**Supplemental Materials I**

This coding scheme is part of the paper “Description, Prediction and Causation: Methodological Challenges of Studying Individual Differences in Child Development” by Hamaker, Mulder, and Van IJzendoorn (under review).

**Sample**

The sampling procedure involved two stages. First, a random sample of a hundred publications was drawn from the Consortium on Individual Development (CID) annual report 2017-2018, which contains an overview of all CID publications (either submitted or published) before 2019. A publication is considered a CID publication if: (a) the consortium is stated in the acknowledgements, or (b) the first or second author is appointed by the CID. To guarantee independence of sources we excluded publications without new data analyses (e.g., systematic reviews, formal commentaries, essays, and review articles) such that a set of data analyses is included only once in the sample. Publications that do different analyses on the same data set, however, do not fall under this exclusion criterion. If a publication was sampled that fell within the exclusion criterion, it was discarded and a new publication was sampled at random until the sample size of 100 publications was met. A list of references of the 100 publications selected for coding is included at the end of this document.

The second stage involved the purposive search for sentences in the (a) research question’s, (b) hypotheses, (c) discussion, and (d) conclusion, of the sampled publications. This was done manually in the qualitative data software NVivo 12 Pro. Table 1 details how we defined the above four sections. Our interest is in substantive statements about the research and results of the researchers themselves. We therefore excluded sentences from coding that

* pertain to publications other than the publication itself (e.g., “Researcher X et al. found that …”, “This is in line with findings by …”);
* describe the strengths and limitations of the publication, as well as directions for future research; and
* describe potential explanations for a result that was found (e.g., “This might suggest that…”, “We see two possible interpretations for…”).

Table 1

*Definitions of the (a) introduction, (b) hypothesis, (c) discussion, and (d) conclusion sections used in the second stage of the sampling procedure.*

|  |  |
| --- | --- |
| Section | Definition |
| Research question | The research question is a subpart of the introduction and usually denoted with phrases like “In this study …”, “the aims of the current study …”, or “we have investigated …”. It states the purpose and goal of the study. |
| Hypothesis | Hypotheses are statements about the expectations of the researchers or a proposed explanation for the phenomenon under study. Often denoted with phrases like “We hypothesized that …”, “We expect to find…”, or “We anticipated that …”. |
| Discussion | Statements in the discussion about the results or consequences of the research at hand. Often denoted with phrases like “Consistent with prior studies, we found …”, “Our analysis showed …”, “Our results suggest that …” |
| Conclusion | This part is either a separate section in the article, or the first or last (few) paragraph(s) in the Discussion section. It is different from the discussion because the conclusion summarizes the main points from the article. It is often denoted by phrases like “Taken together, our results …”, “This study shows …”, or “In conclusion …”. |

**Coding**

We thus have two units of analysis: Randomly sampled CID publications, and purposively sampled sentences within these CID publications. First, we categorized each sentence as being *descriptive*, *predictive*, or *causal* of nature using the codebook in Table 2. The coding was done using the qualitative data software NVivo 12 Pro. The Section “Development of the codebook” details how this coding scheme was developed. The complete list of coded sentences can be found in the folder Supplemental Materials II on <https://github.com/JeroenDMulder/Causality-CID>.

Table 2

*The final codebook used for coding the purposively sampled sentences*.

|  |  |  |
| --- | --- | --- |
| Code | Definition | Example |
| causal | Statement is about causes and effects, interventions, or one-directional effects. | "if X, then Y"  "is variance in X driven by Y"  "the neural underpinnings of X and Y"  "X resulting in Y"  "X leads to Y"  "the underlying dynamics between X and Y"  "X would engage increased Y"  "to what extent do genes drive an association between X and Y"  "can associations between X and Y be attributed to variations in"  "X would modulate Y"  "is X able to protect against Y"  "X is affected by Y"  "X may form a target of intervention"  "X can be primed, depending on Y"  "are differences in X accounted for by Y"  "does X elicit Y"  "the spillover from X to Y"  "(...) processes (...)"  "the impact of X on Y"  "the amount of X explained by Y"  "the interplay between X and Y"  "does X play a role in Y"  "the effect of X on Y"  "the underlying mechanism of X"  "the reactivity of Y in response to X"  "does X prevent the effect of Y"  "the influence of X on Y"  "the role of X in Y"  "does X depend on Y"  "the neural underpinnings of X" |
| descriptive | Statement is exclusively about relationships/associations. | "X would be associated with Y"  "X is a correlate of Y"  "X is related to Y"  "to test linkages between X and Y"  "people with X show higher Y"  "we investigate the relationship between X and Y" |
| predictive | Statement is about relationships and selection, forecasting, or prediction for new units of interest. | "X predicts increasing Y"  "in order to identify adolescents at risk for X"  "individuals with X have higher changes of being Y" |

Second, the randomly sampled CID publications as a whole were reviewed to determine

* the research design (cross-sectional, longitudinal, repeated-measures, or experimental);
* if the researcher used a manipulation (yes, no); and
  + if the researchers used a manipulation, whether it was the independent variable of interest that was randomized (yes, no);
* whether or not the units of interest in the study were twins (yes, no); and
* if the researchers explicitly used the words “cause”, or “causal” to express a causal interest (in the introduction or hypotheses) or make causal statements (in the discussion or conclusion).

**Development of the codebook (Table 2)**

An initial codebook was developed containing the three goals of scientific research, as described in the article, as à priori codes. Using this codebook, two researchers independently coded 10 CID publications. Cohen’s Kappa was computed as a measure of interrater reliability and found to be .713. Differences in coding were discussed, agreed upon and the codebook was adjusted accordingly, resulting in the final version of the codebook as presented in this document. Given the Cohen’s Kappa and the adjustments to the codebook, the interrater reliability for the categorization of sentences to their goal was considered satisfactory.

Below we describe in more detail the changes that were made to the initial codebook:

* Statements that specifically mention moderation or mediation were coded as ‘causal’. However, statements that are solely about interaction (i.e., not mentioning moderation), should not immediately be coded as ‘causal’; they should be categorized based on the interpretation that is given to this interaction.
* Sentences about individuals having an increased or decreased risk at something should be considered ‘predictive’ of nature. For example: “We found that X could differentiate between children at risk for Y.” and “Nonetheless, the moderate to strong relations between X and Y underscores the need for study on X as a high-risk marker.”

**References**

A list of references of the hundred CID publications used for coding can be found below.

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