Type D personality and health-related quality of life in patients with cardiovascular disease: an individual patient data meta-analysis

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Research aims
The aims of our meta-analysis are threefold:

1. Our first aim is to determine the cross-sectional relation between Type D personality and health-related quality of life (HRQoL) in patients with cardiovascular disease.
2. In the subset of prospective studies, our second aim is to determine the relation between Type D personality and *changes* in HRQoL across follow-up in patients with cardiovascular disease.
3. Kupper & Denollet (2016) showed that the heterogeneity in the results of Type D studies can partly be explained by moderators. Therefore, our third aim is to determine whether the patient level moderators age, sex and cardiac diagnosis (e.g. coronary artery disease vs. heart failure) moderate the association between Type D and (changes in) HRQoL.

Searches
We plan to conduct a systematic literature search using the following electronic databases: PubMed, Embase, Web of Science and PsycINFO. We will search for the terms ‘Type D personality' AND (‘cardiovascular disease’ OR 'coronary artery disease' OR 'coronary heart disease' OR 'heart failure' OR 'ventricular arrhythmia', OR ‘atrial fibrillation) AND (‘quality of life’ OR ‘wellbeing'). Furthermore, we will perform hand searches, selecting articles included in earlier systematic reviews and meta-analyses. We will limit our searches to a publication period between 1996 and 2023, because the first publication on Type D personality was in 1996.

Types of study to be included
We will include cross-sectional studies and prospective cohort studies investigating the association between Type D personality and HRQoL of life in patient with various cardiovascular diseases, including coronary artery disease, heart failure, ventricular arrhythmia. Studies should have measured Type D personality using the DS-14 questionnaire and HRQoL using a validated measurement instrument.

We will exclude reviews, meta-analyses, case-control studies, cross-sectional studies, imaging studies, case series case reports. We will also exclude studies focusing on populations other than patients with coronary artery disease, heart failure or ventricular arrhythmia, such as patients with peripheral arterial disease, and inherited cardiac conditions.

If several studies have been published on the same sample of participants, we will include the study with the largest sample size and/or the longest follow-up time.

With respect to the primary outcome, we will exclude studies that did not measure health-related quality of life (HRQoL) with a previously validated instrument. In the literature researchers interchangeably refer to the concepts quality of life (QoL), health-related quality of life (HRQoL) and subjective health status (HS). Commonly used questionnaires differ in the extent to which they measure these constructs. In line with Torrance (1987) we define “Quality of Life as an all-inclusive concept incorporating all factors that impact upon an individual’s life. Health-related quality of life includes only those factors that are part of an individual’s health.” This general HRQoL definition allows including studies that have used a validated questionnaire to measure at least one of the various HRQoL domains (e.g., general, mental, physical, social).

Required data
For each eligible study we will contact the corresponding author (or other authors in case of non-response) and request the raw data listed below. Though researchers are encouraged to share all the listed information, studies will be excluded if researchers are not able to at least share the bold-faced information:

- **Type D personality** (individual item scores of DS-14 questionnaire)
- **HRQoL*** (individual item scores of validated questionnaire)
- Depressive symptoms* (individual item scores of validated questionnaire)
- Anxiety symptoms* (individual item scores of validated questionnaire)
- **Patient characteristics**: Age, Sex, Type of cardiovascular disease

* For prospective designs all available repeated measurements are preferred

Condition or domain being studied
Cardiovascular disease; Type D personality; Negative affectivity; Social inhibition; Health-related quality of life.

Participants/population
Population of individual who at baseline were diagnosed with coronary artery disease, heart failure or ventricular arrhythmia, who responded to the DS-14 or DS-16 questionnaire assessing Type D personality, and with at least one HRQoL measurement.

Main outcome(s)
Health-related quality of life domains (general, physical, mental, social)

Additional outcome(s)
Changes in health-related quality of life domains over time.

Moderators
We will investigate if the relation between Type D and (changes in) HRQoL is moderated by age (continuous), sex (dichotomous), and cardiac diagnosis (nominal with coronary artery disease as reference category).

Data extraction (selection and coding)
The hits of the three search engines will be merged before screening. Two reviewers will independently perform the screening process. Given the relatively small number of studies on the topic, studies will be included or excluded in a single abstract and full-text screening. In case of disagreements between the two reviewers, a third reviewer will be consulted.

Due to the nature of the individual patient data meta-analysis, it is not necessary to extract patient-level data from the included articles. If the authors of the included studies are willing to share the requested data, then the shared dataset will contain all the information we need to appropriate conduct our IPD meta-analysis.

Strategy for data synthesis
We will conduct our primary individual patient data meta-analysis according to a one-stage approach (Burke, Ensor & Riley, 2017), aggregating the data across studies and using a multilevel approach to allow for between-study variation in the estimated regression coefficients (intercept & slope of Type D effect). We will estimate the effects of Type D personality on HRQoL according to a multilevel latent variable interaction model, with a separate model for each HRQoL domain.

Some scholars (e.g., Smith, 2011) have argued that the Type D effect can be seen as a synergy between its subcomponents negative affectivity (NA) and social inhibition (SI). A significant positive relation between Type D and HRQoL would then correspond to a statistically significant interaction effect between the latent NA and SI variables on the latent HRQoL variable. The direction of this interaction effect should be consistent with synergy between NA and SI (the effect of one trait enhances the effect of the other trait on HRQoL).

We will use a latent variable modeling approach to model the relation between on the one hand the latent variables NA, SI and HRQoL, and on the other hand the individual item scores measuring each construct. In cross-sectional data, the structural relations between those latent variables can be analyzed using a structural equation model with latent variable interaction effect (Lodder et al. 2019). For prospective data, this HRQoL model will be extended to a latent growth curve model. Whether non-linear growth curves can be estimated will depend on the number of available measurements per study. The moderation by patient characteristics will also be tested within these multilevel latent interaction models.

Analysis of subgroups or subsets
The moderator variables will indicate whether the relation between Type D personality and HRQoL depends on other factors. In case of a significant moderator effect, subgroup analyses will be performed, using the moderator as a grouping variable, to shed more light on the nature of this moderating effect.

If the included studies differ in the HRQoL measurement instruments, then studies making use of the same instruments will be aggregated in the same one-stage meta-analysis. Different instruments do not necessarily measure the same number and type of HRQoL dimensions, which could require considering them separately in the latent variable models. This may result in several one-stage meta-analyses for each HRQoL measurement instrument that has been used more than once.

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References

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