The relationship between mindfulness and objective measures of body awareness: A meta-analysis

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| Section/topic       | # | Checklist item                                                                                                                                                                                                                                                                                                                                                     | Reported on page # |
|--------------------|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| TITLE              |   |                                                                                                                                                                                                                                                                                                                                                                  |                   |
| Title              | 1 | Identify the report as a systematic review, meta-analysis, or both.                                                                                                                                                                                                                                      | 1                 |
| ABSTRACT           |   |                                                                                                                                                                                                                                                                                                                                                                  |                   |
| Structured summary | 2 | Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number. | 1                 |
| INTRODUCTION       |   |                                                                                                                                                                                                                                                                                                                                                                  |                   |
| Rationale          | 3 | Describe the rationale for the review in the context of what is already known.                                                                                                                                                                                                                           | 1-2               |
| Objectives         | 4 | Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).                                                                                                                                                        | 2                 |
| METHODS            |   |                                                                                                                                                                                                                                                                                                                                                                  |                   |
| Protocol and registration | 5 | Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.                                                                                                                     | 7                 |
| Eligibility criteria | 6 | Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.                                                                                                             | 7                 |
| Information sources | 7 | Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.                                                                                                                                   | 8                 |
| Search             | 8 | Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.                                                                                                                                                                               | 8, Supp Materials |
| Study selection    | 9 | State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).                                                                                                                                                  | 8                 |
| Data collection process | 10 | Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.                                                                                                                                  | 8                 |
| Data items         | 11 | List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.                                                                                                                                                                    | 8-9               |
| Risk of bias in individual studies | 12 | Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.                                                      | 9                 |
| Summary measures   | 13 | State the principal summary measures (e.g., risk ratio, difference in means).                                                                                                                                                                                                                           | 9-10              |
| Synthesis of results | 14 | Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I²) for each meta-analysis.                                                                                                                                                       | 10                |
| Section/topic            | #  | Checklist item                                                                                                                                                  | Reported on page # |
|-------------------------|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| Risk of bias across studies | 15 | Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies). | 10                |
| Additional analyses     | 16 | Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.                  | 6                 |
| RESULTS                 |    |                                                                                                                                                              |                   |
| Study selection         | 17 | Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.     | 6, 22             |
| Study characteristics   | 18 | For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.                      | 2-3, 17-18        |
| Risk of bias within studies | 19 | Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).                                                     | 3, Supp Materials |
| Results of individual studies | 20 | For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot. | 24                |
| Synthesis of results    | 21 | Present results of each meta-analysis done, including confidence intervals and measures of consistency.                                                        | 3-4               |
| Risk of bias across studies | 22 | Present results of any assessment of risk of bias across studies (see Item 15).                                                                             | 4                 |
| Additional analysis     | 23 | Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).                                        | 6                 |
| DISCUSSION              |    |                                                                                                                                                              |                   |
| Summary of evidence     | 24 | Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers). | 4                 |
| Limitations             | 25 | Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).       | 4-6               |
| Conclusions             | 26 | Provide a general interpretation of the results in the context of other evidence, and implications for future research.                                   | 4-7               |
| FUNDING                 |    |                                                                                                                                                              |                   |
| Funding                 | 27 | Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.                    | 16                |

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.
### Supplemental Materials Table 1. List of distal tasks

| Task                                         | Paper                        |
|----------------------------------------------|------------------------------|
| Proprioceptive drift                         | Cebolla 2016, Xu 2018        |
| Tactile sensitivity                          | Fox 2012                     |
| Respiratory load detection, respiratory load discrimination | Daubenmeier 2013*           |
| Heartbeat arousal, skin conductance arousal  | Sze 2010                     |
| Joint kinesthesia                            | Wooten 2018*                 |

Note: Tasks were defined as distal if they involved indirect measure of interoceptive accuracy (Garfinkel et al., 2015). All tasks fit inclusion criteria of ‘correct and precise monitoring’ (Khalsa & Lapidus, 2016). *These papers contained multiple body awareness accuracy measures, and reported effect sizes for proximal measures as well.
| Author      | Year | Randomized | Randomization described and appropriate | Treatment allocation concealed | Groups similar at baseline | Blind outcome assessment | Number of withdrawals/dropouts in each group mentioned | Reasons given for withdrawals/dropouts | Intent-to-treat analysis | Power calculation described | Jadad score |
|-------------|------|------------|-----------------------------------------|-------------------------------|----------------------------|--------------------------|--------------------------------------------------|----------------------------------------|----------------------------|--------------------------------|-------------|
| Aaron 2017  |      | Yes        | Yes                                     | Yes                           | Yes                        | No                       | Yes                                              | No                                     | No                        | No                        | 4           |
| Bornemann 2017 |    | Yes        | Yes                                     | Yes                           | Unclear                    | Yes                      | Yes                                              | Yes                                    | No                        | No                        | 4           |
| Cebolla 2016a |   | No         | No                                      | No                            | No                         | Yes                      | Yes                                              | Yes                                    | Yes                       | No                        | 2           |
| Cebolla 2016b |   | No         | No                                      | No                            | No                         | Yes                      | Yes                                              | Yes                                    | Yes                       | No                        | 2           |
| Daubenmier 2013 |  | No         | No                                      | No                            | No                         | Yes                      | Yes                                              | No                                    | Unclear                   | No                        | 1           |
| Fischer 2017a |   | Yes        | Yes                                     | No                            | Yes                        | No                       | No                                              | Unclear                               | No                        | No                        | 2           |
| Fischer 2017b |   | Yes        | No                                      | Yes                           | Yes                        | No                       | No                                              | No                                    | No                        | No                        | 2           |
| Fox 2012     |      | No         | No                                      | No                            | No                         | Yes                      | No                                              | Yes                                    | No                        | No                        | 2           |
| Kiken 2018   |      | No         | No                                      | No                            | No                         | Yes                      | No                                              | No                                    | Unclear                   | No                        | 1           |
| Melloni 2013 |      | No         | No                                      | No                            | Yes                        | No                       | No                                              | Unclear                               | No                        | No                        | 1           |
| Mirams 2013  |      | Yes        | Yes                                     | Yes                           | Yes                        | No                       | No                                              | No                                    | Unclear                   | No                        | 3           |
| Nielsen 2006 |      | No         | No                                      | No                            | No                         | Yes                      | Yes                                              | Yes                                    | No                        | Yes                       | 2           |
| Otten 2015   |      | No         | No                                      | No                            | No                         | Yes                      | No                                              | No                                    | Unclear                   | No                        | 1           |
| Parkin 2014a |      | Yes        | No                                      | Unclear                       | Yes                        | Yes                     | No                                              | No                                    | Unclear                   | No                        | 2           |
| Parkin 2014b |      | No         | No                                      | No                            | No                         | Yes                      | No                                              | No                                    | Unclear                   | No                        | 1           |
| Szé 2010     |      | No         | No                                      | No                            | No                         | Yes                      | No                                              | No                                    | Unclear                   | No                        | 1           |
| Wooten 2018  |      | Yes        | Unclear                                 | Unclear                       | Yes                        | Yes                      | Yes                                              | No                                    | No                        | No                        | 4           |
| Xu 2018      |      | No         | No                                      | No                            | No                         | Yes                      | No                                              | No                                    | Unclear                   | No                        | 1           |

Note: Bolded columns used to compute modified Jadad score per Piet and Hougaard (2011). Responses coded as “yes” received 1 point and those coded as “no” received 0 points.
### Supplemental Materials Table 3. Search strategy

| Database      | Search string                                                                                                                                                                                                 | Search fields                  |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| PubMed        | (interocept* OR "bodily awareness" OR "body awareness" OR "somatic awareness" OR somatosensory OR visceral OR proprioception OR heat OR cold OR tactile OR "two-point discrimination") AND (mindfulness OR meditation) | All fields                    |
| Scopus        | (interocept* OR "bodily awareness" OR "body awareness" OR "somatic awareness" OR somatosensory OR visceral OR proprioception OR heat OR cold OR tactile OR "two-point discrimination") AND (mindfulness OR meditation) | Article title, abstract, keywords |
| Web of Science| (interocept* OR "bodily awareness" OR "body awareness" OR "somatic awareness" OR somatosensory OR visceral OR proprioception OR heat OR cold OR tactile OR "two-point discrimination") AND (mindfulness OR meditation) | All fields                    |
| PsycINFO      | (interocept* OR "bodily awareness" OR "body awareness" OR "somatic awareness" OR somatosensory OR visceral OR proprioception OR heat OR cold OR tactile OR "two-point discrimination") AND (mindfulness OR meditation) | All fields                    |

**Note:** All databases were searched from inception. No additional exclusions were made within the search (i.e., dissertations were discoverable within PsycINFO).