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## Summary

The aim of the studies described in this thesis was to give a broad description of contemporary biomedical publication culture in the Netherlands, with a special focus on the individual scientist. We have tried to identify both the determinants and the consequences of this culture. The conclusions that follow from the interpretation of the data can be divided in three main subjects; publication pressure, research misbehavior and publication culture.

### *Publication pressure*

Publication pressure is the pressure that scientists perceive to publish the results of their research in scientific journals. We developed a questionnaire to measure perceived publication pressure, the Publication Pressure Questionnaire (PPQ). We analyzed the psychometric properties of the questionnaire with confirmatory and explanatory factor analyses. The fit (of each subscale) was then further investigated by means of item response theory (IRT). We concluded that the PPQ is a valid and reliable instrument to quantify perceived publication pressure among biomedical scientists (Chapter 2).

We have sent a web-based survey to 437 Dutch full professors to study publication pressure with the PPQ and burn out with the Utrecht BurnOut Scale (UBOS). We concluded that publication pressure is strongly correlated with emotional exhaustion (Chapter 4). Also, recently appointed full professors have higher levels of emotional exhaustion and are thus particularly susceptible to burnout. Furthermore, a relatively high H-index was associated with less burnout symptoms (Chapter 3). A substantial proportion of professors believed that publication pressure has become excessive, and expressed a cynical view on the validity of biomedical science.

### *Research misbehavior*

Research misbehavior can be defined as different dishonest behaviors in the scientific process that may corrupt findings and conclusions. Fabrication, falsification, and plagiarism are usually qualified as research misbehavior, although it can be questioned whether the latter should be considered as such. Other actions may be referred to as questionable research practices (QRP's), typical examples of which include salami slicing, gift authorships or 'intuitively' deleting data.

Particularly in medicine, concerns have been expressed about the high prevalence of research misbehaviors. In 2009, a systematic review concluded that almost 2% of scientists confessed having fabricated or falsified data at least once during the last 3 years, and up to 33% admitted to other questionable research practices (Fanelli 2009).

We studied biomedical scientists to determine correlates of self-reported research misbehaviors. In a cross-sectional study we sent out a survey with different questionnaires to two different study populations. In a sample of 315 Flemish biomedical scientists, no less than 15% admitted they had fabricated, plagiarized or manipulated data in the last 3 years. This self-reported behavior was more common in younger scientists. Furthermore, a composite research misbehavior severity score was strongly associated with perceived publication pressure (Chapter 5).

In another cross-sectional study of 535 Dutch biomedical researchers we correlated personality traits with self-reported research misbehavior. The Machiavellianistic personality trait was associated with research misbehavior. Furthermore, higher hierarchical academic positions were associated with higher narcissistic and psychopathic traits, lower self-esteem scores and lower perceived publication pressure. Self-reported research misbehavior was more common among those in higher academic positions (Chapter 8).

### *Publication culture*

It is very difficult to determine what publication culture exactly is. We have explored the definition by asking almost 100 Dutch biomedical scientists among all academic ranks to hypothesize which themes should be part of the definition of publication culture. In a focus group study, participating scientists suggested key aspects of the contemporary publication culture are publication bias, authorships, funding, hypercompetition and citation indexes such as the Impact Factor. The themes discussed in these interviews were mainly perceived as negative. They can lead to cynical sentiments, counterproductive stress levels and - arguably most importantly - questionable research practices among both junior and senior biomedical scientists (Chapter 6).

Two of the themes that were mentioned in the focus group interviews were positive outcome bias and the influence of the pharmaceutical companies on research results. This bias was studied in chapter 7 by cross-sectional survey among 400 Dutch psychiatrists. The results suggested that psychiatrists fail to account for the effects of industry funding disclosure in their judgement of the reliability and relevance of study results. On the other hand, psychiatrists are more likely to critically interpret the content of a scientific abstract in which a positive outcome is reported. That is a striking discrepancy between psychiatrists' attitudes towards the pharmaceutical industry and the effects that funding disclosure has on their perceived credibility and judgement of clinical relevance in study results.