



Peer Community In Network Science

How to age happily in a healthy network

Gabriel Ramos-Fernández based on reviews by 2 anonymous reviewers

A recommendation of:

Social capital: an independent dimension of healthy ageing

Cédric Sueur, Martin Quque, Alexandre Naud, Audrey Bergouignan, François Criscuolo (2021) HAL, hal-03299528, ver. 3 peer-reviewed and recommended by Peer Community in Network Science <https://hal.archives-ouvertes.fr/hal-03299528>

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Recommendation

What is the relationship between social capital and healthy ageing? This is the simple yet ambitious question that Sueur et al. (2021) tackle in their review. The relationship between social capital (understood as the resources an individual has access to by virtue of belonging to a social group) and health has been the subject of discussion at least since the work of Émile Durkheim (1897) who emphasized the social roots of individual health problems, such as stress and its extreme form, reflected in suicidal tendencies. The discipline of medical sociology studies the social determinants of health, partly by focusing on those components of the social capital of individuals that directly influence their health (Cockerham 2017).

Using a comparative approach and focusing more on senescence than chronological ageing, Sueur et al. (2021) provide ample evidence that social capital has a positive relationship with fitness in many animal species, while stressing the plastic nature of senescence and therefore, pointing at the possibility that one way of improving health over an individual's life span could be to improve its social capital. This dynamic view of the relationship between social capital and health, as a determinant of healthy ageing as a process, is one of the main conceptual contributions of this work. Another important contribution is the multi-level framework used by the authors in their review. Taking into account the cellular, endocrine, behavioral, individual and social network levels into the same conceptual scheme is a welcome attempt in view of the traditional reductionistic approaches taken in biomedicine. Another strength of the paper is the use of clearly explained boxes to tackle complicated and long-debated terms like social capital or display a full glossary with all the important terms introduced in the paper.

The authors point at the potential mechanisms by which social capital could affect senescence. Here, it is worth pointing out the contemporary context in which one mechanism identified by the authors, takes place in human communities. Since the work of Seyle (1970) it is well known that stress hormones produce a kind of premature ageing process due to a continued stress response. Clearly, socially determined stressful

conditions such as racism in modern society, can lead to the activation of coping mechanisms that may be related to premature ageing (e.g. Geronimus et al. 2006).

A word of caution is particularly relevant: social capital can also have negative effects on health, the most obvious in the context of a pandemic like COVID-19's being a higher risk of contagion from social exposure. It remains to be seen whether the way in which the human population has adapted as individuals and societies to this risk has necessarily implied a sharp, and probably costly, decrease in social capital.

Overall, this paper should be a good introduction to the intricate relationships between healthy ageing and social capital, hopefully inspiring further research using both animals and humans to understand the social component of ageing.

References

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Reviews

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Evaluation round #1

18 Jul 2021

DOI or URL of the preprint: <https://hal.archives-ouvertes.fr/hal-03299528>

Version of the preprint: 1

Author's Reply

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Decision by [Gabriel Ramos-Fernández](#)

Two reviewers have written a positive opinion of your preprint. Reviewer [1] is asking for several clarifications which I think could increase the readability of the manuscript, as well as suggesting some restructuring which you might want to consider. Both reviewers point at the possible negative or deleterious effect of social capital on aging, which you might want to address and cite some evidence with respect to these effects. In my own reading, I have the following comments:

Line 18 and throughout the manuscript: what do you mean by individuals “adjusting” their social capital? Is there an implication of some kind of optimality? How can the optimal social capital at each life stage be determined, by organisms and by researchers? This point, mentioned in the abstract, is not followed up thoroughly in the body of the paper, and one is left wondering if there is really a strategy to adjust social capital throughout an individual’s lifetime, and if so, how can it be determined to be the “optimal” strategy.

In general, I am left wondering how to measure social capital. You acknowledge that its defined broadly and depending on the discipline, and provide a very nice table summarizing the concept. But perhaps it would be useful if, at least for a certain taxonomic category (primates and other social mammals?), you could suggest a few quantitative metrics of social capital at the individual and group levels. This would certainly promote research and rethinking of the many ways in which social relationships are related to senescence and healthy aging. For example, you could review the existing literature on how the structure of social networks (and quantitative metrics of this structure) determine information flow and thus the social resources related to information (about resources, mates, environmental variables, etc.).

Figure 2: What the graph shows is the change in social capital with respect to chronological age. If biological age is not an axis, how can it be represented in a two-dimensional graph?

Table S1 is a bit saturated—it could use a synthesis, grouping similar components of social capital into broader categories. Also, each component should have a reference.

Reviewed by anonymous reviewer, 15 Jun 2021

The preprint of a review entitled “Social capital: an independent dimension of healthy ageing” focuses on very interesting connection between healthy aging and social relationships. The review is clearly written and although sometimes very information dense I really enjoyed reading it.

The authors define and describe all the variables and phenomena and illustrate the complex relationships between health, aging and social relationships on a range of studies focused on wide range of species.

The review represents very interesting introduction to the topic for a reader not completely familiar with the topic but also provides deeper insights for an informed reader. The boxes and figures are useful and provide additional relevant information.

While reading the paper several questions pop in my head, e.g. like “Are there any costs to social relationships? What kind of measures can be applied to social capital?” Most of them answered or at least mentioned by the authors in subsequent text. Remained unanswered questions are related to more details of the relationship between aging and social capital, e.g., “Do we see differences related to sex of the individuals? or How would individual variation in personality play into the mentioned relationships?”. It is clear, that given the space constrains not everything can be mentioned and the text actually benefits from authors’ ability to stay focused on the main topic. The authors also mention some of the connections that are less known as the relationship with microbiome.

Some of the many phenomena related to the relationship between health, aging, mortality and social relationships mentioned by authors comes from studies that experimentally housed some individuals solitary (e.g. *Drosophila*). This is rather drastic and rare condition in natural populations of social animals. Although the authors also cite studies with more natural settings it is obvious that more research is needed to demonstrate similar effects under natural variation of social relationships.

I can only applaud the authors for gathering such diverse literature in terms of topics and studied species and compile it to such a clear, well-structured and readable review.

I should probably add some weak points too but I could not identify any. I think it is really well written and inspiring paper.

Reviewed by anonymous reviewer, 03 Jul 2021

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