

Making researchers responsible: Attributions of responsibility and ambiguous notions of culture in research codes of conduct

CURRENT STATUS: UNDER REVIEW

BMC Medical Ethics  BMC Series

Govert Valkenburg
NTNU Norwegian University of Science and Technology

✉ govert.valkenburg@ntnu.no *Corresponding Author*
ORCID: <https://orcid.org/0000-0001-7045-9878>

Guus Dix
Leiden University Centre for Science and Technology Studies

Joeri Tjeldink
Amsterdam University Medical Center

Sarah de Rijcke
The University of Manchester Faculty of Biology Medicine and Health

DOI:

10.21203/rs.2.18540/v2

SUBJECT AREAS

Medical Ethics

KEYWORDS

research integrity, codes of conduct, attribution of responsibility, research culture, institution versus individual

Abstract

Background: Research codes of conduct offer guidance to researchers with respect to which values should be realized in research practices, how these values are to be realized, and what the respective responsibilities of the individual and the institution are in this. However, the question how the division between individual and institutional responsibilities is to be made, has hitherto received little attention. Therefore, we conduct an analysis of research codes of conduct, and investigate how responsibilities are positioned as individual or institutional ones and how the boundary between those two is shaped. Method: We selected 12 institutional, national and international codes of conduct that apply to medical research in the Netherlands, and performed a close-reading content analysis of these codes of conduct. We first identify dominant themes, and then investigate how responsibility is attributed to individuals and institutions. Results: We observe that in many cases, the attribution of the responsibility to either the individual or the institution is not entirely clear and that the notion of culture appears as a residual category for such attributions. This notion of responsible research cultures is deemed important as something that mediates between the individual and institutional level, but at the same time largely lacks substantiation. Conclusions: While many attributions of individual and institutional responsibility are clear, the exact boundary between individual and institutional responsibility is often problematic. We suggest two possible avenues for improvement in codes of conduct: either clearly attribute responsibilities to individuals or institutions and depend less on the notion of culture, or make culture a more explicit concern and articulate what it is and how it could be fostered.

1 Background

Research codes of conduct provide guidance in the conduct of research [1]. Such guidance ranges from generic advice to solid rules that are sanctioned and must be followed. While the researcher seems the obvious primary agent to take this responsibility, much of the responsibility is in fact carried by the institutions in which researchers work. Proper reporting, proper referencing in publications, and paying due respect to patients (in case of biomedical research) as research subjects might indeed arguably appear as clearly the responsibility of individuals. Yet, other things might

appear more logically as concerns of institutions: providing infrastructure for data security, offering research integrity training, and installing ethics committees. However, at closer look, as we show, such attributions are not always as clear-cut. As this division is not trivial, we are interested in how the codes make individuals and institutions responsible for realizing a specific value, or for warranting proper conduct of research.

This leads us to addressing the following two research questions in this paper. First, *what are the prominent values reflected in research codes?* Second, *to whom do codes attribute responsibility for the realization of those values: to the individual, to the institution, or to any other entity?* We analysed fourteen institutional, national and international codes of conduct – predominantly in the field of biomedicine – to answer these two questions.

This paper will continue with brief introductions to the two conceptual pillars guiding our analysis: 1) the basic values that matter to (biomedical) scientific research, as reflected by research codes of conduct; and 2) the idea of attribution of responsibility for realising those values and distributing it between the individual and the institution. The method will be explained then, after which the results will be provided and analysed. Importantly, as we will demonstrate, the results provide reason to take an additional look at how notions of “culture” function in codes of conduct: something that sits inconveniently between the individual and the institution with respect to attributing responsibility. The literature on *responsible conduct of research* (RCR) is concerned with research codes of conduct, amongst other concerns. Such codes are essentially normative: they express values that should be realized in research practices. In order to get a perspective on how responsibilities are assigned to either individual researchers or research institutions, we need to distinguish between different sorts of values, as they potentially come with different preferences for attributing responsibility.

1.1 Values in Research Practices

The values enshrined in research codes of conduct have emerged over time and serve different goods. We discern four main classes of values, each relating to one class of goods:

1. values that contribute to the production of the best possible scientific knowledge,
2. values that capture the preservation of good scientific practice and responsibilities

to colleagues,

3. values that one needs to realise in order to be a good researcher oneself, and
4. values that substantiate the responsibility scientists have towards society.

We arrived at these four classes in the first phase of the research, moving back and forth between the literature on research ethics, and the empirical material consisting of research codes of conduct. Thus, while the classification is grounded in the empirical material, it is also used deductively from the literature to organize that very empirical material. We will use these classes as a means of organizing our investigation, as they potentially relate differently to the question of who is responsible for realising them.

The first class of values, related to truthfulness and more generally to a proper production of scientific knowledge, often includes values such as methodological rigour, transparency [2], and fair peer review [2-4]. Also, more abstract values such as inquisitiveness [1, 5, 6], and integrity [7] are widely mentioned in this respect. This literature takes important inspiration from recent cases of fraud such as the Stapel case [8], or the Schön case [9]. In this literature, fraud is chiefly understood as *falsification, fabrication and plagiarism* (FFP) [10-12]. Much attention is paid to the avoidance thereof.

The second class of values (values that capture the preservation of good scientific practice and responsibilities to colleagues) has to do with how researchers relate to their colleagues. For one thing, fairness in treatment of authorship as well as attribution of earlier work, i.e. proper referencing, seems prominent [13]. Also good mentorship [4, 14] and the importance of good role models [6, 15] are mentioned in this context. These are to be seen as operationalisations of the recognition that the collective nature of science requires that individual members preserve that communal quality [16].

The third class concerns researchers' responsibility for maintaining their qualities as a researcher. They should make an effort to keep their research abilities up to date, so as to preserve the quality of their contribution to the field. This starts with getting the proper formal training before entering a field [17]. In a more abstract sense, this is also phrased as the need to preserve a good "character" [6, 18, 19]. As the ability to do good science, need training and practicing, and can easily succumb to

compromising influences, such good character is needed to withstand those [20].

The last class of values relates to how scientific practice carries a broader societal responsibility. Broadly speaking, this means that scientific research must somehow be useful, it must contribute to a fair and inclusive distribution of wellbeing in society, it must somehow be reliable and truthful (even if we already defined that as an obligation to science itself), and in general it must contribute to the realization of social values. In the specific case of biomedical research, this explicitly includes a responsibility towards patients, whether or not as research subjects. Here, influential work [19] has consisted of the formulation of four general principles: autonomy, beneficence, non-maleficence, and justice. While the human research subject is an important subset of “society” towards which research has to act responsibly, we do not see a need in view of our research questions to further engage with the specificity of this subset. This class of values is importantly, but not exclusively, about justifying the privileged position of science as a producer of truth, and comparably autonomous at that. Only if the members of the scientific community are of indisputable integrity, will it be possible to maintain this position.

1.2 Attribution of Responsibility

The definitive property of a value is that it is something (arguably) desirable. This in itself leaves unspecified *who* is responsible for realising that value. It may seem self-evident that the individual, professional researcher is responsible for realising the values of responsible research. However, there is in many cases no obvious reason why realizing any given value is an individual responsibility. In many cases, it might be argued just convincingly that an institution is (partly, if not primarily) responsible for realizing it. Indeed, the RCR literature has broadened its focus so as to include what the responsibility of institutions regarding the facilitation of the conduct of research with integrity [9, 15, 21].

The reason to focus on attributions of responsibility is that they are indeed nontrivial, and at times even problematic. For example, it appears common-sensical that an individual researcher should show an innovative attitude towards novel research problems. However, the current competitive system has been shown to dissuade people from venturing into innovative research [22]. Hence, if we

want researchers to be innovative, institutions carry some responsibility with respect to setting the right conditions. Similarly, publication bias – i.e. the tendency *not* to publish results of research if the results are “negative” in the sense that originally expected, positive, significant findings are not found [22, 23] – is generally agreed to be a bad thing and researchers should not let themselves be caught into it. But that requires that reward systems are arranged such that the publication of such negative results is equally attractive as the publication of positive results, which currently seems not the case. This means that not only research institutions, but also journal publishers carry a responsibility in this. If it is not sufficiently specified *who* is responsible, all relations of accountability and responsibility become ambiguous as well. Consider for example a situation where transparency has not been exercised, where for the sake of argument we assume that it should have been so. In such a situation, both the institution and the individual researcher can in specific perspectives be seen as responsible for the mishap, and it depends on the broader picture who should be responsible for the lack of transparency. The researcher may indeed simply have neglected procedures for openness. But the institution in turn may have failed to provide and enforce relevant protocols and failed to provide the researcher with assistance in accomplishing transparency. The researcher and the institution each have specific possibilities and impossibilities to carry part of this responsibility. Only if a code of conduct is sufficiently specific about who is responsible for what, will it be able to steer away from the pitfall of nobody being or feeling responsible; or perhaps worse, the situation that all responsibility is uncritically shifted onto the individual researcher.

1.3 Research question

We investigated research codes of conduct with a specific interest in the kinds of values of responsible conduct of research that are expressed in them and the kinds of entities – individual researchers, institutions or cultures – that are made responsible for realizing these values. Hence our first research question is: *what are the prominent values reflected in research codes?* Our second research question is: *to whom do codes attribute responsibility for the realization of those values?*

2 Method

Our research scope is defined at the biomedical research done in University Medical Centers (UMCs)

in the Netherlands. In addition, other public-sector research is bound to the same rules and regulations, which makes the joint UMCs representative for the sector. We selected all research codes that any biomedical researcher in these UMCs is subject to. From the highest to the lowest level of organization these are: (1) at the European and global level, the Helsinki Declaration (version 2013) of the World Medical Association, the ALLEA code by the joint European Academies and the code held by the European Science Foundation; (2) at the national level, the joint code by amongst others the VSNU (the Dutch Universities' Association) and NFU (the Dutch Federation of University Medical Centers), and the code of conduct for medical doctors issued by the KNMG (Dutch Medical Association); and (3) at the institutional level, we included the codes of all 8 UMCs of the country (see table 1). At the time of writing, the Academic Medical Center and the VU University Medical Center, both in Amsterdam, were completing their merger into the Amsterdam UMC. In this process, they had already established a joint research code.

An argument could be made that the Dutch law on biomedical research should be considered as well. However, a *prima facie* interpretation of that text reveals that it is about the absolute boundaries of acceptable research conduct, phrasing explicitly what researchers as well as research institutions are bound to. It does therefore not contain any interesting reflections on attributing responsibilities, on how individual and institution relate, or how the boundary between their responsibilities is to be implemented.

If available in both English and Dutch, the English version of the codes was used. In cases where only Dutch versions were available, translation was deemed unproblematic: ambiguity is typically avoided by authors of such texts, so nothing is likely to be lost in translation.

Codes of conduct	Issuing party/parties
<i>International</i>	
Helsinki Declaration	World Medical Association
Good scientific practice in research and scholarship	European Science Foundation
The European Code of Conduct for Research Integrity	ALLEA All European Academies
<i>National</i>	
KNMG Gedragsregels voor Artsen	KNMG Royal Dutch Medical Association
Nederlandse Gedragscode Wetenschappelijke Integriteit (draft version 2018; not yet agreed upon)	KNAW Royal Netherlands Academy of Arts and Sciences NFU Netherlands Federation of University Medical Centers NWO Netherlands Organisation for Scientific Research TO2 Federation for applied-research organisations VSNU Association of Universities The Netherlands The Netherlands Association of Universities of Applied Sciences
Wet medisch-wetenschappelijk onderzoek met mensen (Law on medical-scientific research on human subjects). <i>NOT FURTHER CONSIDERED</i>	The Netherlands
<i>Institutional</i>	
Scientific integrity at the LUMC	Leiden UMC
Research Code Maastricht UMC+	Maastricht UMC+
Regeling Wetenschappelijk Integriteit Radboud Universiteit Nijmegen	Radboud Universiteit Nijmegen
AMC-VUmc Research Code	AMC (Amsterdam) VUmc (Amsterdam)
Erasmus MC Research Codes	Erasmus MC
Research Code. Scientific Integrity at UMC Utrecht & Vision Document Good Scientists Make Good Science	UMC Utrecht
Research Code University Medical Center Groningen	UMC Groningen

Table 1 Consulted research codes of conduct

We imported all the codes into the *qualitative data analysis* package Atlas.ti. In the first round of analysis, we inventoried the basic values, as introduced above, expressed by these codes. Labels[1] were attached manually by the researchers to fragments of the codes, signifying which value was made reference to. This involved an interpretive step by the researchers: sometimes a value is

explicitly mentioned, but sometimes there is also just a description which the researchers interpreted as substantiating a certain value. This was done by one researcher [GV], and some doubtful cases were discussed.

In a prima-facie analysis of these labelled values, complemented with literature study, four classes of values were identified. The values were consequently arranged into the classes mentioned above: truth, society, the scientific community, and the researcher themselves. An overview of the value labels grouped into these four classes is given in table 2. Examples with text fragments will follow in the results section. The interpretation and labelling of values is robust in face of any subjectivity of the researcher (or what in alternative research designs would count as inter-coder reliability), as it only organizes the research material for later interpretation. No explanatory power is attached to the labels and classes themselves.

[1] In qualitative data analysis, these labels are usually referred to as “codes”. However, as this text intensively deals with “research codes” as the unit of analysis, we use “label” here instead to avoid textual ambiguity.

Truth
Bias (avoidance of) DataIntegrity Disinterestedness FFP (avoidance of) Impartiality Independence Integrity Rigour Selection bias (avoidance of) Sloppy science (avoidance of) Veracity
Colleagues
Bullying (avoidance of) Collectiveness Fairness Ghost authorship (avoidance of) Leadership Mentorship

Openness PsychSafety Reliability Trust
Profession
Autonomy Character Expertise Negligence (avoidance of) Training
Society
Accountability Communalism Conflicts of interest (avoidance of) Deception (avoidance of) Human values Outreach Relevance Respect Responsibility Safeguarding dignity Sensationalism (avoidance of) Transparency

Table 2 Values and value classes

In a second round of analysis we inventoried to whom responsibility is attributed in all selected text fragments, i.e. whether and how substantiation was provided to these values, specifically with

reference to where exactly the responsibility is placed: at the individual, the institution, or otherwise. This was also done manually. For example, the fragment: “Open communication in discussing the work with other scientists, in contributing to public knowledge through publication of the findings, and when communicating with the general public. This openness presupposes the proper storage and availability of data and their accessibility for interested colleagues” (UMCU research code, p.8), in our view represents the value of “transparency”, and does not clearly attribute this responsibility to the researcher or the institution. In contrast, the fragment: “Researchers across the entire career path, from junior to the most senior level, undertake training in ethics and research integrity” (ALLEA, p. 5), in our view expresses a view on the value of “training”, and clearly attributes the responsibility to the researcher.

In addition, a third round of analysis into notions of “culture” was found necessary. Here, we did use an automated search, upon which occurrences were assessed and analysed manually. This is accounted for in the result section below.

We did not seek to attribute any explanatory power to the level of operation of the codes, hence we treated all codes equally, whether they are from the global or the institutional level. We did notice some seemingly structural differences between institutional and supra-institutional codes, though. Also, we did not make a historical analysis, but intended to make a snapshot of the situation at the time of writing. All codes analysed were at that moment either in effect, or in a drafting phase and should be expected to be in effect soon in more or less the analysed form.

3 Results

In the following subsections, we discuss the values that came out of our analysis of the included research codes, grouped in the four classes discussed above. We also discuss whether they are explicitly or implicitly attributed to individuals or to institutions, or whether they remain unspecific at this point. We first give a prima-facie overview of the codes. Then, the four classes of values are discussed. Finally, we look at how responsibilities within these four clusters are attributed.

3.1 Prima-facie Assessment of Research Codes of Conduct

The codes differ greatly in length and territory. Among the institutional codes, the longest (joint code

of AMC and VUmc) is 64 pages in length, the shortest (Radboud UMC) is 9 pages in length (no explanatory power is attributed to the page numbers, this is just to sketch the diversity; it can be added that all texts were built-up of full-text A4 size with little or no graphics). The longer the codes are, the broader the range of issues they cover. For example, the Erasmus MC code (47 pages) is explicitly split into three parts (academic integrity, intellectual property, and patient data and material). And while the code of UMC Utrecht is comparably modest at 31 pages, a lot of the territory is covered in the parallel Vision Document of 148 pages (bilingual). The codes being highly different in terms of their length and the territory they cover makes them hard to compare with respect to how strict they are, or how much attention they devote to specific issues. Also, if things are missing from a code, there is no reason to assume that the institution is indifferent to that issue – it might just be resolved otherwise, through other means than this specific form of codification.

In comparison to the supra-institutional codes, the institutional ones are very long. For example, the WMA code consists only of two pages, and the KNMG code only 5 plus a 2-page preamble. The main difference seems to be that the institutional codes contain much more concrete implementation: which committees and procedures are exactly in place, what policy aims the expressed norms and values correlate to, and how the codes themselves are under the permanent care and revision of the institution and its members. We have no reason to assume that it is a particularly “Dutch” thing to write long codes. Also, we do not attach any stricter meaning to page numbers than these broad-stroke observations.

A first reading of all the codes, in parallel with the literature study reported above, iteratively produced the classification of four value categories. In principle, this may result in certain values falling out of scope because they do not fit any of the 4 categories. Therefore, we have first identified all value statements, and only then imposed the categorization, and ascertained that all value statements were indeed covered by one of the four categories.

3.2 Values

3.2.1 Truthfulness

The first class of values consists of those principles that are conducive to producing “true” knowledge.

They thus specify how researchers should engage with their research objects, how knowledge should be presented, how knowledge is corroborated, etc. While we use the single term of “truthfulness” here, this is in fact a complex concept: in practice, it involves many constituting principles and potentially conflicting ones at that; and in codes, it usually appears through more specific and substantial principles.

One way in which truthfulness typically emerges in codes is in an emphasis on *rigour*: scientists should do their work properly and according to the current standards of the field. This is not always literally defined under this denominator, but for example the KNAW code (p. 8) states: “Carefulness means that one deploys methods that count as standard or are justifiable, and that one practices utter meticulousness in the design, execution, reporting and dissemination of the research.”

Substantiations in institutional codes include meticulousness, attention to detail, proper reporting and referencing, the absence of deceit, and the fact that an individual should take appropriate training to achieve rigour. Other appearances of this strive for truthfulness are values such as disinterestedness and impartiality. As the UMCU code (p. 4) states: “Research is to be independent of commissioning or interested parties, ideological or political pressure groups, and economic or financial interests. Any limitation of academic freedom needs to be made visible.” And the MUMC+ code (p. 7, our translation) states: “The research scientist lets his or her research activities be guided by no other interest than the scientific interest. [...] Scientists conduct their work in a context of academic freedom and impartiality. Insofar as constraints of this freedom are inevitable, they shall be revealed.”

In a general sense, ideals of the good may consist of absence and prevention of the bad. In this way, truthfulness indeed appears often as the avoidance of untruthfulness. In fact, references to the avoidance of fraud understood as *falsification, fabrication and plagiarism* and the avoidance of problems such as conflicts of interest, the evasion of laws and regulations, and failure to remedy misconduct make up a great part of research codes. For example, in the ALLEA code (art. 3), FFP is explicitly listed as the “traditional definition” of research misconduct. And in the Radboud code, it is central to the appendix that defines violations of scientific integrity. In the same code, it catches the

eye that the first 7 of 9 pages are about the formal arrangements and procedures that deal with misconduct. The last 2 pages are about the content of misconduct, where 5 out of 8 articles are about FFP and similar crimes against the truth.

3.2.2 Colleagues, Practice and Community

The second class is collegiality: the obligations and entitlements that derive from one's membership of a research community, notably towards colleagues, the institution and the broader academic community. All codes express in some way that research is a collective affair, and that the individual has a responsibility towards this collective nature. One value that subsides under collegiality is fairness about authorship. Most codes contain some reference to the duty to acknowledge the work of others. For example, in the Radboud code, 2 articles are about authorship issues. Interestingly, the UMCU code (p. 19, our translation) also specifies what is *not* a sufficient ground for authorship: "For the sake of clarity, we stipulate that the acquisition of funding, the acquisition of data, and/or the overall management of a research group are insufficient grounds to claim authorship". Thus, this institution claims at least part of the responsibility in setting the standards for authorship. There is also a generally recognized duty to take responsibility for the conduct of others. Most codes make reference to fall-back arrangements such as confidentiality officers and protection for whistle-blowers. For example, the UMCU code (p.8), the VUMc-AMC code (p. 57) and the Radboud code (p.1) mention explicit arrangements for whistle blowers. The supra-institutional KNAW code (p. 14) explicitly stipulates the installation of such arrangements as the responsibility of institutions. While the aforementioned quotations provide ample reason to trust that institutions do indeed take this responsibility, it is interesting to see that there is apparently a point in making this explicit.

3.2.3 Professionalism

Codes also express a responsibility on what it takes to become or remain a good researcher, who has the abilities needed to produce the values that make up good science. We label this class *professionalism*. Given the responsibilities a researcher carries, it is not a strictly voluntary thing for researchers to work on their professionalism. In fact, it is the very condition under which it will be accepted that they do this kind of work. While the idea of codes of conduct is that they specify good

research, they are usually not literally phrased in terms of what such a good researcher is. One exception that makes a reference to a trait of character is the LUMC code: it talks about the “Profile of an honourable researcher”, which is the heading under which many of the more operational values are explained such as respectfulness, meticulousness, impartiality, and responsibility. Also, some more concrete personal qualities emerge from the codes. One important shape in which it comes is the need to take training. The ALLEA code (sec. 2.2) explicitly states that professionals should take training throughout their entire career. The KNAW code (sec. 5.2) states explicitly that institutions should put in place the provision of education, and notably education in research integrity.

3.2.4 Values to the benefit of society

The last entity we observe towards which the medical research bears a certain responsibility, is society at large. This is about science’s contribution to the benefit of society. The values in this class explicitly address society as an actor or actor class that has stake in the realization of the value, in comparison to how the values in the first three classes contribute more indirectly to societal benefit. *Accountability* and *transparency* are important guises in which societal responsibility emerges. Strictly, accountability is something quite different than transparency: the former is about placing oneself in a position where one can be held responsible, while the latter is about providing information on the process underlying specific knowledge outcomes. However, the connection between them is straightforward to see, and indeed the two often align in their operationalization in codes. They both come with clear and complete communication (e.g. KNAW, p.8; VUmc-AMC, p. 15, MUMC+, p. 7), with the possibility and ability for people to put each other’s work up for (constructive) discussion (VUmc-AMC, p.5; UMCG, p.7), facilities for archiving material so as to avail it for cross-checking (UMCU, p.16; UMCG, p.19), and in a general sense with the ability to explain and justify how research outcomes have come about.

Another value to hold dear towards society is that of *relevance*, which in biomedical research predominantly means clinical relevance. It appears in many codes, but at the same time, it is often not clearly specified what exactly makes something relevant or not. One interesting remark is found in the LUMC code (p. 28), which suggests that the involvement of patient organizations helps setting

research questions that are relevant. Thus, even if relevance itself is not directly substantiated, its procedural definition provides guidance. The connection with society as the recipient of relevant knowledge is stipulated as a criterion here.

3.3 Attributions of responsibility

In the previous section, we inventoried the values that appear central to codes, and captured them in the four classes: values serving the truth, values serving colleagues, values preserving the profession, and values benefiting society. Within each of these four classes, we now further explore how the values are presented as responsibilities of individuals or institutions.

3.3.1 Attributing Responsibility to Individuals and Institutions

In truth-related values, FFP is the most prominent anti-position against which is argued. FFP is typically something an individual commits. Interestingly, at no point in the codes did we see any indication that an institution can be found guilty of such conduct, which suggests that it is indeed always ultimately reckoned an individual responsibility to take care of. Similarly, the appearing substantiations of rigour as the main road to truthfulness – such as meticulousness, attention to detail, proper reporting and referencing, the absence of deceit – are hard to see as anything different than individual qualities. However, particularly at the international level, the ALLEA code (sec. 2.1) specifies that institutions have a responsibility in setting the infrastructural conditions to actually deliver rigour, which includes provision of training. Also, the installation of clear fall-back procedures such as an ombudsman and whistle-blower protection in case misconduct has taken place, is generally reckoned an institutional responsibility. Thus, even though truthfulness is predominantly an individual duty, a broader view on the context of trustfulness shows that it is not strictly so and can also be an institutional duty.

Regarding the practice in which the community of colleagues operates, mentorship was found to be a prominent value to realize. While the practical action of mentoring is done by an individual, it is also visible in many codes that mentorship can only take place if the institutional conditions are conducive to it. In many codes, mentorship is appreciated as an important device in warranting research integrity. For example, in the AMC-VUmc code, “Good Mentorship” is a chapter of its own, and

provides a host of specific, operational guidelines for what good mentors (including, but not limited to PhD supervisors) should do on a day-to-day basis. Similarly, in the UMCG and MUMC+ codes, it is a chapter of its own, be it slightly shorter. Mentorship is something “done” by an individual mentor, but at the same time it is something “enabled” or “stimulated” by the institution, for example by setting standards for mentorship arrangements and providing training to mentors. Two other important duties towards the community, namely fairness towards others (chiefly about authorship) and fairness about others (chiefly about reporting mishaps), are typically framed as individual duties, be it that also here it is often recognized that the institutional conditions should be productive.

Duties towards the profession mostly emerge as the need to preserve one’s abilities to live up to the standards of the field. This is primarily achieved through training, both prior to entering the work field and after one has become a member. This is stipulated widely, both by higher-level codes (ALLEA, ch. 2; KNAW, sec. 5.3), and by institutional codes (UMCU, p.14). Especially the codes at the supra-institutional level stipulate that there is an important duty to facilitate this at the institutional level. Ultimately, it is of course the individual researcher who has to take the relevant refresher courses, and we have not found any reference to means of coercion from the sides of institutions.

Towards society, research principally holds the duties of beneficence, accountability and transparency. For example, the LUMC code (p.18) explicitly stages relevance as something that individual researchers should warrant in their research. Another appearance is in the UMCU vision document (p. 60), where it is similarly framed as a duty for the individual researcher to have a realistic view on research outcomes and not to make overpromises. Interesting in this respect is the fact that LUMC (p. 28) stipulates that patient organizations should be involved in research. Thus, the institution takes responsibility in setting a standard here, but it seems still the researcher who is ultimately responsible for actually shaping this engagement. In the Radboud code (p. 8), it is stated that mishaps harm society and the image of research in society, and that in the very first place the employer of the researcher is responsible for preventing such mishaps. The preamble to the VSNU code (p. 3) states that doing science in service of society is an individual affair, while it is also a matter for “those who carry managerial and governing responsibility”.

We observe that there is no direct and univocal relation between the four beneficiaries and who is supposed to take the responsibility for realizing those values. Nevertheless, we are able to conclude to the following statements:

All classes contain at least some references to individual responsibilities as well as institutional responsibilities.

In the two classes of truth-related and society-related values, attributions to the individual are more incident than attributions to institutions.

Obligations towards the profession and obligations towards the research community are more evenly balanced between individual and institutional responsibilities.

Codes at the supra-institutional and international levels (e.g. KNAW, sec. 5.6; ALLEA, ch. 2) are in general much more articulate and explicit about the responsibilities of institutions than the codes of institutions themselves are.

With respect to the truth-related values, this bend towards individual responsibility might be found to be unsurprising, as these values are much more connected to the handwork of science. However, with respect to society-related matters, it is not so self-evident. After all, many (but not all) of the science-society relations are shaped at the institutional level, not the level of the individual scientist.

Also, the attribution to institutions in the higher-level codes is comparably well-operationalized, pointing at such concrete measures as the installation of ethics and integrity committees, and facilities at institutional websites for matters that require publication. To some extent this is unsurprising as the latter are actually meant to inform individuals, not institutions, which is just a natural consequence of different levels of organization coming with different perspectives.

Nonetheless, this might be taken to signal a blind spot in institutional codes. And, apparently, codes are not entirely homogeneous across the board with respect to balancing individual and institutional duties.

3.3.2 Attributing Responsibility to Culture

So far, we have discussed attributions of responsibility to either individuals or institutions, and observe that the distinction between them was not always clear. In addition, during the inductive content analysis we identified a third category that is particularly situated between the individual and the institution: the notion of *culture*. It goes alternatively by names such as climate, atmosphere and environments, and sometimes even remains implicit. It appears as references such as:

“As a medical and biomedical scientific research institute, the LUMC is more than the sum of the individual LUMC researchers. Mutual trust between LUMC researchers and research groups is the foundation on which joint research projects are set up, synergy is generated and bigger steps towards knowledge increase can be taken. In this kind of **environment**, medical and biomedical science and education can flourish, and the LUMC can stand out among its competitors in the Netherlands and abroad.” (LUMC, p. 10; our emphasis)

And:

“The UMCG aims to establish a safe **climate** for reporting and acknowledging violations of academic integrity.” (UMCG, p. 27; our emphasis)

We decided to search the documents on “culture”, “climate”, “atmosphere” and “environment” and their Dutch equivalents (cultuur, klimaat, sfeer and omgeving). It needs pointing out that lexically, these terms refer to different things: culture is not the same as environment, for one. However, in our interpretation they do refer to the same category when they emerge in the codes. We have reckoned the (hypothetical) claim that “researchers should jointly establish a culture of integrity” equivalent with the claim that “researchers should jointly establish an environment of integrity”, etc.. This search yielded 92 quotations that referred to any of these notions (henceforth clustered under culture). We assessed those occurrences manually.

In the codes, culture is often connected to the existence of well-established values and procedures. For example, sometimes, the codes mention the establishment of specific modes of operation, such as organized peer cooperation and evaluation and putting integrity on the agenda of personal assessment cycles (UMCU code p. 5). Multiple codes, moreover, make reference to the importance of whistle-blowing procedures, to ethical review committees and to integrity committees (e.g. RadboudMC, article 4). Combining values with procedures, the KNAW code (art. 5) considers the habit of openly discussing dilemmas and the existence data management facilities as essential elements of a good research culture. In this procedural sense, culture and its equivalents are sometimes linked to specific values such as transparency, independence and trust (e.g. AMC-VUmc, p. 54; LUMC, p. 10). Most codes explicitly state that openness, psychological safety and safety of reporting contribute to

such values (e.g. KNAW, art. 5; UMCG, p. 27). It needs saying that this procedural approach to culture shows a great overlap with we earlier saw as attribution to institutions. Yet, as the codes *themselves* refer to culture or its equivalents, we deem this significant: apparently something beyond the procedures and hence beyond the institutions themselves is pursued.

In addition, culture is at some points operationalized as the selection of (senior) researchers with the right leadership and mentorship characteristics to convey the importance of these values and procedures to a future generation of researchers. The KNAW code (sec. 5.3), for instance, explains the notion of culture as the establishment of clear rules and states, insofar as persons are concerned, and as making sure that “the right senior researchers should be selected” (sec. 5.3, art. 9). The code does at that point not define what a “right researcher” is. Several codes make references to the effect of “seniors being the bearers of culture”, in terms of mentorship, leadership, and the proper design of research projects (e.g. ALLEA p.5, UMC Utrecht Vision Document, p. 87; AMC-VUmc, p. 56). In similar vein, the LUMC code (p.10) spends about a paragraph on setting an “honourable scientific environment” and sees that environment as closely bound up with the need to have the right kind of people in leadership positions. Mentorship relations are equally recognized as a vital mechanism to perpetuate any sort of “culture”. Collectively held norms are transferred through mentors insofar as they are not written down on paper. One code sees seniors as the “conveyors of culture” (UMC Utrecht (p. 87). In the other codes, mentorship is to be interpreted along the same lines, even though explicit reference to culture is not always made. Much like the procedural approach to culture discussed above, this mentorship-based approach seems to suggest something that exists beyond the individual and his or her actions.

In a small number of cases, culture appears as something potentially bad. In one code at the supra-institutional level, for example, culture is depicted as the bearer of sloppy habits and worse. It is then stated that attention should be paid when “the incident occurs more than incidentally, for example when the incident belongs to the research culture in which the researcher operates” (KNAW p. 16). Also, one institutional code refers to today’s “culture of publish or perish” as a potential cause why people are seduced into misbehaviour (LUMC, p.18). However, the same code also refers to

individuals' responsibilities saying that the institution "expects its researchers to take the following steps to avoid scientific fraud, misconduct and plagiarism". In an interesting parallel move, the UMCU Vision Document (p. 14) stipulates that a researcher with integrity will never appeal to environmental factors such as high pressure to justify misbehaviour: "A researcher with integrity will never shift the blame to others, nor appeal to environmental factors such as performance pressure, in order to justify their actions." Interestingly, this is not so much an attribution of responsibility to something beyond individuals and institutions, but rather the existence of something beyond those, that has to be countered by individual and institutional responsibilities.

All in all, there are frequent references to culture and its equivalents in the codes of conduct we analysed. This is an indication that a responsible research culture is an important concern to the writers of the codes and to the wider community of biomedical scientists from which these writers have been selected or that have been consulted in the writing process. As a rough definition, culture appears as something that seems to transcend the individual researcher but is too informal for the institution to carve in stone through rules and regulations. Or conversely: it can be achieved in part by rules and regulations, but then it has to bring into existence something "bigger". Despite the marked importance of positing general ideas about culture in research codes, the vast majority of references to culture contain no substantial specification of how this it is thought to be operating. That is, there seems to be no coherent idea on how it emerges and it "does" things such as coercing, enabling or constraining. On a more interventionist note, these codes do not provide detailed guidelines for how to "do" such a responsible research culture. That is, the discussion of culture includes no hints about who should do what to foster responsible research practices. As such, it is unclear what part of good mentorship practices and should be attributed to culture and what part to individuals, or even to institutions. Moreover, in the case of bad research cultures, the codes slip from the acknowledgement of potential cultural influence to the emphasis on (mostly) individual responsibilities. If we were to push this to a conclusion, it could in fact mean that all references to culture are actually concealed individual attributions.

4 Discussion

4.1 Findings summary

The main findings of our analysis of research codes of conduct are that (1) the attribution of responsibility for good research practices to individual and institution is ambiguous at times and (2) that evoking culture as a category in between the individual and institutional level does little so far to ameliorate this ambiguity. Where we find unambiguous attributions, we notice that supra-institutional codes have a stronger tendency to attribute responsibilities to institutions than the codes of the institutions themselves have. In the two classes of truth-related and society-related values, attributions to the individual are more incident than attributions to institutions. Obligations towards the profession and obligations towards the research community are more evenly balanced between individual and institutional responsibilities.

4.2 Implications

In view of the fact that most of the responsibility is in the end put on the shoulders of the individual, we must expect that whenever attribution of responsibility becomes ambiguous – through evocations of culture or otherwise – it will de facto be attributed to the individual researcher. This altogether sketches a worrisome picture of responsibility ending up on the individual's plate in an obscured way. Our research points at two possible ways out of this problematic situation. One strategy to improve research codes of conduct is to be more clear-cut about the balance between individual and institutional responsibilities. This *strategy of disambiguation* especially pertains to institutional codes as the supra-institutional codes already offer a better balance in this respect. If clarification is successful, the references to culture can be rephrased as either individual or institutional responsibilities.

The considerable incidence of references to culture, however, demonstrates that there is a need to refer to something that somehow falls in between the levels of individual and institution. Even though culture is a difficult concept to grasp and operationalize, certainly for the purpose of setting policy, its widespread use also reflects an intuitive recognition of its importance for how practices eventually operate. It is implicitly recognized as a source of obduracy: if people are part of a sloppy research culture, then training, arrangements and rules about the responsibility of the individual researcher

are insufficient.

A *second strategy of articulation* – the strategy we would advocate – would be to substantiate the notion of culture that is currently missing in codes. We could start from a definition of culture such as the one offered by Geertz [24] who defines culture as “a historically transmitted pattern of meanings embodied in symbols, a system of inherited conceptions expressed in symbolic form by means of which men [sic] communicate, perpetuate, and develop their knowledge about and attitudes towards life.” Carrying this notion to its consequences for research codes of conduct would require an explicit connection to the symbols, conceptions, and knowledge structures of respective research practices. Starting from Geertz’ general definition, we could further differentiate between a range of epistemic cultures [25]: different disciplines and different professional communities working within these disciplines have different cultures of producing knowledge. To engage in a particular scientific practice presupposes a long process of becoming acquainted with scientific ideas and assumptions as embedded in particular scientific skills, instruments, methods and patterns of cooperation. Building on group-grid cultural theory [26, 27] it would be possible to differentiate between the relations with peers (group) and the formalized rules and regulations (grid) that are characteristic for an epistemic culture. Or, alternatively, we could differentiate between the normative, regulative and cognitive elements within a particular epistemic culture [28].

In addition, there is a certain reflexiveness to talking about culture in insufficiently unsubstantiated ways: it contributes to exactly *the opposite* of a good working culture. Think of junior researchers hearing from their mentors that a good culture is important, while not being provided with clear explanation of what this culture is. Worst case, they will adopt such a habit of improperly explaining and sweeping their responsibilities under a carpet of fancy yet vague words. To the contrary, explaining what culture is or how it is operationalized, is in fact itself an example of good culture.

4.3 Limitations

We used four classes of values that were established by moving iteratively between the empirical material and the literature. The upside is that our analysis speaks to both. However, a categorization fully based on the empirical material (in line with the basic ideas of *grounded theory*) or a

categorization entirely based on the literature might have thrown light on different connections or mechanisms. Notably, we have not found a clear explanation, or even an educated guess, of when writers of codes need recourse to a notion such as culture, using it in comparably vague ways.

The manual way of labeling text is time-consuming and may miss out on some insights provided by quantitative and automated analyses. At the same time, we do sense that this method does more justice to the actual meaning of the text as meant by the authors. Also, we sense that no automated analysis can properly deal with ambiguities in the text, which emerge here especially in connection to notions of culture.

The codes were taken from the Dutch context, which may not necessarily provide generalizability to other countries. However, the codes clearly show a high degree of diversity in their exact form and formulations, yet at no point appeared as radically deviating from the international context. Thus, we have no reason to expect that things are radically different in other countries, at least to the extent that institutions in those other countries subscribe to similar international standards. This has not been researched, though. Also, the codes are related to biomedical research contexts, and codes from general universities were only used insofar as they were explicitly in force in the context of a university medical center (specifically Radboud UMC and Radboud University have a joint code).

Generalization of our results to universities and other research institutions might require additional steps that are left out of the current analysis, but we see no reason why UMCs cannot be taken as a valid strategic research site.

5 Conclusions

Research codes of conduct are normative in the sense that they convey the epistemic and moral rules that researchers and research institutions should abide by. Under the heading of “values” we discussed four classes of such rules: truthfulness, collegiality, professionalism and the benefit for society. In addition to this basic source of normativity, the codes are also normative in a more specific sense of attributing responsibility to particular actors. Our analysis shows that this second source of normativity is mobilized to enforce different distributions of responsibility: to the individual, to the institution and to culture.

Insofar as explicit attribution is found, it is more incident to the individual than to the institution. This should perhaps not come as a surprise: codes are by their very nature framed as guidelines that primarily speak to the researcher. Also, research is intuitively thought of as something that is “done” by human beings. And finally, individuals are much more sanctionable than institutions, at least for single mishaps. This is not to say that no responsibility is attributed to institutions. It is acknowledged broadly that they must facilitate that the researcher can in fact deliver integrity and responsible research. Notably the offering of training and the provision of fall-back facilities such as confidential officers and ethical committees are widely mentioned as responsibilities of institutions. Also more straightforward infrastructural arrangements such as education on responsible research, proper information management systems for research data, and guidelines for the checks and balances on any research project are widely regarded as something an institution should provide. This institutional responsibility is emphasised more in supra-institutional codes than in institutional ones.

It has become clear that research codes of conduct do not always clearly attribute responsibilities to either the institution or the individual. Sometimes they move beyond individual and institutional responsibility. We observed that this area is covered by reference to the notion of culture. Culture is deemed important in codes of conduct for things that cannot be reduced to the level of the individual researcher but are hard to formalize into institutional rules or procedures. We also observed that such references are often not sufficiently substantiated. We found no good explanation of what culture is or how it operates. So far, culture is not rendered a distinct and well-developed category in addition to the categories of individual and institution.

Codes of conduct are not only interesting objects of analysis but also interesting instruments to intervene in research practices. Being more articulate in the attribution of responsibility helps prevent making interventions at the wrong level or place. There is little point in remedying a wrong through mentoring if it is in fact the consequence of a compelling regulation; or remedying a wrong at the level of individual action while it is in fact the consequence of collective, aggregative action. Being reflexive about where responsibility should go is a first step in preventing that what should be done by an institution ends up as the responsibility of an individual and vice versa. The current codes fall

short of tapping into the potential of interventions that a developed notion of culture would afford. “Building a certain culture” would require being specific on the content of meanings, norms, and values of that culture. Substantiating culture is not straightforward and requires being specific on how the ideal practice is envisioned, what values are represented and found important, what its mechanisms of inclusion and exclusion of members should be, and how the existence of the practice is thought to be legitimated. The work of articulating what culture means in a setting of responsible research practices and the codes that befit it would be a first step in the direction of better and more targeted interventions.

List Of Abbreviations

ALLEA	All European Academies
AMC	Amsterdam Medical Center
FFP	Falsification, Fabrication, Plagiarism
KNAW	Royal Dutch Academy of Sciences
KNMG	Dutch Medical Association
LUMC	Leiden University Medical Center
MUMC+	Maastricht University Medical Center
NFU	Dutch Federation of University Medical Centers
RCR	Responsible Conduct of Research
UMC	University Medical Center
UMCG	University Medical Center Groningen
UMCU	University Medical Center Utrecht
VSNU	Dutch Universities’ Association
VUmc	Free University Medical Center
WMA	World Medical Association

Declarations

Ethics approval and consent to participate

Not applicable; the research did not involve human subjects.

Consent for publication

Not applicable; no individual's data are contained in the text.

Availability of data and materials

Not applicable; the data used in research are publicly available from the original authoring institutions.

Competing interests

The authors have no competing interests in the outcomes of this research.

Funding

This research was funded by The Netherlands Organisation for Health Research and Development ZonMW, grant number 445001010. The funder had no influence on the conduct during the research.

Authors' contributions

Initial research and analysis: GV

Corroborating research: GV, GD, JT, SR

Research design: GV, JT, SR

Funding acquisition: GV, JT, SR

First draft: GV

Editing: GV, GD, JT, SR

All authors have read and approved the manuscript.

Acknowledgements

The authors wish to thank the editors and three reviewers of this journal for their helpful comments to the paper.

References

1. Drenth PJD. Responsible Conduct in Research. *Science and engineering ethics*. 2006;12(1):13-21.
2. Spier RE. Conference Summary: 'The Responsible Conduct of Basic and Clinical Research'. *Science and engineering ethics*. 2006;12(1):189-97.
3. Hangel N, Schickore J. Scientists' Conceptions of Good Research Practice.

- Perspectives on Science. 2017;25(6):766-91.
4. Ripley E, Markowitz M, Nichols-Casebolt A, Williams L, Macrina F. Guiding the next generation of NIH investigators in responsible conduct of research: the role of the mentor. *Account Res.* 2012;19(4):209-19.
 5. Gläser J, Laudel G, Hinze S, Butler L. Impact of evaluation-based funding on the production of scientific knowledge: What to worry about, and how to find out. 2002.
 6. Shamoo AE, Resnik DB. *Responsible Conduct of Research*. 3 ed. New York: Oxford University Press; 2015.
 7. Becker TE. Integrity in Organizations: Beyond Honesty and Conscientiousness. *The Academy of Management Review.* 1998;23(1):154-61.
 8. Bhattacharjee Y. The mind of a con man. *The New York Times.* 2013 2013.04.26.
 9. Consoli L. Scientific misconduct and science ethics: a case study based approach. *Science and engineering ethics.* 2006;2006(12):533-41.
 10. ALLEA. *The European Code of Conduct for Research Integrity*. Berlin: ALLEA - All European Academies; 2017.
 11. Breit E, Forsberg E-M. Scientific misconduct and integrity: An organizational perspective: Promoting Integrity as an Integral Dimension of Excellence in Research (PRINTEGER); 2016.
 12. Al-Amad S. *Responsible Conduct of Research. Research Ethics in the Arab Region.* *Research Ethics Forum*2017. p. 359-71.
 13. Plemmons DK, Brody SA, Kalichman MW. Student Perceptions of the Effectiveness of Education in the Responsible Conduct of Research. *Science and engineering ethics.* 2006;2006(12):571-82.
 14. DeMets DL, Fleming TR, Geller G, Ransohoff DF. Institutional Responsibility and the Flawed Genomic Biomarkers at Duke University: A Missed Opportunity for

- Transparency and Accountability. *Science and engineering ethics*. 2017;23(4):1199-205.
15. Horbach SPJM, Halffman W. Promoting Virtue or Punishing Fraud: Mapping Contrasts in the Language of 'Scientific Integrity'. *Science and engineering ethics*. 2017;23(6):1461-85.
 16. Merton RK. Science and Technology in a Democratic Order. *Journal of Legal and Political Sociology*. 1942;1:115-26.
 17. Kalichman MW, Plemmons DK. Reported Goals for Responsible Conduct of Research Courses. *Academic Medicine*. 2007;82(9):846-52.
 18. Steneck NH. Fostering Integrity in Research: Definitions, Current Knowledge, and Future Directions. *Science and engineering ethics*. 2006;12(1):53-74.
 19. Beauchamp TL, Childress JF. *Principles of Biomedical Ethics*. 7 ed. New York, Oxford: Oxford University Press; 2013(1979).
 20. Anderson MS, Horn AS, Risbey KR, Ronning EA, Vries RD, Martinson BC. What Do Mentoring and Training in the Responsible Conduct of Research Have To Do with Scientists' Misbehavior? Findings from a National Survey of NIH-Funded Scientists. *Academic Medicine*. 2007;82(9):853-60.
 21. Forsberg EM, Anthun FO, Bailey S, Birchley G, Bout H, Casonato C, et al. Working with Research Integrity-Guidance for Research Performing Organisations: The Bonn PRINTEGER Statement. *Science and engineering ethics*. 2018;24(4):1023-34.
 22. Moore S, Neylon C, Eve MP, O'Donnell DP, Pattinson D. "Excellence R Us": university research and the fetishisation of excellence. *Palgrave Communications*. 2017;3.
 23. Fanelli D. How many scientists fabricate and falsify research? A systematic review and meta-analysis of survey data. *PLoS One*. 2009;4(5):e5738.
 24. Geertz C. *The interpretation of cultures*. New York: Basic Books; 1973.

25. Knorr Cetina K. Epistemic cultures: How the sciences make knowledge. Cambridge, Massachusetts: Harvard University Press; 1999.
26. Hoppe R. Cultures of Public Policy Problems. *Journal of Comparative Policy Analysis: Research and Practice*. 2002;4(3):305-26.
27. Douglas M, Wildavsky A. Risk and culture. Berkeley, CA: University of California Press; 1983.
28. Scott WR. *Institutions and Organizations*. Thousand Oaks: SAGE Publications; 1995.