungsgemeinschaft,  
33  
34 225 DFG) to ASH (HA 8589/5-1) and SV (VO1750/5-1).  
35  
36

37 226 **Acknowledgements**  
38

39  
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41  
42 228 Tholen-Wandel (information specialists) for their advice during the design of the search strategy. We  
43  
44 229 are also thankful to Sarah Mannion de Hernandez for language editing services as well as Antonia Lucht  
45  
46 230 and Lotta Flechsig for the support in the management of literature.  
47  
48

49 231 **Patient and public involvement**  
50

51 232 As this research will be based on already published data, patients and the public will not be involved in  
52  
53 233 the design, interpretation or dissemination of the results.  
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### 15 **Additional files**

16  
17  
18 PRISMA-P checklist (Additional file 1.pdf)

19  
20  
21 PRISMA flow diagram (Additional file 2.pdf)

22  
23  
24 Search strategy (Additional file 3.pdf)

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26  
27 data collection form (Additional file 4.pdf)

## PRISMA-P 2015 Checklist

This checklist has been adapted for use with systematic review protocol submissions to BioMed Central journals from Table 3 in Moher D et al: Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Systematic Reviews* 2015 4:1

An Editorial from the Editors-in-Chief of *Systematic Reviews* details why this checklist was adapted - Moher D, Stewart L & Shekelle P: Implementing PRISMA-P: recommendations for prospective authors. *Systematic Reviews* 2016 5:15

Section/topic	#	Checklist item	Information reported		Line number(s)
			Yes	No	
<b>ADMINISTRATIVE INFORMATION</b>					
<b>Title</b>					
Identification	1a	Identify the report as a protocol of a systematic review	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1-2
Update	1b	If the protocol is for an update of a previous systematic review, identify as such	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Registration</b>	2	If registered, provide the name of the registry (e.g., PROSPERO) and registration number in the Abstract	<input checked="" type="checkbox"/>	<input type="checkbox"/>	42
<b>Authors</b>					
Contact	3a	Provide name, institutional affiliation, and e-mail address of all protocol authors; provide physical mailing address of corresponding author	<input checked="" type="checkbox"/>	<input type="checkbox"/>	9-11
Contributions	3b	Describe contributions of protocol authors and identify the guarantor of the review	<input checked="" type="checkbox"/>	<input type="checkbox"/>	214-216
<b>Amendments</b>	4	If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Support</b>					
Sources	5a	Indicate sources of financial or other support for the review	<input checked="" type="checkbox"/>	<input type="checkbox"/>	224-225
Sponsor	5b	Provide name for the review funder and/or sponsor	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Role of sponsor/funder	5c	Describe roles of funder(s), sponsor(s), and/or institution(s), if any, in developing the protocol	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<b>INTRODUCTION</b>					
<b>Rationale</b>	6	Describe the rationale for the review in the context of what is already known	<input checked="" type="checkbox"/>	<input type="checkbox"/>	74-139

Section/topic	#	Checklist item	Information reported		Line number(s)
			Yes	No	
<b>Objectives</b>	7	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	141-147
<b>METHODS</b>					
<b>Eligibility criteria</b>	8	Specify the study characteristics (e.g., PICO, study design, setting, time frame) and report characteristics (e.g., years considered, language, publication status) to be used as criteria for eligibility for the review	<input checked="" type="checkbox"/>	<input type="checkbox"/>	152-153
<b>Information sources</b>	9	Describe all intended information sources (e.g., electronic databases, contact with study authors, trial registers, or other grey literature sources) with planned dates of coverage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	155-160
<b>Search strategy</b>	10	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated	<input checked="" type="checkbox"/>	<input type="checkbox"/>	162-173
<b>STUDY RECORDS</b>					
Data management	11a	Describe the mechanism(s) that will be used to manage records and data throughout the review	<input checked="" type="checkbox"/>	<input type="checkbox"/>	185-193
Selection process	11b	State the process that will be used for selecting studies (e.g., two independent reviewers) through each phase of the review (i.e., screening, eligibility, and inclusion in meta-analysis)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	176-183
Data collection process	11c	Describe planned method of extracting data from reports (e.g., piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators	<input checked="" type="checkbox"/>	<input type="checkbox"/>	175-193
<b>Data items</b>	12	List and define all variables for which data will be sought (e.g., PICO items, funding sources), any pre-planned data assumptions and simplifications	<input checked="" type="checkbox"/>	<input type="checkbox"/>	188-193
<b>Outcomes and prioritization</b>	13	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	<input checked="" type="checkbox"/>	<input type="checkbox"/>	153, 188-193
<b>Risk of bias in individual studies</b>	14	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	200-205
<b>DATA</b>					
<b>Synthesis</b>	15a	Describe criteria under which study data will be quantitatively synthesized	<input type="checkbox"/>	<input type="checkbox"/>	
	15b	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data, and methods of combining data from studies, including any planned exploration of consistency (e.g., $I^2$ , Kendall's tau)	<input type="checkbox"/>	<input type="checkbox"/>	

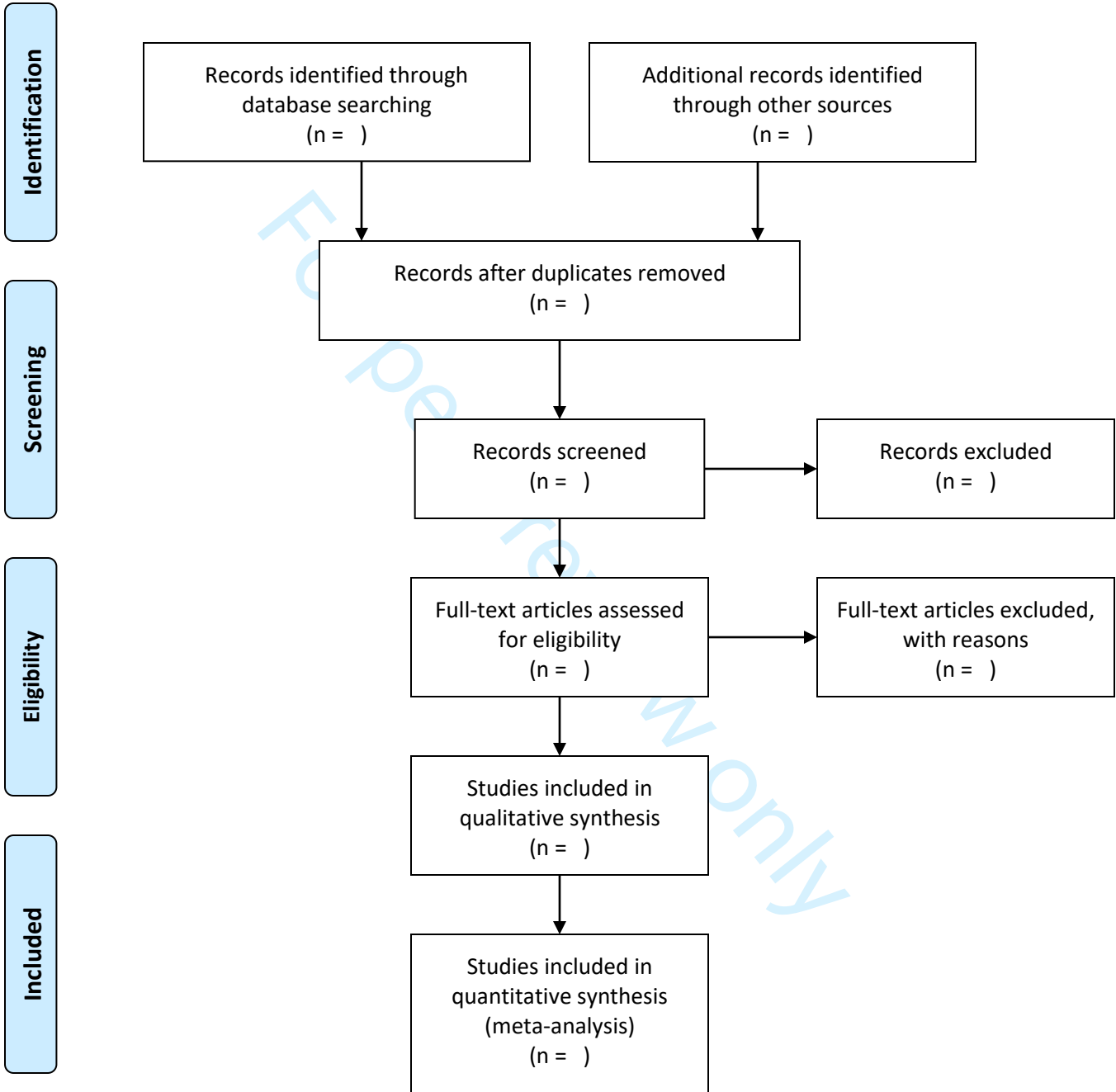
Section/topic	#	Checklist item	Information reported		Line number(s)
			Yes	No	
	15c	Describe any proposed additional analyses (e.g., sensitivity or subgroup analyses, meta-regression)	<input type="checkbox"/>	<input type="checkbox"/>	
	15d	If quantitative synthesis is not appropriate, describe the type of summary planned	<input checked="" type="checkbox"/>	<input type="checkbox"/>	195-198
<b>Meta-bias(es)</b>	16	Specify any planned assessment of meta-bias(es) (e.g., publication bias across studies, selective reporting within studies)	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Confidence in cumulative evidence</b>	17	Describe how the strength of the body of evidence will be assessed (e.g., GRADE)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	202-204

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# PRISMA 2009 Flow Diagram



From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

For more information, visit [www.prisma-statement.org](http://www.prisma-statement.org).

For peer review only - <http://bmjopen.bmj.com/site/about/guidelines.xhtml>

1  
2  
3 Datenbank: APA PsycInfo <1806 to January Week 4 2021>  
4

5 Suchstrategie:  
6  
7

8 1 (Checking\* or gazing\* or "safety behavi\*r" or "reassurance seek\*").ti,ab. (7270)

9 2 obsessive compulsive disorder/ or compulsions/ or Generalized Anxiety Disorder/ or worry.ti,ab. or  
10 eating disorders/ or anorexia nervosa/ or binge eating disorder/ or bulimia/ or body image/ or body  
11 image disturbances/ or body dysmorphic disorder/ or dissatisfaction/ or hypochondriasis/ or health  
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**Data Extraction Form**

Reviewer:

Date:

**Disorder:** OCD  GAD  ED  BDD  IAD clinical  analogue**Research question:** (1) situation  (2a) short-term  (2b) long-term**BASIC CHARACTERISTICS**Ref ID:Author(s):Publication title:Publication year:Country:**SAMPLE**Sample Size:Average Age:Gender:Type of sample:

- Diagnosis and criteria for diagnosis (clinical samples):
- Type of symptoms (analogue samples):

Co-morbidities:**STUDY DESIGN**Setting:Type of CB investigated:Assessment time points:Instruments for the assessment of outcomes and types of outcomes investigated:**STUDY RESULTS**Research question and outcome:**Brief summary** (add research question and disorder in each case):– Confirmed  Rejected

# BMJ Open

## Short-term functions and long-term consequences of checking behavior as a transdiagnostic phenomenon: Protocol for a systematic review

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2021-056732.R2
Article Type:	Protocol
Date Submitted by the Author:	29-Mar-2022
Complete List of Authors:	Vivell, Maj-Britt; University of Konstanz, Institute of Psychology Opladen, Vanessa; Osnabrück University Vocks, Silja; Osnabrück University Hartmann, Andrea; University of Konstanz, Institute of Psychology
<b>Primary Subject Heading</b>:	Mental health
Secondary Subject Heading:	Research methods
Keywords:	Eating disorders < PSYCHIATRY, Anxiety disorders < PSYCHIATRY, Adult psychiatry < PSYCHIATRY, MENTAL HEALTH

SCHOLARONE™  
Manuscripts

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3 1 Short-term functions and long-term consequences of checking behavior as a transdiagnostic  
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5 2 phenomenon: Protocol for a systematic review  
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10 4 Maj-Britt Vivell<sup>1</sup>, Vanessa Opladen<sup>2</sup>, Silja Vocks<sup>2</sup> & Andrea S. Hartmann<sup>1</sup>  
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16 6 <sup>2</sup> Osnabrück University, Institute of Psychology, Department of Clinical Psychology and  
17 7 Psychotherapy, Osnabrück, Germany  
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## 24 **ABSTRACT**

25 **Introduction:** Checking behavior (CB) occurs in various mental health problems. Cognitive-behavioral  
26 models for these mental disorders share similar theoretical assumptions. Thus, they postulate a negative  
27 reinforcing effect of CB by reducing negative affect (i.e. anxiety) and a maintenance of the pathology  
28 due to a lack of reality-testing of concerns. This paper details methods for a systematic review that will  
29 be conducted to synthesize empirical evidence testing these theoretical assumptions across obsessive-  
30 compulsive, generalized anxiety, eating, body dysmorphic and illness anxiety disorder. The results are  
31 expected to foster our understanding of the mechanisms of action underlying CB, which is of high  
32 clinical relevance. Depending on whether or not the findings confirm the model assumptions regarding  
33 CB, the focus of treatments would need to be intensified or modified.

34 **Methods and Analysis:** We will search PsycINFO, PubMed, PSYINDEX, and Scopus for studies  
35 investigating the emotional state in which CB is being used as well as the immediate and longer-term  
36 effects of CB on cognitive and emotional measures in clinical and analogue samples. The selection  
37 process, data extraction and quality assessment of included studies will be performed by two  
38 independent reviewers. In the case of inconsistencies, a third reviewer will be involved. Study results  
39 will be reported in a narrative synthesis.

40 **Ethics and dissemination:** Ethics approval will not be required as this is a protocol for systematic  
41 review. The results are mainly disseminated through peer-reviewed publications.

42 **Protocol registration number:** PROSPERO, CRD42021238835.

44 **KEYWORDS:** Safety Behavior, Checking, Obsessive-Compulsive Disorder, Generalized Anxiety  
45 Disorder, Eating Disorders, Anorexia Nervosa, Bulimia Nervosa, Binge Eating Disorder, Body  
46 Dysmorphic Disorder, Illness Anxiety Disorder

## 47 **STRENGTHS AND LIMITATIONS OF THIS STUDY**

- 48 • The protocol is written following the PRISMA-P guidelines.

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3 49 • As the review includes non-randomized studies that are likely to produce evidence of low  
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5 50 certainty, risk of bias and the strength of evidence collected from each study will be assessed using  
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7 51 the GRADE system.  
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9 52 • The heterogeneity and the expected small number of studies represents a limitation of this  
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11 53 systematic review.  
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For peer review only

## 71 INTRODUCTION

### 72 Rationale

73 Safety behavior represents a core feature of various mental disorders[1, 2] and is defined as “actions  
74 taken to prevent, avoid, or escape a feared outcome”[3]. In the narrower sense, this includes behaviors  
75 such as taking sedatives, not going to certain places without another person, or always carrying a bottle  
76 of water. Furthermore, it comprises avoidance behaviors and checking behavior (CB), which manifests  
77 in different ways depending on the respective disorder. The earliest descriptions of the latter can be  
78 found regarding obsessive-compulsive disorders (OCD)[4, 5].

79 In OCD, CB is the most common compulsion[6] and manifests, for example, as controlling the absence  
80 of potential sources of danger in one’s surroundings (e.g., stove turned off to prevent fire, windows or  
81 doors locked to prevent burglary) or repetitive requests for reassurance from others[7, 8]. Closely related  
82 to this, CB in generalized anxiety disorder (GAD) is also described[9-11], but mainly in terms of  
83 interpersonal checking (i.e., seeking reassurance from others, for example before making decisions,  
84 when engaging in activities or asking a loved one if he or she is upset)[8, 12]. While in OCD and GAD,  
85 checking primarily refers to objects, environment, relationships, and achievement, in other disorders,  
86 the main focus of CB is one’s own body. Disorders with body-related CB include eating disorders  
87 (EDs)[13], body dysmorphic disorder (BDD)[14] and illness anxiety disorder (IAD)[15]. In EDs, i.e.  
88 anorexia nervosa (AN), bulimia nervosa (BN) and binge eating disorder (BED), CB expresses itself as  
89 inspecting one’s own body in terms of its weight or shape, and manifests in behaviors such as repeated  
90 weighing, measuring the circumference of body parts, inspecting one’s body or individual body parts in  
91 the mirror, seeking reassurance about one’s appearance and comparing it to others[13, 16]. CB in BDD  
92 is described as inspecting one’s perceived defect by looking at it in the mirror or other reflective surfaces  
93 (e.g. shop windows, car mirrors) in a ritualistic way, taking photos, comparing it with other people (in  
94 real life, media, photos of oneself in the past), checking its size or contour by touching it with one’s  
95 fingers, and asking others for reassurance (e.g. whether the perceived flaw has become worse or is  
96 adequately camouflaged)[17-19]. Whereas checking in EDs and BDD refers to figure, weight, or  
97 appearance, checking in IAD focuses on health. It manifests as repeatedly inspecting one’s body for

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2  
3 98 signs of illness (e.g. breast self-examination, lymph node palpation) or seeking reassurance from others  
4  
5 99 about health and signs of a severe illness (e.g. family, friends, health care physicians, or alternative  
6  
7 100 sources such as medical textbooks)[15, 20].  
8  
9

10 101 Although CB refers to different domains (e.g. weight, illness, safety of the environment) in all five  
11  
12 102 disorders, cognitive-behavioral theories regarding the mechanism of action of checking are very  
13  
14 103 alike[e.g. 7, 21-24]. Three central theoretical postulates are formulated in each case. First, it is proposed  
15  
16 104 that CB is used primarily in order to gain relief from unpleasant emotional states[22, 25]. Relatedly, the  
17  
18 105 second theoretical postulate states that CB is thought to have a negative affect-reducing function in the  
19  
20 106 short-term[17]. For example in OCD, it is postulated by Rachman (2002), that people repeatedly check  
21  
22 107 for safety in situations where they feel unsure about the absence of harm in order to gain relief from  
23  
24 108 their indisposition, uncertainty, and anxiety[7]. In EDs it is hypothesized that body checking reduces  
25  
26 109 negative affect which is triggered, for example, by dysfunctional body-related information  
27  
28 110 processing[22]. For BDD, it is postulated that there is distress caused by physical appearance, which  
29  
30 111 becomes very strong, for example, in social situations. CB, according to the theory, serves to reduce  
31  
32 112 these unpleasant emotions (e.g., fear, disgust, anger, shame) caused by appearance[23]. By providing  
33  
34 113 immediate short-term relief from unpleasant feelings, the third theoretical assumption is based on a  
35  
36 114 learning theory mechanism[23]. It is postulated, that CB as a behavior is negatively reinforced (i.e.,  
37  
38 115 produces the absence of a negative consequence), therefore increasing the likelihood that it will be  
39  
40 116 performed more frequently in the future[22] as patients experience CB to be helpful and necessary in  
41  
42 117 the short run. In contrast, theories postulate that repeated use of CB reinforces anxiety and  
43  
44 118 psychopathology in the long-term, turning into a self-perpetuating mechanism[24]. For example, it is  
45  
46 119 discussed that CB can foster distorted perception and evaluation of one's body in EDs[16, 22]. For BDD,  
47  
48 120 it is postulated that CB increases selective attention in the long-term and may intensify the dysfunctional  
49  
50 121 beliefs about the supposed flaw(s), thus contributing to the maintenance of the disorder[17, 19].  
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54  
55 122 In sum, although CB looks phenomenologically different depending on the respective disorder,  
56  
57 123 etiological models across disorders outline checking as an important behavior which provides immediate  
58  
59 124 relief from negative states in the short term, therefore reinforcing itself and leading to a self-perpetuating  
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1  
2  
3 125 mechanism, and hence contributing to the maintenance of the pathology in the long term. Although the  
4  
5 126 mechanism of action of CB has been postulated in numerous models of different disorders, empirical  
6  
7 127 support for these assumptions is lacking. To date, several empirical studies have investigated the  
8  
9 128 proposed mechanisms in each disorder, but a systematic overview of studies is yet to be undertaken. A  
10  
11 129 systematic overview, however, is urgently needed, given that current cognitive-behavioral treatments  
12  
13 130 for these disorders are based on the aforementioned theories and include ritual prevention (i.e., not using  
14  
15 131 CB to learn that situations can be handled without this safety behavior) as one therapeutic technique  
16  
17 132 aimed at reducing CB and consequently related disorder-specific symptoms. Usually, this is addressed  
18  
19 133 in the context of exposure therapy (i.e., confronting patients with fearful or even avoided situations  
20  
21 134 without the use of safety behaviors, e.g., in OCD, leaving the house without checking the stove and  
22  
23 135 windows). Depending on whether or not the empirical evidence supports the proposed emotion  
24  
25 136 regulating mechanism of checking in the cognitive-behavioral models, the focus of these interventions  
26  
27 137 would need to be intensified or altered, respectively. For example, one might assume that CB does not  
28  
29 138 or not only serve to reduce negative affect, but also to gain certainty[26]. Therefore, it might be  
30  
31 139 worthwhile to address the excessive need for certainty more directly, for example, through cognitive  
32  
33 140 interventions questioning the pursuit of certainty[27] or promoting the willingness to experience fear  
34  
35 141 and uncertainty[28]. Furthermore, a better understanding of the mechanisms of action underlying CB  
36  
37 142 may also have implications for the prevention of mental disorders (for example, if the proposed long-  
38  
39 143 term negative effect of CB on psychopathology can be supported by empirical evidence, prevention  
40  
41 144 programs addressing the reduction of checking in healthy individuals or at-risk groups could be  
42  
43 145 developed).

## 46 47 48 146 **Objectives**

49  
50  
51 147 As such, our systematic review intends to synthesize existing evidence for the three postulates regarding  
52  
53 148 CB across the mental disorders OCD, GAD, EDs, BDD and IAD. The current study protocol outlines  
54  
55 149 the methods of our investigation and is based on the PRISMA-P checklist (Additional file 1). The  
56  
57 150 following research questions will be addressed: 1) Which (emotional) states are people in when engaging  
58  
59 151 in CB? 2a) What effect does CB have on emotional, cognitive and disorder-specific outcomes in the



1  
2  
3 152 short-term (i.e. directly following CB)? 2b) What effect does CB have on emotional, cognitive and  
4  
5 153 disorder-specific outcomes in the long-term (i.e. after a repeated number of checking episodes)?  
6  
7

8 154 **METHODS**  
9

10  
11 155 Our review has been registered with PROSPERO (CRD42021238835). The planned data selection  
12  
13 156 process runs from January to May 2022.  
14

15  
16 157 **Inclusion and exclusion criteria**  
17

18 158 The inclusion and exclusion criteria are shown in Table 1.  
19

20  
21 159 *Table 1*  
22

	<b>Inclusion criteria</b>	<b>Exclusion criteria</b>
<b>Types of studies</b>	all study designs and settings original empirical papers and dissertations	therapeutically guided checking <sup>a</sup>
<b>Participants</b>	clinical and nonclinical samples	
<b>Type of checking</b>	disorder specific checking	checking not typical for the diagnosis
<b>Outcomes of interest</b>	global and disorder specific emotional (e.g. anxiety) or cognitive (e.g. worry) measures	
<b>Language</b>	English, German, French or Italian	

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<sup>a</sup> If our search yields studies investigating the effect of CB in an experimental design, it may be necessary to distinguish CB from exposure as a treatment modality. Therefore, we will exclude studies investigating CB with an instruction to check for therapeutic purposes (e.g., in therapeutically guided mirror exposures).

160 **Information sources**

161 The following electronic databases will be searched: PsycINFO, PubMed, PSYNDEX and Scopus.

162 Furthermore, we will screen the bibliographies of relevant articles for additional studies. Additionally,

1  
2  
3 163 research registries (ClinicalTrials.gov, PROSPERO and the International Clinical Trials Registry  
4  
5 164 Platform of the World Health Organization) will be searched for eligible unpublished studies. The search  
6  
7 165 process will be presented in a PRISMA flow diagram (Additional file 2). It shows whether an article  
8  
9 166 stems from the electronic databases or from further literature research.  
10

## 11 12 167 Search strategy

13  
14  
15 168 During the design of the search strategy, library staff were on hand to advise us. To generate search  
16  
17 169 terms, we screened reviews and primary studies as well as the respective keywords (using the  
18  
19 170 “Thesaurus of Psychological Index Terms” and “Medical Subject Headings”). The search terms  
20  
21 171 available for selection were presented to and discussed by a group of experienced clinical researchers.  
22  
23 172 Finally, relevant keywords and, if necessary due to lack of indexing, free text words were selected for  
24  
25 173 each disorder. Since checking behaviors have not yet been keyworded, their search was limited to free  
26  
27 174 text words. To reduce irrelevant hits, only studies that included checking terms in the title or abstract  
28  
29 175 were searched. To be implemented in the scientific databases, the disorder-related search terms were  
30  
31 176 combined using the Boolean operator "AND" with the free text words for Checking. The only filter set  
32  
33 177 is that the search should be limited to studies with human participants. The full search strategy for one  
34  
35 178 database is displayed as additional file (Additional file 3). This will be adapted for each database  
36  
37 179 according to the respective guidelines.  
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## 41 180 **Study records**

### 42 43 181 Selection process

44  
45  
46 182 In a first step, two independent reviewers will screen the titles and abstracts yielded by the search after  
47  
48 183 removal of duplicates. We will then obtain the full text for potentially eligible studies. If the full text is  
49  
50 184 not available, e.g., through institutional membership, we will contact the authors to request access. By  
51  
52 185 screening the full text in a second step, the two reviewers will assess for inclusion in the review based  
53  
54 186 on the criteria outlined before. We will note the reason for exclusion of any study and present the  
55  
56 187 selection process in the PRISMA flow diagram (Additional file 2). In the case of discrepancies between  
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3 188 the two reviewers in either step, a third reviewer will be consulted. None of the reviewers will be blind  
4  
5 189 to the journal titles or to the study authors or institutions.  
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#### 8 190 Data Extraction

9  
10  
11 191 For all included studies, data will be extracted by two independent raters using a data collection form  
12  
13 192 developed for this review (Additional file 4). Both reviewers will pilot this in advance with five studies  
14  
15 193 and make adjustments prior to the extraction of data if necessary. We plan to extract the following  
16  
17 194 information and data from each study: 1) Basic characteristics of the study: authors, title, publication  
18  
19 195 year, country; 2) Sample: sample size, average age, gender, type of sample (clinical vs. analogue),  
20  
21 196 diagnosis and criteria for diagnosis (clinical samples) or type of symptoms in analogue samples,  
22  
23 197 comorbidities; 3) Setting (e.g. online survey, laboratory experiment); 4) Type of CB investigated; 5)  
24  
25 198 Assessment time points; 6) Instruments for the assessment of outcomes and type of outcomes  
26  
27 199 investigated; 7) Study results with regard to the research questions.  
28  
29

#### 30 200 Data Synthesis

31  
32  
33 201 Selected studies will first be assigned according to the disorder or psychopathology they investigated.  
34  
35 202 Within these five groups, studies will additionally be categorized according to which research question  
36  
37 203 they address. Due to the expected low number of eligible studies, we will carry out a narrative synthesis  
38  
39 204 and compile a table outlining characteristics and findings of every study.  
40  
41

#### 42 205 Risk of Bias

43  
44  
45 206 We will assess the risk of bias within randomized trials using the Cochrane Collaboration tool for  
46  
47 207 assessing risk of bias[29] and within non-randomized studies with the Risk Of Bias In Non-randomized  
48  
49 208 Studies of Interventions (ROBINS-I) tool[30]. The strength of evidence collected from each study in the  
50  
51 209 review will be assessed using the Grading of Recommendations Assessment, Development and  
52  
53 210 Evaluation (GRADE) system[31]. The evaluation process will be conducted by two independent  
54  
55 211 reviewers. If necessary, a third reviewer will resolve disagreements.  
56  
57

#### 58 212 **Patients and Public Involvement**

1  
2  
3 213 Patients and the public will not be directly involved in the design, interpretation or dissemination of the  
4  
5 214 results.

### 8 215 **Ethics and Dissemination**

10 216 This systematic review will be based on previously published data, so there will be no requirement for  
11  
12 217 ethical approval. The results of the review will be submitted for publication in a peer-reviewed  
13  
14 218 psychological journal. In addition, the results will be disseminated in various media such as symposia,  
15  
16 219 congresses, seminars.

### 20 220 **STATEMENTS**

#### 23 221 **Authors' contribution**

25 222 SV and ASH developed the primary idea for the review, and this was refined with the help of MV and  
26  
27 223 VO. All authors contributed to the development of the protocol document. All authors read and agreed  
28  
29 224 the final version of the manuscript. MV is the guarantor of the review.

#### 32 225 **Ethics approval and consent to participate**

35 226 Ethics approval will not be required as this is a protocol for systematic review.

#### 38 227 **Availability of data and materials**

41 228 No additional data available.

#### 43 229 **Competing interests**

46 230 The authors declare that they have no competing interests.

#### 49 231 **Funding**

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53  
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### 30 Additional files

31  
32 PRISMA-P checklist (Additional file 1.pdf)

33  
34 PRISMA flow diagram (Additional file 2.pdf)

35  
36 Search strategy (Additional file 3.pdf)

37  
38 data collection form (Additional file 4.pdf)  
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## PRISMA-P 2015 Checklist

This checklist has been adapted for use with systematic review protocol submissions to BioMed Central journals from Table 3 in Moher D et al: Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Systematic Reviews* 2015 4:1

An Editorial from the Editors-in-Chief of *Systematic Reviews* details why this checklist was adapted - Moher D, Stewart L & Shekelle P: Implementing PRISMA-P: recommendations for prospective authors. *Systematic Reviews* 2016 5:15

Section/topic	#	Checklist item	Information reported		Line number(s)
			Yes	No	
<b>ADMINISTRATIVE INFORMATION</b>					
<b>Title</b>					
Identification	1a	Identify the report as a protocol of a systematic review	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1-2
Update	1b	If the protocol is for an update of a previous systematic review, identify as such	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Registration</b>	2	If registered, provide the name of the registry (e.g., PROSPERO) and registration number in the Abstract	<input checked="" type="checkbox"/>	<input type="checkbox"/>	42
<b>Authors</b>					
Contact	3a	Provide name, institutional affiliation, and e-mail address of all protocol authors; provide physical mailing address of corresponding author	<input checked="" type="checkbox"/>	<input type="checkbox"/>	9-11
Contributions	3b	Describe contributions of protocol authors and identify the guarantor of the review	<input checked="" type="checkbox"/>	<input type="checkbox"/>	214-216
<b>Amendments</b>	4	If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Support</b>					
Sources	5a	Indicate sources of financial or other support for the review	<input checked="" type="checkbox"/>	<input type="checkbox"/>	224-225
Sponsor	5b	Provide name for the review funder and/or sponsor	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Role of sponsor/funder	5c	Describe roles of funder(s), sponsor(s), and/or institution(s), if any, in developing the protocol	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<b>INTRODUCTION</b>					
<b>Rationale</b>	6	Describe the rationale for the review in the context of what is already known	<input checked="" type="checkbox"/>	<input type="checkbox"/>	74-139



Section/topic	#	Checklist item	Information reported		Line number(s)
			Yes	No	
<b>Objectives</b>	7	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	141-147
<b>METHODS</b>					
<b>Eligibility criteria</b>	8	Specify the study characteristics (e.g., PICO, study design, setting, time frame) and report characteristics (e.g., years considered, language, publication status) to be used as criteria for eligibility for the review	<input checked="" type="checkbox"/>	<input type="checkbox"/>	152-153
<b>Information sources</b>	9	Describe all intended information sources (e.g., electronic databases, contact with study authors, trial registers, or other grey literature sources) with planned dates of coverage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	155-160
<b>Search strategy</b>	10	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated	<input checked="" type="checkbox"/>	<input type="checkbox"/>	162-173
<b>STUDY RECORDS</b>					
Data management	11a	Describe the mechanism(s) that will be used to manage records and data throughout the review	<input checked="" type="checkbox"/>	<input type="checkbox"/>	185-193
Selection process	11b	State the process that will be used for selecting studies (e.g., two independent reviewers) through each phase of the review (i.e., screening, eligibility, and inclusion in meta-analysis)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	176-183
Data collection process	11c	Describe planned method of extracting data from reports (e.g., piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators	<input checked="" type="checkbox"/>	<input type="checkbox"/>	175-193
<b>Data items</b>	12	List and define all variables for which data will be sought (e.g., PICO items, funding sources), any pre-planned data assumptions and simplifications	<input checked="" type="checkbox"/>	<input type="checkbox"/>	188-193
<b>Outcomes and prioritization</b>	13	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	<input checked="" type="checkbox"/>	<input type="checkbox"/>	153, 188-193
<b>Risk of bias in individual studies</b>	14	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	200-205
<b>DATA</b>					
<b>Synthesis</b>	15a	Describe criteria under which study data will be quantitatively synthesized	<input type="checkbox"/>	<input type="checkbox"/>	
	15b	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data, and methods of combining data from studies, including any planned exploration of consistency (e.g., $I^2$ , Kendall's tau)	<input type="checkbox"/>	<input type="checkbox"/>	

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Section/topic	#	Checklist item	Information reported		Line number(s)
			Yes	No	
	15c	Describe any proposed additional analyses (e.g., sensitivity or subgroup analyses, meta-regression)	<input type="checkbox"/>	<input type="checkbox"/>	
	15d	If quantitative synthesis is not appropriate, describe the type of summary planned	<input checked="" type="checkbox"/>	<input type="checkbox"/>	195-198
<b>Meta-bias(es)</b>	16	Specify any planned assessment of meta-bias(es) (e.g., publication bias across studies, selective reporting within studies)	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Confidence in cumulative evidence</b>	17	Describe how the strength of the body of evidence will be assessed (e.g., GRADE)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	202-204

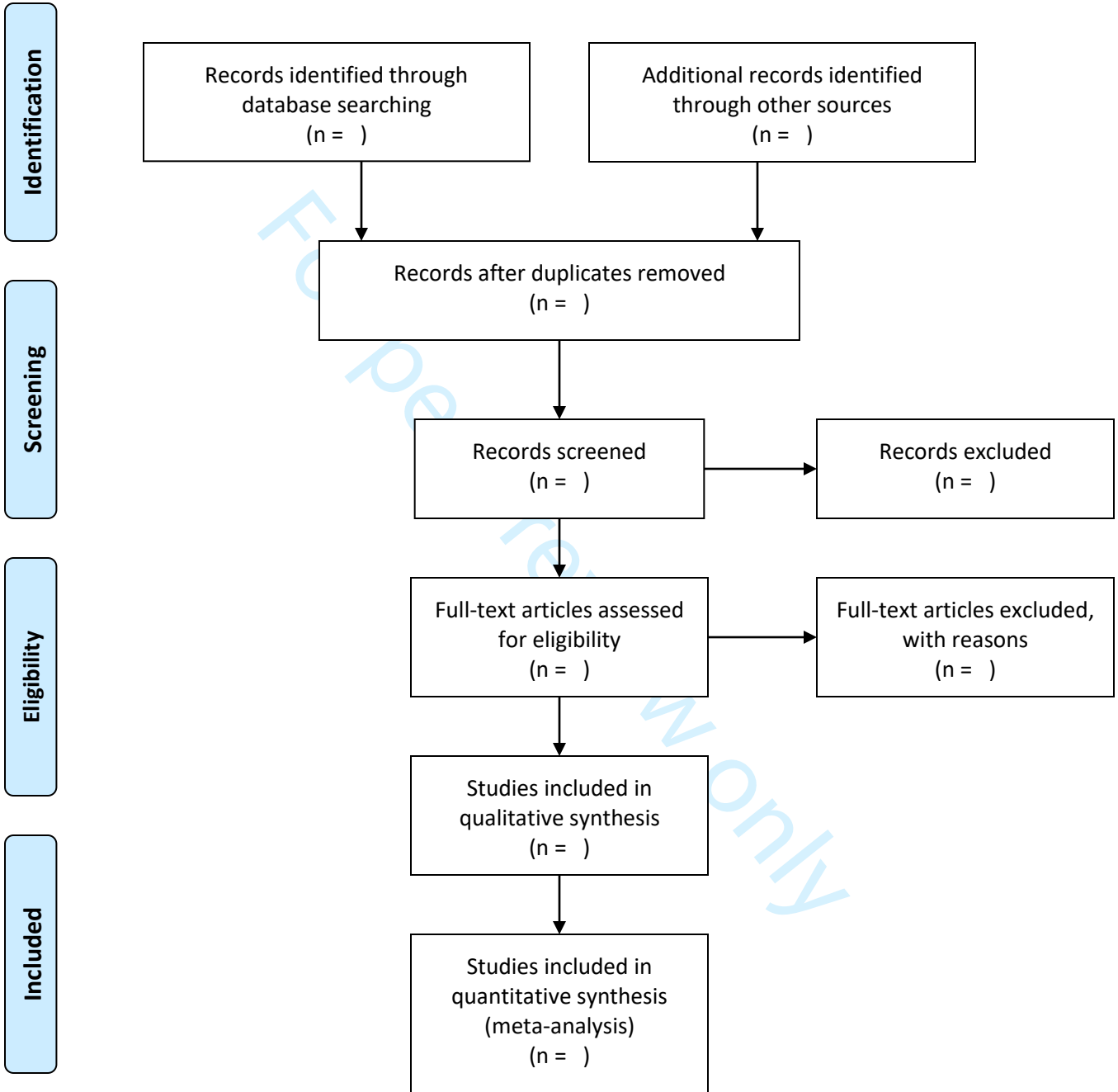
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# PRISMA 2009 Flow Diagram



From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

For more information, visit [www.prisma-statement.org](http://www.prisma-statement.org).

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3 Datenbank: APA PsycInfo <1806 to January Week 4 2021>  
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5 Suchstrategie:  
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8 1 (Checking\* or gazing\* or "safety behavi\*r" or "reassurance seek\*").ti,ab. (7270)

9 2 obsessive compulsive disorder/ or compulsions/ or Generalized Anxiety Disorder/ or worry.ti,ab. or  
10 eating disorders/ or anorexia nervosa/ or binge eating disorder/ or bulimia/ or body image/ or body  
11 image disturbances/ or body dysmorphic disorder/ or dissatisfaction/ or hypochondriasis/ or health  
12 anxiety/ (70340)

13 3 1 and 2 (1197)

14 4 limit 3 to human (1152)

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**Data Extraction Form**

Reviewer:

Date:

**Disorder:** OCD  GAD  ED  BDD  IAD clinical  analogue**Research question:** (1) situation  (2a) short-term  (2b) long-term**BASIC CHARACTERISTICS**Ref ID:Author(s):Publication title:Publication year:Country:**SAMPLE**Sample Size:Average Age:Gender:Type of sample:

- Diagnosis and criteria for diagnosis (clinical samples):
- Type of symptoms (analogue samples):

Co-morbidities:**STUDY DESIGN**Setting:Type of CB investigated:Assessment time points:Instruments for the assessment of outcomes and types of outcomes investigated:**STUDY RESULTS**Research question and outcome:**Brief summary** (add research question and disorder in each case):– Confirmed  Rejected