1   # The Hong Kong Principles for Assessing Researchers:
2   # Fostering Research Integrity
3
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29 **Abstract**
30
31 The primary goal of research is to advance knowledge. For that knowledge to benefit research and

32 society, it must be trustworthy. Trustworthy research is robust, rigorous and transparent at all stages of

33 design, execution and reporting. Initiatives such as the San Francisco Declaration on Research

34 Assessment (DORA) and the Leiden Manifesto have led the way bringing much needed global attention

35 to the importance of taking a considered, transparent and broad approach to assessing research quality.

36 Since publication in 2012 the DORA principles have been signed up to by over 1500 organizations and

37 nearly 15,000 individuals. Despite this significant progress, assessment of researchers still rarely includes

38 considerations related to trustworthiness, rigor and transparency. We have developed the Hong Kong

39 Principles (HKPs) as part of the 6th World Conference on Research Integrity with a specific focus on the

40 need to drive research improvement through ensuring that researchers are explicitly recognized and

41 rewarded (i.e., their careers are advanced) for behavior that leads to trustworthy research. The HKPs

42 have been developed with the idea that their implementation could assist in how researchers are

43 assessed for career advancement with a view to strengthen research integrity. We present five

44 principles: responsible research practices; transparent reporting; open science (open research); valuing

45 a diversity of types of research; and recognizing all contributions to research and scholarly activity. For

46 each principle we provide a rationale for its inclusion and provide examples where these principles are

47 already being adopted.

48   **Introduction**

49   In a quest to advance knowledge, researchers publish approximately 1.5 million journal articles each

50   year. The presumption is that this literature can be used by other researchers, stakeholders, and the

51   wider society because it is trusted, robust, rigorous and complete.

52

53   The approach taken to validating research and its outcomes differs depending on the nature of the

54   research. For example, to rigorously examine the effects of a health intervention, trial participants

55   (human or animal) are typically required to be randomized to the intervention being studied. Many

56   researchers advocate registration of protocols as a way to ensure transparency and to enable others to

57   engage with their research. Subsequently, the use of reporting guidelines can help ensure complete and

58   transparent reporting of the researchers' methods and results. When the research is being

59   disseminated, the research team would ensure that the associated data, materials and any analytical

60   code are made available as an integral part of publication. Such data sharing facilitates re-analysis of the

61   data to check reproducibility and to perform secondary analyses.

62

63   Although some mechanisms exist to support researchers in ensuring transparency at all stages of design,

64   execution and reporting, there is not widespread adoption of these practices. There are many

65   interwoven reasons for this. One contributing factor, we argue, is that little emphasis is placed on the

66   rigor of research when hiring, reviewing and promoting researchers. Working together across the

67   research sector as a whole to address this systemic issue, we believe, offers a global opportunity to

68   improve research and impact.

69

70   We developed the Hong Kong Principles (HKPs) as part of the 6th World Conference on Research

71   Integrity (WCRI) specifically to drive greater recognition for researchers who commit to robust, rigorous

72   and transparent practices (i.e., their careers are advanced) (see Figure). If implemented, the HKPs could

73   play a critical role in evidence-based assessments of researchers and put research rigor at the heart of

74   assessment, as well as open up research to the wider benefit of society.

75

76   We propose five principles, each with a rationale for its inclusion. We illustrate these principles with

77   examples where we know they exist. These examples are not exhaustive, and many are relevant to more

78   than one principle. Together, they illustrate of a breadth of approaches as to how these principles can

79   operate at the very highest levels of international research.

80

81 Early drafts of the HKPs were circulated to the 700 participants registered for the 6th WCRI. Further

82 discussions took place during two sessions at the 6th WCRI. A penultimate version was uploaded on the

83 6th WCRI website after the conference. More than 100 people provided input and feedback. We

84 acknowledge all of these valuable contributions and the global leadership of those working on the San

85 Francisco Declaration on Research Assessment (DORA), the Leiden Manifesto and other initiatives to

86 promote the responsible use of metrics, which have laid the foundations for much of our work (1-4).

87

88 **Principles**

89 **Principle 1: Assess researchers on responsible practices from conception to delivery, including the**

90 **development of the research idea, research design, methodology, execution and effective**

91 **dissemination.**

92

93 *Rationale*

94 The numbers of publications, citations, and total volume of grants are often still the dominant metrics

95 used by research institutions for assessing and rewarding their researchers (1-4). Providing bonuses to

96 academics for publishing in certain journals (i.e., merit pay) is also common in many parts of the world

97 (5-7). These assessment criteria tell assessors little about the researchers and the rigor of their work;

98 thus they are not particularly 'responsible' metrics. These metrics can also be unduly influenced by field

99 and citation practices and provide little information about a publication's (and therefore a researcher's)

100 contributions to research and society. Other criteria are required to provide a broader view of markers

101 of best practices: for example, the extent to which a researcher develops research questions with the

102 involvement of appropriate members of the public (see Figure).

103

104 *Current implementation*

105 The Canadian Institutes of Health Research's Strategy for Patient-Oriented Research (SPOR) is a multi-

106 million-dollar initiative to bring patients into a broad range of activities regarding research across

107 Canadian provinces and territories (8). Patients are now active in the development of research projects

108 in setting priorities and formulating study questions. The Ontario response (Ontario SUPPORT Unit) has

109 included a series of articles with patients taking a leadership role in co-authoring the content (9). In the

110 UK, the James Lind Alliance, funded by the UK National Institute of Health Research (NIHR), is a

111   successful example of including patients, carers and clinicians to develop priority-setting partnerships

112   (10) and question formulation (11).

113

114   With a focus on enhancing reproducibility the US National Institutes of Health (NIH) have revised their

115   application instructions and review criteria to strengthen scientific rigor and transparency (12). One of

116   the resources they recommend is the Experimental Design Assistant (EDA) developed by The National

117   Centre for the Replacement, Refinement & Reduction of Animals in Research (NC3Rs). This 10-module

118   online tool was developed to assist researchers in the design and analysis of animal experiments. It

119   includes dedicated support for randomization, blinding and sample size calculation. It can also be used

120   to help researchers prepare the experimental design information and analysis plan requested for grant

121   applications (13). The NC3Rs encourages the use of the EDA so that applicants can generate an EDA

122   report, which can be submitted in place of the experimental design and methodology appendix.

123

124   Other examples of preferred criteria include social media metrics as indicators of disseminating research

125   (14), public lectures about the results of a research project, public engagement and other types of

126   events that bring together funders, researchers and other stakeholders to work on an effective

127   communication plan of the research program (15). Organizations such as the Wellcome Trust are taking

128   a holistic attitude to redefining their approach to engagement explicitly to help people feel empowered

129   to access, use, respond to and create health research (16).

130

131   **Principle 2: Value the accurate and transparent reporting of all research, regardless of the results.**

132

133   *Rationale*

134   Failure to publish all findings of all studies seriously distorts the evidence base for decision making. For

135   example, a systematic review of trials of reboxetine for treating depression found that almost three

136   quarters of included patients were in unpublished trials (17). Selective publishing of research with

137   positive results (i.e., publication bias) distorts science's evidence-base and has been demonstrated in a

138   variety of disciplines including economics, psychology and clinical and preclinical health research (e.g.,

139   18). Furthermore, the frequency of other reporting biases (e.g., switched primary outcomes without

140   disclosure, and spin) is around 30% (19). This is unacceptably high and diminishes the trustworthiness

141   and integrity of research (7). It also appears that Promotion and Tenure Committees (PTCs) generally do

142   not give sufficient importance to registering protocols and data analysis plans, full publishing of

143   completed studies or making data, code, and materials available (20).

144

145   *Current implementation*

146   Study registration and reporting guidelines are useful tools to help improve the completeness and

147   transparency of a very broad spectrum of research (e.g., 21-24). As part of the editorial policies of the

148   Wellcome Trust's open access publishing platform (Wellcome Open Research (WOR)), authors are

149   required to use reporting guidelines for protocols (e.g., SPIRIT) and completed studies (e.g., ARRIVE)

150   (25). Other funders, such as Gates Open Research (26), the NC3Rs Gateway (27) and the Association of

151   Medical Research Charities (28), do likewise. To help reduce publication bias, WOR also requires

152   registration through one of several different options (e.g., registered reports) (25). Similarly, to promote

153   the registration and publication of all research the NIHR in the UK indicate that "When submitting an

154   application to NIHR programmes for funding for a new clinical trial, the applicant must disclose past

155   publication and trial Registration history for any relevant publications and research grants held,

156   referenced in the application." (29). While these are examples of best practice from funders, we were

157   unable to find any research institution that has incorporated them into researcher assessments (20).

158

159   Several research institutions (e.g., University of Toronto) are now recommending that their clinical

160   trialists use SEPTRE (30), a web-based protocol creation and management tool. When SEPTRE is used,

161   protocol information for trials is automatically registered in clinicaltrials.gov. This saves time and helps

162   the researchers, and their research institutions, to maintain best publication practices (e.g., trial

163   registration). Some journals in the social sciences, particularly psychology, use registered reports to help

164   ensure that research is published regardless of its results (31,32).

165

166   **Principle 3: Value the practices of open science (open research) - such as open methods, materials and**

167   **data.**

168

169   Rationale

170   Openness in research is more than just access to research – it brings equality to the research process. It

171   encompasses a range of practices across the entire lifecycle of research (33). Access to research should

172   not be about who has the resources to pay to see behind a paywall, typically subscription journals.

173   Healthcare and social policy decisions should be made based on access to all research knowledge rather

174 than only a part of it (34). A considerable amount of public funds is used for research and its results can

175 have profound social impact. Preclinical scientists are committing to openly share their laboratory

176 notebooks (35) to streamline research, foster collaborations and reduce unnecessary duplication. In an

177 effort to deter questionable authorship practices, the Consortia Advancing Standards in Research

178 Administration Information supports the CRediT taxonomy (36) as a way for research authors to more

179 openly describe how each person has contributed to a research project.

180

181 Data sharing is another example of openness but is not common practice in clinical research (with some

182 exceptions, such as genetics) (37) although patients seem supportive of sharing their data, at least of

183 randomized trials they have participated in (38). Data sharing is also not considered standard in many

184 other disciplines. Without data sharing it is difficult to check the selectivity of reports; data sharing is key

185 to addressing the reproducibility crisis (39) and building trust (40). There are varying estimates as to

186 which proportion of research is made available through open access mediums, such as open access

187 journals, repositories, or as preprints, but it is far from 100% (41).

188

189 *Current implementation*

190 Ghent University, Belgium, has employed data sharing guidance stating, "Sound data management is a

191 basic requirement for this (academic analysis) and provides additional guarantees for a flawless

192 methodology, for sharing, and reusing data by other researchers in an Open Science context and for the

193 accountability of a researchers own academic integrity" (42). The Nanyang Technological University

194 (NTU), Singapore, implemented an Open Access policy in 2011. All NTU faculty and staff must deposit

195 their final peer-reviewed manuscript of journal articles and conference papers in the Digital Repository

196 (DR-NTU) maintained by the Library upon acceptance of their publications. At NTU's faculty of medicine,

197 random data audits are conducted on the submitted (required) Data Management Plans (DMPs) and

198 checks are made to see if the final data are indeed shared on NTU's open access data repository DR-

199 NTU.

200

201 To help facilitate data sharing the University of Cambridge has introduced the concept of 'data

202 champions' (43). Here, volunteers advise members of the research community on proper handling of

203 research data supporting the use of the Findable, Accessible, Interoperable, and Re-usable (FAIR)

204 research principles (44). Delft University of Technology, The Netherlands, has taken this concept a step

205 further and implemented it as a career assessment criterion (45). The University of Glasgow's academic

206   promotion criteria explicitly allows for data sharing as a research and scholarship output (to support

207   replication) (46).

208

209   Some journals have also established strong data sharing policies. For example, the PLOS journals

210   "require authors to make all data underlying the findings described in their manuscript fully available

211   without restriction at the time of publication. When specific legal or ethical requirements prohibit public

212   sharing of a dataset, authors must indicate how researchers may obtain access to the data. Refusal to

213   share data and related metadata and methods in accordance with this policy will be grounds for

214   rejection." (47). Given that societal benefit is part of an emerging career assessment, clinical researchers

215   should also respond to a growing view that patients want their data shared (38).

216

217   Open research is supported by key infrastructure compliance, such as requiring an Open Researcher and

218   Contributor ID (ORCID) by every researcher, whereby each researcher can be uniquely identified. A

219   recent letter from global funders committing to Implementing ORCIDs for all researchers is a significant

220   step forward (48). This was recently implemented at the Ottawa Hospital Research Institute (49). In

221   Australia and New Zealand there is a consortium that supports ORCID nationally.

222

223   The NIH promotes the use of preprints in grant applications (50) as do all major UK public funders (e.g.,

224   Medical Research Council, UK) (51), The Wellcome Trust made them compulsory for work in health

225   emergencies and promotes their use widely in particular for early career researchers (52).

226

227   **Principle 4: Value a broad range of research and scholarship, such as replication, innovation,**

228   **translation, synthesis, and meta-research.**

229

230   *Rationale*

231   A system that rewards benefit to society and encourages trustworthy and important research needs to

232   take the different types of research into account: creating new ideas; testing them; replicating key

233   findings; synthesis of existing research; developing and validating new tools; measures or methods; etc.

234   Different indicators and criteria need to be developed that are relevant to these different types and

235   stages of research (see Figure). This includes different timeframes of assessment for different types of

236   research.

237

238   Incentives that encourage one fixed idea of the 'right kind' of research will be slow, or even stall,

239   progress. So-called blue-sky research that builds on chance findings or curiosity-driven research based

240   on 'out-of-the-box' thinking should be possible and encouraged, as well in an academic reward system

241   that values societal progress (53). For example, the discovery of graphene at the University of

242   Manchester, UK, was the result of Friday afternoon discussions outside the 'normal' research activities

243   (54). Other examples from a broad range of disciplines exist (55). The short-term nature of academic

244   reward cycles makes this kind of research less attractive for funders, institutions and individual

245   researchers. Equally, replication studies or research synthesis efforts are often not regarded as

246   innovative enough in researcher assessments despite their critical importance for the credibility of

247   research, or for a balanced and robust systematic presentation of all available evidence, respectively

248   (39,56). This is not universally appreciated by PTCs. Research on research and meta-research are

249   practiced at, for example, at METRICS (Stanford, USA) (57), QUEST (Berlin, Germany) (58) whose focus is

250   on clinical and preclinical meta-research, and the Meta Research Center at Tilburg University (59)

251   (Tilburg, The Netherlands) whose focus is on the social sciences. Such activities are important to inform

252   and improve research practices and therefore contribute to making research more reliable and relevant.

253

254   *Current implementation*

255   Some funders have already recognized the relevance of a broad range of research activities. The

256   Research Impact Assessment Platform (Researchfish) works to capture some of this diversity and can

257   generate reports on the impact of a broad spectrum of funded research (60). The Wellcome Success

258   Framework highlights the importance of a long-term vision and shared objectives in order to take a

259   more balanced approach to assessment (61). The German Federal Ministry of Science and Education is

260   funding preclinical confirmatory trials (62).

261

262   The Wellcome Trust has developed a new Longitudinal Population Studies Strategy, funded data re-use

263   prizes (63) and supports research on research (64). All approaches are aimed at valuing a broad range of

264   scholarship and maximizing the value of research. The Netherlands Organization for Scientific Research

265   is in its third call for replication studies (65). Research on research and meta-research are also gaining

266   momentum and now have some formal outlets. For example, PLOS Biology and eLIFE have a meta-

267   research section in their journals (66,67). We were unable to find any academic institution that has

268   incorporated replication or meta-research into their career assessment portfolio (20). NIHR requires the

269   completion of a systematic review prior to funding any new research (68). The NC3Rs have also

270   promoted the importance of systematic reviews for providing a rationale for project proposals (69,70).

271   In the event that such a review does not exist, they provide funding to perform one.

272

273   **Principle 5: Value a range of other contributions to responsible research and scholarly activity, such as**

274   **peer review for grants and publications, mentoring, outreach, and knowledge exchange.**

275

276   *Rationale*

277   As discussed alongside Principle 1, research assessments frequently focus on a narrow range of easy to

278   measure metrics including publications, citations and funding income (1,20). For the research ecosystem

279   to function optimally, other research activities are also essential. Peer review remains the cornerstone

280   of quality assessment of grants, publications and conferences. The quality of peer review contributions

281   to journals and funders, should also be part of assessments for promotion and tenure as should

282   contributions to various research infrastructure, oversight, or regulations. Equally, contributions to

283   improvements that go beyond an individual-centered approach for assessment should be considered.

284   These activities are currently largely missing from PTCs (20). Contributions to developing the careers of

285   others at all stages of their career is critical as are contributions various committees related to research

286   (e.g., assuming the role of an editor). How best to do this without creating further barriers and

287   bureaucracy, however, has long been debated (71).

288

289   Any reward system that has the whole research enterprise at heart and aims to foster a climate

290   conducive to trustworthy and useful research with the highest regard to integrity, needs to find ways to

291   incorporate these vital roles into its overall assessment structure.

292

293   *Current implementation*

294   Macquarie University, Sydney, Australia, has some exciting initiatives in their new academic promotion

295   policy which includes five pillars one of which is in leadership and citizenship. Here researchers can show

296   their alignment with the university's values and broader contribution to the university, and its

297   community (72). As a result of this implementation, the number of promotion applications increased by

298   50% and the number of women promoted has also increased.

299

300   The University of Glasgow's academic promotion criteria explicitly rewards researchers for participation

301   in peer review and other related activities (e.g., journal editorship) (73,74). In order for this to occur, it is

302   necessary to have organizations that can provide reviewers with a permanent identifier (a Digital Object

303   Identifier (DOI)) for journals that publish Open Reviews (75) that can be included in a researcher's CV or

304   which can aggregate completed peer reviews (76). Such policies might also help promote more

305   meaningful involvement in training in peer review (76). The University of Exeter, UK, has developed

306   'Exeter Academic', a hub to help their researchers navigate career progression (77). Leadership and

307   citizenship are two (of five) major areas of focus. The former includes mentoring and the latter includes

308   avenues to disseminate research knowledge from the university's researchers.

309

310   The Finnish Advisory Board on Research Integrity (TENK) template for researcher CVs includes a broad

311   spectrum of contributions including mentoring and 'trust in society' (78). As a measure of mentorship,

312   Maastricht University, The Netherlands assesses the career progression of its PhD graduates (79). We

313   were unable to identify research institutions that reward researchers who have participated in training

314   courses on high-quality mentorship (20).

315

316   The Irish Health Research Board (HRB) has a knowledge exchange and dissemination grant program

317   providing existing HRB-funded researchers with an opportunity to seek supplementary funding for

318   exchange and dissemination activities that can accelerate and maximize the potential translation and

319   impact of the research findings, and learning gained, on policy or practice and health outcomes (80). A

320   similar scheme exists through the Canadian Institutes of Health Research (81) and the NC3Rs Skills and

321   Knowledge Transfer grants (82) and their Crack IT open innovation platform (83).

322

323   Wellcome's grant forms limit the number of publications applicants can submit and explicitly invite

324   applicants to detail other achievements. This is combined with explicit guidance for panel members

325   reminding them of the importance of taking a broad view when assessing individuals (84).

326

327   **Discussion**

328   The HKPs focus on promoting assessment practices that strengthen research integrity by deliberately

329   concentrating primarily on what research institutions can do to modify the criteria used by PTCs for

330   career assessments. The five principles we formulated are aimed at how research institutions should

331   incentivize, reward and assess individual researchers within their respective organization. The HKPs do

332   not address gender and other forms of diversity, inclusiveness, and other related issues. These themes

333   require an assessment of a group of researchers (e.g., research institution) when making decisions about

334   funding allocations or human resources policies. Individual researchers are obviously not in a position to

335   change their gender, equity or diversity. Furthermore, these issues concern the social justice and

336   societal relevance of research rather than research integrity.

337

338   *Dissemination*

339   The World Conferences on Research Integrity (WCRI) Foundation (85) and the REduce research Waste

340   And Review Diligence (REWARD) Alliance (86) will make the HKPs available on their websites. This

341   'home' will include the principles, the signatories, infographics, translations into several languages

342   (ongoing), future implementation plans (ongoing), and crucially, a place to highlight those who have

343   endorsed the HKPs. Beyond journal publication, we are developing other synergistic dissemination

344   routes.

345

346   *Endorsement and Uptake*

347   Research institutions are key to the HKPs. They are the home of current and future researchers, where

348   promotion and tenure assessments are carried out. To help facilitate HKPs 'on the ground', local key

349   opinion leaders, and their endorsement, should be included in any plan. The HKPs have been recognized

350   by the Governing Board of the WCRI Foundation and the Steering Committee of the REWARD Alliance.

351   We invite academic institutions, funders, other groups and individuals to do likewise on the WCRI

352   Foundation's [website](#).

353

354   We are inviting individuals and organizations to deliver brief (2-3 minutes) YouTube testimonials as to

355   how they have implemented the HKPs (categorized by stakeholder group) and we will provide a link to

356   these videos on the WCRI Foundation website. This approach can serve as a pragmatic way for

357   individuals and organizations to show how they are endorsing and using the HKPs and as a nudge to

358   others to do likewise.

359

360   To implement some of these principles is likely straightforward although this might not be the case for

361   all principles. To do so requires more understanding of the complexities of today's research

362   environment, such as the availability of institutional infrastructure, whether current CV formats are

363   optimal to collect best practices, enabling transparency about career assessment, and considering closer

364   alignment with policies of funders.

365

366   We would like to evaluate our approach and develop tool kits for those interested in ways to implement

367   the five principles. We will work with signatories to take this forward. We see the HKPs as an important

368   step along the way to improving research integrity and we encourage an ongoing dialogue to support

369   implementation of these important principles.

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509

510   Figure[1]: Robust, rigorous and transparent practice and impact

511

Research stage	Potential measures of rigorous research practice	Importance to research quality
Question	Knowledge synthesis Priority-setting exercise; stakeholder(s) engagement;	Useful and relevant research that builds on previous research
Design	Open protocols; (Pre)registration Reuse of protocol by others	Reduces publication bias and other reporting biases; Enhances reproducibility
Conduct	Quality assurance of data; Data sharing; sharing materials Reuse of data/materials by others	Allows data aggregation, data reuse, and transparency
Analysis	Analytical code sharing	Enhances reproducibility
Report	Transparency; open access; Use of reporting guidelines	Enhances openness and accessibility
Dissemination	Impact on research (including altmetrics; citations) Impact on practice/society	Focuses on outcomes & impact of research

512
513   [1]Items in black are measures of responsible research practice; items in red are measures of use by
514   others